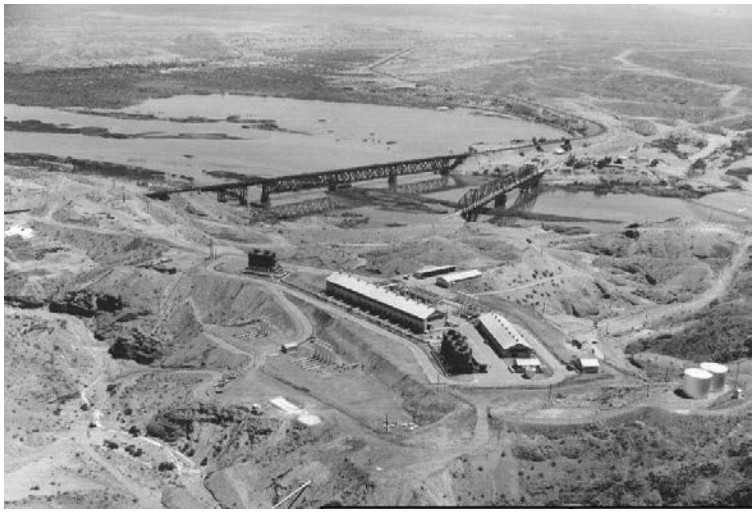
Appendix A
Construction Quality Assurance Project Plan

Construction Quality Assurance Project Plan for PG&E Topock Compressor Station

Needles, California



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Prepared for

Pacific Gas & Electric Company
155 Grand Avenue, Suite 800
Oakland, California 94612

Submitted by

PARSONS

2121 N. California Blvd., Ste. 500
Walnut Creek, CA 94596

APPROVALS

Prepared by _____ Date: September 4, 2014
Corinne Shia, Project Manager

Prepared by _____ Date: September 4, 2014
Ben Liptak, Quality Manager

Prepared by _____ Date: September 4, 2014
Wayne Kiso, Environmental Specialist

Reviewed by _____ Date: September 4, 2014
Keith Aleckson, Quality Manager

Approved by _____ Date: September 4, 2014
Susan Ferris, Program Manager

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CERTIFICATION

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ACRONYMS

A/E	Architect/Engineer
ACI	American Concrete Institute
ANSI	American National Standards Institute
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ARS	Arizona Revised Statutes
ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
ASQ	American Society for Quality
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BLM	U.S. Bureau of Land Management
BMP	Best Management Practice
BOD	Basis of Design
BOR	U.S. Bureau of Reclamation
CACA	Corrective Action Consent Agreement (1996)
CD	Consent Decree
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHPMP	Cultural and Historic Properties Management Plan
CIMP	Cultural Impact Mitigation Program
CMQ/OE	Certified Manager of Quality / Organizational Excellence
CQA	Certified Quality Auditor
CQAPP	Construction Quality Assurance Project Plan
CQCP	Contractor Quality Control Plan
CQE	Certified Quality Engineer
C/RAWP	Construction/Remedial Action Work Plan
CRIT	Colorado River Indian Tribes
CWG	Consultative Working Group
DFOW	Definable Feature of Work
DOI	U.S. Department of Interior
DOT	U.S. Department of Transportation
DTSC	California Department of Toxic Substances Control
EIR	Environmental Impact Report
HNWR	Havasu National Wildlife Refuge
HWCA	Hazardous Waste Control Act

IRZ	In-situ Reactive Zone (IRZ)
ISO	International Organization for Standardization
ITP	Inspection and Testing Plan
LDR	land disposal restriction
NCR	nonconformance report
NDE	nondestructive evaluation
NDT	nondestructive testing
NQA-1	Nuclear Quality Assurance Level 1
NTH	National Trails Highway
O&M	operations and maintenance
PA	Programmatic Agreement
PBA	Programmatic Biological Assessment
PG&E	Pacific Gas and Electric Company
PMO	Program Management Office
PO	purchase order
QA	Quality Assurance
QC	Quality Control
QSR	Quality Surveillance Report
RCA	root cause analysis
RCRA	Resource Conservation and Recovery Act
RFI	Request for Information
RFO	Request for Offers
RFP	Request for Proposal
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
USC	United States Code
USFWS	U.S. Fish and Wildlife Service

DEFINITION OF TERMS

The following definitions apply to this CQAPP:

Area of Potential Effects (APE): The area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any are present. The APE for the Topock site is contained within what the Fort Mojave and other Native American Tribes have identified as a larger area of traditional and cultural importance.

- **Audit:** A documented activity performed in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence and performance-based activities, that applicable elements of the quality assurance program have been developed, documented, and effectively implemented in accordance with specified requirements.
- **Auditor:** Any individual who performs any portion of an audit, including lead auditors, technical specialists, and others such as management representatives and auditors-in-training.
- **Corrective Action:** Actions taken to correct an identified nonconformance or deficiency and to prevent future recurrence.
- **Corrective Action Report:** The document in which the condition is identified and corrective action and verification of completion are documented.
- **Deficiency:** Failure to develop, document, or effectively implement any applicable element of the Quality Assurance Program.
- **Design Change Request:** A document that is prepared when the scope of work is changed. Sources of change include the following:
  - **Internal**: Changes that do not result in a contract modification and therefore can be handled internally by PG&E. These may include design changes to improve functionality, reduce costs, or for use of standard materials; schedule changes for staff workload balancing, task sequencing, and work processes; increased level of effort due to unexpected additions to the level of work when executing a task; or quality deviations communication and handoffs among PG&E and subcontractor organizations.
  - **External:** These may include requests for information or changes in resources; contractor-initiated changes relating to construction technique, value engineering, presumed error or scope addition; PG&E-initiated changes such as scope addition, criteria change, construction technique, and value engineering; schedule changes; externally driven design changes to improve functionality, reduce costs, or for use of standard materials; missed scope; regulatory changes such as code revisions, regulatory changes, permit conditions that can impact the project; field or construction changes as a result of a field issue, such as changed or unforeseen conditions, scheduling, local code change, scope additions, or PG&E direction may result in a design change; and stakeholders' programmatic and/or technical requests.

- **Document Control:** Establishes the controls and defines the process for ensuring that documents are identified, prepared, reviewed, approved, revised, and made available for use. Document control, and any associated document management system, focuses primarily on gathering, organizing, and managing official project documents and records. After the records are turned over for document control, they are "controlled," meaning that they are in final form and are ready to be distributed.
- **Engineer of Record:** Engineer of Record is a registered professional who takes responsibility for the design and associated drawings and documents. The Engineer of Record may act in a supervisory or oversight role, taking responsibility for the validity of work performed by other (nonregistered) members of the design team after suitable review and validation.
- **Federal Agencies:** In the context of the groundwater remedy, this refers to the U.S. Department of Interior, Bureau of Land Management, U.S. Fish and Wildlife Service (USFWS), and Bureau of Reclamation.
- **Groundwater EIR Project Area:** The area within which remedial activities will be occurring that have the potential, directly or ultimately, to result in physical changes to the environment. The Groundwater EIR Project Area was delineated during the development of the Programmatic Environmental Impact Report.
- **Hold Point:** See Witness Point.
- **Inspection:** Examination, by visual check or by measurement using monitoring devices, of executed work to ensure compliance with specified requirements.
- **Inspector:** Personnel performing inspection activities with the necessary expertise in the area to be inspected.
- **Internal Audits:** Audits of those portions of the organization's quality assurance program retained under its direct control and within its organizational structure.
- **Nonconforming Product:** Nonconforming product includes the following:
  - Defective, damaged, or wrongly supplied material or equipment
  - Incorrectly stored equipment or material (stored in a way that might affect its quality)
  - Work activities executed incorporating material or installed equipment that has not been approved
  - Work activities found not to be in accordance with design requirements and /or not addressed within a reasonable time after inspection
  - Work activities found not to be in accordance with design requirements and that, if continued, will lead to a major defect requiring extensive remedial work
  - Damaged or incorrectly constructed or installed items

- Work activities implemented based on drawings, method statements, and specifications that have not been checked and approved

- **Observation:** A statement of fact regarding the potential for a noncompliance that could lead to a more serious problem if not identified and/or corrected, but that does not constitute a lack of compliance with established requirements.
- **Official Record:** The complete and accurate evidence of a business action or business transaction. Records include documents, papers, reports, photographs, electronic transmissions, emails, databases, videos, CD-ROMs, machine-readable materials, and any other documentary materials, regardless of physical form or characteristics, that are created, received, or maintained in connection with business activities and serve as evidence of the company's functions, policies, decisions, procedures, obligations, and / or operations. Records may be originals or reproduced copies.
- **Oversight:** Overall process for monitoring and evaluating compliance and construction activities to regulations, industry standards, and management expectations and report on status / progress. This includes the organizational freedom to identify problems, recommend and provide solutions, and verify implementation of the solution. Oversight provides independent evaluation to assess compliance to regulations, commitments, procedures, and management expectations; evaluate the performance of organizations and programs against industry standards; and assess the effectiveness of procedures and programs.
- **Owner's Representative:** An Owner's Representative is either an employee of the company or a designated official representative of the owner (e.g., architect, engineer, or contractor) to oversee a project.
- **Preventive Action:** Action taken to eliminate the cause of a potential nonconformance or deficiency.
- **Quality Assurance (QA):** Established elements and programs that provide the background to give adequate confidence that all quality requirements from the construction contract are satisfied. Many of these elements and programs are included as part of the project delivery process. The construction contractor is responsible for the construction work; the QA Officer assures quality of construction.
- **Quality Assurance Audit Finding:** A documented statement of fact concerning a noncompliance or deviation from established requirements.
- **Quality Control (QC):** A process implemented at the discipline and project level that includes those checks and reviews deemed most appropriate for a specific discipline and project. Its purpose is to subject each deliverable to rigorous scrutiny at the initial, intermediate, and final stages of development. This is the responsibility of the person(s) actually performing the work.

- **Quality Plan:** A document specifying which procedures and associated resources to be applied by the responsible individuals at a specified time for the project.
- **Record:** A document stating results achieved or providing evidence of activities performed.
- **Request for Information (RFI):** A document generated by the contractor any time a question or inconsistency arises with regard to the contract documents and requires any input from the Design Engineer.
- **Root Cause:** The cause of an event which, if adequately addressed, will prevent a recurrence of that same event.
- **Site:** The geographic area subject to or necessary to implement the corrective action/remedial action consistent with the requirements of the CACA and CD, respectively. This area is generally depicted in Figure 1-1 of this CQAPP.
- **Stop Work Order:** The order issued to the Construction Manager to stop further processing, delivery, installation, or operation until the nonconformance, deficiency, or unsatisfactory condition has been identified and addressed.
- **Surveillance:** Monitoring or observing an item, activity, task, or process, to verify if it conforms to specified requirements. This process includes the terms monitoring, observations, walkdowns, and source verification.
- **Testing:** Verification that certain material or executed work satisfies specified requirements through the use of specific equipment or methods that monitor the physical characteristics and/or chemical properties of a material or executed item.
- **Witness Point:** A point at which authorized personnel may witness a certain test or measurement. Subsequent work may proceed without authorized personnel being present. A witness point is a routine activity that is offered to observe the fabrication/construction process and to ensure that effective quality control has taken place. At a witness point, QA may or may not comment on the test or measurement; QA may request additional activities or, if has been agreed in advance, QA could stop the activity if is not in accordance with the requisition requirements or to the satisfaction of the witness.

1 INTRODUCTION

This section provides a brief project description and information regarding the groundwater remedy and current project schedule; cultural, historic, and biological resources; and key stakeholders. It also defines the objective and scope of this Construction Quality Assurance Project Plan (CQAPP). This information provides the framework within which this CQAPP was developed.

1.1 Project Description

Pacific Gas and Electric Company (PG&E) is implementing a selected remedy for chromium contamination in groundwater at the PG&E Topock Compressor Station located in eastern San Bernardino County, California. The selected groundwater remedy addresses existing chromium contamination from past discharges of wastewater in the Former Percolation Bed (Solid Waste Management Unit [SWMU] 1]) and the area around the Former Percolation Bed within Bat Cave Wash (Area of Concern [AOC] 1) near the Compressor Station. The remedy also addresses groundwater within the East Ravine (AOC 10) and under the Compressor Station. Figure 1-1 presents the general remedy layout (CH2M HILL 2014).

Remedial activities at the 779.2-acre Topock site are being performed in conformance with the requirements of Resource Conservation and Recovery Act (RCRA) Corrective Action pursuant to a Corrective Action Consent Agreement (CACA) entered into by PG&E and the California Department of Toxic Substances Control (DTSC) in 1996 (DTSC 1996).

The 2005 Administrative Consent Agreement between PG&E and Federal Agencies (U.S. Department of Interior [DOI]), Bureau of Land Management [BLM], U.S. Fish and Wildlife Service (USFWS), and U.S. Bureau of Reclamation [BOR]), executed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), incorporated the CACA by reference and addressed requirements up to and including the Record of Decision executed on January 20, 2011.

Most recently, PG&E and the United States executed a Remedial Design/Remedial Action Consent Decree (CD), on behalf of DOI, under CERCLA in 2012, which was approved by the U.S. District Court for the Central District of California in November 2013 (DOI 2013). This CD, which involves PG&E and the Federal Agencies and will be effective upon court approval, involves related requirements from the remedial design to the completion of the remedial action.

The CACA and CD specify requirements for development of a Construction Quality Plan, the elements of which are included in this document:

- **1996 CACA:** The agreement indicates a requirement for the Owner/Operator to develop and implement a complete construction quality assurance (QA) program to ensure that the corrective measure will meet or exceed all design criteria, plans, and specifications.

- **2013 Remedial Design/Remedial Action CD:** This document states that PG&E must prepare a CQAPP as part of the pre-final/final design that will describe the QA approach during construction, i.e.:
  - Construction QA objectives, specific quality control (QC) requirements and performance standards to be followed during implementation of remedial actions
  - Identification of a QA official, independent of the construction contractor, to conduct a QA program during the construction phase of the project
  - Identification of responsibilities and authorities of all organizations and key personnel involved in the design and construction of the site remediation
  - Description of the construction QA personnel qualifications
  - Description of inspection activities, observations, and tests to be conducted, along with their schedules and scope

This CQAPP is required to be included in the Construction/Remedial Action Work Plan for the Final Groundwater Remedy, PG&E Topock Compressor Station, Needles, California (hereafter referred to as the Construction/Remedial Action Work Plan (C/RAWP).

1.1.1 Groundwater Remedy

The groundwater cleanup method selected by DTSC and DOI is known as *in situ treatment with fresh water flushing*. This in situ process starts by injecting a food-grade material (such as grain alcohol) into affected groundwater to stimulate the growth of naturally occurring bacteria within the soil. The growth cycle of the bacteria creates conditions that convert hexavalent chromium to trivalent chromium, a naturally abundant substance that is not harmful to humans, animals, or the environment. Once converted, trivalent chromium leaves the groundwater and becomes part of the surrounding soil. This cleanup technology is well proven and has been applied at numerous sites throughout the United States.

The groundwater remedy includes the following tasks:

- Construction of an In-situ Reactive Zone (IRZ) along National Trails Highway (NTH) using a line of wells that may be used as both injection and extraction wells to circulate groundwater and distribute an organic carbon source to promote bacteriological reduction of the Cr(VI) to Cr(III).
- Flushing via a combination of fresh water injection and injection of carbon-amended water in wells upgradient of the plume.
- Extraction wells near the Colorado River to provide hydraulic capture of the plume, accelerate cleanup of the floodplain, and enhance the flow of contaminated groundwater through the IRZ line.

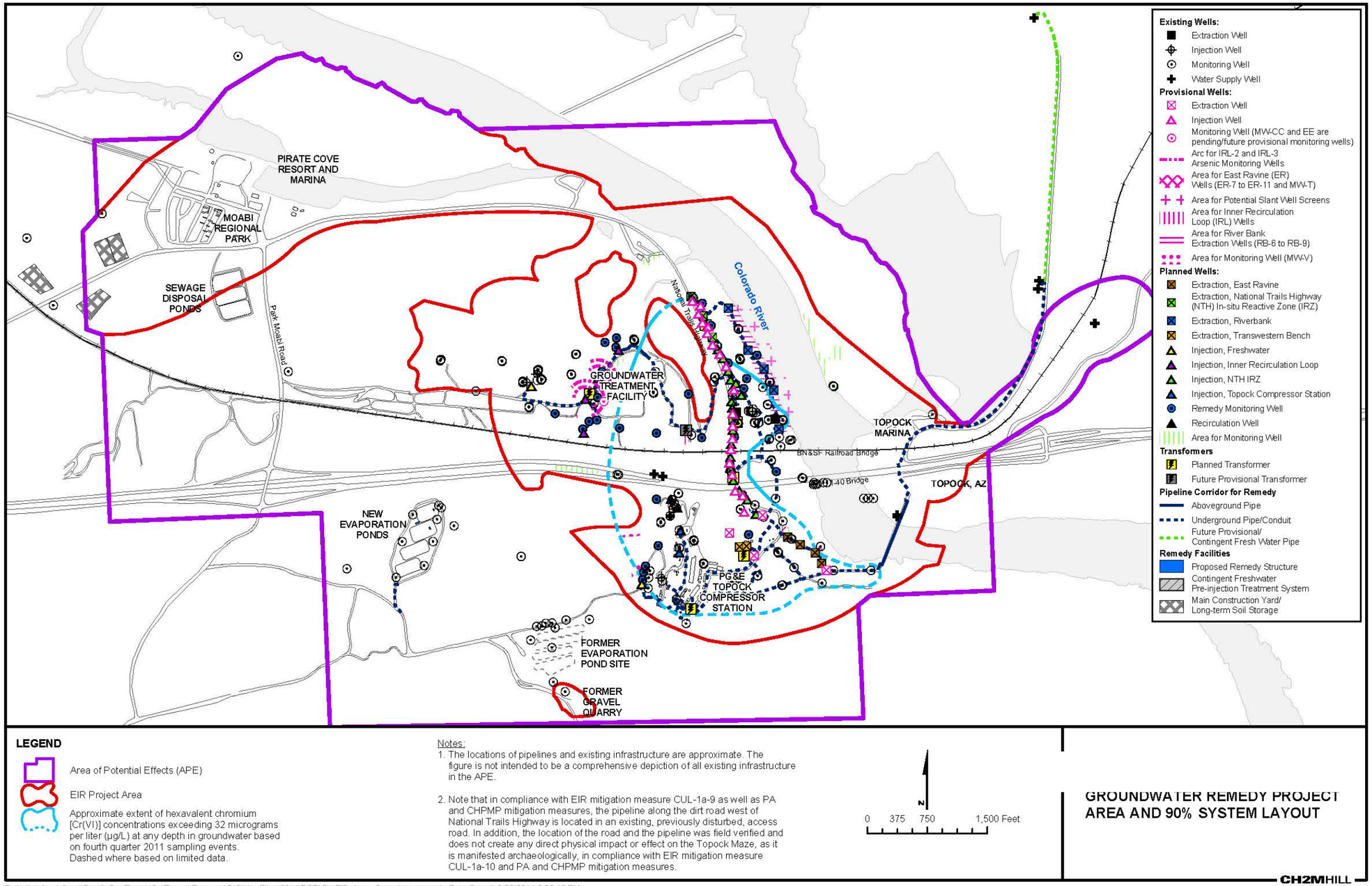

Figure 1-1: Groundwater Remedy Project Area and System Layout

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- Bedrock extraction wells in the eastern (downgradient) end of the East Ravine to provide hydraulic capture of contaminated groundwater in bedrock. Extracted water will be treated and managed using the same active treatment system that will be used to treat and manage contaminated groundwater extracted from the alluvial aquifer.
- Institutional controls to restrict surface land uses and prevent the use of groundwater.
- Monitored natural attenuation (MNA) as a long-term component to address residual chromium that may remain in recalcitrant portions of the aquifer after enhanced in-situ treatment and optimized system performance.

1.1.2 Cultural, Historic, and Biological Resources

The Topock site lies within a larger geographic area considered sacred by the Fort Mojave and other Native American tribes. Moreover, properties on and near the site are eligible for, or listed on, the National Register of Historic Places and include Native American cultural resources and elements of the historic built environment.

A large portion of the site and surrounding area is the Havasu National Wildlife Refuge (HNWR). The USFWS and BOR Comprehensive Management Plan calls for protection of endangered and threatened species and the marsh and wetland habitat, as well as habitat for migratory, wintering, and nongame avian species (CH2M HILL 2007). Portions of the Topock site also are located in a Riparian and Cultural Area of Critical Environmental Concern and the Topock-Needles Special Cultural Resource Management Area as defined in the BLM's Resource Management Plan (BLM 2012).

1.1.3 Public Participation and Key Stakeholders

Community outreach plans (DTSC 2007 and 2013 and DOI 2012)) provides the framework for informing and involving the stakeholder community in the Topock site cleanup process. These plans present the overall outreach strategy and describe the specific outreach activities that DTSC will implement through both formal and informal forums (e.g., public meetings, briefings, and site tours). Written documentation (e.g., reports, fact sheets, and public notices) and progress on cleanup is accessible through a variety of venues (e.g., information repositories, websites, site visits, and face-to-face meetings). These forums and mechanisms for communication as well as those described in the Communication Framework (see Section 2 of the Construction/Remedial Action Work Plan) will be used, as appropriate, to provide status updates concerning the CQAPP and related actions executed during construction.

The key stakeholders include the following:

- **Federal Government:** Federal agencies include the DOI, BLM, BOR, USFWS, HNWR, Bureau of Indian Affairs, and U.S. Geological Service. DTSC coordinates involvement of these federal agencies, which have regulatory authority in this affected area, through its Consultative Working Group (CWG).

- **State and Local Governments:** The State of California and local governments have resources that are affected or could be affected by former activities and the remedial project. Many of these agencies participate in the CWG. DTSC also works closely with its counterpart in Arizona, the Arizona Department of Environmental Quality, because it is affected by the groundwater system and draws on the Colorado River for water.
- **Tribal Governments:** A number of Native American Indian Tribes have lands that border the Colorado River. These tribes are federally recognized sovereign nations that are historically and spiritually rooted in the land and who are economically reliant on the Colorado River. Five tribes located along the river (from north to south): Fort Mojave Indian Tribe, Chemehuevi Indian Tribe, Colorado River Indian Tribes (CRIT), Fort Yuma-Quechan Indian Tribe, and the Cocopah Indian Tribe; together they form the Five Lower River Tribes Coalition. DTSC also communicates regarding the project with other interested tribes in southern California and Arizona, including the Hualapai Indian Tribe, Torres-Martinez Desert Cahuilla Indian Tribe, Havasupai Indian Tribe, Twenty-Nine Palms Indian Tribe, and the Yavapai-Prescott Indian Tribe. DTSC and the tribes are working together to ensure that the interests and concerns of the Tribe are identified and considered during the DTSC's planning, decision-making, and other project activities, including the planned construction of the final groundwater remedy.

1.2 Quality Program Overview

PG&E's approach to management of the quality of the groundwater remedy construction project includes a combination of QC performed by the contractor and QA performed by PG&E. This CQAPP details the systems and controls that PG&E has put in place to ensure that the quality of the project meets the requirements specified in the Construction/Remedial Action Work Plan, drawings, specifications, and contract documents. PG&E provides definition and overall management of the quality approach to be followed by its contractors and consultants. The quality of the Topock remediation construction will be ensured through an integrated system of QA performed by PG&E and QC provided by the contractors. The PG&E Quality Assurance Manager is responsible for the day-to-day coordination of QA and QC measures in the field.

This CQAPP is included as an appendix to the Construction/Remedial Action Work Plan and was developed in accordance with the 1996 CACA (Attachment 6, Section E.4) and 2013 Remedial Design/Remedial Action CD (DTSC Case 5:13-cv-00074-VAP-OP, Document 5-1, Section VI (13b) and VIII and Section 2.25 of Appendix C). The scope is limited to the construction activities outlined in the Construction/Remedial Action Work Plan. The CQAPP establishes the following:

- Project procedures and general responsibilities for the QA/QC program

- Protocols to ensure that the Topock groundwater remedy construction is executed in accordance with the relevant portions of the Construction/Remedial Action Work Plan and contract documents, which include drawings, specifications, and other defined requirements.

The contractors are responsible for constructing and controlling the quality of their work as specified in contract documentation (e.g., contract, drawings, specifications). The contractor's QC is the systematic implementation of a program of inspections, tests, and production controls to attain the required standards of quality and to preclude problems resulting from noncompliance. Each contractor will establish an independent QC program and write a Contractor Quality Control Plan (CQCP). The CQCP must provide for tests and inspections pursuant to various technical specifications. It will define procedures to ensure that activities affecting quality are documented and accomplished in accordance with contract documents, written instructions, and industry standards, codes, and procedures. Furthermore, the CQCP defines the methods for ensuring that all activities will meet specified requirements. The CQCP will be reviewed by the Topock Project Manager, Construction Manager, Site Manager, and Resident Engineer before being approved by the QA Manager.

Independently of the contractors, the QA Manager provides QA through periodic monitoring and scheduled inspections to verify the effectiveness of the contractor's QC program and ensure that the quality and contract requirements are met by the contractors[1]. The QA Manager ensures that the contractor's QC is working effectively and that the resultant construction complies with the quality requirements established by the contract.

Based on the CACA and CD requirements, the objectives of this CQAPP are to provide the following:

- Description of a complete and effective plan for ensuring that the groundwater remediation system is constructed to meet the specified standards (i.e., design criteria, plans, and specifications)
- Identification of construction QA objectives, specific QC requirements, and performance standards to be followed during implementation of remedial actions
- Description of a QA official (QA Manager), independent of the construction contractor, to oversee a QA program during construction phase of the project
- Description of the QA/QC responsibilities and authorities of organizations and key personnel involved in the design and construction of the site remediation
- Description of the QA position qualifications

[1] The groundwater remedy may include multiple contractors (and subcontractors) to support construction. This CQAPP uses the terms "contractor" and "construction contractor," both of which are interchangeable in the context of this quality document. Quality requirements and standards will apply to all contractors supporting the construction of this groundwater remedy.

- Description of inspection activities, observations, and tests to be conducted, along with their schedules and scope.

1.3 CQAPP Organization

To address the topics noted in Section 1.2, this CQAPP is organized as follows:

- **Section 1, Introduction:** This section includes a brief review of the project history, remedy and project schedule, areas of interest and concern, and key stakeholders. It also defines the objective and scope of this CQAPP.
- **Section 2, Construction Quality Organization:** This section presents the construction quality organization and the roles, responsibilities, qualifications, and authorities of key personnel.
- **Section 3, Plan for Quality:** The plan for quality addresses submittals, change control, document control, procurement and purchasing, testing and inspection plans, and stakeholder, regulatory, and mitigation measure requirements.
- **Section 4, Inspection and Verification:** This section presents the requirements for inspections during construction to address material handling, the four-phase inspection process, and measuring and testing equipment and audits.
- **Section 5, Deficiencies and Corrective Action:** This section presents the procedures for identifying, controlling, and resolving deficiencies and nonconformances, as well as the process for managing corrective and preventive actions.
- **Section 6, Continuous Improvement:** This section addresses continuous improvement, which includes a spectrum of strategies such as conduct of trend analyses, root cause analyses, and lessons learned.
- **Section 7, References:** This section presents the bibliographic references to key documents cited in this CQAPP.
- Appendices:
  - **Appendix A, Construction Quality Control Requirements:** This appendix outlines potential requirements for the construction contractor.
  - **Appendix B, Sample QA and QC Forms:** These forms are included as examples of what forms might be used during construction.

2 PROJECT QUALITY ORGANIZATION

This section presents the responsibilities and authorities of organizations and key personnel involved in the construction, the structure of the quality organization, the minimum training and experience of the quality personnel, and the training to be provided to these personnel.

2.1 Responsibilities and Authorities of Key Organizations

The organizations involved in the construction phase of the groundwater remedy and their QA/QC roles and responsibilities are summarized in the following sections.

2.1.1 California Department of Toxic Substances Control

DTSC is the lead state agency overseeing Corrective Action for the groundwater remedy in accordance with the CACA. DTSC will be reviewing and approving the Construction/Remedial Action Work Plan as well as this CQAPP and will oversee, review, and verify the remedy is constructed in accordance with the final design, performance standards (e.g., applicable or relevant and appropriate requirements [ARARs] and California Environmental Quality Act [CEQA] mitigation measures), and related QA/QC requirements.

2.1.2 Federal Agencies

The DOI, BOR, and BLM are the federal agencies overseeing response actions for land under their jurisdiction, custody, or control near the groundwater remedy in accordance with the 2005 Administrative Consent Agreement. The 2005 Administrative Consent Agreement was executed among PG&E and these federal agencies and addresses CERCLA actions through Record of Decision. The 2013 Remedial Design/Remedial Action Consent Decree addresses related requirements and actions by PG&E and DOI during the remedial design and remedial action. These federal agencies will review and approve the Construction/Remedial Action Work Plan as well as this CQAPP and will oversee, review, and verify the remedy is constructed in accordance with the final design, performance standards (including ARARS) and related QA/QC requirements.

2.1.3 Pacific Gas and General Electric Company (PG&E) and PG&E Chromium Program Management Office (PMO)

PG&E is responsible for design, implementation, and closeout of the remedial action in accordance with the 1996 CACA and 2013 Remedial Design/Remedial Action CD, and for ensuring that its contractors and subcontractors perform the remedial action construction in accordance with these requirements. This CQAPP details the systems PG&E has established to achieve its quality objectives. The PG&E Program Management Office (PMO) has been established by PG&E to implement PG&E's chromium remediation program, including construction of the Topock groundwater remedy. Although the specific contracting approach for this project has not been developed, either PG&E or the PMO will serve as the owner of remedy construction project, and "Owner" refers to either PG&E or the PMO in this document.

The owner is responsible for verifying that the construction contractor it has retained effectively implements and manages the systems detailed in the final design. PG&E is also responsible for formal communications with and submittals to DTSC, DOI, Tribes, and other stakeholders, as required.

The key personnel overseeing this remedial action construction include the Chromium Remediation Director, PMO, Topock Project Manager, Topock Construction Manager, QA Manager, Site Manager, and Resident Engineer. Each of these individuals has specific QA and/or QC roles, responsibilities, and authorities that are further delineated in Section 2.2. PG&E, through the Chromium Remediation Director, is assuming responsibility as the Owner.

As noted above, PG&E retains ultimate accountability for project success. If PG&E designates the PMO or another entity to represent its interests for certain areas of this remedy, this document will be updated to document related responsibilities, as appropriate.

2.1.4 Engineer of Record

The Engineer of Record is an independent, duly qualified, licensed design professional firm retained directly by PG&E to provide design and engineering services in connection with the remedial project. This definition includes all subcontractors to the Engineer of Record. In support of the QA process, several organizations are designated as the Engineer of Record depending on their role in the groundwater remedy. These organizations include CH2M HILL, AECOM, Alisto, and Arcadis. The firms' roles are summarized below:

- **AECOM** is designing the below-ground remedy infrastructure inside the Compressor Station.
- **Arcadis** is designing infrastructure specifically related to the in situ groundwater remediation system.
- **CH2M HILL** is designing infrastructure related to the freshwater supply system, remedy produced water system, electrical medium voltage distribution system, fiber optic network, and supervisory control and data acquisition system.
- **Alisto** is designing improvements to existing wastewater evaporation ponds.

2.1.5 Construction Contractor

The contractor is retained by the Owner to provide the labor, materials, and equipment required for remedy construction in accordance with the contract requirements. The construction contractor and its subcontractors are responsible for the QC of constructed work products as well as the necessary inspections and tests required to ensure that the work complies with the contract documents. These contractors exercise oversight and authority over their workforce, including QC personnel and related QC support services, and are independent of PG&E's construction and quality organization.

The contractor and its subcontractors are required to submit an organization chart in the CQCP to show all QC personnel and how these personnel integrate with other management, production and construction functions and personnel. All QC staff members are subject to acceptance by PG&E. The requirements for the QC organization include a QC Manager and a sufficient number of additional qualified personnel to ensure contract compliance. The contractor must provide a QC organization that is represented on the site at all times during progress of the work and with authority to ensure compliance with the contract.

2.2 Construction and Quality Organizational Structure

The quality functions of the project organizations are functionally integrated although contractually separate. Figure 2-1 shows the functional structure of the project quality team. Section 2.4 (Table 2-1) provides details on the required qualifications for PG&E and contractor personnel.

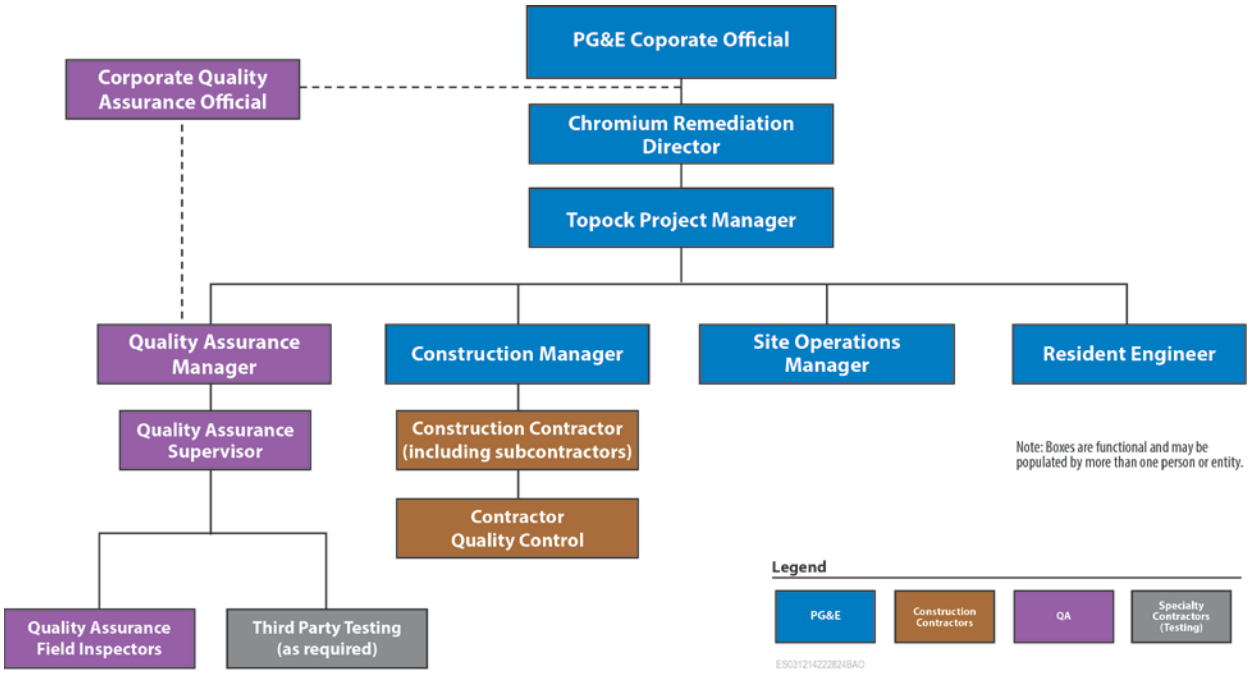

Figure 2-1: Topock Remedial Action Project Organization

2.3 Responsibilities and Authorities of Key Personnel

Key personnel involved in the construction of the groundwater remedy and their QA/QC roles and responsibilities are described in Sections 2.3.1 and 2.3.2.

The current PG&E organizational structure and related assignments represents the current concept for groundwater remedy construction. PG&E retains the right to reorganize and/or assign other parties to certain roles to ensure project success. Given that personnel assignments are subject to change during construction, the Topock Project Manager will maintain a staffing list of CQAPP personnel assignments, including each person's role and responsibilities.

2.3.1 Owner's Personnel

This section outlines the key roles and responsibilities of PG&E's personnel on the remedy construction with an emphasis on QA.

2.3.1.1 Chromium Remediation Director

The Chromium Remediation Director has leadership responsibilities for the entire remedial action, including this construction phase. As a lead corporate official, this individual manages the team in planning, executing business programs and works with PG&E's corporate contracts, finance, legal, and public relations personnel to ensure program success. The Chromium Remediation Director has the following responsibilities:

- Approve program management standards and methodologies to achieve program goals.
- Perform business contract negotiations with the stakeholders, as needed.
- Ensure that program deliverables meet quality standards and project requirements.

2.3.1.2 Topock Project Manager

The Topock Project Manager develops the Construction/Remedial Action Work Plan with the team and manages the team's performance on project tasks. The Topock Project Manager secures acceptance and approval of deliverables from the stakeholders. He/she is responsible for communication, including status reporting, risk management, and escalation of issues that cannot be resolved within the team. The Topock Project Manager also serves as review and approval authority if the construction project potentially affects long-term regulatory compliance of the remedy or acceptance by external stakeholders, and in general, serves as the primary point of contact between the Topock groundwater remedy construction project and other facets of the Topock project.

The Topock Project Manager has oversight over PG&E-assigned personnel not associated with the construction project, namely the Site Manager and Field Activities Supervisor and their supporting staff. The Topock Project Manager has the following responsibilities:

- Review/approve the technical and schedule components of the remedy construction as they relate to broader project issues.
- Lead coordination efforts with external stakeholders.
- Ensure implementation of rigorous risk identification and mitigation process on an ongoing basis and convey information effectively to internal management.
- Monitor and support continuous improvement of the remedy construction.

2.3.1.3 Construction Manager

The Construction Manager (or designee)[2] is the primary point of contact for the Owner on all construction activities and management issues. The Construction Manager is responsible for the overall management of activities related to the construction program, including the implementation of the C/RAWP, elements of this CQAPP, and the health and safety program. The Construction Manager holds project meetings, updates the construction schedule, supports inspection and testing services in collaboration with the QA Manager, and exercises approval authority over contractor submittals. The Construction Manager has the following responsibilities:

- Manage, monitor, and report on the compliance of the construction of the remedy in accordance with the final design and related regulatory and CD requirements.
- Identify and manage technical, financial, safety, and schedule risks.
- Work with the Topock Project Manager to secure the acceptance and approval of deliverables from the stakeholders.
- Review and approve nonconformances, and review and process claims.
- Update the construction schedule.
- Host meetings with the team, stakeholders, and PG&E management, as required.
- Assist the QA Manager in reviewing all construction QC documentation to ensure conformance with the contract, regulatory, and other requirements.
- Review and approve construction QC conformance testing results for adherence with contract and other legal documents.
- Approve construction QC inspection and test plans.
- Schedule and oversee construction QC inspections during the performance of work.

The Construction Manager coordinates with the assigned QA Manager to confirm that all QA and QC aspects of this program are completed and that any nonconformances, either by PG&E or contractor personnel, are mitigated or corrected promptly.

[2] The Construction Manager may designate a representative of the team to take actions or make a decision. Throughout this document where the Construction Manager is mentioned, the designee may be responsible as directed.

2.3.1.4 Site Operations Manager

The Site Operations Manager is the primary point of contact for field activities related to the construction project. The Site Operations Manager holds daily meetings, coordinates site operations, and provides review for contractor submittals in coordination with the Construction Manager. The Site Operations Manager has the following responsibilities:

- Work with the Topock Project Manager to coordinate with external stakeholders.
- Serve as primary on-site point of contact for external stakeholders.
- Identify and manage technical, safety, and schedule risks.
- Review provide input to nonconformances and process claims.
- Host daily, weekly, and monthly meetings with the team, stakeholders, and PG&E management, as required.
- Participate in and coordinate QC inspections during the performance of work.

2.3.1.5 Resident Engineer

Under the direction of the Construction Manager, the Resident Engineer supports and oversees the construction activities for the groundwater remedy and works with the QA Manager on QA/QC activities in accordance with the Construction/Remedial Action Work Plan and this CQAPP. The Resident Engineer has the following responsibilities:

- Coordinate activities with the Engineers of Record, Lead Well Designers, and construction contractors.
- Updates schedules.
- Coordinate and lead the review of project submittals and RFIs.
- Hold meetings on plans and related actions.
- Support documentation and verification of constructed work.
- Support documentation of contractor deficiencies.
- Provide input on lessons learned.

2.3.1.6 QA Manager

The QA Manager's overall responsibility is to monitor and verify the implementation of this CQAPP. This individual is delegated the authority to identify and record quality problems via surveillance or a full audit. The QA Manager also performs periodic audits of the adequacy and implementation of the quality program based on articulated design and performance standards as documented in the Final Remedial Design and Construction/Remedial Action Work Plan.

In addition to his QA role on this process, the QA Manager manages his team to verify all QC actions, including the four-phase inspection and testing process; implementation of controls for

equipment and materials delivered to the site and their proper storage and identification prior to their incorporation into project construction activities; verification that the products or fabricated items manufactured or constructed off-site by PG&E contractors, subcontractors, or suppliers comply with contract requirements; oversight of third-party testing services; verification (together with the Construction Manager) that the contractors/subcontractors submit related QC plans and implement these plans fully; and preparation and filing of QC documentation (e.g., logs, reports, and checklists).

The QA Manager has the following responsibilities:

- Implement this CQAPP during the construction phase of the groundwater remedy.
- Verify and oversee contractor work products, QC testing, and services in collaboration with the Construction Manager.
- Interface with the project personnel and contractors regarding the quality system and QA activities.
- Plan, schedule, and perform project performance reviews as needed (e.g., audits and surveillances) to confirm acceptability of work.
- Confirm compliance with quality performance criteria and performance improvement processes.
- Provide reports to project and senior management on the project's quality performance.
- Provide ongoing training on QA procedures to the team.
- Develop skills, assess performance, and drive continuous improvement.
- Initiate corrective actions to address internal audit findings.
- Ensure that QC activities are documented (i.e., field log book, daily QC reports, and photographs).

This QA Program is based on the concept that work performance is a process that can be planned, performed, assessed, and improved. The QA Manager is responsible for these ongoing activities. Because all work is accomplished using the resources of people, equipment, and procedures, the QA Manager is responsible for fostering an attitude of support and for encouraging personnel to complete their work in a quality manner. PG&E onsite personnel are encouraged to identify noncompliant work or areas for improvement. The QA Manager is responsible for identifying PG&E's needs and expectations (both internal and external). Meeting these needs and expectations is a measure of quality and success. Achieving quality is the responsibility of those who perform the work.

2.3.1.7 QA Supervisor

The QA Supervisor reports to the QA Manager and oversees the QA Field Technicians' work. This individual supports the planning, scheduling, and review of related work products (e.g.,

audits and surveillances) on behalf of the QA Manager. He/she also will ensure follow through on corrective actions and verify that all QA documentation is prepared and archived.

2.3.1.8 QA Field Inspectors

The Field Inspectors report to the QA Supervisor and support the Construction Manager by conducting surveillances and audits. These individuals will monitor the activities of the contractors, ensuring that contractors comply with the plans and specifications, applicable building codes, good workmanship, and the QC requirements of the contract. As part of this construction process, Field Inspectors have the following responsibilities:

- Verify that quality requirements are in compliance with products and services provided.
- Assist in QA audits of internal and external organizations. Internal to PG&E, audits will be performed to ensure that personnel are conforming to the CQAPP and related documentation and requirements. External organizations, such as the construction contractors, will be subject to audits to verify conformance to quality documentation such as the CQCP.
- Identify and report quality issues or trends in the assigned area or product based on data from a variety of sources.
- Recommend and/or verify implementation of appropriate corrective action for quality issues in coordination with program management, engineering, purchasing, construction management, and others.
- Review documentation related to product quality in the assigned area, such as quality manuals and procedures, technical deliverables, test procedures and operation sheets, purchase orders, and subcontracts.
- Provide support to management as directed for quality activities relating to internal or external organizations (customers, suppliers, subcontractors, and others).
- Perform other functions associated with this position as appropriate and directed by management.

The QA Field Inspectors must be alert to detecting, recording, and reporting any deviation from the contract documents. These individuals must keep accurate and detailed records of the contractor's performance and progress, delivery of materials, and other pertinent matters, including the inspection report.

2.3.1.9 Third-Party Testing Personnel

The purpose of third-party observation and documentation is to provide detailed written and photographic records of installation and placement of materials used during the construction process. An accurate and reliable observation inventory record contributes to the overall quality and success of this remedial action construction. This documentation can be particularly helpful when underground or hidden elements of construction come into question, especially when

verification testing or observation would require costly and destructive demolition and replacement work.

PG&E will specify what aspect or aspects of the construction process (e.g., wells and building envelopes) will require third-party testing services. These services will be planned and executed under the direction of the QA Manager, who will ensure that the company(ies) providing third-party testing have neither participated nor been involved in the design or in any procurement, purchasing, construction, or installation actions.

2.3.2 Construction Contractor's Quality Control Personnel

This section describes the contractor's QC personnel roles and responsibilities. Note that the contractor's QC organization is independent of the contractor's construction/production organization.

2.3.2.1 QC Manager

The QC Manager should be a full-time employee or subcontractor of the Contractor and has responsibility for construction QC. This individual will have full authority to institute any and all actions necessary for the successful implementation of the QC program to ensure compliance with the contract plans and technical specifications. The QC Manager reports directly to a responsible officer of the Construction Contractor.

2.3.2.2 QC Inspectors

The Contractor QC Inspectors perform the following functions:

- Inspect materials, construction, plant, and equipment for conformance with then technical specifications.
- Perform QC tests as required by the technical specifications.

Contractor QC Inspectors will be engineers, engineering technicians, or experienced craftsmen with qualifications in the appropriate field and as specified in Section 2.4 of this CQAPP.

2.4 QA/QC Personnel Requirements

Table 2-1 specifies the typical qualifications for the PG&E and construction contractor personnel involved in QA and/or QA activities during the remedial action construction phase.

Table 2-1: Typical Qualifications for QA/QC Personnel on the Topock Groundwater Remedy Construction

Position	Typical Qualifications
PG&E Personnel	
Quality Assurance Manager	• 4-year degree in Engineering (or related field) and/or 5 years of related work experience in QA. • Preferred (not required): Lead Auditor certification (ISO 9001 or equal), or ASQ Certification (Construction Manager CMQ/OE, CQA, or CQE), or other related certifications may include Building Inspector, NQA-1 (nuclear auditor), NDT (ASNT), Welding Inspector (AWS), DOT. • Knowledge of industry quality systems and standards, e.g., ISO 9000, ASME, ANSI, ASTM. • Proficiency in the use of computers and software packages related to field. • Ability to communicate clearly and interface effectively with a diverse group of professionals.
QA Field Inspectors	• 4-year degree in Engineering and/or related field (or equivalent experience) and 2–4 years of related work experience in the field of quality assurance. • 5 years of related experience on a similar engineering/construction project • Knowledge of industry quality systems and standards, such as ISO 9001, ASME, ANSI, and ASTM. • Knowledge of quality assurance/quality control work practices and processes • Preferred (not required): ASQ Certification (Construction Manager CMQ/OE, CQA, or CQE). • Proficiency in the use of computers and software packages related to field. • Ability to communicate clearly and interface effectively with a diverse group of professionals.
Construction Contractor	
QC Manager	• High school / trade school or additional education plus 10 years of related experience or high school plus 7 years QC related experience with 2 years as QC Inspector and previous supervisory experience. • Preferred (not required): Associates degree or 4-year degree (BA/BS) • Proficiency in use of computers and software packages related to field. • Ability to communicate clearly and interface effectively with a diverse group of professionals.
QC Inspectors	• High school / trade school plus 4 years of construction-related experience or 1 year as QC Inspector. • Preferred (not required): Associate's degree plus 1 year of construction-related experience or bachelor's degree (any discipline; engineering, physical science, mathematics, or QA). • Ability to communicate clearly and interface effectively with a diverse group of professionals.

ANSI	American National Standards Institute	CQA	Certified Quality Auditor
ASME	American Society of Mechanical Engineers	CQE	Certified Quality Engineer
ASNT	American Society for Nondestructive Testing	DOT	Department of Transportation
ASQ	American Society for Quality	ISO	International Organization for Standardization
ASTM	American Society for Testing and Materials	NDT	nondestructive testing
AWS	American Welding Society	NQA-1	Nuclear Quality Assurance Level 1
CMQ/OE	Certified Manager of Quality/Organizational Excellence		

2.5 Competence, Awareness, and Training

PG&E recognizes the need to maintain a high-quality, well-trained, and competent construction management and inspection team. PG&E personnel will receive ongoing training to maintain and improve their technical skills and level of competence to perform the work in their assigned roles. PG&E managers and staff are required to regularly review and assess training needs to maintain efficiency in existing job functions and to provide additional skills, knowledge, or competence required to adequately adapt to changes in technology, methods, or job functions.

Prior to the start of a project, the Chromium Remediation Director and the Topock Project Manager will assess the project-specific staffing needs and implement training, as necessary. The typical qualifications for construction and QA/QC positions on this project are described in Section 2.4 (Table 2-1) of this CQAPP.

Project team members will be selected based on their qualifications, including education, licenses, certifications, training, experience, and capabilities to perform the specific tasks needed. Specific training will be provided to all personnel prior to starting a new job assignment within the project. Project staff are required to become familiar with and knowledgeable about the project specifications, drawings, addenda, Requests for Information (and subsequent responses), design clarifications, shop drawings, submittals, and contract change orders to ensure that the groundwater remedy is constructed in accordance with the latest project documents. Records of qualifications, training, indoctrination, briefings, and project-specific training are documented and maintained.

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3 PLAN FOR QUALITY

This section describes the plan for QA and addresses QA/QC personnel requirements, submittals, change control, document control plans, procurement and purchasing, testing and inspection, and regulatory and mitigation measures to be applied during construction. Appendix A contains a summary of the minimum QC requirements for the construction contractor, which is to be used as a reference to fulfill project requirements.

3.1 Introduction

This QA Program is based on the concept that work performance is a process that can be planned, performed, assessed, and improved. The QA Manager implements and maintains this CQAPP throughout the course of the project. PG&E Management ensures that the processes outlined in this plan are implemented in order to meet project requirements, and that the integrity of the quality management system is maintained when changes to the CQAPP are planned and implemented. Changes in the project scope or organization structure are monitored and discussed among all team members. Needed CQAPP changes are planned and controlled to ensure that the integrity of the CQAPP is maintained. All responsible and relevant members of the team and support personnel, including all relevant contractors, subcontractors, and subconsultants will be informed of the changes in details to ensure conformance to the CQAPP.

3.2 Submittals

The Construction Manager administers and controls the processing of supplier/contractor submittals, as specified in the contract. After the submittal documents are reviewed for completeness, they are transmitted to the relevant project staff for review and verification for compliance with contract requirements. The submittal's disposition is noted on the submittal, which is signed, dated and returned to the contractor. If required, the contractor revises the submittal by incorporating the comments and resubmits the document for review and verification for compliance. The contractor must have a procedure for review and approval of submittals prior to submission. Submittals are maintained as project files.

3.2.1 Submittal Schedule

The contractor must submit and maintain a submittal schedule. The Construction Manager coordinates the review with the Resident Engineer and approves the submittal schedule. The schedule is initially submitted shortly after contract award and then periodically along with schedule updates. The Construction Manager works with the contractor to prioritize the sequence of submittals so that the most critical submittals are received and processed first. The submittal schedule becomes the baseline against which receipt of all required submittals is compared.

3.2.2 Submittal Process

Submittals are managed as follows:

1. Contractors number and certify the completeness of all submittals before submitting them to the Construction Manager.
2. Contractors must also complete submittal transmittal forms and submit paper copies, if specified, and one electronic copy of all required submittals to the Construction Manager's document manager (the submittal transmittal form must always accompany each submittal package to and from the contractor, the Construction Manager, and the Engineer of Record).
3. Upon receiving the submittal, the Construction Manager logs the submittal and provides a review to ascertain whether the package is complete. If the submittal is incomplete, it is returned to the contractor.
4. The original submittal transmittal and all copied attachments are logged into the document tracking system. The Construction Manager then forwards the submittal to the appropriate reviewers.
5. If the Construction Manager provides a submittal to the Engineer of Record for review, the firm will review it for general conformance with contract design documents, coordinate concurrent discipline reviews within the design team, coordinate concurrent reviews by owner and other entities, and consolidate responses into a single coordinated action.
6. After reviewing the submittal, the Engineer of Record (or other designated reviewer) makes the appropriate notations and action taken on the submitted documents and returns the submittal to the Construction Manager.
7. The Construction Manager returns a minimum of one copy of the submittal to the contractor with an original stamp of the action required.
8. The six actions that may be taken for each submittal are as follows:
    a. Approved: Submittal meets the contract requirements. No additional copies are required of the contractor.
    b. Approved As Noted: Submittal meets contract requirements with minor corrections noted. Resubmittal is not required. Contractor must incorporate the required corrections into the work in the field. No additional copies are required of the contractor.
    c. Revise and Resubmit: Submittal has some areas that do not meet requirements. These areas are revised to meet requirements, and the entire submittal must be resubmitted for review and approval. No work may begin in the field until the revised submittal has been approved.

d. Rejected: Submittal is inadequate and does not meet contract requirements. The complete submittal must be revised and resubmitted for approval. No work may begin in the field until the revised submittal has been approved.

e. For Information Only: Submitted for information only. No response action is required.

f. Received, No Action Taken: Receipt of submittal is noted; no further action is required.

9. When a submittal is to be revised and resubmitted, the contractor revises the submittal and indicates this revision by incrementing the revision number. The contractor's submittal process is then repeated.

The Construction Manager is responsible for tracking the submittal package during the entire review process and advising all concerned of any schedule impacts to ensure that the review process takes place within the required timeframe. The Construction Manager retains copies of all submittal documents and revisions and ensures that an accurate file is available for ready retrieval during the life of the project. The Construction Manager maintains all submittal files. These submittals are filed in numeric sequence. Each submittal file must contain a complete submittal copy of the submittal before and after the review process.

3.3 Change Control

Design changes may be either internal or external. Internal changes may or may not result in a contract modification and are managed by PG&E. External changes represent a wide spectrum of changes (e.g., requests for information or changes in resources; contractor-initiated changes relating to construction technique; missed scope; regulatory changes such as code revisions; and field or construction changes as a result of a field issue).

If an agency such as DTSC or DOI requests a change, a formal request will be submitted to the Chromium Remediation Director or Topock Project Manager. This request will be reviewed by the Topock Project Manager, Construction Manager, Site Manager, Resident Engineer, QA Manager, and affected Engineer of Record. Upon review, a formal response will be provided to the requesting agency and all stakeholders and related documents, drawings, or contracts will be updated and included in the record files.

All changes or potential changes to the drawings, specifications, and contract documents must be identified and documented, whether they originated internally or were requested externally from the government, stakeholders, or other outside influencers. Changes are reviewed; verified and validated, as appropriate; and approved by the Resident Engineer (or designee) prior to implementation. The review of design changes includes an evaluation of the effect of the changes on interfacing disciplines and products/services already delivered. Records of the results of the review of changes and any necessary actions are maintained as project records.

3.3.1 Contractor/Subcontractor Oversight

The construction contractor (or subcontractor) cannot make unauthorized changes or operate outside of its contract specifications. If the construction contractor has a question (or an inconsistency is identified) regarding the scope of work, this information will be documented in a Request for Information (RFI) and forwarded to the Construction Manager for review. The RFI must be reviewed by a relevant subject matter expert who must approve, deny, or recommend another course of action. Appendix B includes a template form that may be used to support RFI documentation.

At a minimum, the RFI form must contain the following information:

- Identification of the originating organization
- Classification: Information, Clarification, Discrepancy, Other
- Description
- Contract or specification reference
- Proposed solution
- Cost impact (if any)
- Results of review/disposition

- Signature of review and approval authority

If QA staff members discover that the contractor is making unauthorized changes or is operating outside its contract, they should inform the contractor and recommend that the firms obtain proper authorization or request a change before proceeding. If the contractor is unresponsive, the QA staff must document the situation with their recommendations and forward it to the Construction Manager. QA Field Inspectors or field engineers may submit written recommendations when they determine that a change to the construction contract drawing and/or specifications is necessary to complete the work or to conform to contract requirements. All written recommendations must be forwarded to the Construction Manager. No changes can be made unless they are authorized in writing by the Topock Construction Manager (or designee).

3.4 Document Control

Document control is the process of ensuring that documents are reviewed for adequacy, approved for release by authorized personnel, and distributed to and used at the location where the prescribed activity is performed. It is also a means to ensure that personnel are using the most recent release of procedures, instructions, and plans in performing work functions. Document control applies to documentation distributed both internally and externally via hard copy or electronically, and it is essential to ensure consistent and technically defensible documents.

- A ***Document*** provides guidance and/or direction for performing work, making decisions, or rendering judgments that affect the quality of the products or services that customers receive. A *document* should be construed to mean any physical guide or direction, whether it be written, video tape, physical sample, sample drawing, computer program, or other medium.
- A ***Record*** proves that some type of required quality system action took place. Sometimes documents become records. For instance, Management Review Minutes become the record that a Management Review has taken place.

A document says "DO."
A record says "DONE."

Documents identified as part of the groundwater remedy construction will be controlled. Procedures will be established to define the controls needed for the following tasks:

- Approve documents for adequacy prior to issue.
- Review, update (as necessary), and reapprove documents.
- Ensure that changes and the current revision status of documents are identified.
- Ensure that relevant versions of applicable documents are available at points of use.
- Ensure that documents remain legible and readily identifiable.

- Ensure that documents of external origin determined by the project to be necessary for the planning and operation of the project are identified and their distribution controlled.
- Prevent the unintended use of obsolete documents and appropriately identify such documents if they are retained for any purpose.

3.4.1 Construction Contractor Documentation

The construction subcontractor's QC documentation must cover all aspects of QC program activities, and it includes both Daily Inspection Reports and Daily Test Reports.

3.4.1.1 Daily Record Keeping

Project documents are managed through a combination of a secure document filing and storage system and a computerized document tracking system. Sufficient records must be prepared and maintained as work is performed in order to furnish documentary evidence of the quality of construction and laboratory analysis and of activities affecting quality. Each QC Inspector must maintain a daily log of all inspections performed for both contractor and subcontractor operations on a form acceptable to the Site Manager and Construction Manager. The Daily Inspection and Daily Test reports must be signed by the responsible QC Inspector and the QC Manager. The Site Manager must be provided at least one copy of each daily inspection and test report on the work day following the day of record.

3.4.1.2 Daily Construction Report

A daily construction report is prepared by the QC Inspectors, reviewed by the QA Supervisor, and approved by the QA Manager. The report will include a summary of the contractor's daily construction activities. Supporting inspection data sheets are attached to the daily report, when needed. Example forms are provided in Appendix B. At a minimum, the daily construction report includes the following information:

- Date, project name, location, and other identification
- Description of weather conditions, including temperature, cloud cover, and precipitation
- Reports on any meetings held and the results
- Record of visitors to site
- Locations of construction underway during that day
- Equipment and personnel working in each activity, including subcontractors
- Descriptions of work being inspected
- Decisions made regarding approval of units of material or of work, and corrective actions to be taken
- Description of problems or delays and resolution
- Communications with contractor staff

- Construction activities completed and/or in progress
- Progress photos, where applicable
- Inspection and testing results (see Section 3.4.1.3)
- Signature of the report preparer

The daily construction reports are routed on a daily basis to the project QC/QA files and are maintained as part of the permanent project record. These reports are distributed to the appropriate parties within the team.

3.4.1.3 Inspection and Testing Forms

Report forms are completed for inspections and tests conducted. The forms vary by inspection or test type. Representative forms for several types of inspection and testing reports are included in Appendix B and include the following information:

- Description or title of the inspection activity
- Location of the inspection activity or location from which the sample was obtained
- Recorded observation or test data
- Results of the inspection activity
- Personnel involved in the inspection activity
- Signature of the inspector

3.4.1.4 Record Drawings

The original design drawings are marked up by the contractor as the project progresses to indicate as-built conditions. These are referred to as red-line drawings. If there is a change to a specified material, dimension, location, or other feature, the as-built drawing indicates the work performed. The contractor is responsible for ensuring that red-line record drawings are maintained daily throughout the construction process.

Upon the completion of the as-built red-line drawings, the contractor submits the red-line markup drawings to the Resident Engineer and Site Manager for review. The Resident Engineer and Site Manager provide markups to the Engineers of Record, who incorporate those markups and issues the final as-built drawings to the Construction Manager. The Resident Engineer may, at his/her discretion, assume responsibility for revising markups and issuing the final as-built drawings.

3.4.2 Control of Quality Records

Quality records are maintained to demonstrate conformance to specified requirements and the effective operation of the quality system. Pertinent quality records from contractor and suppliers are an element of this data. Quality records must be legible and must be stored and retained for easy retrieval in a suitable environment to prevent damage, loss, or deterioration. The QA

Manager establishes and maintains documented procedures for identification, collection, indexing, access, filing, storage, maintenance, and disposition of quality records. Retention times for quality records must be established and recorded. Quality records will be made available for evaluation by the relevant stakeholders. Records may be in the form of any type of media (e.g., hard copy or electronic). The records to be maintained must be listed. The maintenance of QA records must be a continuous process. Finally, the records management process must ensure compliance with contractual and statutory requirements.

Examples of records for this project include the following:

- Daily construction QA logs and records
- Inspection checklists and reports
- Surveillance reports
- Nonconformance reports (NCRs)
- Material receiving reports
- Monitoring and test data

Records that verify the conformance to applicable requirements are kept until completion of the project unless otherwise determined by the construction contract. All records are maintained (stored) in a manner to preclude deterioration. All records must be readily available for review by the relevant stakeholders. All PG&E records are held in confidence and no third party may access customer information without the PG&E's written authorization. Pertinent quality records are retained to comply with governmental, contractual, or construction requirements, whichever is longer.

3.5 Construction Procurement and Purchasing Requirements

The Owner monitors and verifies, as necessary, that the contractor-purchased services or supplies conform to contract requirements. The type and extent of control applied to the supplier and the purchased products/services depends on the effect of the products/ services on subsequent product realization of the final product/service.

The Owner evaluates and selects contractors based on their ability to supply products and/or services in accordance with the organization's requirements. Criteria for selection, evaluation, and reevaluation are established and will be implemented for this groundwater remedy. Records of the results of evaluations and any necessary actions arising from the evaluations will be documented and archived.

Contractors will apply their organizational protocols for obtaining products and services, as appropriate. PG&E may elect to review and assess these procedures to ensure conformance to contract requirements.

3.5.1 Purchasing Information

Subcontract information must describe the scope of work or products and or services to be purchased, including the following information, where appropriate:

- Requirements for approval of product, procedures, processes, and equipment
- Requirements for qualification of personnel
- Quality requirements

The Owner or its designee will ensure the adequacy of the specified scope of work or purchase requirements prior to its communication with the supplier. Each subcontract or PO must be reviewed for compliance with the project requirements (including the CQAPP requirements).

3.5.2 Verification of Purchased Product

The Owner's QA program establishes and implements the inspection or other activities necessary for ensuring that supplier or subcontractor products and services meet contract requirements. Where the Owner's QA staff intends to perform verification at the supplier's premises, the organization must state the intended verification arrangements and method of product release in the purchasing information. The verification process is described below.

3.5.3 Review of Supplier / Subcontractor Submittals

The Construction Manager administers and controls the review of supplier/documents. The documents are transmitted to the cognizant project staff for review and verification for compliance with the approved process, technical, inspection, and test requirements, as appropriate. The subcontractor/supplier is advised of the results of the review, including, when necessary, any actions necessary to obtain approval.

3.5.4 Supplier/Subcontractor Surveillance Process

When required, QA personnel must develop, review, and approve source inspection plans to monitor supplier/subcontractor activities. When applicable, the plans must be included in the designated purchase requisitions. The program is based on the contract, contractor's proposal, and documents submitted by the supplier/subcontractor. It is keyed to the major milestones or critical stages in the design, construction, or manufacturing sequence. The source inspection plan establishes the requirements for review of the supplier/subcontractor processes, procedures, and witness hold points for inspections and tests verifying product conformance, as-built information, packing, and authorization for shipment.

When specified by the source inspection plan, the inspector must verify, at the supplier / subcontractor's location, that the item or process complies with the specified requirements. Personnel performing the inspections are responsible for documenting the inspection and for reporting the results to the QA Manager, Construction Manager, and others, as applicable. If any deficiencies are found during the inspection process, the supplier's management is advised to

provide corrective action to correct the deficiencies. The inspector is responsible for reporting the status of the open noncompliance.

3.5.5 Acceptance of Supplier/Subcontractor Items or Services

The supplier/subcontractor must furnish documentary evidence that the item or service conforms to the procurement/subcontract requirement. The Owner, or its designee, will identify the method to accept the item, system, software, or service at the time of receipt or final inspection. In addition, the receipt or final inspection performed and documented by the project staff must confirm the configuration identification, dimensional, physical, and other characteristics, including freedom from shipping/ construction damage and cleanliness. The method of acceptance is based on the certificate of conformance or objective evidence of compliance, source verification (inspection, surveillance, or audit), or post-installation testing.

4 INSPECTION AND VERIFICATION ACTIVITIES

This section addresses the contractor quality control, verification, and acceptance testing plans and testing for implementing each technical specification applicable to the contractor's contract requirements. The plans cover the type, test standard, frequency, control requirements, and assigned responsibility for inspections and tests. The Construction Manager and QA Manager review and approve these plans as part of the CQCP submittals.

Ongoing QA monitoring and oversight of contractor QC inspections and testing is performed by the Site Manager, Construction Manager and/or QA Manager. In this manner, the inspections and tests required to measure compliance with the relevant portions of the groundwater remedy are established and carried out.

4.1 General Construction Inspection and Verification Requirements

Contractors must perform the inspections and tests as prescribed in the technical specifications for the PG&E Topock Groundwater Remedy. QA inspection and testing is used to verify the adequacy and effectiveness of the contractor QC program. The QA inspection and testing frequency will be at the discretion of the PG&E QA Manager based on results of QC tests, evaluation of daily reports, audits of the QC program, and verification testing conducted by the Owner's third-party testing firm. If information becomes available that indicates a potential problem, the QA Manager will review in detail all pertinent information and order additional verification testing, if necessary.

The construction inspections are keyed to the schedule for tracking and performed by the construction staff when the construction reaches the inspection points. PG&E's QA Manager will work with the construction contractor to ensure that all required inspections and tests are witnessed by PG&E / QA Field Technicians or other assigned personnel.

4.1.1 Inspection and Testing Plan

An inspection and testing plan (ITP) is tied to the construction schedule, following the order of the specification technical sections, indicating what inspections and tests will be performed, the names of persons responsible for the inspection and testing of each segment of work, and the time schedule and frequency for each inspection and test.

The ITP consists of a list of definable features of work (DFOW) with required inspections, tests, acceptance criteria, required documentation, and other controls to provide objective evidence of conformance for each item to stated specifications. A DFOW is a task that is separate and distinct from other tasks and has distinct control and requirements. The DFOW will be agreed upon with the Construction Manager prior to start of work. A sample list of DFOW is shown in Table 4-1. This is not intended to be a complete list; the requirements for each project can vary. This list is provided for illustration only.

Table 4-1: Examples of Definable Features of Work

	DFOW
1	Earthwork (grading, excavation, compaction, backfill)
2	Subgrade Concrete (footings, foundations)
3	Structural (slab on grade, fabricated steel, tank erection, welding)
4	Architectural (wall construction and finishes, paintings and coatings, roof coverings)
5	Plumbing (domestic piping, drain-waste-vent, natural gas supply piping)
6	Electrical (conduit cable trays, distribution systems, protection systems)
7	Mechanical and Piping (equipment installation, pumps, valves, compressors, piping assemblies, heating equipment, cooling equipment, ductwork)
8	Controls and Instrumentation (installation and commissioning)

The ITP is prepared by the construction contractor and submitted to the Construction Manager and QA Manager for approval prior to the start of work. At a minimum, the ITP must contain the following information:

- Qualification (e.g., certification level) of test personnel.
- Acceptance criteria with reference to relevant construction specifications.
- Reference to the inspection or test procedure used.
- Frequency of inspection or test, e.g., all equipment installation inspection per the contract requirements, witnessing all field testing, and inspection of all systems (architectural/civil/ structural, mechanical, electrical).
- Verification of material traceability. For example, verify that all installed equipment and material are labeled and identified per the contract plans and specifications.
- Format to be used for reporting the results, e.g., daily report, process checklist, or inspection reports.
- Mandatory hold and/or witness points.

The contractor should review the PG&E QA Project Plan (CH2M HILL 2012), environmental requirements, and cultural requirements for additional items that may have to be included in the ITP, as shown in Table 4-2. Related requirements will be documented in the contractor's documents and specifications.

Table 4-2: Example of Inspection and Testing Plan

Item	DFOW	Inspection/ Test Type	Acceptance Criteria	Spec. Ref.	Frequency	Report Form	Code/ Standard	Hold / Witness Point
1	Excavate for foundation	Backfill Materials	1½" sieve, 80–100 passing a 1" sieve and 0–5% passing in #8 sieve	02200-2.1.c	Per Foundation	Geotechnical Field Report	ASTM	No
2	Excavate for foundation	Earthwork	Moisture density 2%–4%	02200-1.4.c	Per Foundation	Geotechnical Field Report	ASTM	No
3	Excavate for foundation	Earthwork / Compaction	Pack @ 95% of proctor	02325-3.4.E	Per Foundation	Geotechnical Field Report	ASTM / ACI	No
4	Foundation concrete pour	Concrete / Rebar	Size & placement	03301-2.1	Per Foundation	4-Step Report	ASTM / ACI	Yes
5	Foundation concrete pour	Concrete	3,000 psi	03301-3.1B	Every Truck	Geotechnical Lab Report	ASTM / ACI	No
6	Foundation concrete pour	Concrete	Slump not to exceed 3"	03301-3.6E	Every Truck	Geotechnical Field Report	ASTM / ACI	No
7	Equipment installation	Visual Inspection	Certificate of conformance	13121.1.1	Per Each Delivery	4-Step Report	ASTM	Yes
8	Equipment installation	Visual Inspection	Shelter lifting and placement	13121.1.3	Per Installation	4-Step Report	ASTM	Yes
9	Electronic installation	Grounding & Bonding	Testing	16060-1a	Per Installation	4-Step Report	ASTM	Yes
10	Electronic installation	Wires and Cables	Installation	16120.6.b	Per Installation	4-Step Report	ASTM	Yes
11	Electronic installation	Wires and Cables	Testing	16120.8.0	Per Installation	4-Step Report	ASTM	Yes
12	Site Restoration	Grassing by Seeding	Placement	02920.3.1	Per Installation	4-Step Report	ASTM	Yes

ACI = American Concrete Institute
ASTM = American Society for Testing and Materials

4.1.2 QC Testing

As required by the contract specifications, the Contractor must establish a test program to ensure that all required testing is properly identified, planned, documented, and performed under controlled and suitable environmental conditions, including cleanliness. Testing must be performed in accordance with written test procedures in the CQCP. Such test procedures must incorporate or reference the requirements contained in the contract technical specifications, codes, and industry standards. Per the CQCP, the Contractor must submit the test procedures to the Construction Manager and QA Manager for review and acceptance prior to their implementation.

The contractor is responsible for establishing a system of daily test reports that will record all QC test results. Test results from each day's work period must be submitted to the QA Manager prior to the start of the next day's work period. When required by the technical specifications, the contractor will maintain statistical QC charts. The Contractor's responsible technician and the

QC Manager must sign the daily test reports. The QA Supervisor and QA Manager review the test results daily and identify any nonconforming test results for discussion with the Contractor regarding potential corrective action.

4.1.3 QA Testing

The QA Manager is responsible for the QA materials sampling and testing program. QA testing is provided for the verification of the adequacy and effectiveness of the contractor's QC testing. QA testing is performed by the QA Manager/QA Field Technicians and is independent of, and in addition to, QC testing performed by contractors.

QA testing may be performed on a pre-established schedule or as directed by the QA Manager. QA testing is performed by, or under the supervision of, the QA staff to validate the contractor's QC sampling and testing. Such testing may be performed by third-party testing services. The typical test frequency is one QA test for every 10 to 15 of the construction Contractor's QC tests. More frequent testing may be necessary during startup to verify that the process is under control and that it complies with the technical specifications of the construction contracts. In lieu of performing independent tests, the QA Manager may choose to witness QC testing or conduct tests on split samples from QC testing. When QA and QC test results do not compare or have wide variances, additional testing may be needed to validate the results. Additional tests to be performed by QA Field Technicians or the third-party testing services will be at the direction of the QA Manager. The need for QA testing is based on the following considerations:

- The item's criticality to the function of a system, its reliability, etc.
- Quality checks have to be performed for fabrication sequences not available for inspection at completion.
- Deficiencies are discovered.

QA testing must be performed in accordance with the following protocol:

- The QA Manager develops a weekly quality test and inspection schedule using the construction activity forecast as a guide. The schedule must:
  - Identify the QA test activities
  - Identify the hold points
- The weekly quality test schedule is distributed to the Site Manager, Construction Manager, and QA Supervisor.
- The Contractor is given a one-day advance notice of impending hold points. The QA Manager reviews QA tests and maintains files for all field QA documentation.

4.1.4 Material Handling Plan

Construction materials must be accepted by the QA Manager (or delegate) prior to incorporation into the project. Construction materials that are governed by specifications are subject to material

acceptance requirements established herein (Sections 4.1.4 to 4.1.8). Appendix B includes a sample form to support material receiving and inspection.

The process documented in the CQCP by which materials are accepted for use and incorporation into the project is based on the following criteria:

- Source of supply approval
- Material certification documentation provided by the material source that the delivered materials meet the contract specifications
- Offsite inspections and construction QC sampling and testing as per the CQCP
- Visual inspection of all materials, when required in the material frequency guide

After delivered materials are accepted by the QA Manager, or delegate, the materials may be used for construction and incorporated into the project.

A certificate of compliance signed by the QC Manager and verified/approved by the QA Manager (or designee) indicating that all materials incorporated in the project conform to the contract requirements is submitted with the monthly pay request. All open nonconformance and nonconformance reports are noted as exclusions on the certificate of compliance. A final certificate of compliance is submitted at the completion of the project.

4.1.5 Source of Supply Approval

The contractor/subcontractor will submit to the Resident Engineer the sources of supply and item material types that will be used in the work in accordance with contract requirements.

For materials not initially identified or changes to the initial source provided, the source of supply must be provided sufficiently in advance of use to allow time for review and approval. Copies of documentation for all sources of supply must be provided as soon as known, but must be provided to the PG&E Resident Engineer no less than 30 days (or another specified time frame) prior to delivery to the site.

Sources of construction materials include manufacturers, fabricators, and/or suppliers of the materials. The PG&E Resident Engineer/QA Manager will approve select sources of supply for materials incorporated into project construction based on the recommendation of the QA Manager or delegate. Source approval will be based on contract requirements (including specification) and PG&E's list of qualified manufacturers, producers, and fabricators. Source approval, if applied, will be documented. The source of the supply documentation is maintained by the QC Manager as a project quality record. In addition, all source of supply records are entered in the QA Manager's quality record database.

Other sources may be used, providing that materials meet specifications, as assured by inspection and QC measures performed at the manufacturer's fabrication site. Material substitutions must be submitted for review and approved prior to their use in the project.

4.1.6 Material Certification/Certificates of Conformance

Material certification is required to verify that delivered materials fulfill contract requirements. Material certification is documented from the source that the materials conform to contract specifications and the Resident Engineer or QA Manager's approved suppliers/vendors list. The material certification must be written on the source's letterhead and must be signed by an officer of the company. Material certification documentation must be maintained by the QC Manager as a project quality record and must be submitted no less than 24 hours prior to installation or use of the materials. Material certification documentation is maintained in the quality records database, which is assessable to personnel in the field office.

Substitution of specified materials cannot occur without prior approval by the Construction Manager/Resident Engineer, who will consult with the appropriate Engineer of Record. Furthermore, if approval is obtained, the source of supply must be submitted for approval and material certification is required. Failure to acquire prior substitution approval will result in the assignment of a nonconformance report.

4.1.7 Offsite Inspection, Sampling, and Testing for Material Acceptance

Offsite inspection and/or QC sampling and testing are required for the acceptance of some construction materials prior to delivery to the site. The requirements for offsite inspections, sampling, and testing are based on the materials frequency guide and will be detailed in the specifications. Additional offsite sampling and testing is performed as deemed necessary by the QA Manager. Inspection, sampling, and testing documentation for material acceptance are maintained by the QA Manager as project quality records.

4.1.8 Material Receiving Inspection

A visual material field inspection will be performed when materials arrive on the project site. The inspector performing the inspection will complete a materials field inspection report (see Appendix B), which is approved and signed by the QC Manager or his designee. The inspection verifies the quantity, dimensions, and condition of the material, and determines that it conforms to specified requirements. These reports are maintained by the construction QA Manager as a project quality record. Material shortages are noted on the materials field inspection report and are tracked by the contractor's QC manager until the remaining items are received and accepted.

4.1.9 Material Control

Materials that are found to be nonconforming through receipt inspection or that lack the required documentation must be marked with a red tag to identify the acceptance status as "on hold." The initials of the material receiving inspector and the inspection date must be incorporated into the

marking. The tag must be appropriate to withstand the anticipated weathering effects of the storage area.

Materials with red (on-hold) markings must not be incorporated into the work until the material acceptance issue(s) have been resolved and any applicable NCRs have been closed (Section 5.3 describes the NCR process). Only the PG&E Construction Manager or QA Manager can authorize the removal of the tag and release the material for use.

4.1.10 Compliance with Handling, Storage, Packaging, Preservation, and Delivery Requirements

Field inspectors inspect the construction contractor's activities to ensure technical compliance in identification, handling, storage, packaging, preservation, and delivery of materials, parts, assemblies, and end products. Related quality records and documents are maintained and controlled in accordance with the procedures provided in Section 3.5 of this CQAPP.

4.1.11 Material Identification and Traceability

QA Field Inspectors monitor the construction contractor to ensure that identification and traceability requirements are met. Products and materials must be traced from receipt through all project stages to installation. Documentation such as project control checklists, material receipts, material tracking forms, procedures, sample and test documentation, and reports ensure that the applicable material item traceability is maintained. Project specifications and/or procedures define product identification and traceability requirements, which generally include the following:

- Materials or equipment intended for use in construction are identified and segregated until inspection confirms that they conform to technical and quality requirements.
- Materials are traceable to documents attesting to their conformance with technical requirements that are stated in specifications or drawings. Testing of materials is also conducted as necessary to verify conformance with material specifications.

4.2 Four-Phase Inspections

The Contractor must establish a program for inspection of activities affecting quality and must cover all construction activities, including both onsite and offsite operations. Inspections must be performed to verify compliance with documented instructions, drawings, procedures, and specifications as required by the contract. All inspections must be documented by the Contractor as required by the project specifications.

A four-phase inspection must be completed for each DFOW. Appendix B includes a template that can be used to support documentation of this process. The four phases of inspection are described below.

4.2.1 Preparatory Inspection

The Contractor and/or Owner's QA designee performs preparatory inspections prior to beginning any work on any DFOW to verify that the necessary prerequisites are met and that the required resources are available and in place. This inspection is also used to establish the acceptable work process and procedures that will be followed for each DFOW. The preparatory inspection includes the following tasks:

- Review safety, environmental, and cultural requirements.
- Ensure that preparatory inspections include a review of contract requirements.
- Ensure that all materials and /or equipment have been tested, submitted, and approved.
- Ensure that provisions have been made to provide required testing.
- Examine the work area to ascertain that all preliminary work has been completed.
- Examine materials, equipment, and samples to ensure that they conform to approved shop drawings or submittal data, that all materials and/or equipment are on hand, and that all monitoring and measuring equipment is properly calibrated and in proper working condition.

4.2.2 Initial Inspection

The Contractor must conduct an initial inspection at the beginning of each DFOW when enough work has been accomplished to enable an examination of the quality of workmanship. This inspection verifies that the contractor has commenced the work per the drawings and specifications. The initial inspection checklist must address the following areas:

- Review the control testing for compliance with contract requirements.
- Examine the quality of workmanship.
- Verify that defective or damaged materials have not been used.
- Verify that materials have not been omitted and that dimensional requirements are met.

4.2.3 Follow-Up Inspection

The Contractor and/or Owner's QA designee perform follow-up inspections periodically during individual work activities to verify continued compliance with the approved drawings and specifications, including control testing, until the completion of the work. The follow-up inspection includes the following tasks:

- Ensure continuing compliance with Contract requirements.
- Ensure continuing compliance with control testing until completion of particular feature of work.
- Contractor QC records follow-up inspection in daily QC reports.
- The QA Manager's inspection staff records follow-up inspections in the daily inspection report.

- Conduct final follow-up inspections and correct test deficiencies prior to the addition of new features of work.

4.2.4 Final Inspection

The Contractor, Site Manager, Construction Manager, and QA Manager (or designee) perform a final inspection at the completion of work; this is the witness and hold point indicated in the ITP. The Contractor cannot continue with the work until given approval by the Construction Manager. The final inspection includes the following tasks:

- Develop a punch list of items that do not conform to the approved plans and specifications to be included in the construction QC documentation.
- Perform a second completion inspection after punch list items have been completed and the QC/QA Manager has been notified by the contractor.
- Complete the inspection reports that identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective action taken or proposed.

Additional QA inspections may include inspection of third-party lab testing facilities, fabrication facilities, and suppliers. Other inspections outside the four-phase program described above are ordered or performed by the QA Manager to verify compliance with building code and standards. These inspections must be performed and conducted at various points of construction that would typically require code compliance inspections.

When deficiencies are discovered during the four-phase or other inspection processes, the QA Manager must consider a focused inspection. If a focused inspection determines that material, performed work, or installation is deficient and/or does not meet the project specifications, the QA Manager ensures that the deficiency is corrected and documented.

4.3 Measurement and Testing Equipment

This section provides the protocol for measuring and testing equipment to be used during the groundwater remedy construction.

4.3.1 Purpose and Scope

The Contractor must establish a Measuring and Test Equipment Control Plan. Control of monitoring and measuring devices establishes an approved method for the control of monitoring, measuring and test equipment and assigns responsibilities within the process. The scope of this procedure includes monitoring, measuring, and test equipment used to render values that are the basis of conclusions or assumptions incorporated in work products.

4.3.2 Responsibilities

The Contractor is responsible for ensuring that the appropriately calibrated equipment is provided and used for related testing at the groundwater remedy construction site. The Contractor is responsible for completing calibration records for test equipment and submitting calibration to the QA Manager as described in the project specifications. The QA Manager is responsible for retaining appropriate records in the project contract files. The QA Manager or other responsible individual, depending on project practice, must retain calibration records and must clearly identify and segregate equipment that fails verification or calibration requirements

Measuring and testing responsibilities are associated with both the Owner and the Contractor (as documented in the CQCP). Both of these organizational leads are responsible for ensuring that the appropriately calibrated equipment is provided and used for related testing at the groundwater remedy construction site. These individuals (or designees) also are responsible for retaining appropriate records in the project contract files and retaining calibration records and must clearly identify and segregate equipment that fails verification or calibration requirements.

4.3.3 Equipment Identification and Calibration

All monitoring and measuring equipment must have a unique identification number. This number may be the serial number of the equipment, or it may be assigned by the owner of the equipment. This number must be permanently affixed to the equipment in such a manner that it cannot readily be removed under normal use.

The user is responsible to know and comply with the specific calibration requirements for any measuring device. If using rented equipment, the instrument must be provided with documentation of calibration (including an expiration date) and instructions for calibration. For measurements to be considered valid, monitoring and measuring equipment must:

- Be calibrated or verified at scheduled intervals, or prior to use, against measurement standards traceable to international or national measurement standards. Where no such standard exists, the basis used for calibration or verification must be documented and filed either with the equipment or in the project contract files.
- Use the calibration history, along with other data and information, to determine the calibration interval.

If equipment is calibrated by the Owner’s team members or contractor personnel, calibration must be to a documented method and the calibration must be certified to have been performed according to the documented method. The certification should include the following information:

- Unique instrument ID
- Date of calibration
- Individual(s) performing the calibration

- Traceability to acceptable reference (national or international) standards
- Result of comparison to calibration acceptance criteria.

In addition, the calibrated equipment must:

- Be adjusted or readjusted, then recalibrated as necessary.
- Be safeguarded from adjustments that would invalidate the measurement result.
- Be protected from damage and deterioration during handling, maintenance and storage.
- Have the frequency of calibration based on specifications, codes, and manufacturer's recommendations.

Users of the monitoring and measuring equipment are responsible for verifying that the equipment is free from damage, deterioration, and any other condition that may affect its accuracy or functionality.

Records of the results of calibration and/or verification activities may be maintained by the user assigned the equipment or the responsible owner of the equipment. Users of the equipment must explicitly identify equipment used in developing a work product or service and maintain calibration and/or verification records in the project contract files. A log is also kept in the project quality documentation files.

4.3.4 Removal of Equipment from Service

Monitoring and measuring equipment must be immediately removed from service if one or more of the following conditions exist:

- Equipment has never been calibrated.
- Equipment calibration date is past due.
- Equipment failed calibration criteria.
- Equipment failed in operation.
- Equipment readings are suspect or known to be outside designated limits.
- Equipment is physically damaged in a manner that would affect its function or accuracy.

Such equipment must be identified as being out of service.

The validity of previous measuring results should, as appropriate, be assessed when equipment is found not to conform to requirements. The appropriate action must be taken on the equipment and on any work product or work product constituent affected by the nonconforming equipment.

Any monitoring and measuring equipment that fails to stay in calibration for a practical period shall be withdrawn from service and either repaired or replaced.

4.4 Construction Audits

The QA Manager establishes an auditing system to verify the Owner's and Contractor's implementation of and conformance to this CQAPP and contract technical specification requirements. The auditing system is used to determine the effectiveness of the QC system.

The audit must be planned, performed, and documented in accordance with written instructions, procedures, or checks. The audit scope, frequency, and methods must be defined prior to the audit. Audits must be performed by qualified and properly trained personnel who are familiar with the quality system and auditing procedures and techniques. The QA Manager will ensure the objectivity and impartiality of the audit process by selecting personnel not involved with or responsible for the work. Auditors cannot audit their own work. The auditing system must cover all the quality-affecting activities for both construction and laboratories and must be applicable to onsite and offsite locations, including all subcontractors.

The results of the audits must be documented and reported to the Topock Project Manager, QA Manager, Site Manager, and Construction Manager. All nonconforming conditions identified during the audit are classified by severity. Nonconformances classified as Level 2 and above require corrective action and must be reaudited to verify that the actions taken by the appropriate organization were effective. Table 4-3 defines the severity levels,

Table 4-3: Severity Levels and Descriptions for Audit Findings

Level	Severity Level	Description
4	Significant	A classification assigned to an adverse condition that has a significant impact on the company's ability to meet objectives, is systemic in nature, and requires consideration by executive management. A Significant finding requires an investigation for cause determination and corrective action to correct the condition.
3	Moderate	A classification assigned to an adverse condition that has either a significant impact on the audited organization or implications for a broader segment of the company. A Moderate finding requires an investigation for cause determination and corrective action to correct the condition.
2	Minor	A classification assigned to an adverse condition that has a direct impact on the project. A Minor finding requires an investigation for cause determination and corrective action to correct the condition.
1	Recommendation	The documented identification of a condition that is not an adverse condition but, if left uncorrected, may lead to an adverse condition. Recommendations are documented in the audit report but do not require written responses.

4.4.1 Audit Process

This section details the audit process, including related planning, execution, and documentation. Appendix B includes a sample form to document audit findings and related recommendations.

4.4.1.1 Auditor Selection

The QA Manager assigns the Lead Auditor and other auditors. The Lead Auditor and auditors must be qualified and/or trained in applicable quality practices and must be familiar with

requirements and specifications of the project. The audit team may include auditors and subject matter experts from other departments and projects, when necessary.

4.4.1.2 Audit Notification

Before an audit begins, the Lead Auditor will notify the organization to be audited in writing. The audit notification must include the audit plan. Advance notification ensures that QA personnel and project teams are aware of the prescribed time for these audit and enables maximum participation by office and/or project staff.

4.4.1.3 Audit Plan and Checklist

The Lead Auditor must specifically schedule the audit, establish the audit scope, prepare an audit plan, and conduct the examination of records and activities. The audit plan must include the following information:

- Scope of the audit
- Organization and work areas to be audited
- Location, time, and dates of duration of the audit
- Documents that specify the criteria against which the work will be measured
- Auditing personnel
- Checklist to evaluate quality system elements

The individual selected to perform audit activities cannot have been assigned any past or present direct responsibilities for performing the work being audited.

4.4.1.4 Audit Entrance Meeting

The audit entrance meeting must be held among the auditor(s), the manager responsible for the areas to be audited, and applicable members of the organization being audited to introduce personnel, arrange for access to personnel and documents, arrange for access to the facilities, and explain the scope of the audit.

4.4.1.5 Audit Execution

Using the checklist as a guide, the auditor performs the audit using a combination of interviews, examination of project documents and records, and observation of work in progress. The auditors have the flexibility to examine other areas if the course of the audit indicates that other areas might need investigation. Objective evidence is examined to the depth necessary to determine if audit elements are being effectively implemented and documented. Objective evidence examined is described in the audit checklist for each element assessed. The checklist results provide a basis for generating the findings and observations.

Daily briefings may be held with the management of the organization/task being audited to inform them on the progress of the audit, concerns, and preliminary findings and to exchange

views and gather information. Any adverse condition requiring prompt corrective action is reported immediately to the management of the audited organization.

4.4.1.6 Audit Closeout Meeting

After the audit, the Lead Auditor arranges for a closeout meeting with the responsible manager and the relevant project team members. At that time, the Lead Auditor discusses the audit results and confirms the findings identified and observations made during the audit.

4.4.1.7 Audit Report

The Lead Auditor prepares and approves the audit report within 15 business days of the post-audit conference. At a minimum, the audit reports must include the following information:

- Time, dates, and location of the audit
- Scope of the audit
- Identification of and justification for any differences between the audit plan and the actual conduct of the audit
- Synopsis of results of the audit
- Description of the findings and observations that were discovered during the audit and an indication of their severity level

The Lead Auditor issues and distributes the report to the manager of the areas audited, QA Manager, Site Manager, Construction Manager, and Contractor management, as appropriate.

4.4.1.8 Corrective Action

For each finding in the audit report, the Lead Auditor completes an audit finding form (Appendix B) and issues it to the responsible personnel at the audit closeout meeting. The responsible personnel acknowledge the finding and then work with the Lead Auditor to determine the cause and appropriate corrective action to prevent recurrence of the finding. The Lead Auditor reviews and approves the recommended corrective action and the due date for implementation proposed by the responsible personnel.

4.4.1.9 Audit Closeout

The Lead Auditor or QA Manager verifies closure of the finding in a timely manner by reviewing objective evidence of corrective action taken and documenting the conclusions in the audit finding form.

The QA Manager may schedule a follow-up audit, specifically examining the subsequent corrective action taken to close out the prior findings. This follow-up audit can be performed at the next scheduled audit. The conduct of the follow-up audit is not likely to require a pre-audit conference or daily briefing. A post-audit conference with the relevant individuals may be conducted to discuss the effectiveness and extent of implementation of the corrective action(s).

Verification of closeout action must include verification of the effectiveness of the corrective action. This information must be documented in the closeout audit report issued to project management at the conclusion of the follow-up audit.

4.4.1.10 Audit Records

Audit records include the audit reports, audit findings, and record/verification of completion of corrective action, as appropriate to the type and scope of the audit.

4.5 Construction Surveillance

During the construction phase of the project, QA Field Inspectors perform routine planned and unplanned surveillances on the work in progress. Surveillance activities are detailed verification processes that can be performed any time between audits and can be used as a supplement to audits to further verify closure of audit findings. Surveillance findings can also be instrumental in preparing future project audits. Appendix B includes a sample report form to support daily quality surveillances.

Construction surveillance is used for the following:

- Identify systemic weaknesses in the construction, installation, and commissioning of subcontractor activities
- Provide a measurable program for monitoring quality activities through the use of quality metrics as a result of sampling plans, etc.
- Verify that subcontractors and Owner's personnel are performing inspection and testing activities as defined by the contract requirements
- Provide early identification and root cause determinations of systemic quality weaknesses prior to the completion of nonconforming items or activities protocols
- Provide a systematic program for verifying that deliverables conform to specified Project, PG&E, or regulatory requirements
- Provide metrics on key performance indicators to allow PG&E to objectively assess the level of quality being achieved during construction.
- Provide an added level of assurance that fabrication and laboratory/test facilities and equipment are adequate for the performance of required activities.

Surveillance activities are performed by discipline to provide confidence that the quality-related activities of the construction site or contractor are being performed to an acceptable level. This practice is performed randomly and is based on a sampling of the activities performed.

The QA Manager coordinates the scheduling of surveillance activities with the contractor responsible for the activities being surveyed.

4.5.1 Acceptance Sampling

The QA Manager determines the acceptable sampling size based on a specific lot size for each of the items surveyed. This sampling is used to determine acceptability of the items being constructed and/or fabricated. It is expected that defects found are corrected even if the lot as a whole has been accepted.

Listed below are some of the items that will be surveyed by QA. The list is for example purposes only and may be modified as needed to meet the specific requirements of this project:

- Material Control and Traceability: Construction site control of materials are monitored via routine surveillance of materials activities, verification of materials by reviewing material certificates, and witnessing of material testing, where practical.
- Material Receipt and Storage: The construction site receiving practices are monitored to ensure that receipt of material is properly recorded and deficiencies are reported. The storage of materials is monitored to ensure that materials are stored in a manner that prevents damage and that they are segregated from other nonproject materials. Special attention is directed to segregation of various grades of materials. Receipt of tagged items is monitored in the manner described above and is verified, assuring adequate protection against damage, corrosion, and ingress of dirt or water.
- Material Traceability: Materials are monitored daily as part of this surveillance program to ensure compliance with requirements. When required by the contract, the following items are also reviewed:
  - Structural steel and piping materials traceable to material certificates
  - Welding consumables traceable to test certificates
  - Cables traceable to a batch number and drum through the cable schedule and pulling slips
  - Tagged equipment traceable through registers, indexes, and record drawings
  - Structural and piping components, which are sampled to ensure that they can be traced from the fabrication drawings to the materials certificates
  - Control of off-cuts (drop material) is also monitored to maintain traceability to the material certificate
- Material Preservation: As the materials are turned over, construction site personnel are responsible for handling, storing, and preserving materials and equipment intended for the project. A spot check is conducted periodically to ensure that preservation records are up to date and that manufacturers' preservation requirements and frequencies are in compliance.
- Welding (Structural and Piping): The construction site welding activities are monitored through the verification of welder qualifications, welder history logs, welding monitoring, and verification of welding parameters. These activities are carried out on a random basis and documented on the Quality Surveillance Report (QSR).

- Dimensional Control: Dimensional control activities relating to the construction site are monitored and verified through a series of report reviews and by witnessing the construction site personnel taking dimensional checks.
- Visual Examination: The quality of visual examination is verified by examining the materials and welds randomly, on a periodic basis, and in critical areas defined in the QSR. If the standard of acceptance is found to be lacking, corrective action is implemented and the action is verified to be effective. No further nondestructive evaluation (NDE)/inspection is performed until visual acceptance is achieved
- Surface Protection (coating, fire proofing, and wrapping): Construction site material and equipment surface protection activities are monitored and verified through daily surveillance and verification of the coating quality. These activities are carried out randomly as determined by the QSR.
- Electrical: The construction site installation, testing, and preservation of electrical systems is monitored and verified through on-site surveillance and verification. The qualifications, experience, and performance of the electrical construction site personnel are monitored.
- Piping: Piping activities are monitored and verified through witnessing of tests. These activities are carried out randomly as determined by the QSR.
- Mechanical Completion/Ready for Commissioning: The status of mechanical completion/ready for commissioning is reviewed periodically to ensure that it is being completed on an ongoing basis and that any outstanding work or punch list items, including those originating from the equipment suppliers, are cleared and signed off accordingly.
- Mechanical Equipment: The mechanical activities are monitored and verified through witnessing of tests. These activities are implemented randomly as determined by the QSR.
- Insulation; Construction site material and insulation activities are monitored and verified through daily surveillance and verification of the insulation quality. These activities are carried out randomly as determined by the QSR.

4.5.2 Quality Surveillance Reports

Results of surveillances are documented in QSRs. At a minimum, the QSR includes the following information:

- Time, date, and location of the surveillance
- Scope of the surveillance
- Items and/or services inspected, including associated specifications and/or requirements, and indication whether they are in conformance
- Description of any deficiencies identified during the surveillance

For each deficiency identified in the QSR, an NCR is issued to the responsible organization and corrective action is required as described in Section 5.3. Quality Surveillance Reports, NCRs, and evidence of corrective action taken are retained as project records.

4.6 Regulatory and Mitigative Best Management Practices

The Construction/Remedial Action Work Plan includes a Project Management Plan that documents PG&E's organizational structure and processes for the construction and start-up of the groundwater remedy. The Project Management Plan includes PG&E's organizational processes to track, document, and communicate compliance with Mitigation Measures, ARARs, and other agreements. In addition, the Construction/Remedial Action Work Plan includes a Site Management Plan that describes procedures and protocols for maintaining compliance with mitigation measures, ARARs, and other agreements, and addresses such topics as waste management, best management practices, monitoring and decontamination in terms of how these measures will be monitored, tracked, and documented during construction.

5 CONSTRUCTION DEFICIENCIES

This section provides procedures for tracking construction deficiencies (noncompliance) from identification through acceptable corrective action. It defines the controls and related responsibilities and authorities for dealing with noncompliant products or services.

5.1 Deficiency Identification

A deficiency occurs when a material, performed work, or installation does not meet the plans and/or specifications for the project.

5.2 Contractor QC Deficiency Identification and Control

When material, performed work, or installation is found deficient, the Contractor must ensure that the nonconforming material, work, or installation is identified and controlled to prevent unintended use or delivery. The Construction Manager notifies the Contractor of noncompliance with any of the foregoing requirements. The Contractor must, after receipt of such notice, immediately take corrective action.

5.2.1 Minor Deficiencies

Minor deficiencies noted during test or inspection are reported verbally to the Contractor's representative and noted on the Daily Construction Report. Minor deficiencies are items that do not require significant rework or repair work to correct, and will not result in significant deviations from the required quality standard if corrected immediately.

Control and disposition of such deficiencies are handled by the originator of the Daily Construction Report and the Contractor's supervisor responsible for the work; they do not require formal action by the contractor's QC Manager or the Construction Manager. Ideally, such minor deficiencies can be corrected on the spot by agreement with the contractor's supervisor.

5.2.2 Nonconformances

Nonconformances are major deviations from the contract requirement and/or accepted standard of quality; they must be formally documented for corrective action by the Construction Manager's field staff or by the third-party testing group. If the contractor fails to correct a minor deficiency within 5 days of notification, the deficiency will be designated as a nonconformance. Nonconformances must be formally documented (see sample NCR form in Appendix B).

The NCR must be distributed to the contractor, and the contractor must follow up on the NCR as required to verify that corrective action has been completed. The QA Manager, or designee, must verify and accept the corrected work by actual inspection.

5.3 Nonconformance Report

The NCR is a formal notification to the contractor that work does not meet the plans or the specifications for the project. If an item of work is found to be deficient (i.e., out of conformance with the construction drawings and/or specifications) the inspector documents it on the NCR as described in this section. NCRs are included on the nonconformance log and are tracked through verification that the nonconformance has been corrected.

The NCR process is as follows:

1. Project personnel identify and document the nonconforming product on an NCR (Appendix B). The initiator enters the relevant project information, subject, references, and a description of the nonconforming condition and annotates, when applicable, if the nonconforming product is tagged.

2. The NCR is then reviewed by the QA Manager, or designee, who validates the nonconformance and assigns project staff cognizant in the product or service to prepare action to correct the nonconformance. The NCR is then issued to the Contractor.

3. If necessary, the QA Manager, or designee, may request that a root cause analysis be performed along with corrective action necessary to address the cause of the nonconformance and prevent its recurrence.

4. After the NCR is validated, the nonconforming product may be tagged or segregated from conforming product, when practical, to preclude its inadvertent use.

5. The individual responsible to resolve the nonconformance then completes the disposition portion of the NCR with the action necessary to resolve the nonconformance and includes a schedule date for completion. Typical disposition of product may involve one of the following processes:

   a. Reject and return to the supplier or scrap
   b. Repair
   c. Rework/rewrite
   d. Use as is

   NOTE: A nonconforming item waiting for repair or rework may be conditionally released if justified in writing and approved by the QA Manager or designee. Justification for conditional release is documented on the NCR. A HOLD tag may be attached to the material or item traceable to the NCR.

6. The QA Manager or designee then reviews and approves the disposition and/or corrective action and tracks completion based on the schedule date.

7. The QA Manager or designee verifies the satisfactory completion of actions required for disposition of the NCR. The repair and rework material or item is reinspected to demonstrate conformance to the requirements. The verifier is responsible for removing the tagging of the nonconforming product, if such tagging is used. The QA Manager ensures that NCRs are closed or reviews their status regularly with the project staff and documents justification for keeping them open past the due date.

Completed NCRs are retained as project records.

5.4 Contractor QC Deficiency Correction

When material, performed work, or installation is found to be deficient and/or does not meet the project specifications, the QA Manager ensures that the deficiency is corrected. The QA Manager or his designee ensures that the nonconforming material, work, or installation is identified and controlled to prevent its unintended use or delivery. When practical, the construction contractor must tag and segregate it from conforming material or items to preclude its inadvertent use. If segregation is impractical or impossible because of the physical characteristics of the item or other reasons, the nonconformance tag must be displayed prominently to preclude inadvertent use.

The contractor is responsible for documenting the nonconformance in a NCR as specified in Section 5.2.2. The construction contractor implements corrective actions to remedy work that is not in accordance with the drawings and specifications. The corrective actions include removal and replacement of deficient work using methods approved by the Construction Manager or designee. Removal must be performed in a manner that does not disturb work that meets specified criteria; otherwise, the disturbed material must also be removed and replaced. Replacement must be performed in accordance with the corresponding technical specifications. The replacement is subjected to the same scope of quality inspection and testing as the original work. If the replacement work is not in accordance with the drawings and specifications, the replacement work must be removed, replaced, re-inspected, and retested.

5.5 Preventive Actions

Preventive actions are taken to eliminate the cause of a potential nonconformance. For example, defects that appear on the surface of concrete during construction or within a relatively short time after completion are usually caused by poor quality materials, improper mix design, lack of proper placing and curing procedures, or poor workmanship. The contractor must take preventive actions as necessary to eliminate the causes of potential deficiencies in order to prevent their occurrence. The contractor’s CQCP must include quality improvement practices to continually improve construction practices and address quality problems at their source. The Site Manager, Construction Manager, and QA Manager monitor, inspect, and audit the processes used to prevent erroneous information or construction products from being passed to the owner. The

Construction Manager and QA Manager have the authority to implement, verify, and review the project's preventive and corrective action effectiveness. They are empowered to improve the project's work processes to eliminate the causes of potential nonconformances.

6 CONTINUOUS IMPROVEMENT

PG&E strives to continually improve the effectiveness of the quality management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions, and management review. This section presents the strategy and plan to improve the construction process.

6.1 Root Cause Analysis

When a major deficiency is documented, a root cause analysis (RCA) is performed to determine and solve the root causes of deficiencies as opposed to addressing the symptoms. The root cause investigation and reporting process has five distinctive phases to ensure that the fundamental cause of the noncompliance is eliminated rather than applying a quick fix that does not prevent a recurrence of the noncompliance. Management involvement and adequate allocation of resources are essential to successful execution of the five root cause investigation and reporting phases:

- **Phase 1: Data Collection.** To ensure that data is not lost, it is important to define the problem and begin the data collection phase of the RCA immediately after the condition is identified. The following information is collected:
  - Circumstances before, during, and after the condition was discovered.
  - Personnel involved and actions taken.
  - Environmental factors.
  - Other information having relevance to the condition identified.
- **Phase 2: Assessment.** Any RCA method may be used that includes the following steps:
  - Analyze the problem, coordinating (if necessary) with departments or individuals to adequately assess the problem.
  - Determine the significance and/or severity of the problem.
  - Identify the causes immediately preceding and surrounding the condition.
  - Identify the reasons that the condition in the preceding step existed and continue working back to the root cause (the fundamental cause that, if corrected, will prevent recurrence of this problem and similar occurrences throughout the facility).

  The identification of the root cause or causes is the stopping point in the assessment phase.
- **Phase 3: Corrective Action(s).** Implementing effective corrective action(s) for each root cause reduces the probability that a problem will recur, and it improves reliability and safety.
- **Phase 4: Inform.** Discuss and explain the results of the analysis, including corrective action(s), with management and personnel involved in the occurrence.

- **Phase 5: Follow-up.** Follow-up includes determining if corrective action has been effective in resolving problems. An effectiveness review is essential to ensure that corrective action(s) have been implemented and are preventing recurrence.

6.2 Lessons Learned/Best Practices

In support of process improvement, the Owner's management team, led by the Construction Manager, will schedule senior level meetings to review and assess plans and progress, document lessons learned, and conduct formal and informal audits of the construction process to measure the success of QA/QC plans and procedures. Documentation of lessons learned and best practices are imperative to PG&E's performance and to providing confidence to its stakeholders that the construction process has achieved its quality goals.

Knowledge management is a recommended implementation technique for PG&E. This is a systematic method for employees to capture and share knowledge across the corporation and to optimize business processes and the quality of work products so that the team can benefit from the experience of others and improve performance.

Table 6-1 documents the methods to ensure continuous improvement throughout the life cycle of the remedy construction.

Table 6-1: Methods to Ensure Achievement of and Continuous Improvement of Quality Goals and Objectives during Remedy Construction

Method[1]	Owner's Responsible Personnel[2]	
Data Analysis and Trending	Construction Manager and Topock Project Manager	
Root Cause Analyses	Construction Manager and Topock Project Manager	
Documentation of Lessons Learned	Construction Manager and Topock Project Manager	
Audits	Construction Manager and Topock Project Manager	
Management Reviews	Chromium Remediation Director, Construction Manager, and Topock Project Manager	

[1]Stakeholder reviews will be evaluated in support of continuous improvement in accordance with measures documented in the Construction/Remedial Action Work Plan.
[2]QA Manager, Construction Manager, and team member support the data tracking and analyses.

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APPENDIX A: CONSTRUCTION QUALITY CONTROL REQUIREMENTS

This appendix summarizes the minimum QC requirements for construction contractors covered in the CQAPP and a guide for developing the Contractor Quality Control Plan (CQCP) submittal.

A.1 Quality Control Plan Requirements

The CQCP must identify Contract quality requirements for each activity and describe how contractor intends to furnish control testing, certifications, and records in order to provide quality work. The CQCP must include procedures to ensure that equipment, workmanship, fabrication, construction, operations, and inspections comply with the Contract Documents. Minimum CQCP requirements are as follows:

- Name, resume, authority, and responsibility of QC Representative who will monitor the quality of construction activities.
- An organizational chart showing the lines of authority and responsibility among key project personnel.
- List of outside organizations, including testing laboratories, architects, or consulting engineers, that will be employed by the Contractor. Include a description of services to be provided.
- List of definable features of work (DFOWs) that have distinct and separate control requirements.
- An inspection and test plan keyed to the construction schedule, following the order of the specification technical sections, indicating what inspections and tests will be performed, the names of persons responsible for the inspection and testing of each segment of work, and the time schedule and frequency for each inspection and test.
- Procedures for documenting QC operations and inspection and testing with a copy of all forms and reports to be used for this purpose.
- Contractor's procedure to identify, segregate, disposition, and correct nonconforming product and services.
- Contractor's procedure for initiating requests, control, and implementation of changes to the Contract's scope of work, specifications, or requirements.

The contractor's CQCP must address the four-step inspection process for each DFOW that includes preparatory, initial, follow-up, and final inspections. Minimum requirements are as follows:

- Checklists must be developed to document the four-step inspection process for each DFOW.
- A copy of the completed checklists must be submitted weekly to PG&E.

A.2 Contractor Quality Monitoring

The Owner may perform such inspections, tests, and monitoring as necessary to determine or verify the Contractor's compliance with contract requirements. The Contractor must provide such facilities and assistance for PG&E monitoring as may be reasonably required and must ensure that all QC records and places of work are open and available to the Owner. The Owner's monitoring activities may consist of review, observation, and inspection of contractor personnel, material, equipment, processes, and test results, including off-site inspections. PG&E may perform quality audits of records and performance of contractor or its lower tier subcontractor and suppliers. The Contractor, subcontractor, or supplier being audited must be available during the audit as required by the Owner. Testing or inspecting by the Owner, government agencies, or stakeholders does not relieve the Contractor or its subcontractors from performing work according to Contract requirements.

QA personnel will notify contractor of any detected noncompliance with these requirements or technical specifications. Such notice, when delivered to the Contractor at the work site, must be deemed sufficient for the purpose of notification. The Contractor must take immediate corrective action after receipt of a noncompliance notice and must maintain a detailed record of every noncompliance and corrective action taken.

A.3 Submittal Register

The Resident Engineer or Contractor must provide a submittal register to schedule, manage, and track all required subcontract submittals.

A.4 Quality Control Reports

The Contractor must provide forms to be used in conjunction with QC reporting. A copy of all forms must be included with the CQCP. The following requirements are listed for specific reports:

- **Test Reports.** The Contractor is responsible for establishing a system that will record all tests results. Information on test designation, location, date of test, specification requirements, results and retest results, causes for rejection and recommended remedial actions must be documented. A copy of test results must be sent directly from the agency performing the testing services to QA Manager. A copy of any failing report must be sent immediately. All test reports provided by a testing agency must be reviewed and signed by a competent, qualified individual in the related discipline of the test subject matter.
- **Construction Reports.** Submit duplicate copies to the Site Manager and Construction Manager on the business day following the day of report. At a minimum, daily construction reports must include the following information:
  - List of subcontractors at the site

- List of separate contractors at the site
- Approximate count of personnel at the site
- High and low temperatures, general weather conditions
- Accidents
- Meetings and significant decisions
- Unusual events
- Stoppages, delays, shortages, and losses
- Meter readings and similar recordings
- Emergency procedures
- Orders and requests of governing authorities
- Change Orders received, implemented
- Services connected, disconnected
- Equipment or system tests and startups
- Partial completions/occupancies
- Substantial completions authorized
- Number of days used in the subcontract period to date

A.5 Record Drawings

The Contractor's QC personnel must ensure that the record drawings required by the contract are scalable, kept current on a daily basis, and marked to show deviations from the contract drawings. Ensure that each deviation has been identified with the appropriate modifying documentation.

A.6 Inspections and Testing Laboratory

All inspections and testing on and off site required by the Contract must be performed as specified in individual specification sections by a certified independent firm employed by the Contractor at its expense. Inspecting, testing, and source QC may occur on or off site. Qualifications and certifications of the independent inspections and testing firm must be submitted for Owner approval. Testing reports by the independent firm must be submitted to the QA Manager, in duplicate, indicating observations and results of tests and indicating compliance or noncompliance with Contract documents. The Contractor must furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested. Any retesting required because of nonconformance to specified requirements must be performed by the same independent firm at contractor's expense.

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APPENDIX B: EXAMPLE QUALITY FORMS

1. Daily Quality Surveillance Report Form
2. Laboratory Inspection Form
3. Material Receipts and Inspection Form
4. Audit Finding Form
5. Nonconformance Report (NCR) Form
6. Request for Information (RFI) Form
7. Four-Phase Inspection Form

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1. Daily Quality Surveillance Report Form

Daily Quality Surveillance Report

Project Name:	Contract No:	Report Date:
Subcontractor:	Location:	Report No.:

SURVEILLANCE ACTIVITIES		SURVEILLANCE TYPE AND COMMENTS (Enter N/A if sampling is not required.)				
Quality Control Activities		Lot Size	Sample Size	Accepted No.	Rejected No.	Comments - (reference Surveillance Deficiency Reports for details, as necessary)
Civil/ Structural	Survey Control					
	Earthwork/ Soil					
	Soil Preloading & Consolidation					
	Piling					
	Concrete					
	Structural Steel					
	Buildings					
	Foundations					
	Formwork					
	Clearing/ Disposal					
	Roads/ Paving					
	Grouting					
	Excavation					
	Bolts, Bolt Tensioning, Bolt Torquing					
	Test Cylinders					
	Piping - Drainage/ Sewer					
Mechanical	Equipment – Rotating, Other					
	Vessels, Tanks, Exchangers, Boilers, Columns					
	Piping					
	Mechanical Testing					
	Cleaning, Flushing, Hydrotesting					

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Example

Daily Quality Surveillance Report

Project Name:	Contract No:	Report Date:
Subcontractor:	Location:	Report No.:

SURVEILLANCE ACTIVITIES		SURVEILLANCE TYPE AND COMMENTS (Enter N/A if sampling is not required.)				
Quality Control Activities		Lot Size	Sample Size	Accepted No.	Rejected No.	Comments - (reference Surveillance Deficiency Reports for details, as necessary)
Electrical	Raceways, Wire & Cable					
	Transformers					
	Motors					
	Insulation					
	MCC, Switchgear, Panels					
	Heat Trace					
	Conduit					
	Direct Buried Cable					
	Terminations					
	Cable Testing					
	Breakers, Fuses, Circuit Interrupters					
	Batteries, Chargers					
	Electrical Testing					
Instrumentation	Instrumentation					
	Calibration, Testing					
	Flow, Temperature, Pressure Devices					
	Protective, Alarm					
	Installation					
Coating, Painting, & Wrapping	Painting, Coating					
	Insulation, Refractory					
	Fireproofing					

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Example

Daily Quality Surveillance Report

Project Name:	Contract No:	Report Date:
Subcontractor:	Location:	Report No.:

SURVEILLANCE ACTIVITIES		SURVEILLANCE TYPE AND COMMENTS (Enter N/A if sampling is not required.)				
Quality Control Activities		Lot Size	Sample Size	Accepted No.	Rejected No.	Comments - (reference Surveillance Deficiency Reports for details, as necessary)
Non Destructive Examination	NDE					
	Visual					
	Radiographic					
	Ultrasonic					
	Magnetic Particle					
	Liquid Penetrant					
	Positive Material Identification					
Calibration	Calibration					

Example

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2. Laboratory Inspection Form

Laboratory - Test Facility Inspection Checklist

Facility:	Project Number:
Location of Facility:	Project Name:
Facility Contact Name:	Contact Number :
Inspector/Appraiser:	Date Performed:

S. No.	Description of checking to be carried out	Status
1.0	GENERAL	
1.1	Is the lab accredited by a properly authorized body for the tests being carried out?	
1.2	Is the lab approved by SC/ PMC/ Client/ etc., as per project requirements?	
1.3	Is the lab approved by local authorities if/ as per project requirements?	
1.4	Is the lab operating under a documented Quality Assurance Program?	
1.5	Does the testing staff (lab techs) have the required qualifications and experience (e.g. ACI Level 1, etc.), as per project requirements?	
1.6	Is the testing facility of sufficient size to accommodate all necessary test equipment and technicians and to correctly conduct the tests included in the scope of accreditation?	
1.7	Is a complete copy of required project specifications available and accessible by all technical staff?	
1.8	Is a hard copy of required test standards (ASTM, BS, AASHTO, others) available and accessible by all concerned technical staff?	
1.9	Is the Inspection and Testing Plan?	
1.10	Are records of lab staff (qualification, contact, annual leave schedule, blood group, etc. along with the other routine data) available?	
1.11	Are all staff positions documented in the lab's organization chart?	
1.12	Is the record of all test equipment maintained with serial numbers, and calibration due dates?	
1.13	Is the equipment calibrated by proper accredited body and calibration of equipment is traceable to internationally recognized standards?	

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Example

Laboratory - Test Facility Inspection Checklist

S. No.	Description of checking to be carried out	Status
1.14	Are specimen samples being kept under Consultant's supervision?	
1.15	Are walkways in and around the lab clear, with no chemical storage? Are entrance and exits also clear of obstructions?	
1.16	Are emergency notification, procedures, contacts, and phone numbers posted?	
1.17	Is lab neat, clean with no excess accumulation of combustibles?	
1.18	Are appropriate trash containers in use and emptied when full?	
1.19	Are lab surfaces clean and sanitary with no excess visible contamination?	
1.20	Are proper disposal containers available for sharp items?	
1.21	Is there unrestricted access to eyewashes, safety showers, and fire extinguishers?	
1.22	Are experiments conducted on stable non-moving surfaces?	
1.23	Are chemicals stored in cabinets and not on open benches when not in use?	
1.24	Is food and/or drink present in lab, in refrigerators or on lab benches?	
1.25	Are chemicals or lab coats present in designated eating areas or other non-lab areas?	
1.26	Do sinks and sink traps look clean/ free of chemical residue?	
1.27	Is glassware free of chips, cracks, sharp edges and other defects?	
1.28	Are container caps and lids are in good condition?	
2.0	PERSONAL PROTECTIVE EQUIPMENT/PRACTICES	
2.1	Is proper personal protective equipment available for employees & visitors and are correct sizes being used?	
2.2	Are lab workers are dressed properly?	
2.3	Are lab coats in use?	
2.4	Has lab Supervisor completed any HSE session/ curriculum/ assignments?	

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Example

Laboratory - Test Facility Inspection Checklist

S. No.	Description of checking to be carried out	Status
2.5	Have lab workers received HSE training or completed appropriate HSE sessions?	
3.0	GAS CYLINDERS	
3.1	Does gas piping appear gas tight and intact?	
3.2	Are cylinders stored properly (heat compatible materials and distance from combustibles)?	
3.3	Are gas cylinders secured in an upright position?	
4.0	SAFETY EQUIPMENT	
4.1	Are appropriate fire extinguishers present, mounted and accessible? Are smoke detectors/ fire alarms available?	
4.2	Is all safety equipment properly maintained with proper inspection tags attached?	
4.3	Are first aid kits available and maintained?	
5.0	ELECTRICAL EQUIPMENT	
5.1	Is electrical equipment in good condition?	
5.2	Are electrical cords are frayed?	
5.3	Are all electrical equipment properly grounded?	
5.4	Are electrical outlets overloaded?	
5.5	Are circuit breaker panels closed and unobstructed?	
5.6	Are extension cords used only in temporary applications?	
5.7	Are multi-plug adapters in use?	
6.0	LABORATORY EQUIPMENT	
6.1	Note the general condition of lab equipment (rust, etc.).	
6.2	Are moving parts of equipment guarded to prevent physical contact?	
6.3	Has calibration been completed and are proper inspection tags attached?	
6.4	Are lab equipment calibration certificates available?	
7.0	SAMPLING & TESTING	
7.1	Do sampling & testing procedures comply with specified international test standards?	

Example

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Laboratory - Test Facility Inspection Checklist

S. No.	Description of checking to be carried out	Status
7.2	Does contractor's "Request for Inspection & Testing" Procedure comply with Client's requirements?	
7.3	Have all tests been witnessed by the Consultant or by Consultant's authorized body?	
7.4	Do test request provide information of previous tests, if conducted, at same location?	
7.5	Are test forms (working forms/ reporting forms) available?	
7.6	Are working test forms signed by Consultant or by Consultant's authorized body?	
7.7	Do reporting forms show names and signatures of: Tested by/ Checked by/ Witnessed by/ Approved By?	
7.8	Do records of Daily Testing show No. of samples passed and failed?	
7.9	Do records of Monthly Testing showing No. of samples passed and failed?	
8.0	**MATERIALS**	
8.1	Are material specimens stored under Consultant's supervision?	
8.2	Are reference samples stored under Consultant's supervision?	
8.3	Is sampling of delivered materials done as per required frequency?	
9.0	**Filling (Soft Copies and Hard Copies):**	
9.1	Are complete copies of Approved Materials' Submittals (including Test Reports, Certificates, Technical Data, Final Approved Shop drawing, Method Statements, etc.) available?	
9.2	Are logs of Material Submittals showing all required parameters and status including complete information regarding Conditions of Approval and Fulfillment of Conditions of Approval?	
9.3	Are Client's / SC's / Overview Consultant's Material Approvals available?	
9.4	Are Independent/third party lab, government, and/ or Client lab test reports and logs available?	
9.5	Are test reports for all field tests available?	

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Example

Laboratory - Test Facility Inspection Checklist

S. No.	Description of checking to be carried out	Status
9.6	Are reports/ logs of all site-lab tests showing all parameters and including location/ date of test/ test results/ status/ etc. available?	
9.7	Is a log of Materials Testing vis-à-vis required testing frequency available?	
9.8	Is a log of lab equipment with equipment identification available?	
9.9	Is lab equipment breakdown/ maintenance record available?	
9.10	Are lab equipment user manuals, circuit drawings etc. available?	
9.11	Are records of Testing & Inspection Requests available?	

Remarks:

Accompanying documents:

Inspector/Appraiser	Facility Contact
Name:	**Name:**
Sign :	**Sign :**
Date :	**Date :**

Example

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3. Material Receipts and Inspection Form

QUALITY CONTROL MATERIALS/EQUIPMENT RECEIVING REPORT

Date: _____ Day of Week (circle one): Su M Tu W Th F S Page: _____ of _____

Name: _____ (Please Print)

Location: _____ Activity #: _____ Spec. Sect.: _____

Equipment or Material Received: _____

_____

Parameters Inspected (Check all that apply)

- ☐ Identification
- ☐ Quantity
- ☐ Damage
- ☐ Required Markings
- ☐ Conformance with Specifications
- ☐ Material Classification
- ☐ Test Reports/Mill Certificates
- ☐ Dimensions
- ☐ Cleanliness
- ☐ Properly Stored and Protected

Disposition _____ ACCEPTED _____ REJECTED _____ HOLD _____

Additional Information: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Except as noted above, all permanent materials meet the requirements of the plans and specifications.

Signed: _____ Title: _____

Example

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4. Audit Finding Form

Quality Audit Finding

AUDITED AREA:	AUDIT # FINDING #
AUDITOR:	CHECKLIST ITEM NO.:
DATE(S) OF AUDIT/SURVEILLANCE:	REFERENCE:
REQUIREMENT:	
FINDING:	**SEVERITY:** ___3_____
FINDING ACKNOWLEDGED BY: _____	DATE: _____
ROOT CAUSE:	
RECOMMENDED ACTION:	
CORRECTIVE ACTION PLAN:	
SCHEDULED COMPLETION DATE:	CORRECTIVE ACTION RESPONSIBILITY ASSIGNED TO:
CORRECTIVE ACTION TAKEN:	
CORRECTIVE ACTION COMPLETED DATE: _____	SIGNATURE: _____
CORRECTIVE ACTION VERIFIED BY: _____ (AUDITOR)	DATE: _____
COMMENTS:	

Example

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5. Nonconformance Report (NCR) Form

Nonconformance Report (To be reviewed by the QAM and forwarded to the Contractor / Supplier)		Form:	Page 1 of 1
		Rev	Date
RE / PM:	**Work Release:**	**Report #:**	
Sub/Supplier:	**Site / Location:**	**Date:**	
Requirement:			
Description of Nonconformance:			
Contractor / Supplier Signature:		**Date:**	
Disposition (NCR Only): ☐ **Repair** ☐ **Rework** ☐ **Reject / Scrap** ☐ **Re-Use**			
Cause of Nonconformance:			
Corrective Action Plan to Prevent Reoccurrence:			
Assigned To (Contractor / Supplier):		**Due Date:**	
Corrective / Preventive Action Taken:			
Close-Out Verification			
QA Mgr Signature:		**Date:**	
QA Field Inspector:		**Date:**	

Example

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6. Request for Information (RFI) Form

Request for Information (To be used to request technical information, clarification, or direction as a result of field conditions or an inconsistency)		Form:	Page 1 of 1
		Rev	Date
RFI Number:	**Date:**	**Reason:** ☐ Information ☐ Clarification ☐ Discrepancy ☐ Other _____	
Work Release Number:	**Discipline**		
Submitted by:			
Reference (DWG, spec, ref, etc.):			
Description:			
Proposed Solution:			
Cost Impact (if yes, include cost breakdown): ☐ Yes ☐ No			
Reply:			
NOTE: Response to this RFI is a technical solution only to the above query and does not authorize additional cost. If Subcontractor feels additional cost is justified, a "Change Request" must be submitted by the contractor and approved by PG&E Construction Management prior to the work being performed in the field.			

REVIEW AND APPROVAL	
Reviewed by:	**Date:**
Reviewed by:	**Date:**
Project Manager:	**Date:**

Example

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7. Four-Phase Inspection Form

EXAMPLE 4-STEP INSPECTION CHECKLISTS

PREPARATORY INSPECTION CHECKLIST: _____ **DATE:** _____

SUBCONTRACT NO: _____ NTP DATE: _____

PROJECT: _____ LOCATION: _____

DEFINABLE SCOPE OF THE WORK FEATURES (DFOW): _____

PROJECT TEAM

SUPERINTENDENT _____ FOREMAN _____

SITE SAFETY OFFICER _____ TESTING REP. _____

INSTALLER _____ MANUFACTURER'S REP. _____

CERTIFIED INSPECTOR _____ RESIDENT ENGINEER (RE) _____

QUALITY CONTROL REPRESENTATIVE _____

No.	Item	Description	Yes	No	N/A	Comments
1	Safety	Has the Hazard Analysis been submitted for review?	☐	☐	☐	
2	Safety	Are there additions to the Activity Hazard Analysis (AHA) and are they incorporated?	☐	☐	☐	
3	Safety	Has the Site Specific Safety Plan been reviewed?	☐	☐	☐	
4	Safety	Has the Emergency Action Plan including contact list been reviewed and posted on site?	☐	☐	☐	
5	Safety	Are Materials Safety Data Sheets (MSDS) on hand and reviewed?	☐	☐	☐	
6	Safety	Do all members have the required Personal Protective Equipment (PPE)?	☐	☐	☐	
7	Materials	Does the project team have copies of all the approved submittals for this DFOW on site?	☐	☐	☐	
8	Equipment	Are all operators certified to run the necessary equipment and is proof of certification on site?	☐	☐	☐	
9	Equipment	Has a checklist been completed for all equipment prior to use, and have copies been submitted to the General Contractor?	☐	☐	☐	
10	Permits	Are the required work permits posted on site?	☐	☐	☐	
11	Plans / Specs	Are the latest plans and specifications on site and have they been reviewed by the Superintendent?	☐	☐	☐	
12	Tolerances	Is the Superintendent aware of all construction tolerances for this DFOW?	☐	☐	☐	
13	Testing	Is there testing required for this DFOW?	☐	☐	☐	
14	Testing	If required is the third party testing agency available to perform the testing?	☐	☐	☐	
15	Inspect/ Testing	Have the Quality Control Representative (QCR) and Resident Engineer (RE) reviewed the Inspection and Test Plan?	☐	☐	☐	

1 of 4

Example

INITIAL INSPECTION CHECKLIST

SUBCONTRACT NO: _____ DATE: _____

PROJECT: _____ LOCATION: _____

DEFINABLE SCOPE OF THE WORK FEATURES (DFOW) INSPECTED: _____

PERSONNEL PERFORMING INSPECTION: _____

No.	Item	Description	Yes	No	N/A	Comments
1	Safety	Do all members have the required Personal Protective Equipment (PPE)?	☐	☐	☐	
2	Safety	Is there any additional Activity Hazard Analysis (AHA), and have they been reviewed by all staff?	☐	☐	☐	
3	Safety	Is the site well organized and maintained?	☐	☐	☐	
4	Material	Are the materials being used in strict compliance with the contract requirements?	☐	☐	☐	
5	Equipment	Is the equipment being used in strict compliance with the contract requirements?	☐	☐	☐	
6	Equipment	Have all tools and equipment been verified that it meets manufacture's recommendations for operation?	☐	☐	☐	
7	Tolerances	Is all work being installed per the tolerances detailed in the drawings and specifications?	☐	☐	☐	
8	Testing	Are any tests required for this DFOW and have they been completed and properly documented?	☐	☐	☐	
9	Inspections	Does this DFOW require a Witness and Hold Point? If so has it been properly documented?	☐	☐	☐	
10	Plans	Are all variations to the original plans being updated on the as-built drawings?	☐	☐	☐	

QUALITY CONTROL REPRESENTATIVE: _____ **DATE:** _____

Example

2 of 4

FOLLOW-UP INSPECTION CHECKLIST

SUBCONTRACT NO: _____ DATE: _____

PROJECT: _____ LOCATION: _____

DEFINABLE SCOPE OF THE WORK FEATURES (DFOW) INSPECTED: _____

PERSONNEL PERFORMING INSPECTION: _____

No.	Item	Description	Yes	No	N/A	Comments
1	Safety	Do all members have the required Personal Protective Equipment (PPE)?	☒	☐	☐	
2	Safety	Is the site well organized and maintained?	☐	☐	☐	
3	Materials and Equipment	Are the materials and equipment being used in strict compliance with the contract requirements?	☐	☐	☐	
4	Equipment	Have all tools and equipment been verified that it meets manufacture's recommendations for operation?	☐	☐	☐	
5	Tolerances	Is all work being installed per the tolerances detailed in the drawings and specifications?	☐	☐	☐	
6	Testing	Are any tests required for this DFOW, and have they been completed and properly documented?	☐	☐	☐	
7	Inspections	Does this DFOW require a Witness and Hold Point? If so, has it been properly documented?	☐	☐	☐	
8	Plans	Are all variations to the original plans being updated on the as-built drawings?	☐	☐	☐	

QUALITY CONTROL REPRESENTATIVE: _____ **DATE:** _____

Example

3 of 4

FINAL INSPECTION CHECKLIST

SUBCONTRACT NO: _____ DATE: _____

PROJECT: _____ LOCATION: _____

DEFINABLE SCOPE OF THE WORK FEATURES (DFOW) INSPECTED: _____

PERSONNEL PERFORMING INSPECTION: _____

No.	Item	Description	Yes	No	N/A	Comments
1	Plans	Are the as-built drawings completed for this DFOW?	☐	☐	☐	
2	Safety	Have all affected areas been cleaned and / or returned to a condition that will protect others from injury or incident?	☐	☐	☐	
3	Testing	Does the RE have copies of all test results?	☐	☐	☐	
4	Material	Are all unused materials returned or stored?	☐	☐	☐	
5	Equipment	Have all equipment instructions been submitted to the RE?	☐	☐	☐	
6	Equipment	Is all equipment tested and operable?	☐	☐	☐	

List of Punchlist items:

1. _____

Anticipated Completion: _____ Actual Completion: _____

2. _____

Anticipated Completion: _____ Actual Completion: _____

3. _____

Anticipated Completion: _____ Actual Completion: _____

4. _____

Anticipated Completion: _____ Actual Completion: _____

5. _____

Anticipated Completion: _____ Actual Completion: _____

QUALITY CONTROL REPRESENTATIVE: _____ **DATE:** _____

4 of 4

Example

Appendix B
Standard Operating Procedures
(On CD-ROM Only)

Standard Operating Procedure
PG&E Topock Groundwater Remedy
Operation and Maintenance Plan

Title: Process Water Sampling

Number: Remedy-SOP-01_Rev0

Created Date: June 19, 2012

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS). This standard operating procedure (SOP) addresses the procedures to be used for collection of process water samples from the groundwater remediation system.

2 Required Documents

1. Event-specific sampling and analysis plan (SAP), work plan, or field instructions.
2. Applicable project work plan, monitoring plan, quality assurance project plan (QAPP), and/or Operation and Maintenance (O&M) Manual.
3. Topock Program Health and Safety Plan (HSP).
4. Blank sampling log and field notebook.

3 Preparation, Setup, and Sampling Procedures

1. Review event-specific SAP or event-specific field instructions, O&M Manual, and HSP.
2. Review sampling procedures and equipment and planned sample ports with field crew.
3. Inventory sample bottles, review required analyses, and understand lab courier schedule.
4. Prepare sampling log (use field notebook and summarize relevant information on sampling form).
5. Gather sample containers and equipment and mobilize to the first sample location.
6. Open the sampling port and allow enough water to flow to flush the ‘off main pipe’.
7. Remove the cap of the sample container and collect the sample. Continue one container at a time, beginning with the containers for metals [including Cr(VI) and Cr(T)] and then the containers for general chemistry parameters.
8. After all containers for that sampling location have been filled, complete the sampling log sheet.
9. Repeat steps 5 through 8 for each sampling location.

Refer to the O&M Manual for sample handling and management, equipment decontamination, and waste management procedures.

Standard Operating Procedure
PG&E Topock Remedy-produced Water Conditioning Plant Operation and Maintenance Plan

Title: System "Hot" Startup and Shutdown

Number: RTP-SOP-01_Rev0

Created Date: 12/19/13

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS). The Remedy-produced Water Conditioning Plant (RTP) will treat the water produced by the groundwater remedy prior to re-use or re-injection onsite.

The objective of this Standard Operating Procedure (SOP) is to describe the procedures for (a.) starting up the RTP after a short-term shutdown and (b.) shutting down the RTP for a short term.

2 Drawing Numbers

- Influent Tanks 1 through 4, Instrumentation: I-11-01 through I-11-04
- Filter Systems A and B Side, Instrumentation: I-12-01 and I-12-02
- Remedy-produced Water Conditioning Systems, Instrumentation: I-12-03 and I-12-04
- Air Compressor and seal water system, Instrumentation: I-12-05
- Conditioned Water Storage Tanks, Instrumentation: I-14-01 and I-14-02

3 Equipment List

- Health and Safety Plan

4 Preconditions

a. System startup:

- Operators should have system training and operating experience before attempting a system startup.
- Power has been restored (if startup is occurring after a power outage).
- All master control center (MCC) breakers are energized except the "Spare Starter" and "Spare Breaker."

b. System shutdown:

- Operators should have system training and operating experience before attempting a system shutdown.
- The daily scheduled backwash and treatment processes are complete, or it is otherwise necessary to manually shutdown the RTP.

5 Procedure

a. System startup:

1. Go to HMI in the Office/Sample Room on the second floor of the Plant.
2. Ensure that the HVAC unit is ON.
3. Confirm the air compressor CMP-101 and air dryer/filter X-102 are ON.
4. Confirm that seal water package system is ON.
5. Switch Influent Tank 1 recirculation pump PMP-201 to AUTO.
6. Switch Influent Tank 2 recirculation pump PMP-202 to AUTO.
7. Switch Influent Tank 3 recirculation pump PMP-203 to AUTO.
8. Switch Influent Tank 4 recirculation pump PMP-204 to AUTO.
9. Switch A Side filter feed pumps PMP-310 and PMP-320 to AUTO.
10. Switch B Side filter feed pumps PMP-330 and PMP-340 to AUTO.
11. Enable chemicals feed pumps:
    - Caustic feed pumps, PMP-911 and PMP-912
    - Coagulant feed pumps, PMP-921 and PMP-922
    - Acid feed pumps PMP-931 and PMP-932
12. Switch conditioned water transfer pumps PMP-405 and PMP-406 to AUTO.
13. Switch truck fill pump PMP-501 to AUTO.

b. System shutdown:

1. Go to HMI in the Office/Sample Room on the second floor of the Plant.
2. Switch Influent Tank 1 recirculation pump PMP-201 to OFF.
3. Switch Influent Tank 2 recirculation pump PMP-202 to OFF.
4. Switch Influent Tank 3 recirculation pump PMP-203 to OFF.
5. Switch Influent Tank 4 recirculation pump PMP-204 to OFF.
6. Switch A Side filter feed pumps PMP-310 and PMP-320 to OFF.
7. Switch B Side filter feed pumps PMP-330 and PMP-340 to OFF.
14. Disable chemicals feed pumps:
    - Caustic feed pumps, PMP-911 and PMP-912
    - Coagulant feed pumps, PMP-921 and PMP-922
    - Acid feed pumps PMP-931 and PMP-932
8. Switch conditioned water transfer pumps PMP-405 and PMP-406 to OFF.
9. Switch truck fill pump PMP-501 to OFF.

Standard Operating Procedure
PG&E Topock Remedy-Produced Water Conditioning Plant Operation and Maintenance Plan

Title: Off-site Trucking of Remedy-produced Water

Number: RTP-SOP-08_Rev0

Created Date: 2/13/14

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS). The Remedy-produced Water Conditioning Plant (RTP) will treat the water produced by the groundwater remedy prior to re-use or re-injection onsite.

The objective of this Standard Operating Procedure (SOP) is to describe the procedures for transferring conditioned water to the TCS truck fill station for off-site trucking

This procedure is controlled both manually and through the SCADA/HMI.

If question/concerns arise throughout the procedure, contact the Maintenance Supervisor to determine how to proceed.

2 Drawing Numbers

- Conditioned Water B-Side, Instrumentation: I-14-02

3 Equipment List

- Appropriate personal protective equipment (PPE)
- Health and Safety Plan
- Safety cones
- 5-gallon bucket

4 Preconditions

- B-Side conditioned water storage tank (TNK-510) water level is above the low-level set point (LSL-551).

5 Procedure

1. Be aware that you are working around large equipment with limited visibility. You must make sure that the driver sees you and knows what you intend to do. DO NOT put yourself in a position where you can get crushed or pinched.

2. Prepare loading site:
   a. Adjust containment pad so that when trailer tandems are at the front lip of the pad the loading hose will lie within the rear area of the containment pad.
   b. Confirm that all the adapters are present and that the loading hose is properly stored and not in the path of the trucks as they enter the loading area.
   c. Confirm that the safety cones are in place at the north end of the containment pad (where the truck will be entering) and that you have a 5-gallon bucket to place under the trailer's drip tray valves.
3. Stage truck on the containment pad:
   a. As the truck moves to the loading area, the operator directs the truck driver for the placement of the truck on the containment pad.
      i. The operator is to use hand signals to stop the truck when the front trailer axle is at the south end of the containment pad (opposite of the entrance). This assures enough room in the containment pad behind the trailer to catch any minor spills. This also provides enough room for the hose to be in the containment pad in case it is dropped during connecting or disconnecting to the trailer.
   b. Check that the driver has a valid license and appropriate credentials.
   c. Check that the driver has completed a pre-trip inspection on the truck and trailer.
   d. Check that the driver currently driving the truck is the same driver who performed the pre-trip inspection.

      Note: If there are any discrepancies in steps 3.b, 3.c and 3.d please contact the Project Manger before proceeding.
   e. Allow the driver to hook up to the load-out hose.

      Note: The driver is responsible for:
      i. Attaching the load-out hose to the truck.
      ii. Making sure the truck tank is vented.
      iii. Determining how many gallons are to be loaded.
      iv. Disconnecting the load-out hose.
      v. Operating the load valve on the truck.

      The operator is responsible for:
      i. All valves upstream of the load-out hose.
      ii. Operating the load-out pump.
      iii. Telling the driver how many gallons have been loaded.
4. Select tank and activate pump:
   a. Confirm using the HMI that the conditioned storage water tank (TNK-510) is in appropriate condition to discharge.
   b. Write the beginning totalizer reading on the shipping documentation.
   c. Confirm with the driver that the line isolation valves are properly positioned before opening tank valves.
   d. Open the manual valve upstream of the TCS Truck Fill Pump (V-501A).

e. Open the manual valve downstream of the TCS Truck Fill Pump (V-510C).

f. Double check truck valves and vents and confirm with the driver that the truck is ready to receive water before opening load-out hose supply valve (remember that water may gravity-flow out of the hose even if the pump is off).

g. Open the load supply valve.

h. Turn on the truck fill/transfer pump PMP-501 by turning the hand switch HC-502 to ON.

i. The truck fill/transfer pump will draw from the conditioned water storage tank (TNK-510).

j. During the pumping operation the operator must stay in the load control area and the driver must stay by the trailer valve.

k. There are numerous ways the drivers use to load their trucks to the legal limits. This means that the operator and the driver need to work together to assure that the truck goes out properly loaded.

l. When the truck is loaded, first turn off the transfer pump PMP-501 by turning the hand switch HC-502 to OFF. Then close the load supply valve.

m. The driver will close the trailer valve.

5. Disconnect the hose from trailer valve:

   a. Confirm that the 5-gallon bucket is under drip tray valve and drip tray valve is open.

   b. The operator will disconnect the load-out hose.

   c. Hang the hose on the storage hook, remove any adapters used and replace trailer valve cap or plug.

   d. Close drip tray valve and remove 5-gallon bucket from under drip tray.

6. Fill out shipping documentation and record the load:

   a. Write the ending totalizer reading on the shipping documentation.

   b. Confirm that you and the driver have filled out and signed appropriate forms and that the shipping documentation has been properly filled in and the shipping documentation number recorded.

   c. Confirm that you and the driver have signed the shipping documentation and give the driver their copies.

7. Shutdown after loading is completed:

   a. Work with the driver to inspect that the truck is in a safe condition and that it is not overweight.

   b. Instruct the driver to exit the decontamination pad in the eastbound direction. Assist the truck driver with exiting the decontamination pad.

   c. Adjust placement of containment pad in the loading area if it has slipped during the loading operation.

   d. Empty the 5-gallon buckets into the decontamination pad secondary containment trench.

   e. Take all paperwork to office and file in the appropriate place.

Standard Operating Procedure

PG&E Topock Remedy-produced Water Conditioning Plant Operation and Maintenance Plan

Title: Disposal of Produced Water in Evaporation Ponds via the TCS Waste Water Tank

Number: RTP-SOP-10_Rev0

Created Date: 2/24/14

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS). The Remedy-produced Water Conditioning Plant (RTP) will treat the water produced by the groundwater remedy prior to re-use or re-injection onsite.

The objective of this Standard Operating Procedure (SOP) is to describe the procedures for transferring water from the following locations to the evaporation ponds:

a. Unconditioned water from the Remedy A-Side
b. Conditioned water from the Remedy A-Side
c. Liquids/solids from Influent Tank Farm secondary containment
d. Liquids/solids from A-Side Conditioned Water Storage Tank Farm secondary containment

This procedure will require coordination with TCS Operations. Permission to transfer a specific quantity of water must be approved by TCS and steps must be taken to assure that only the specific quantity of water is transferred.

The water transferred to the evaporation ponds first goes to the TCS waste water tank, and the TCS waste water pump automatically transfers water from the TCS waste water tank to the evaporation ponds based on the level in the waste water tank. This procedure is controlled manually and through the SCADA/HMI.

2 Drawing Numbers

- Influent Tanks 1 through 4, Instrumentation: I-11-01 through I-11-04
- Filter System A-Side, Instrumentation: I-12-01
- Conditioned Water Storage Tanks, Instrumentation: I-14-01 and I-14-02

3 Equipment List

- Appropriate personal protective equipment (PPE)
- May also require handheld pH and conductivity meters

4 Preconditions

a. Unconditioned water from the Remedy A-side:

- PG&E has instructed for unconditioned water to be sent from the Remedy A-side to the evaporation ponds via the TCS waste water tank.
- Designated influent tank(s) (TNK-201; TNK-202; TNK-203; TNK-204) water level is full or backwash pumps have completed their designated cycles.

b. Conditioned water from the Remedy A-side Conditioned Water Tank Farm:

- PG&E has instructed for water to be sent from the Remedy A-side conditioned water storage tanks (TNK-401; TNK-402) to evaporation ponds via the TCS waste water tank.
- Designated Remedy A-side conditioned water storage tank(s) water level(s) are above the low-level set point (LSL-451; LSL-453).

c. Liquids/solids from Influent Tank Farm secondary containment:

- PG&E has instructed for water to be sent from the Influent Tank Farm secondary containment to evaporation ponds via the TCS waste water tank.
- There are liquids/solids in the Influent Tank Farm sump.
- The manual valves are configured to pump liquids/solids to the influent tanks.

d. Liquids/solids from A-side Conditioned Water Storage Tank Farm secondary containment:

- PG&E has instructed for water to be sent from Conditioned Water Storage Tank Farm A-side secondary containment to evaporation ponds via the TCS waste water tank.
- There are liquids/solids in the Conditioned Water Storage Tank Farm sump.
- The manual valves are configured to pump liquids/solids to the Influent Tank Farm sump.

5 Procedure

a. Transferring unconditioned water from the Remedy A-side to evaporation ponds via the TCS waste water tank:

1. Notify and coordinate with TCS Operations before water is transferred. Confirm the allowable flow rate and allowable volume of liquid that may be transferred to the TCS waste water tank.
2. Use the HMI to turn off the primary filter feed pump on the filter system A-side (PMP-310 or PMP-320).
3. Ensure the manual valve V-310F is closed.
4. Close the manual valve upstream of the primary coarse cartridge filter (V-311A or V-321A).
5. Open the normally closed (NC) manual valve downstream of the primary filter feed pump that routes liquids/solids to the TCS waste water tank (V-310E or V-320E).
6. Use the HMI to program the primary filter feed pump (PMP-310 or PMP-320) to transfer only the volume of water determined in step 1 to the TCS waste water tank.
7. Use the HMI to turn on the primary filter feed pump (PMP-310 or PMP-320). Use the speed command to adjust the flow rate to the allowable flow rate determined in step a.1.
8. The filter feed pump will move water to the TCS waste water tank when the second Precondition is met.

9. The filter feed pump will turn off when the volume of water to be transferred that was programmed in step a.6 is reached.
10. Close the NC manual valve downstream of the primary filter feed pump that routes liquids/solids to the TCS waste water tank (V-310E or V-320E).
11. If necessary for the current filter process configuration, open the manual valve V-310F.
12. Open the manual valve upstream of the primary coarse cartridge filter (V-311A or V-321A).
13. Use the speed command on the HMI to adjust the flow rate of the primary filter feed pump back to its initial flow rate (prior to step a.4).
14. Use the HMI to return the primary filter feed pump on the filter system A-side (PMP-310 or PMP-320) to the regular Backwash Schedule, unless otherwise instructed.

b. Transferring conditioned water from the Remedy A-side Conditioned Water Tank Farm to evaporation ponds via the TCS waste water tank:

1. Notify and coordinate with TCS Operations before water is transferred. Confirm the allowable flow rate and allowable volume of liquid that may be transferred to the TCS waste water tank.
2. Use the HMI to turn off the conditioned water transfer pump (PMP-405 or PMP-406).
3. Use the HMI to close XV-416.
4. Use the HMI to open XV-415, which allows water to be transferred to the TCS waste water tank.
5. Use the HMI to program the conditioned water transfer pump (PMP-405 or PMP-406) to transfer only the volume of water determined in step b.1 to the TCS waste water tank.
6. The conditioned water transfer pump (PMP-405 or PMP-406) will move water to the TCS waste water tank when the Preconditions are met. The volume of water transferred can be monitored using the flow meter FM-471.
7. The conditioned water transfer pump will turn off when the volume of water to be transferred that was programmed in step b.5 is reached.
8. Use the HMI to close XV-415.
9. Use the HMI to open XV-416 so that water will be transferred to the T-720 conditioned water frac tank, unless otherwise instructed.
10. Use the HMI to return the conditioned water transfer pumps on the filter system A-side (PMP-310 or PMP-320) to the regular Backwash Schedule, unless otherwise instructed.

c. Transferring liquids/solids from the Influent Tank Farm secondary containment to evaporation ponds via the TCS waste water tank:

1. Notify and coordinate with TCS Operations before water is transferred. Confirm the allowable flow rate and allowable volume of liquid that may be transferred to the TCS waste water tank.
2. Open manual valve V-205C and then close manual valve V-205A.
3. Plug in sump pump PMP-205. Keep track of the volume of liquids/solids transferred to the TCS waste water tank using the flow meter FM-271.
4. When the maximum allowable volume determined in step c.1 has been reached **or** all liquids/solids in the sump have been pumped before the maximum allowable volume has been reached, unplug the sump pump.
5. Open manual valve V-205A and then close manual valve V-205C.

d. Transferring conditioned water from the Conditioned Water Storage Tank Farm A-side secondary containment to evaporation ponds via the TCS waste water tank:

   1. Notify and coordinate with TCS Operations before water is transferred. Confirm the allowable flow rate and allowable volume of liquid that may be transferred to the TCS waste water tank.
   2. Open manual valve V-407D and then close manual valve V-407B.
   3. Plug in PMP-407 at the outlet. Keep track of the volume of liquids/solids transferred to the TCS waste water tank using the flow meter FM-472.
   4. When the maximum allowable volume determined in step e.1 has been reached **or** all liquids/solids in the sump have been pumped before the maximum allowable volume has been reached, unplug the sump pump.
   5. Open manual valve V-407B and then close manual valve V-407D.

Standard Operating Procedure
PG&E Topock IRZ
Operation and Maintenance Plan

Title: MW-20 Bench System Startup (NTH IRZ and IRL)
Number: IRZ-SOP-01_Rev0

Creation Date: 9/8/2014

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedures for startup of the National Trails Highwah (NTH) In-Situ Reactive Zone (IRZ) and the Inner Recirculation Loop (IRL) extraction and injection well recirculation systems. The NTH IRZ consists of four extraction wells and up to 24 injection wells, while the IRL consists of five River Bank extraction wells and four Inner Recirculation Loop injection wells. Below-grade piping networks allow for the conveyance of extracted groundwater, carbon-amended water, and fresh water between extraction wells, the MW-20 Bench, and injection wells. Ethanol dosing facilities for the NTH IRZ and IRL are located at the MW-20 Bench with dosing procedures outlined in IRZ-SOP-06.

2 Drawing Numbers

- I-04-01: IRZ Single Screen NTH IRZ Extraction Wells P&ID
- I-04-02: IRZ Dual Screen NTH IRZ Extraction Wells P&ID
- I-04-03: IRZ Single Screen NTH IRZ Injection Wells P&ID
- I-04-04: IRZ Dual Screen NTH IRZ Injection Wells P&ID
- I-04-05: IRZ Dual Screen Cluster NTH IRZ Injection Wells P&ID Sheet 1 of 2
- I-04-06: IRZ Dual Screen Cluster NTH IRZ Injection Wells P&ID Sheet 2 of 2
- I-05-01: Inner Recirculation Loop Extraction Wells P&ID
- I-05-02: Inner Recirculation Loop Injection Wells Type 1 P&ID
- I-05-03: Inner Recirculation Loop Injection Wells Type 2 P&ID
- I-06-01: MW-20 Bench Carbon Amendment Building P&ID Sheet 1 of 4
- I-06-02: MW-20 Bench Carbon Amendment Building P&ID Sheet 2 of 4
- M-04-03: IRZ Single Screen Extraction Well Vault Mechanical Details
- M-04-04: IRZ Dual Screen Extraction Well Vault Mechanical Details
- M-04-05: IRZ Single Screen Injection Well Vaults Mechanical Details

- M-04-06: IRZ Dual Screen Injection Well Vaults Mechanical Details
- M-04-07: IRZ Dual Screen Injection Well Vaults Mechanical Sections
- M-04-08: IRZ Dual Screen Cluster Injection Well Vaults Mechanical Details
- M-04-09: IRZ Dual Screen Cluster Injection Well Vaults Mechanical Sections
- M-05-05: Inner Recirculation Loop Injection Well Vault Type 1 Mechanical Details
- M-05-06: Inner Recirculation Loop Injection Well Vault Type 1 Mechanical Sections
- M-05-07: Inner Recirculation Loop Injection Well Vault Type 2 Mechanical Details
- M-05-08: Inner Recirculation Loop Injection Well Vault Type 2 Mechanical Sections

3 Equipment

- Appropriate PPE
- Health and Safety Plan
- Ethanol spill kit
- Fire extinguisher
- Eyewash supplies and safety shower

4 Procedure

1. Prefield Meeting
   - 1.1 Confirm with Maintenance Supervisor which injection and extraction wells are desired to operate
2. Pre-startup human machine interface (HMI) checks
   - 2.1 Check system alarm status on HMI
     - 2.1.1 Select “ALARMS” tab on HMI
     - 2.1.2 Verify if any alarm condition extist
       1. Document any alarm conditions in the checklist if they exist
   - 2.2 Call Maintenance Supervisor or Project Engineer if any alarms are active
   - 2.3 Select the “Injection Well” tab on the HMI to view the NTH IRZ and IRL injection well valve positions
     - 2.3.1 Place desired wells to operate in “AUTO” position (this will not open the valves at this point)
   - 2.4 Select the “Extraction Well” tab on the HMI to view the extraction well valve positions
     - 2.4.1 Place desired wells to operate in “AUTO” position (this will not activate the pumps)
3. System startup
   - 3.1 Select the “SYSTEM” tab on the HMI screen
   - 3.2 Initiate recirculation by pressing “STARTUP”. Injection wells will open first followed by startup of extraction wells

4. Post-startup HMI checks

4.1 Confirm and record proper operating parameters

4.1.1 MW-20 Bench IRZ extraction header pressures. Record pressures on tablet

1. PIT-*762
2. PIT-*763

4.1.2 NTH IRZ

1. Extraction well flow rate (FIT-*570A, FIT-*571A, FIT-*571B). Record flow rates on tablet
2. Extraction well water level (PT-*560B, PT-*561B, PT-*561C). Record water levels on tablet
3. Injection well flow rate (FIT-*572A, FIT-*573A, FIT-*573B, FIT-*574A, FIT-*574B, FIT-*575A, FIT-*575B). Record flow rates on tablet
4. Injection well water levels (PT-*562E, PT-*563H, PT-*563I, PT-*564H, PT-*564I, PT-*565H, PT-*565I) . Record water levels on tablet

4.1.3 IRL

1. Extraction well flow rate (FIT-*670A) . Record flow rates on tablet
2. Extraction well water level (PT-*660B). Record water levels on tablet
3. Injection well flow rate (FIT-*671A). Record flow rates on tablet
4. Injection well water levels (PT-*661E) . Record water levels on tablet

4.2 Call Project Engineer if any equipment is operating outside of acceptable range (PLC and tablet will provide warnings if a parameter is out of range)

5. Post-startup manual system checks

5.1 Confirm and record proper operating parameters

5.1.1 MW-20 Bench IRZ injection header pressures. Record pressures on tablet

1. PI-*760A
2. PI-*760B
3. PI-*760C

5.2 Check piping for any leaks within the MW-20 Bench carbon amendment building

Standard Operating Procedure
PG&E Topock IRZ
Operation and Maintenance Plan

Title: MW-20 Bench System Shutdown/Emergency Shutdown (NTH IRZ and IRL)

Number: IRZ-SOP-02_Rev0

Creation Date: 9/8/2014

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedures for normal shutdown along with emergency shutdown of the MW-20 Bench System, which includes the National Trails Highwah (NTH) In-Situ Reactive Zone (IRZ) and the Inner Recirculation Loop (IRL) recirculation systems. The NTH IRZ consists of four extraction wells and up to 24 injection wells, while the IRL consists of five River Bank extraction wells and four Inner Recirculation Loop injection wells. Ethanol dosing facilities for the NTH IRZ and IRL are located at the MW-20 Bench. Below-grade piping networks allow for the conveyance of extracted groundwater, carbon-amended water, and fresh water between extraction wells, the MW-20 Bench, and injection wells. The following SOP provides procedures for shutdown of the system along with subsequence checks to verify system parameters are in safe conditions. In the event of an emergency system shutdown it is important to keep human health and safety as the top priority. The system E-Stop should be engaged and then the environment should be deemed safe prior to continuance of procedures. If an unsafe circumstance remains go to a safe location and contact the project engineer.

2 Drawing Numbers

- I-04-01: IRZ Single Screen Extraction Wells P&ID
- I-04-02: IRZ Dual Screen Extraction Wells P&ID
- I-04-03: IRZ Single Screen Injection Wells P&ID
- I-04-04: IRZ Dual Screen Injection Wells P&ID
- I-04-05: IRZ Dual Screen Cluster Injection Wells P&ID Sheet 1 of 2
- I-04-06: IRZ Dual Screen Cluster Injection Wells P&ID Sheet 2 of 2
- I-05-01: Inner Recirculation Loop Extraction Wells P&ID
- I-05-02: Inner Recirculation Loop Injection Wells Type 1 P&ID
- I-05-03: Inner Recirculation Loop Injection Wells Type 2 P&ID
- I-06-01: MW-20 Bench Carbon Amendment Building P&ID Sheet 1 of 4

- I-06-02: MW-20 Bench Carbon Amendment Building P&ID Sheet 2 of 4
- I-06-03: MW-20 Bench Carbon Amendment Building P&ID Sheet 3 of 4
- I-06-04: MW-20 Bench Carbon Amendment Building P&ID Sheet 4 of 4
- M-04-05: IRZ Single Screen Injection Well Vaults Mechanical Details
- M-04-06: IRZ Dual Screen Injection Well Vaults Mechanical Details
- M-04-07: IRZ Dual Screen Injection Well Vaults Mechanical Sections
- M-04-08: IRZ Dual Screen Cluster Injection Well Vaults Mechanical Details
- M-04-09: IRZ Dual Screen Cluster Injection Well Vaults Mechanical Sections
- M-05-05: Inner Recirculation Loop Injection Well Vault Type 1 Mechanical Details
- M-05-06: Inner Recirculation Loop Injection Well Vault Type 1 Mechanical Sections
- M-05-07: Inner Recirculation Loop Injection Well Vault Type 2 Mechanical Details
- M-05-08: Inner Recirculation Loop Injection Well Vault Type 2 Mechanical Sections

3 Equipment

- Appropriate PPE
- Health and Safety Plan
- Ethanol spill kit
- Fire extinguisher
- Eyewash supplies and safety shower

4 Procedure

Routine Shutdown Procedures

1. Pre-shutdown human machine interface (HMI) checks
   - 1.1 Check system alarm status on HMI
     - 1.1.1 Select “ALARMS” tab on HMI
     - 1.1.2 Verify if any alarm conditions exist
       1. Document any alarm conditions in the checklist
       2. Troubleshoot any alarms
       3. Call Maintenance Supervisor or Project Engineer if alarms cannot be readily addressed
2. System shutdown
   - 2.1 Scroll to the “SYSTEM” tab on the HMI
   - 2.2 Initiate shutdown by pressing “SYSTEM SHUTDOWN”
   - 2.3 Verify that operating equipment on the HMI process flow diagram graphic visually turns from green (operating) to red (inactive)

2.3.1 Red (inactive) equipment to note

1. Pump PMP-*740
2. Pump PMP-*741
3. Pump PMP-*742
4. FV-*711 (located downstream of Tank *T701) should be closed
5. FV-*712 (located downstream of Pump PMP-*740) should be closed
6. FV-*713 (located downstream of Pump PMP-*741) should be closed
7. FV-*714 (located downstream of Pump PMP-*742) should be closed
8. FV-*715 (located on ethanol conveyance line upstream of the with IRL Injection Header) should be closed
9. FV-*716 (located on ethanol conveyance line upstream of tee with North NTH IRZ Injection Header Leg IRZ 1-22) should be closed
10. FV-*717 (located on ethanol conveyance line upstream of tee with South NTH IRZ Injection Header Leg IRZ 24-40) should be closed
11. FV-*504, FV-*508, FV-*509, FV-*514, FV-*515, FV-*516, FV-*517, FV-*604, and FV-*605 (located in NTH IRZ and IRL injection meter vaults) should be closed
12. FV-*608 (located on IRL injection well ASR Pump Package backwash lines) should be closed

3. Post-shutdown human machine interface (HMI) checks

3.1 Check system flow rates

3.1.1 NTH IRZ

1. Extraction well flow rate (FIT-*570A, FIT-*571A, FIT-*571B): 0 gallons per minute (gpm) per well
2. Injection well flow rate (FIT-*572A, FIT-*573A, FIT-*573B, FIT-*574A, FIT-*574B, FIT-*575A, FIT-*575B): 0 gpm per well

3.1.2 IRL

1. Extraction well flow rate (FIT-*670A): 0 gpm per well
2. Injection well flow rate (FIT-*671A): 0 gpm per well

3.1.3 Carbon Amendment Building

1. Carbon substrate hose pump PMP-*740 flow rate (FIT-*771): 0 gpm
2. Carbon substrate hose pump PMP-*741 flow rate (FIT-*775): 0 gpm
3. Carbon substrate hose pump PMP-*742 flow rate (FIT-*776): 0 gpm
4. River bank extraction well header flow rate (FIT-*772): 0 gpm
5. IRZ-23 well and Northern NTH IRZ extraction network header well flow rate (FIT-*773 and FIT-*774): 0 gpm

3.2 Call Maintenance Supervisor or Project Engineer if any detectable flow rate is still observed following shutdown

4. Post-shutdown manual system checks

4.1 Record system pressures – Verify MW-20 Bench System pressures are 0 pounds per square inch (psi). Notify project engineer if system pressures above 5 psi remain in section of the piping

4.1.1 Injection header pressure

1. PI-*760A
2. PI-*760B
3. PI-*760C

4.1.2 Extraction header pressure

1. PIT-*762
2. PIT-*763

4.2 Check piping for any leaks

Emergency System Shutdown

Note: Human health and safety is the first priority in any emergency situation.

1. System shutdown

1.1 Hit the E-Stop Button

1.1.1 Locations

1. Exterior of the IRZ Carbon Amendment Building
2. On the control panel in the electrical and control room of the IRZ Carbon Amendment Building

1.2 Determine if the emergency condition has been mitigated

1.2.1 If yes procede to Step 2

1.2.2 If no, locate yourself to a safe area and call the Maintenance Supervisor or Project Engineer

2. System shutdown verification

2.1 Verify that operating equipment on the HMI process flow diagram graphic visually turned from green (operating) to red (inactive)

2.1.1 Pump PMP-*740

2.1.2 Pump PMP-*P741

2.1.3 Pump PMP-*P742

2.1.4 FV-*711 (located downstream of Tank TNK-*701) should be closed

2.1.5 FV-*712 (located downstream of Pump PMP-*740) should be closed

2.1.6 FV-*713 (located downstream of Pump PMP-*741) should be closed

2.1.7 FV-*714 (located downstream of Pump PMP-*742) should be closed

2.1.8 FV-*715 (located on ethanol conveyance line upstream of the with IRL Injection Header) should be closed

2.1.9 FV-*716 (located on ethanol conveyance line upstream of tee with North NTH IRZ Injection Header Leg IRZ 1-22) should be closed

2.1.10 FV-*717 (located on ethanol conveyance line upstream of tee with South NTH IRZ Injection Header Leg IRZ 24-40) should be closed

2.1.11 FV-*504, FV-*508, FV-*509, FV-*514, FV-*515, FV-*516, FV-*517, FV-*604, and FV-*605 (located in NTH IRZ and IRL injection meter vaults) should be closed

2.1.12 FV-*608 (located on IRL injection well ASR Pump Package backwash lines) should be closed

3. Post-shutdown human machine interface (HMI) checks

3.1 System flow rates

3.1.1 NTH IRZ

1. Extraction well flow rate (FIT-*570A, FIT-*571A, FIT-*571B): 0 gallons per minute (gpm) per well
2. Injection well flow rate (FIT-*572A, FIT-*573A, FIT-*573B, FIT-*574A, FIT-*574B, FIT-*575A, FIT-*575B): 0 gpm per well

3.1.2 IRL

1. Extraction well flow rate (FIT-*670A): 0 gpm per well
2. Injection well flow rate (FIT-*671A): 0 gpm per well

3.1.3 Carbon Amendment Building

1. Carbon substrate hose pump PMP-*740 flow rate (FIT-*771): 0 gpm
2. Carbon substrate hose pump PMP-*741 flow rate (FIT-*775): 0 gpm
3. Carbon substrate hose pump PMP-*742 flow rate (FIT-*776): 0 gpm
4. River bank extraction well header flow rate (FIT-*772): 0 gpm
5. IRZ-23 well and Northern NTH IRZ extraction network header well flow rate (FIT-*773 and FIT-*774): 0 gpm

3.1.4 Call Maintenance Supervisor or Project Engineer if any detectable flow rate is still observed following shutdown

4. Post-shutdown manual system checks

4.1 Record system pressures – Verify MW-20 Bench System pressures are 0 psi. Notify project engineer if system pressures above 5 psi remain in section of the piping

4.1.1 Injection header pressure

1. PI-*760A
2. PI-*760B
3. PI-*760C

4.1.2 Extraction header pressure

1. PIT-*762
2. PIT-*763
3. PIT-*764

4.2 Check piping for any leaks

Standard Operating Procedure
PG&E Topock IRZ
Operation and Maintenance Plan

Title: Transwestern Bench System Startup (TCS Loop)

Number: IRZ-SOP-03_Rev0

Creation Date: 9/8/2014

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedures for startup of the TCS recirculation loop extraction and injection well recirculation systems. The TCS loop consists of two Transwestern (TW) Bench extraction wells, two provisional TW Bench extraction wells, five East Ravine extraction wells, 6 provisional East Ravine extraction wells, and two TCS injection wells. Below-grade piping networks allow for the conveyance of extracted groundwater, carbon-amended water, and fresh water between extraction wells, the TW Bench, and injection wells. Ethanol dosing facilities for the TCS loop wells are located at the TW Bench with dosing procedures outlined in IRZ-SOP-06.

2 Drawing Numbers

- I-03-01: TCS Loop East Ravine Extraction Wells P&ID
- I-03-02: TCS Loop Transwestern Bench Extraction Wells P&ID
- I-03-03: TCS Injection Wells P&ID
- I-08-01: TW Bench Carbon Amendment Buliding P&ID Sheet 1 of 2
- I-08-02: TW Bench Carbon Amendment Buliding P&ID Sheet 2 of 2
- M-03-03: TCS Loop Extraction Well Vault Mechanical Details
- M-03-04: TCS Loop Injection Well Vault Mechanical Details Sheet 1 of 2
- M-03-05: TCS Loop Injection Well Vault Mechanical Details Sheet 2 of 2

3 Equipment

- Appropriate PPE
- Health and Safety Plan
- Ethanol spill kit
- Fire extinguisher

- Eyewash supplies and safety shower

4 Procedure

1. Prefield meeting
   - 1.1 Confirm with Maintenance Supervisor which injection and extraction wells are desired to operate
2. Pre-startup human machine interface (HMI) checks
   - 2.1 Check system alarm status on HMI
     - 2.1.1 Select “ALARMS” tab on HMI
     - 2.1.2 Verify if any alarm condition extist
       1. Document any alarm conditions in the checklist if they exist
       2. Troubleshoot any alarms that are active
   - 2.2 Call Maintenance Supervisor or Project Engineer if alarms cannot be readily addressed
   - 2.3 Select the “Injection Well” tab on the HMI to view the TCS well valve positions
     - 2.3.1 Place desired wells to operate in “AUTO” position (this will not open the valves at this point)
   - 2.4 Select the “Injection Well” tab on the HMI to view the extraction well valve positions
     - 2.4.1 Place desired wells to operate in “AUTO” position (this will not activate the pumps)
3. System startup
   - 3.1 Select the “SYSTEM” tab on the HMI screen
   - 3.2 Initiate recirculation by pressing “STARTUP”. Injection wells will open first followed by startup of extraction wells
4. Post-startup HMI checks
   - 4.1 Confirm and record proper operating parameters
     - 4.1.1 TW Bench IRZ extraction header pressures. Record pressures on tablet
       1. PIT-*963
       2. PIT-*964
       3. PIT-*965
     - 4.1.2 TCS Loop
       1. Extraction well flow rate (FIT-*470A and FIT-*471A). Record flow rates on tablet
       2. Extraction well water level (PT-*460B and PT-*461B). Record water levels on tablet
       3. Injection well flow rate (FIT-*472A and FIT-*472B). Record flow rates on tablet
       4. Injection well water levels (PT-* 462E and PT-* 462F) . Record water levels on tablet
   - 4.2 Call Maintenance Supervisor or Project Engineer if any equipment is operating outside of acceptable range (tablet will provide a warning if a parameter is out of range)

5. Post-startup manual system checks

5.1 Confirm and record proper operating parameters

5.1.1 TW Bench IRZ injection header pressure. Record pressure on tablet

1. PI-*960A

5.2 Check piping for any leaks within the TW Bench carbon amendment building

Standard Operating Procedure
PG&E Topock IRZ
Operation and Maintenance Plan

Title: Transwestern Bench System Shutdown/Emergency Shutdown (TCS Recirculation Loop)

Number: IRZ-SOP-04_Rev0

Creation Date: 9/8/2014

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedures for normal shutdown along with emergency shutdown (E-Stop) of the Transwestern (TW) Bench System which includes the Topock Compressor Station (TCS) recirculation loop. The TCS loop consists of two Transwestern Bench extraction wells, two provisional Transwestern Bench extraction wells, five East Ravine extraction wells, 6 provisional East Ravine extraction wells, and two TCS injection wells. Ethanol dosing facilities for the TCS recirculation loop are located at the TW Bench. Below-grade piping networks allow for the conveyance of extracted groundwater, carbon-amended water, and fresh water between extraction wells, the Transwestern Bench, and injection wells. In the event of an emergency system shutdown, it is important to keep human health and safety as the top priority. The system E-Stop should be engaged and then the environment should be deemed safe prior restarting operation of the TW Bench System. If an unsafe circumstance remains go to a safe location and contact the project engineer.

2 Drawing Numbers

- I-03-01: TCS Loop East Ravine Extraction Wells P&ID
- I-03-02: TCS Loop East Transwestern Bench Extraction Wells P&ID
- I-03-03: TCS Loop Injection Wells P&ID
- I-08-01: Transwestern Bench Carbon Amendment Buliding P&ID Sheet 1 of 2
- I-08-02: Transwestern Bench Carbon Amendment Buliding P&ID Sheet 2 of 2
- M-03-03: TCS Loop Extraction Well Vaults Mechanical Details
- M-03-04: TCS Loop Injection Well Vaults Mechanical Details Sheet 1 of 2
- M-03-05: TCS Loop Injection Well Vaults Mechanical Details Sheet 2 of 2

3 Equipment

- Appropriate PPE

- Health and Safety Plan
- Ethanol spill kit
- Fire extinguisher
- Eyewash supplies and safety shower

4 Procedure

Routine Shutdown Procedures

1. Pre-shutdown human machine interface (HMI) checks
   - 1.1 Check system alarm status on HMI
     - 1.1.1 Select “ALARMS” tab on HMI
     - 1.1.2 Verify if any alarm condition extist
       1. Document any alarm conditions in the checklist if they exist
       2. Troubleshoot any alarms that are active
   - 1.2 Call Maintenance Supervisor or Project Engineer if alarms cannot be readily addressed
2. System shutdown
   - 2.1 Select “SYSTEM” tab on the HMI
   - 2.2 Initiate shutdown by pressing “SYSTEM SHUTDOWN”
   - 2.3 Verify that operating equipment on the HMI process flow diagram graphic visually turns from green (operating) to red (inactive)
     - 2.3.1 Red (inactive) equipment to note
       1. Pump PMP-*940
       2. Pump PMP-*941
       3. FV-*919 (located downstream of Tank TNK-*901) closed
       4. FV-*920 (located downstream of Pump PMP-*940) closed
       5. FV-*921 (located downstream of Pump PMP-*941) closed
       6. FV-*407 and FV-*408 (flow control valves located in the injection well meter vaults) closed
3. Post-shutdown human machine interface(HMI) checks
   - 3.1 Check system flow rates
     - 3.1.1 Carbon amendment system
       1. Carbon substrate combined flow rate (FIT-*973): 0 gallons per minute (gpm) total
       2. Combined extraction flow rate (FIT-*970): 0 gpm total
     - 3.1.2 Extraction Wells
       1. Extraction well flow rate (FIT-*470A, FIT-*471A): 0 gpm total
     - 3.1.3 Injection Wells

1. Injection well flow rate (FIT-*472A, FIT-*472B): 0 gpm total. Check actuated flow control valve positions

3.2 Call Maintenance Supervisor or Project Engineer if any detectable flow rate is still observed following shutdown

4. Post-shutdown manual system checks

4.1 Record system pressures – Verify TW Bench System pressures are 0 pounds per square inch (psi). Notify Maintenance Supervisor or Project Engineer if system pressures above 5 psi remain in section of the piping

4.1.1 Transwestern Bench

1. Injection header pressure PI-*960A
2. TW Bench extraction well network header PIT-*963
3. East Ravine extraction well network header PIT-*964
4. Supplimental flow TW Bench header PIT-*965

4.2 Check piping for any leaks

Emergency System Shutdown

Note: Human health and safety is the first priority in an emergency situation.

1. System shutdown

1.1 Hit the E-Stop Button

1.1.1 Locations

1. Exterior of the IRZ Carbon Amendment Building
2. On the control panel in the office area of the IRZ Carbon Amendment Building

1.2 Determine if the emergency condition has been mitigated

1.2.1 If yes, procede to Step 2

1.2.2 If no, locate yourself to a safe area and call the project engineer

2. System shutdown verification

2.1 Verify that operating equipment on the HMI process flow diagram graphic visually turned from green (operating) to red (inactive)

2.1.1 Pump PMP-*940 off

2.1.2 Pump PMP-*941 off

2.1.3 FV-*919 (located downstream of Tank TNK-*901) closed

2.1.4 FV-*920 (located downstream of Pump PMP-*940) closed

2.1.5 FV-*921 (located downstream of Pump PMP-*941) closed

2.1.6 FV-*407 and FV-*408 (flow control valves located in the injection well meter vaults) closed

3. Post-shutdown human machine interface(HMI) checks

3.1 Check system flow rates

3.1.1 Carbon amendment system

1. Carbon substrate combined flow rate (FIT-*973): 0 gpm total
2. Combined extraction flow rate (FIT-*970): 0 gpm total

3.1.2 Extraction Wells

1. Extraction well flow rate (FIT-*470A, FIT-*471A): 0 gpm total

3.1.3 Injection Wells

1. Injection well flow rate (FIT-*472A, FIT-*472B): 0 gpm total Check actuated flow control valve positions

3.1.4 Call Maintenance Supervisor or Project Engineer if any detectable flow rate is still observed following shutdown

4. Post-shutdown manual system checks

4.1 Record system pressures – Verify TW Bench System pressures are 0 psi. Notify project engineer if system pressures above 5 psi remain in section of the piping

4.1.1 Transwestern Bench

1. Injection header pressure PI-*960A
2. TW Bench extraction well network header PIT-*963
3. East Ravine extraction well network header PIT-*964
4. Supplimental flow TW Bench header PIT-*965

4.2 Check piping for any leaks

Standard Operating Procedure
PG&E Topock IRZ
Operation and Maintenance Plan

Title: MW-20 Bench Carbon Storage Tank Delivery/Filling
Number: IRZ-SOP-07_Rev0

Creation Date: 9/8/2014

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedure for ethanol delivery and filling at IRZ Carbon Substrate Tank TNK-*701, located adjacent to the MW-20 Bench Carbon Amendment Building. Tank TNK-*701 is a 15,000-gallon, above-grade, horizontal saddle tank that is fully compatible with ethanol. TNK-*701 has double-wall construction and an intergral interstitial zone to provide secondary containment. TNK-*701 also includes a primary pressure/vacuum vent, emergency vents to prevent damage from failure of the primary vent, and a vapor recovery system designed to capture any emissions generated during the storage tank filling process.

2 Drawing Numbers

- I-06-01: MW-20 Bench Carbon Amendment Building P&ID Sheet 1 of 4
- I-06-02: MW-20 Bench Carbon Amendment Building P&ID Sheet 2 of 4
- I-06-03: MW-20 Bench Carbon Amendment Building P&ID Sheet 3 of 4
- I-06-04: MW-20 Bench Carbon Amendment Building P&ID Sheet 4 of 4
- M-06-04: MW-20 Bench Carbon Substrate Storage Tank Mechanical Details and Sections

3 Equipment

- Appropriate PPE
- Health and Safety Plan
- Carbon substrate spill kit
- Water hose and fire extinguisher
- Wheel chocks to be placed behind delivery truck tires
- Electrical grounding equipment for truck, tank, and transfer equipment
- Eyewash supplies and safety shower

- Non-sparking tools (as needed)

4 Procedure

1. Safety equipment check
   - 1.1 Manually test safety shower and eyewash station
     - 1.1.1 Troubleshoot safety shower and eyewash station if not functioning properly.
     - 1.1.2 Do not proceed with tank filling unless functioning safety shower and eyewash station are available.
2. Human machine interface (HMI) system status check
   - 2.1 Confirm Tank TNK-*701 transducers are active
     - 2.1.1 Level transducer LT-*752
     - 2.1.2 Temperature transducer TT-*790
   - 2.2 Confirm that carbon substrate hose pumps PMP-*740, PMP-*741, and PMP-*742 are not active
     - 2.2.1 Look at HMI to confirm they are all in the “OFF” position
   - 2.3 Confirm solenoid valve FV-*711 is closed
   - 2.4 Verify alarm status of level switches within carbon storage secondary tanks and discharge piping to detect leaks
     - 2.4.1 LS-*751 – IRZ Carbon Substrate Tank TNK-*701 secondary tank
     - 2.4.2 LS-*753 - IRZ Carbon Substrate Tank TNK-*701 discharge piping
3. Tank TNK-*701 leak inspection
   - 3.1 Walk around entire tank
   - 3.2 Check for:
     - 3.2.1 Leaks along equipment surfaces
     - 3.2.2 Accumulated liquid on the ground
   - 3.3 Immediately alert project team if a leak is detected
4. Delivery truck staging
   - 4.1 Instruct truck driver not to exceed 5 miles per hour (mph) while driving onsite
   - 4.2 Use a spotter during delivery truck approach and parking
   - 4.3 Park delivery truck in designated parking space next to Tank TNK-*701
   - 4.4 Avoid backing transfer truck
   - 4.5 Place wheel chocks behind truck tires once it is parked
   - 4.6 Place buckets under hose connections in transfer equipment
5. Tank TNK-*701 volume check
   - 5.1 Check Tank TNK-*701 level on HMI
   - 5.2 Verify tank level manually with level gauge staff

5.3 Request delivery volume from truck driver

5.4 Calculate available space in tank

5.4.1 Verify Tank TNK-*701 has adequate available space for delivery volume

5.4.2 Float valve will shut off flow to tank at 90% of tank capacity

6. Delivery specification check

6.1 Confirm the appropriate product is being delivered

CAUTION: Open flames around ethanol fumes may cause a fire creating immediate danger to personnel conducting the procedures.

7. Ignition source check

7.1 Confirm truck engine has been turned off

7.2 Confirm no electrical equipment is operational near the transfer connections

7.3 Staff is not smoking (smoking not allowed onsite)

8. Tank TNK-*701 and equipment inspection

8.1 Inspect concrete pad for signs of settling or wear

8.2 Visually inspect secondary containment tank, pipes, and hoses for signs of leaks and/or wear

8.3 Ensure check valve V-*701B is installed in the appropriate direction

8.4 Ensure ball valve V-*701A is in the open position

8.5 Connect camlock hose to the camlock connections on the truck and TNK-*701

8.5.1 Visually inspect the hose for signs of wear

8.6 Manually (by hand) check that pipe, hose, and camlock connections are secure

8.6.1 Secure connections if they are loose

8.7 Visually inspect truck transfer hose, valves, and pump

9. Electrical grounding

9.1 Install electrical ground connection cable and clamp to prevent buildup of static charge

9.1.1 To be installed on truck, tank, and transfer equipment

9.1.2 Grounding cables and clamps to be connected to designated grounding electrode

10. Ethanol transfer

10.1 Initially check Tank TNK-*701 and transfer equipment for signs of leaks

10.1.1 Immediately stop ethanol transfer if a leak is observed

10.2 Monitor transfer pressure at start of transfer and every 2-3 minutes thereafter

10.2.1 Allowable pressure range: 0 – 10 PSI

10.3 Check Tank TNK-*701 level on the HMI every 2-3 minutes throughout transfer

11. Ethanol transfer completion

11.1 Disconnect delivery truck from Tank TNK-*701

11.1.1 Confirm the line is not under pressure

11.1.2 Confirm with driver that ethanol has been purged from delivery lines prior to disconnecting transfer equipment

1. Typically performed by pushing air through the lines

11.1.3 Confirm buckets are placed under connections prior to disconnecting transfer equipment

11.1.4 Disconnect hoses

11.1.5 Clean up any minor carbon substrate spills immediately with absorbent pads

11.1.6 Disconnect grounding/bonding cables and clamps

12. Delivery truck departure

12.1 Unchock the tires

12.2 Remind driver to stay under 5 mph

12.3 Have driver pull through to parking lot exitSpot driver out to the main road

13. System status check

13.1 Check system status on HMI

13.1.1 Record new Tank TNK-*701 level upon transfer completion from LT-*752

13.1.2 Record temperature on TT-*790

13.1.3 Open solenoid valve FV-*711

13.1.4 Activate carbon substrate hose pumps PMP-*740, PMP-*741, and PMP-*742 on HMI

Standard Operating Procedure
PG&E Topock IRZ
Operation and Maintenance Plan

Title: Transwestern Bench Carbon Storage Tank Delivery/Filling

Number: IRZ-SOP-08_Rev0

Creation Date: 9/8/2014

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedure for ethanol delivery at Carbon Substrate Tank TNK-*901, located adjacent to the Transwestern Bench Carbon Amendment Building. Tank TNK-*901 is a 3,000-gallon, above-grade, horizontal saddle tank that is fully compatible with ethanol. TNK-*901 has double-wall construction and an intergral interstitial zone to provide secondary containment. TNK-*901 includes an intergral overfill prevention devide attached to the tank fill line, designed to prevent filling of the tank beyond 90% of the rated capacity. TNK-*901 also includes a primary pressure/vacuum vent, emergency vents to prevent damage from failure of the primary vent, and a product and vapor recovery system.

2 Drawing Numbers

- I-08-01: Transwestern Bench Carbon Amendment Building P&ID Sheet 1 of 2
- I-08-02: Transwestern Bench Carbon Amendment Building P&ID Sheet 2 of 2
- M-08-04: Transwestern Bench Carbon Substrate Storage Tank Mechanical Details and Sections
- S-08-11: Transwestern Bench Storage Tank Foundation

3 Equipment

- Appropriate PPE
- Health and Safety Plan
- Carbon substrate spill kit
- Water hose and fire extinguisher
- Wheel chocks to be placed behind delivery truck tires
- Electrical grounding equipment for truck, tank, and transfer equipment
- Eyewash supplies and safety shower

- Non-sparking tools (as needed)

4 Procedure

1. Safety equipment check
   - 1.1 Manually test safety shower and eyewash station
     - 1.1.1 Troubleshoot safety shower and eyewash station if not functioning properly.
     - 1.1.2 Do not proceed with tank filling unless functioning safety shower and eyewash station are available.
2. Human machine interface (HMI) system status check
   - 2.1 Confirm Tank TNK-*901 transducers are active
     - 2.1.1 Level transducer LT-*952
     - 2.1.2 Temperature transducer TT-*990
   - 2.2 Confirm that carbon substrate hose pumps PMP-*940 and PMP-*941 are not active
     - 2.2.1 Look at HMI to confirme they are all in the “OFF” position
   - 2.3 Confirm solenoid valve FV-*919 is closed
   - 2.4 Verify alarm status of level switches within carbon storage secondary tanks and discharge piping to detect leaks
     - 2.4.1 LS-*951 – TW Bench Carbon Substrate Tank TNK-*901 secondary tank
     - 2.4.2 LS-*953 - TW Carbon Substrate Tank TNK-*901 discharge piping
3. Tank TNK-*901 leak inspection
   - 3.1 Walk around entire tank
   - 3.2 Check for:
     - 3.2.1 Leaks along equipment surfaces
     - 3.2.2 Accumulated liquid on the ground
   - 3.3 Immediately alert project team if a leak is detected
4. Delivery truck staging
   - 4.1 Instruct truck driver not to exceed 5 miles per hour (mph) while driving onsite
   - 4.2 Use a spotter during delivery truck approach and parking
   - 4.3 Park delivery truck in designated parking space next to Tank TNK-*901
   - 4.4 Avoid backing transfer truck
   - 4.5 Place wheel chocks behind truck tires once it is parked
   - 4.6 Place buckets under hose connections in transfer equipment
5. Tank TNK-*901 volume check
   - 5.1 Check Tank TNK-*901 level on HMI
   - 5.2 Verify tank level manually with level gauge staff

5.3 Request delivery volume from truck driver

5.4 Calculate available space in tank

5.4.1 Verify Tank TNK-*901 has adequate available space for delivery volume

5.4.2 Float valve will shut off flow to tank at 90% of tank capacity

6. Delivery specifications check

6.1 Confirm the appropriate product is being delivered

CAUTION: Open flames around ethanol fumes may cause a fire creating immediate danger to personnel conducting the procedures.

7. Ignition source check

7.1 Confirm truck engine has been turned off

7.2 Confirm no electrical equipment is operational near the transfer connections

7.3 Staff is not smoking (smoking not allowed onsite)

8. Inspect Tank TNK-*901 and equipment inspection

8.1 Inspect concrete pad for signs of settling or wear

8.2 Visually inspect secondary containment tank, pipes, and hoses for signs of leaks and/or wear

8.3 Ensure check valve V-*910B is installed in the appropriate direction

8.4 Ensure ball valve V-*910A is in the open position

8.5 Connect camlock hose to the camlock connections on the truck and TNK-*901

8.5.1 Visually inspect the hose for signs of wear

8.6 Manually (by hand) check that pipe, hose, and camlock connections are secure

8.6.1 Secure connections if they are loose

8.7 Visually inspect truck transfer hose, valves, and pump

9. Electrical grounding

9.1 Install electrical ground connection cable and clamp to prevent buildup of static charge

9.1.1 To be installed on truck, tank, and transfer equipment

9.1.2 Grounding cables and clamps to be connected to designated grounding electrode

10. Ethanol transfer

10.1 Initially check Tank TNK-*901 and transfer equipment for signs of leaks

10.1.1 Immediately stop carbon substrate transfer if a leak is observed

10.2 Monitor transfer pressure at start of transfer and every 2-3 minutes thereafter

10.2.1 Allowable pressure range: 0-10 psi

10.3 Check Tank TNK-*901 level on the HMI every 2-3 minutes throughout transfer

11. Ethanol transfer completion

11.1 Disconnect truck from Tank TNK-*901

11.1.1 Confirm the line is not under pressure

11.1.2 Confirm with driver that ethanol has been purged from delivery lines prior to disconnecting transfer equipment

1. Typically performed by pushing air through the lines

11.1.3 Confirm buckets are placed under connections prior to disconnecting transfer equipment

11.1.4 Disconnect hoses prior to removing grounding and bonding cables and clamps

11.1.5 Clean up any minor carbon substrate spills immediately with absorbent pads

11.1.6 Disconnect grounding/bonding cables and clamps

12. Delivery truck departure

12.1 Unchock the tires

12.2 Remind driver to stay under 5 mph

12.3 Have driver pull through to parking lot exit

12.4 Spot driver out to the main road

13. System status check

13.1 Check system status on HMI

13.1.1 Record new Tank TNK-*901 level upon transfer completion from LT-*952

13.1.2 Record temperature on TT-*990

Standard Operating Procedure
PG&E Topock IRZ
Operation and Maintenance Plan

Title: Discharge of Clean-in-Place Water to the Remedy-Produced Water Conditioning Plant

Number: IRZ-SOP-13_Rev0

Creation Date: 9/8/2014

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedure for the transfer of clean-in-place (CIP) water from MW-20 Bench Frac Tank TNK-*723 to the Remedy-Produced Water Conditioning Plant. CIP maintenance activities produced water that must be conveyed to the Remedy-Produced Water Conditioning Plant for treatment on an as needed basis. This SOP covers the manual and automated procedures for conveyance of CIP water in tank TNK-*723 to the Remedy-Produced Water Conditioning Plant. This SOP assumes that all CIP application to the In Situ Reactive Zone (IRZ) conveyance lines outlined in IRZ-SOP-12 has been completed and the CIP water is being stored in frac tank TNK-*723 awaiting transfer.

2 Drawing Numbers

- I-06-04: MW-20 Bench Carbon Amendment Building P&ID Sheet 4 of 4
- REMEDY-SOP-06

3 Equipment

- Appropriate personal protective equipment (PPE)
- Health and Safety Plan

4 Procedure

1. Pre-startup human machine interface (HMI) checks
   - 1.1 Check system alarm status on HMI
     - 1.1.1 Select “ALARMS” tab on HMI
     - 1.1.2 Verify if any alarm conditions exist associated with the system
       1. Document any alarm conditions in the checklist if they exist

1.2 Attempt to troubleshoot alarms

1.2.1 Call project engineer or maintenance supervisor if alarms cannot be easily addressed

2. Shutdown of automatic backwashing activities

2.1 Select the “AUTOMATIC BACKWASH” tab on the HMI to view the National Trails Highway (NTH) IRZ and Inner Recirculation Loop (IRL) injection well valve positions

2.1.1 To remove ALL wells from automatic operation place extraction pumps in the “OFF” position

2.2 Verify that the Backwash Frac Tank TNK-*721 is not receiving flow from other processes during the scheduled transfer

3. Valve check

3.1 Select the “CIP TRANSFER” tab on the HMI

3.1.1 Select “CLOSE” for actuated valve FV-*732

3.2 Manually close valve V-*726B on the backwash transfer line to back wash frac tank TNK-*721

3.3 Manually open valve V-*726O to transfer pump PMP-*745 to the Remedy-Produced Water Conditioning Plant

4. Transfer of CIP water to the Remedy Produced Water Conditioning Plant

4.1 Select the “CIP TRANSFER” tab on the HMI to view the CIP process screen

4.2 Place FV-*733 into the “OPEN” position

4.3 Place PMP-*745 into “AUTO” to begin the transfer

4.3.1 Transfer will only commence if the water levels in the Remedy-Produced Water Conditioning Plant influent tanks (TNK-*201, TNK-*202, TNK-*203, TNK-*204) are below the high-level switch (LSH-*251, LSH-*253, LSH-*255, LSH-*257) elevations

4.4 Visually inspect the lines for signs of leaks

4.5 Once TNK-*T723 is empty *LT758 will initiate the programmable logic controller to do the following

4.5.1 FV-*733 will close

4.5.2 PMP-*745 will automatically shutoff

4.6 Place transfer pump PMP-*745 into “OFF” to make sure it does not turn on again in association with future CIP activities

5. Manual valve check

5.1 Manually close valve V-*726O to the Remedy-Produced Water Conditioning Plant

5.2 Manually open valve V-*726B on the backwash transfer line to back wash frac tank TNK-*721

6. Proceed to REMEDY-SOP-06 for procedures on restarting the automatic backwashing

Standard Operating Procedure
PG&E Topock IRZ
Operation and Maintenance Plan

Title: Offsite Trucking of Clean-in-Place Water from MW-20 Bench

Number: IRZ-SOP-15_Rev0

Creation Date: 9/8/2014

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedure for transferring clean-in-place (CIP) water from frac tank TNK-*723 at the MW-20 Bench to the truck fill station for off-site trucking. This procedure is controlled both manually and through automation with the use of the human machine interface (HMI). This SOP assumes that all CIP application to the In Situ Reactive Zone (IRZ) conveyance lines outlined in IRZ-SOP-12 has been completed and the CIP water is currently stored in frac tank TNK-*723 awaiting transfer.

2 Drawing Numbers

- I-06-04: MW-20 Bench Carbon Amendment Building P&ID Sheet 4 of 4

3 Equipment

- Appropriate personal protective equipment (PPE)
- Health and Safety Plan
- 5-gallon buckets
- Tablet for data recording

4 Procedure

1. Pre-transfer health and safety procedures

   1.1 Manually test the eyewash station and safety shower at the MW-20 Bench Carbon Amendment Building

   1.2 Run water and verify the temperature of the water is cool enough for exposure

2. Pre-startup human machine interface (HMI) checks
   - 2.1 Check system alarm status on HMI
   - 2.2 Select “ALARMS” tab on HMI
   - 2.3 Verify if any alarm conditions extist associated with the system
     1. Document any alarm conditions in the checklist if they exist
     2. Attempt to troubleshoot any alarms
   - 2.4 Call project engineer or maintenance supervisor if alarms cannot be readily addressed
3. Loading site preparation
   - 3.1 Inspect concrete pad for signs of settling or wear
   - 3.2 Confirm that load-out hose is properly stored and not in the path of trucks entering the loading area
   - 3.3 Visually inspect load-out hose for signs of wear
   - 3.4 Confirm that necessary hoses and connections are present
4. Truck staging and hook-up
   - 4.1 Instruct truck driver not to exceed 5 miles per hour (mph) while driving onsite
   - 4.2 Confirm that driver and equipment meet job requirements
     1. Verify that the driver has completed a pre-trip inspection on the truck and trailer
     2. Verify that the driver currently driving the truck is the same driver who performed the pre-trip inspection

     NOTE: If any deficiencies are discovered per Step 4.2, contact the Maintenance Supervisor before proceeding.
   - 4.3 Use a spotter to direct truck driver during approach and alignment of truck on containment pad
     1. Spotter to use hand signals to stop truck when the front trailer axle is at the north end of the containment pad (opposite of entrance)
     2. Ensure that there is enough room in the containment pad behind the trailer to catch any minor spills
   - 4.4 Place wheel chocks behind truck tires once truck is parked
   - 4.5 Place 5-gallon bucket under trailer’s inlet connection
   - 4.6 Have driver hook up to the load-out hose

     NOTE: Driver is responsible for:
     - Attaching the load-out hose to the truck
     - Making sure the truck tank is vented
     - Determining how many gallons are to be loaded
     - Disconnecting the load-out hose

- Operating the load valve (trailer valve) on the truck

Operator is responsible for:

- All valves upstream of the load-out hose
- Operating the transfer pump PMP-*744
- Telling the driver how many gallons have been loaded

4.7 Connect load-out hose to the dry-break coupling on the remedy-produced water line

4.8 Manually check that pipe, hose, and connections are secure

1. Secure any loose connections

4.9 Place 5-gallon buckets under hose connections in transfer equipment

5. Remedy-produced water transfer

5.1 Record the beginning totalizer reading (FIT-*780A) on the shipping documentation and tablet

5.2 Confirm with the driver that the line isolation valves are properly positioned before opening tank valves

5.3 Valve check

1. Open manual valves/verify position
   a. V-*726C
   b. V-*726F
   c. V-*726H
   d. V-*726J
2. Close manual valve/verify position
   a. V-*726I
   b. V-*726O

5.4 Have driver check truck valves and vents

5.5 Confirm with driver that truck is ready to receive water

1. Open load supply valve V-*726L

5.6 Select the “CIP TRANSFER” tab on the HMI to view the CIP process screen

5.7 Place FV-*732 into the “OPEN” possition

5.8 Place PMP-*744 into “AUTO” to begin the transfer

5.9 Visually inspect the lines for signs of leaks

5.10 During the pumping operation, the operator must stay in the load control area and the driver must stay by the trailer valve

5.11 Communicate with driver to ensure that truck is not loaded beyond legal limits

5.12 Once TNK-*723 is empty LT-*758 will initiate the programmable logic controller to do the following

5.13 FV-*732 will close

5.14 PMP-*744 will automatically shutoff

5.15 Place transfer pump PMP-*744 into “OFF” to make sure it doesn’t turn on again in association with future CIP activities

5.16 Confirm that remedy-produced water line is not under pressure

5.17 Close load supply valve V-*726L

5.18 Have driver close the trailer valve

5.19 Select the “CIP TRANSFER” tab on the HMI to view the CIP process screen

5.20 Place FV-*732 into the “CLOSE” possition

6. Truck disconnection

6.1 Confirm that 5-gallon buckets are under hose connection points

6.2 Have driver open connection to truck (water will be in hose)

6.3 Have driver disconnect load-out hose from trailer valve

6.4 Disconnect load-out hose from the cam-lock coupling on the remedy-produced water line

6.5 Allow load-out hose to drain into 5-gallon buckets

6.6 Remove any adapters used

6.7 Have driver replace trailer valve cap or plug

6.8 Have driver close drip tray valve

6.9 Remove 5-gallon buckets from under connection points

6.10 Empty 5-gallon buckets into containment pad sump

6.11 Store equipment (hose, adapters, buckets) properly

7. Shipping documentation preparation

7.1 Record the ending totalizer reading (FIT-*780A) on the shipping documentation and tablet

7.2 Confirm that appropriate forms are filled out and signed

7.3 Confirm that shipping documentation is complete and signed

7.4 Confirm that shipping documentation number is recorded

7.5 Provide driver with appropriate copies

8. Truck demobilization

8.1 Work with driver to inspect that truck is in safe condition

8.2 Confirm that hose, buckets, and other equipment have been removed from path of truck exiting the loading area

8.3 Unchock tires

8.4 Remind driver to stay under 5 mph while onsite

8.5 Instruct driver to exit the containment pad heading north

8.6 Spot driver out to the main road

9. Post-transfer system checks

9.1 Select the “CIP TRANSFER” tab on the HMI to view the CIP process screen

1. Check and record the new tank level on LT-*758 for TNK-*723 on the tablet
2. Verify that actuated valve FV-*732 is in the “CLOSE” position

9.2 Valve check

1. Close manual valve/verify position
   a. V-*726J
   b. V-*726L
   c. V-*726O

9.3 Scan/file paperwork/shipping documentation

Standard Operating Procedure

PG&E Topock Freshwater Supply Conveyance and Storage Operation and Maintenance Plan

Title: Startup and Shutdown of Freshwater Supply Conveyance and Storage System

Number: FWS-SOP-01_Rev0

Created Date: 6/25/14

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E PN: Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedures for (a.) starting up and (b.) shutting down the freshwater supply conveyance and storage system. The procedures should only be used to perform (a.) a “hot” startup after a short term shutdown, (b.) a short term system shutdown, or (c.) system shutdown for major maintenance or repair at the well. This procedure applies to the primary freshwater supply well, HNWR-1A. The HNWR-1 well will serve as a secondary supply well and the Site B will serve as a contingency supply well, if needed.

2 Equipment List

- Health and Safety Plan
- Appropriate personal protective equipment (PPE)

3 Drawing Numbers

- Freshwater Supply Well (HNWR-1A), Instrumentation: I-01-01
- Freshwater Tank, Instrumentation: I-02-01

4 Preconditions

Operators should have system training and operating experience before attempting a system startup or shutdown.

For (a.) system startup, power has been restored (if startup is occurring after a power outage).

For (b.) system shutdown, a power outage has occurred or system needs a manual shutdown for reasons related to the downstream users of freshwater.

For (c.) system shutdown, major maintenance or repair at the well is to be performed.

5 Procedure

a. Startup Procedure

   1. If system power outage has occurred, power first needs to be restored.
   2. Using the HMI, Switch HNWR-1A well pump PMP-010 to AUTO.

b. Short-term Shutdown Procedure

   1. Use the HMI to switch HNWR-1A well pump PMP-010 to OFF.

c. Shutdown Procedure for Major Maintenance or Repair

   1. Use the HMI to switch HNWR-1A well pump PMP-010 to OFF.
   2. Go to the Pump Control Panel on the Control Panel Equipment Pad at HNWR-1A.
   3. Turn switches for the “Main Disconnect” and “Pump Disconnect” to OFF.
   4. Lockout/ Tagout the pump (see SOP-HSE-310 Lockout/Tagout, Enterprise Standard Operating Procedure).
   5. To startup the pump after the completion of major maintenance or repair:
      a. Remove lock and tag from the pump per SOP-HSE-310.
      b. Verify manual valves V-010B, V-071A, V-061A, and V-020A are open.
      c. At the Pump Control Panel on the Control Panel Equipment Pad at HNWR-1A, turn switches for the “Main Disconnect” and “Pump Disconnect” to ON.
      d. Use the HMI to switch HNWR-1A well pump PMP-010 to AUTO.

Well-SOP-01 Rev. 0

Standard Operating Procedure for Well and Borehole Decommissioning

PREPARED FOR:	Topock Groundwater Remediation Project
COPY TO:	Project File
PREPARED BY:	Pacific Gas & Electric Company
DATE:	August 27, 2014

This document defines the standard operating procedures (SOP) for decommissioning groundwater wells and boreholes associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California (Site). This document was developed, in part, as a direct result of Tribal concerns that included dialog regarding future decommissioning activities at the site between PG&E, agencies, and Native American Indian Tribes (Tribes). PG&E acknowledges that the Topock Remediation Project is an area that is culturally important to the Tribes and that the activities, materials, and procedures used in this process are of specific interest. Tribes have raised concerns with drilling intrusions, well and borehole decommissioning, emplacement of foreign materials into the earth, and retention of soils displaced as a result of drilling. Based on Tribal input, the potential for use of displaced site material in the decommissioning process, which may require a variance with the applicable permitting agency, is included in this document (Section 2.2.3).

An initial draft of this SOP was submitted for review and comment by the agencies and Tribes. The comments received, PG&E responses to these comments, as well as the conclusions of discussion during a June 6, 2014 conference call regarding the PG&E responses to comments are documented in Attachment A.

This SOP will be used as a reference to guide the development of future work plans required for agency, Tribal, and stakeholder review prior to conducting all well and borehole decommissioning tasks associated with the groundwater remedy. For the purpose of this SOP, an exploratory borehole (borehole) is defined as a drilled borehole in which no casings have been installed, regardless of whether or not the borehole was drilled to the water table. However, California boreholes drilled to the water table must be decommissioned per water well standards. The technical procedures included in this SOP are based on applicable regulatory and project-specific guidance information; however, specific work plans for well decommissioning tasks are necessary to evaluate task-specific details and ensure overall compliance. The structure of the SOP has been developed to provide adequate flexibility such that it can be applied to different well types and sizes in a variety of environmental settings. Specifically, this SOP provides a summary of the following key criteria that must be considered when developing a scope of work to decommission a well or exploratory borehole:

- Regulatory information and project-specific resources
- General technical specifications and procedures used for well or borehole decommissioning
- Evaluation of the well or borehole decommissioning scenarios

1.0 Summary of Guidance Information

Multiple sources of guidance information must be considered prior to conducting well or borehole decommissioning activities. Groundwater wells at the Site are located in the states of California and Arizona. Both states regulate the minimum specifications and procedures for the decommissioning of groundwater monitoring and supply wells to protect the quality of groundwater. Further, project-specific documents provide additional guidance related to sensitive cultural and biological resources. A summary of key regulatory information (project-specific applicable or relevant and appropriate [ARAR] numbers are provided) and project-specific resource documents associated with conducting groundwater well or borehole decommissioning activities is provided in the following subsections.

1.1 Regulatory Information – California (ARAR #98)

Statewide minimum standards for decommissioning a groundwater well in the State of California were established by the California Department of Water Resources (DWR) in the California Well Standards. The California Well Standards were originally established in Bulletin 74 (February 1968), later re-written as Bulletin 74-81 (December 1981), and later supplemented by Bulletin 74-90 (June 1991). The DWR states that the California Well Standards may not be sufficient for local conditions and local permitting agencies may need to adopt more stringent standards to ensure groundwater quality protection. However, The County of San Bernardino is the local permitting agency for Site wells located in California and have adopted the DWR standards.

The California Well Standards identify well destruction (or decommissioning for this SOP) requirements for both water supply wells (Part III of Bulletin 74-81), and monitoring wells and exploratory boreholes[1] (Part III of Bulletin 74-90). Although San Bernardino County does not require permits for the decommissioning of boreholes that do not reach the water table, DTSC has stated that they may request that some exploratory boreholes that do not reach the water table be decommissioned as wells under certain circumstances. For example, a borehole that terminates within 10 to 20 feet the water table and is located in an area where the potential for infiltration (e.g., wash channels) or future spills (e.g., an area of active industrial operations) is greater. The general requirements for both well types are similar; however, special considerations for monitoring wells and exploratory boreholes address the potential for these well types to be in areas of known or potential pollution or contamination.

1.2 Regulatory Information – Arizona (ARARs #48 and #49)

Development of rules for adopting standards for the construction and abandonment (or decommissioning for this SOP) of a groundwater well in the State of Arizona are required under Arizona Revised Statute 45-594(A). In response to the statute, the Arizona Department of Water Resources (ADWR), adopted the Well Abandonment Rule. The Well Abandonment Rule as Arizona Administrative Code (A.A.C) R12-15-816 was originally established on March 5, 1984. An amendment to the rule was effected on June 18, 1990. The Well Abandonment Rule requires that the abandonment (decommissioning) of a well be accomplished through filling or sealing the well so as to prevent the well from allowing the vertical movement of water. The rule contained general guidance for the decommissioning process, but lacked specific information regarding applicable aquifer conditions, and for the depths, types of materials and methods for the well decommissioning. ADWR provided additional written guidance for well abandonment to comply with A.A.C. R12-15-816(G) in the Well Abandonment Handbook on October 3, 2008.

The Well Abandonment Handbook (WAH) provides a standard well decommissioning method to be used for the post-installation of any well or borehole, regardless of the aquifer or vadose zone conditions applicable to the well (Section IV A). In addition, the WAH details five alternative abandonment methods. The five alternatives are for specific vadose zone and aquifer conditions which may include contamination, single or multiple aquifers, or dry wells (Section IV B). For example, Alternative 4, which applies to wells that only penetrate a single aquifer without vertical flow components and no water quality contamination issues, might be applicable to wells in the Topock area that are 8-inches or greater in diameter. A variance option to Alternative 4 permits the use of clean fine sand to fill the well being decommissioned.

Legal authorization from the ADWR is required to decommission most types of wells in the State of Arizona. ADWR requires a statewide decommissioning form to be filed and reviewed prior to decommissioning. The notice of intention to abandon a well (NOIA) can be obtained from the ADWR Groundwater Management Support Section in Phoenix or other local offices. In addition, all forms are available online at http://www.azwater.gov/azdwr/WaterManagement/NOI/documents/PermitsFormsApplicationsNOI.htm. The permit must be signed and filed by the well owner. The information on the NOIA must include a well construction diagram with proposed decommissioning specifications; casing type, description of the proposed method of decommissioning (over-drilling, jacking, perforation, etc.); a description of the method of emplacing sealing or fill materials; and the specific type and estimated amount of grout material to be used (water-cement ratio, water-

[1] San Bernardino County does not require permits for the installation or decommissioning of boreholes that do not reach the water table.

bentonite ratio and/or other materials or additives used). ADWR performs a completeness and substantive review of the NOIA to determine whether the proposed abandonment methods and materials meet the requirements of the ADWR abandonment rule in R12-15-816(G). If an alternative method of decommissioning is proposed in lieu of the standard method, further substantive review is performed by ADWR to verify that the proposed methods apply, and whether appropriate fill materials were chosen. A proposal to use an alternative decommissioning method requires an application to ADWR for a variance from the well decommissioning rule (a deviation from the standard decommissioning method). Following ADWR confirmation that the proposed well decommissioning methods and materials meet the requirements of the rule, a well decommissioning authorization card is mailed to the designated well drilling contractor and well decommissioning operations may begin.

1.3 Project-specific Resources

In addition to regulatory guidance, project specific requirements or information must be considered prior to initiating well decommissioning activities. The following is a list of documents that may be applicable:

- **Topock Well Inventory Data Package** – Inventory of wells related to the Topock Remediation Project for reference when developing specific plans for well decommissioning. This data package includes a technical memorandum, well location map, and a searchable spreadsheet of well details. As requested by DTSC, the well inventory spreadsheet (electronic file) and available well logs associated with the Topock Project will be archived on the DTSC website. This archive will be updated periodically as additional wells and boreholes are installed.
- **Environmental Impact Report (EIR) Mitigation Measures Reporting Program (MMRP)** – This document details specific compliance criteria that must be considered before, during, and after implementation of well decommissioning activities.
- **Management Protocol for Handling and Disposition of Displaced Site Material** – This document identifies the general approach and management protocols required for the handling and disposition of soil and/or rock that is displaced as a result of activities associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project. The use of displaced site material for use in the well decommissioning process is discussed in Section 2.2.3.
- **Special Handling for Clay Material Encountered During Drilling** – As requested by the Hualapai Department of Cultural Resources, special handling procedures for drill cuttings generated from clay beds will be used in the field (this does not include clay-containing sediment mixtures, only clay beds). If clay bed(s) are encountered during drilling, then the cutting from those interval(s) will be set aside on 100% cotton muslin (dye free) for future disposition, following discussions with the Tribes. PG&E will notify the agencies and Tribes in the event clay material is encountered and separated for storage.
- **Previous Well Decommissioning Work Plans** –
  - Well PGE-6 Revised Decommissioning Work Plan (November 10, 2006).
  - Final Revised Implementation Plan for Repair of Monitoring Wells MW-38S and MW-38D and Old Well/Pipe Reconnaissance (February 11, 2011).
- **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Permit Exemption –** Per the November 16, 2007 Memorandum from the United States Department of the Interior, remedial actions including well decommissioning are exempt from the federal, state, and local permitting process. Since the issuance of this memorandum, the applicability of this exemption has been confirmed with the County of San Bernardino, California in February 2008 and January 2011. However, the County of San Bernardino will need to be consulted in the event a variance to the California Well Standards is required. The applicability of this exemption has not been confirmed with the State of Arizona. Regardless of the permit exemption, all work plans for decommissioning activities will be reviewed and approved by the appropriate state and federal agencies prior to implementation.

1.4 General Technical Resources

In addition to regulatory guidance and project specific information various technical resources should be considered during the development of a work plan for well or borehole decommissioning. The following is a list of documents that may be useful:

- Monitoring Well Design and Construction for Hydrogeologic Characterization. Guidance Manual for Ground Water Investigations. July 1995. State of California, Environmental Protection Agency.
- ASTM Standard D5299-99 (2005), "Standard Guidance for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities", ASTM International, West Conshohocken, PA, 2005, www.astm.org.
- ASTM Standard C150/C150M-12, "Standard Specification for Portland Cement", ASTM International, West Conshohocken, PA, 2012, www.astm.org.
- ASTM Standard D4380-84 (2006), "Standard Test Method for Density of Bentonitic Slurries", ASTM International, West Conshohocken, PA, 2012, www.astm.org.

2.0 General Technical Specifications and Procedures for Decommissioning Wells and Exploratory Boreholes

Monitoring wells or exploratory boreholes that are no longer useful must be properly decommissioned to ensure the quality of groundwater is protected and eliminate a possible physical hazard to humans and animals. Notification or permitting requirements should be evaluated prior to the initiation of well decommissioning activities in the field. Involved oversight agencies will be notified in advance of any decommissioning activities to ensure concurrence with decommissioning of a particular well(s). The general process for decommissioning a well at the Topock site is presented on Figure 1, Well Decommissioning Decision Protocol. The information provided in this section is intended to be applicable for wells or boreholes located in either California or Arizona; however, it is assumed that the details included in the specific work plan(s) will be designed in compliance with the appropriate state regulations, and reviewed by the appropriate permitting agency. In addition, depending on the condition of the aquifer and well(s) subject to decommissioning, potentially applicable variance options that include the minimization of the placement of sealing material should be evaluated with the lead agencies during well decommission work plan development (e.g., Arizona Alternative 4 – variance option). A discussion of the primary steps identified in this protocol, including the potential materials and methods required for each, is presented in the following subsections.

2.1 Evaluation of Well or Borehole

Key well or borehole information should be assembled and reviewed prior to initiating decommissioning activities to determine lithologic and well construction details, the current condition of the well or borehole, soil and water quality information, applicable regulatory criteria, and identification of the procedures and materials that should be used. The majority of this information will be available through review of drilling and well installation information, the Topock Well Inventory, groundwater sample collection logs, or other related documents. The Topock Well Inventory can be found online at: http://dtsc-topock.com/sites/default/files/Topock-Well-Inventory_Tech-Memo.pdf. However, it is possible that additional survey of the given well or borehole will be required to obtain all key information. The following is a list of survey techniques that may be utilized to evaluate the condition of well or borehole (list is not intended to be all-inclusive):

- Well measurement – Evaluation of the depth to the bottom of, or the depth to water within, a well or borehole. This is typically accomplished using a graduated measuring tape with a water sensor or blunt weight at the end.
- Video survey – An in-well video camera can be used to evaluate the condition of the well casing and screen, and identify obstructions. In-well cameras are typically calibrated for depth and orientation (i.e. north, south, east and west), and deployed on a cable using a winch.

- Geophysical survey – Depending on the well casing type, depth to water, potential presence of metallic centralizers or other well construction components, and other variables, select geophysical survey tools may be useful. Similar to an in-well camera, in-well geophysical tools are deployed on a cable using a winch. While not a complete list, examples of geophysical tools that may be useful include:
  - Acoustic (Cement Bond Log) – Used to determine the quality of cement bonding in cased or sealed wells.
  - Gamma – Used to determine intervals of bentonite seals and gravel pack.
  - Caliper – Used to verify diameter of the well or borehole, which is used to calculate borehole and well casing volumes, and identifies obstructions or areas of borehole washout or constriction.
  - Casing Inspection Thickness Measurement (CITM) – An in well survey that uses electromagnetic waves to measure well casing wall thickness in carbon based steels. Survey can be used to understand or measure the integrity of the well casing.

2.2 Identification of Materials and Placement Requirements

Different types of materials are required for different well or borehole decommissioning scenarios depending on above-ground, and subsurface environment. Sealing materials are required when the potential for flow of water through the material must be kept to an absolute minimum such that the volume of water and possible pollutants and contaminants passing through them will be of minimal consequence (no material is completely impervious). Filler material is permitted for use under some circumstances when the flow of water through the material is not of critical concern. Potential materials suitable for use during well and borehole decommissioning at the Topock site and associated placement requirements are listed in the following subsections.

2.2.1 Sealing Material

Conventional sealing activities are performed with the objective of completely filling the borehole or well casing, voids in the formation in the vicinity of the borehole, and if not over-drilled, the gravel pack and annular spaces. Sealing materials are required for use when decommissioning wells and boreholes regardless of whether they are located in an area of known or potential pollution or contamination. In uncontaminated areas where the well is wholly situated in unconsolidated material in an unconfined groundwater zone, , the sealing material is focused in the upper 20 feet of the well or borehole to prevent the infiltration of potential surface contamination. In areas of known or potential soil or groundwater contamination, sealing material is required throughout the entirety of the well or borehole. The following is a list of sealing materials that may be used at the Topock site:

- Neat cement – Compose entirely of Type II/V Portland cement grout with up to 6% bentonite powder.
- Sand-cement grout – Composed of Portland cement with no more than two parts sand to one part cement by weight of sand.
- Concrete – Composed of Portland cement and aggregated mixed at a ratio of at least 564 lbs. of cement per cubic yard of aggregate. Aggregate used must be smaller than 1/5 of the radial thickness of the annular seal and is typically reserved for large volume/diameter borehole or well decommissioning.
- Bentonite clay – Composed of commercially prepared, powdered, granulated, pelletized, or chipped/crushed sodium montmorillonite clay with the largest dimension of pellet or chip being less than 1/5 the radial thickness of the annular seal. Bentonite cannot be used as a sealing material opposite zones of fractured rock, unless otherwise approved by lead agencies. As bentonite seals may have a tendency to dry, shrink and crack in arid and semi-arid areas where subsurface moisture levels can be low, they are not recommended for sealing the vadose zone at the Topock site. In addition, bentonite is not recommended for application in high TDS environments (e.g., >5,000 parts per million) due to the adverse effects on its ability to properly swell and seal in these conditions.

According to Arizona and California Well Standards, drilling mud or cuttings are not acceptable sealing materials.

Water used for the preparation of sealing materials should be potable, compatible with the type of sealing material used and free of contaminants and suspended matter. All manufacturers' specifications for mixture

volumes and curing times must be strictly followed (typically, ASTM C150, Standard Specification for Portland cement). Further, the use of any additives must comply with the requirements of ASTM C494 (Standard Specification for Chemical Admixtures for Concrete).

Sealing material must be placed into a well or borehole at the required interval(s) in one continuous decommissioning operation, which may include multiple lifts of sealant, using methods that prevent the free-fall, dilution, and/or separation of aggregates from the cementing materials. Typically, fluid sealing material is placed using a tremie pipe with positive displacement pumping (pumped under pressure), beginning at the bottom of the sealed interval with the end of the tremie pipe submerged two feet or more below the surface of the grout during placement. When using a tremie pipe, if sealing material is placed throughout the well or borehole, static water is either displaced out of the top by the injected column of sealing material, or into the formation (applicable SOPs for waste management/spill containment will followed). Alternatively, fluid sealing material may need to be pumped into the well under pressure, using the well casing as the conduit. In this case the static water and the sealing material are forced into the voids of the well/borehole and formation. When fluid sealing material is placed under pressure, the pressure must be maintained long enough for the sealing material to cure, as applicable. Dry sealing material, such as bentonite chips or pellets, are typically placed by using a tremie pipe or the well casing as a conduit. Dry sealing materials require water for hydration and proper sealing. Regardless of sealing material type or placement method, verification shall be made that the volume of the material placed in the well or borehole is at least equal to the calculated volume of void space to be sealed.

2.2.2 Filler Material

Filler materials are permitted for use in select portions of the decommissioned well or borehole when located in uncontaminated areas. Suitable filler materials include clay, silt, sand, gravel, crushed stone, native soils, mixtures of the aforementioned types, as well as sealing materials defined above. However, materials containing organic matter are not acceptable.

Filler material must be placed into the well or borehole from the bottom up, such that bridging does not occur and the entire void space is filled. To assure that bridging has not occurred during placement, verification shall be made that the volume of the material placed in the well or borehole (with appropriate porosity assumptions) is at least equal to the calculated volume of void space to be filled (i.e., empty hole).

2.2.3 Displaced Site Material

As discussed in Section 1.3 (Management Protocol for Handling and Disposition of Displaced Site Material), soil and rock that are displaced as a result of the Topock Remediation Project may be retained on site for future use. One of the potential reuses for this material identified in the management protocol is replacement into borings. If the material was generated as drill cuttings, then lead agencies must agree that the material can be used as a component of either sealing or filler material for the purpose of well or borehole decommissioning (a variance may be required).

The requirements for placement of displaced site material, should it be deemed appropriate for use based on physical and chemical composition, are the same as that for filler material. Additional processing of the displaced material may be required to ensure that grain size requirements are met, that the material is free of organic matter, and that the material can be practicably placed into the well or borehole (i.e., prevent bridging). This processing may require the use of heavy equipment for grading or crushing the material so that it is suitable for use in the decommissioning process. An appropriate onsite location would need to be identified if such processing were required.

2.3 Well or Borehole Decommissioning Scenarios

Following evaluation of the well or borehole and in coordination with lead agencies, it must be determined if the well can be decommissioned in place (with or without modification) or if the well materials must be removed. The following subsections define the decommissioning scenarios that may apply pending completion of the well evaluation and coordination with lead agencies, responsible agencies (San Bernardino County or Arizona

Department of Water Resources), affected land owner, Tribes, and other stakeholders. Artesian groundwater conditions have not been observed at the Topock site, and therefore, are not considered in this SOP.

All wells associated with the Topock Remediation Project are considered to be in non-urban areas. When developing work plans that include well or borehole decommissioning, lead and responsible agencies (San Bernardino County) in California will be consulted to confirm this assumption. For the purpose of this SOP, well or borehole decommissioning scenarios are presented for two types of well site environments. These environments, Type 1 and Type 2, are defined as:

- Type 1 Well Environment – A well classified as Type 1 is located outside the area of known or potential soil or groundwater contamination (e.g., as determined by the soil and/or groundwater quality data available for the location or the likelihood of a future release in the area) and is not located in an area that is subject to increased surface water infiltration relative to nearby upland areas (e.g., channel of Bat Cave Wash).
- Type 2 Well Environment – A well classified as Type 2 is located in an area of known or potential soil or groundwater contamination (e.g., as determined by the soil and/or groundwater quality data available for the location or the likelihood of a future release in the area) and/or in an area that is subject to increased surface water infiltration relative to nearby upland areas (e.g., channel of Bat Cave Wash). Any wells located on the Topock Compressor Station, within wash channels, within areas of concern (AOCs), or within/adjacent to roads are in a Type 2 environment.

Three approaches to well and borehole decommissioning, including one approach that would require the approval of a variance to the California Well Standards, were presented by DTSC as draft concepts for discussion during the January 19, 2012 TWG Meeting. This information is provided as Attachment B to this SOP for consideration when developing future work plans that involve borehole or well decommissioning. The overriding consideration for the variance scenario presented in Attachment B was that the decommissioning method would provide seals that had a net permeability equal to or less than the naturally occurring geologic materials encountered along the borehole.

2.3.1 Exploratory Borehole

Typically, exploratory boreholes at the Topock site are installed as part of a data collection effort (i.e., lithologic, soil or groundwater sample collection) and are immediately decommissioned once the data collection objectives for that borehole have been achieved. Therefore, the borehole is typically decommissioned while the drilling tools or casing is still in place, prior to demobilization from that borehole. The following general procedure should be followed for decommissioning an exploratory borehole:

1. Evaluate the borehole for obstructions immediately prior to conducting decommissioning activities. If an obstruction is encountered that will prevent successful sealing of the borehole, attempts must be made to remove it prior to placement of the sealing material.
2. Place sealing material from total depth to ground surface. Typically, sealing material will be placed using a tremie pipe with positive displacement pumping. Industry practice is to place sealing material from total depth to the ground surface. However, if the boring is not within an area of known or potential pollution or contamination as determined by the soil and/or groundwater quality data available for the borehole, evaluate using displaced site material, or filler material if displaced site material is not available or appropriate, in lieu of sealing material in the upper 5 to 10 feet of the borehole. The use of displaced site material or filler material may require a permit variance if the borehole reached the water table.
3. Verify that the resulting condition of the borehole opening at the surface does not present a physical hazard to humans or animals. If voids are present fill voids created with displaced site material, or filler material if displaced site material is not available or appropriate.

2.3.2 Decommissioning a Well in Place

Wells determined to have been constructed in conformance with applicable standards without indication of compromise since the time of installation may be decommissioned in place. This decommissioning option should be utilized whenever acceptable to the regulatory agencies as it represents the field procedures that are least intrusive and create the least amount of disturbance. Further, this decommissioning method is appropriate if the well is in good repair but cannot be removed (e.g., wells constructed with large diameter steel casing), or if removal would negatively influence sealing of the well (e.g., a collapse during removal). In this case the monitoring well casing and any other significant voids (i.e., pore spaces in the gravel pack), at a minimum, should be completely filled with sealing material. The following general procedure should be followed for decommissioning a well in place:

1. Conduct evaluation of the well as detailed in Section 2.1 and verify with lead agencies, responsible agencies (San Bernardino County or Arizona Department of Water Resources), affected land owner, Tribes, and other stakeholders that the well should be decommissioned in place, and whether it is in a location considered to be Type 2.
2. Evaluate well for obstructions immediately prior to conducting decommissioning activities. If an obstruction is encountered that will prevent successful sealing of the well, attempts must be made to remove it prior to placement of the sealing and/or filler material.
3. Place sealing material. Typically, if fluid sealing material is used, this will be conducted using a tremie pipe with positive displacement pumping.
    a. Type 1 Well – Evaluate using filler material in lieu of sealing material in portions of the well casing. Place sealing material from total depth to near ground surface.
    b. Type 2 Well – Place sealing material from total depth to within 5 feet of the ground surface (bgs).
4. Decommission well head.
    a. Type 1 Well – Remove all well head protection and excavate around the well casing to a depth of approximately 1 to 5 feet bgs, or as practicable. Remove all well materials to a depth of approximately 1 to 5 feet bgs, or as practicable, cap casing with sealing material such that it extends beyond the diameter of the borehole and will drain fluids away from the borehole. Backfill the void created with displaced site material, or filler material if displaced site material is not available or appropriate.
    b. Type 2 Well – Remove all well head protection and excavate around the well casing to a depth of 5 feet bgs. Remove all well materials to a depth of 5 feet bgs, cap casing with sealing material such that it extends beyond the diameter of the borehole and will drain fluids away from the borehole. Backfill the void created with displaced site material, or filler material if displaced site material is not available or appropriate.

Note that the Type 1 and Type 2 well scenarios are subtly different. While the Type 2 scenario requires the removal of all well materials to a depth of 5 feet bgs (per CA well standards), Type 1 wells do not require the removal of any well materials. The removal of well materials to a depth of approximately 1 to 5 feet bgs, or as practicable, is not required by CA well standards, but included per stakeholder comments.

2.3.3 Decommissioning a Well in Place with Modification

It may be determined that a well should be decommissioned in place, but requires modification prior to sealing. This method may be appropriate in the event well materials or an obstruction cannot be removed, clogged screen cannot be removed, or if removal would negatively influence sealing of the well. In this scenario it may be required to remove a portion of the well casing, perforate sections of the well screen or casing, or conduct other well modifications to facilitate proper sealing. The following general procedure should be followed for decommissioning a well in place when a modification is required:

1. Conduct evaluation of the well as detailed in Section 2.1 and verify with lead agencies, responsible agencies (San Bernardino County or Arizona Department of Water Resources), affected land owner, Tribes, and other stakeholders that the well should be decommissioned in place, what modification work is required, and whether it is considered to be Type 2.
2. Implement required well modification.
3. Place sealing material. The condition that warrants well modification must be evaluated to determine the method use to place the sealing material. For example, if casing perforations above the water table are required, sealing under pressure may be appropriate.
    a. Type 1 Well – Evaluate using filler material in lieu of sealing material in portions of the borehole. Place sealing material from total depth to near ground surface, or in the event casing is removed, the new top of casing depth. If a portion of the casing is removed, sealing or filler material requirements for the interval above the top of casing must be determined through discussion with lead agencies, responsible agencies (San Bernardino County or Arizona Department of Water Resources), affected land owner, Tribes, and other stakeholders.
    b. Type 2 Well – Place sealing material from total depth to within 5 feet of the ground surface (bgs). If a portion of the casing is removed, sealing or filler material requirements for the interval above the top of casing must be determined through discussion with lead agencies, responsible agencies (San Bernardino County or Arizona Department of Water Resources), affected land owner, Tribes, and other stakeholders.
5. Decommission well head.
    a. Type 1 Well –Remove all well head protection and excavate around the well casing to a depth of approximately 1 to 5 bgs, or as practicable. Removal all well materials to a depth of approximately 1 to 5 feet bgs, or as practicable, cap casing with sealing material such that it extends beyond the diameter of the borehole and will drain fluids away from the borehole. Backfill the void created with displaced site material, or filler material if displaced site material is not available or appropriate.
    b. Type 2 Well – Remove all well head protection and excavate around the well casing to a depth of 5 bgs. Removal all well materials to a depth of 5 feet bgs, cap casing with sealing material such that it extends beyond the diameter of the borehole and will drain fluids away from the borehole. Backfill the void created with displaced site material, or filler material if displaced site material is not available or appropriate.

2.3.4 Decommissioning a Well by Removing Well Materials

In some cases a well may be decommissioned by complete removal of the well materials. This method may be appropriate in the event a well was not constructed in accordance with applicable standards and the deficiencies may prevent the proper sealing of the well, even with modification. Further, when removal is practicable, lead agencies, responsible agencies (San Bernardino County or Arizona Department of Water Resources), affected land owner, or other stakeholders may determine this method preferable to others. Removal is typically conducted by over-drilling the existing well materials with larger diameter drilling tools. Typically, this method is only applied to wells constructed with polyvinyl chloride (PVC) casing or limited lengths of smaller diameter steel casing. Other methods of casing removal (e.g., hydraulic casing jacks) may be useful to remove limited lengths of larger diameter steel casing. The following general procedure should be followed for decommissioning a well by removing the well materials:

1. Conduct evaluation of the well as detailed in Section 2.1 and verify with lead agencies, responsible agencies (San Bernardino County or Arizona Department of Water Resources), affected land owner, Tribes, and other stakeholders that the well should be decommissioned by removal.
2. Remove well materials. Typically, this is conducted by over-drilling or in some cases by combination of the use of hydraulic casing jacks combined with over-drilling.

3. Evaluate borehole for obstructions immediately prior to conducting decommissioning activities. If an obstruction is encountered that will prevent successful sealing of the borehole, it must be removed prior to placement of the sealing material.
4. Place sealing/filler material from total depth to ground surface. Typically, this will be conducted using a tremie pipe with positive displacement pumping. Industry practice is to place sealing material from total depth to the ground surface. However, if the boring is not within an area of known or potential pollution or contamination, evaluate using filler material in lieu of sealing material in portions of the borehole.
5. Decommission remaining elements of the well head protection and fill voids created with displaced site material, or filler material if displaced site material is not available or appropriate.

Other methods may be employed for removal of the well, particularly for steel well materials and steel conductor casings used to seal off upper lithologic zones. Specifically, the well string (or conductor casing) may be pulled by jacking with external equipment, or with the drill rig. Once the well string is removed from the borehole, the remaining materials in the original borehole should be over-drilled to remove them from the formation.

2.4 Well Decommissioning Reporting

Following completion of well decommissioning tasks, reporting of field activities must be completed in compliance with the lead agencies requirements. In addition, project-specific reporting must be completed (as required) and the Topock Well Inventory must be updated to reflect the results of decommissioning activities. The timeline for reporting requirements will be specified in the project-specific work plan. The Well Decommissioning Report will be submitted to lead agencies no later than 90 days after completion of well decommissioning activities and will include, at a minimum:

- A summary of the approval process completed prior to well decommissioning, including reference to submitted work plans, subsequent communication and modifications (as applicable) and documentation of approval to proceed;
- Discussion regarding application of the Well Decommissioning Decision Protocol;
- Details of the work performed, including explanation of the applicable well decommissioning scenario and materials utilized;
- Documentation of compliance with applicable permitting requirements, and;
- Signature and seal of an appropriately licensed professional geologist or engineer.

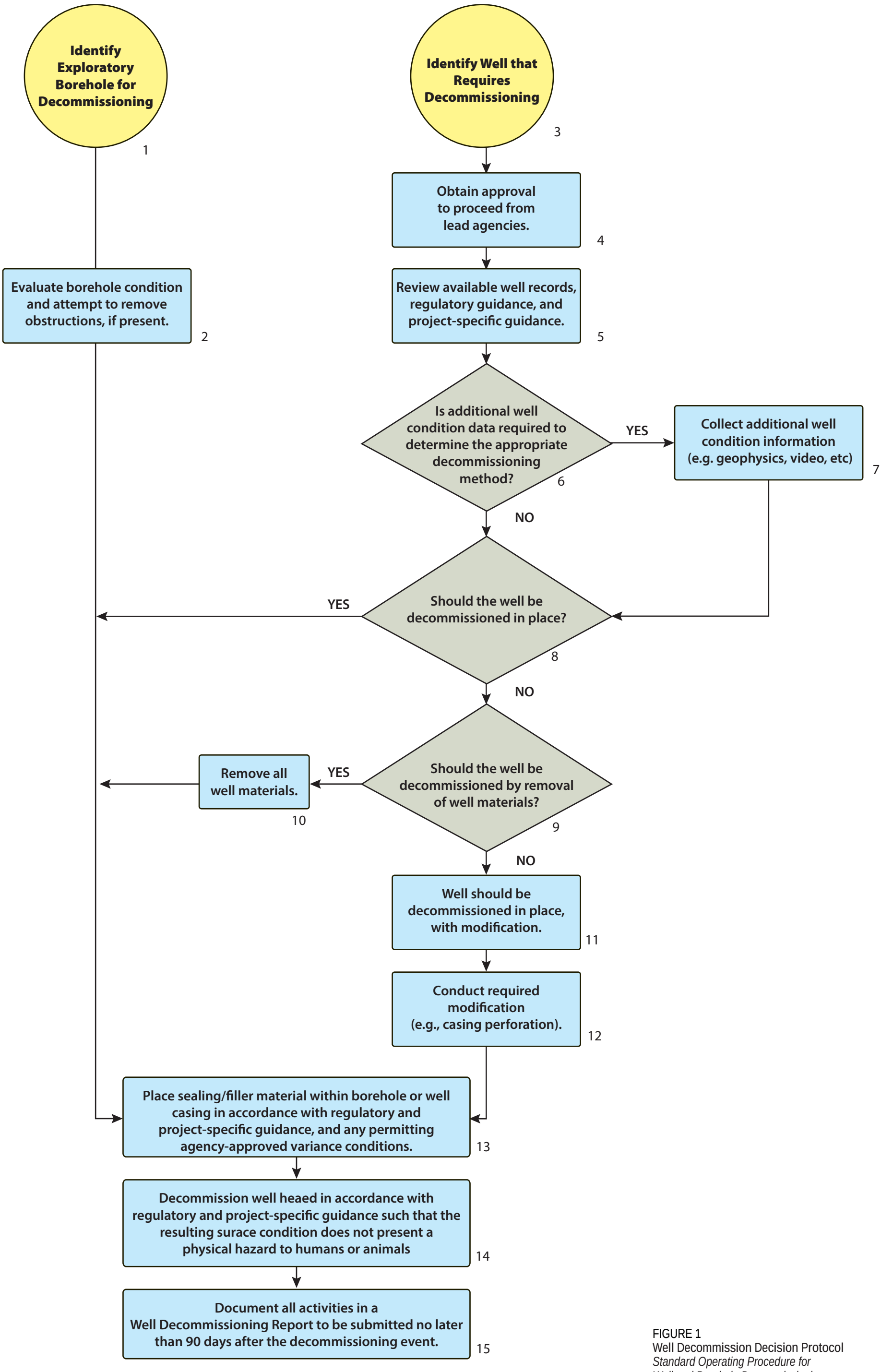


FIGURE 1
Well Decommission Decision Protocol
Standard Operating Procedure for Well and Borehole Decommissioning PG&E Topock Compressor Station Needles, California

Attachment A
Responses to Comments on Draft *Standard Operating Procedure for Well and Borehole Decommissioning*

Responses to Comments on *Standard Operating Procedure for Well and Borehole Decommissioning*, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
1	Arizona Department of Water Resources (ADWR) February 28, 2013 Letter ADWR-1			The text in the Standard Operation Procedure (SOP), section 1.2 states that all required forms can be obtained from the Phoenix ADWR offices. All forms are available online at: http://www.azwater.gov/iazdwr/WaterManagement/NOI/documents/PermitsFormsApplicationsNOI.htm	The text in **bold** will be added to the following statement. The notice of intention to abandon a well (NOIA) can be obtained from the ADWR Groundwater Management Support Section in Phoenix or other local offices. **In addition, all forms are available online at:** http://www.azwater.gov/iazdwr/WaterManagement/NOI/documents/PermitsFormsApplicationsNOI.htm	No additional comments.
2	ADWR-2			The SOP document describes requirements for abandoning (decommissioning) wells in Arizona and California and technical specifications and procedures for abandoning wells at the Topock Compressor Station remediation site. The proposed methods are thorough, protective of the aquifer, and consistent with minimum well construction and abandonment requirements in Arizona Administrative Code (A.A.C.) R12-15-816 and substantive policy described in the ADWR "Well Abandonment Handbook" (2008).	PG&E appreciates the review and input from ADEQ and ADWR on this SOP.	No additional comments.
3	ADWR-3			The proposed methods suggested for abandoning exploratory boreholes in Arizona utilizing "granulated material" are satisfactory. The methods are consistent with the variance option of Alternative 4 in the "Well Abandonment Handbook". Notices of Intent to Abandon a Well must be accompanied with a written request for a variance from the provisions of the minimum well construction and abandonment standards and in accordance with A.A.C. R12-15-820.	This comment is specific to the *Revised Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California* (January 28, 2013). However, as noted by the Fort Mojave Indian Tribe in comment FMIT-6, this represents an example of successful application of a variance to the standard well decommissioning procedure in Arizona. This variance was approved by ADWR based on project-specific information about the condition of the aquifer and planned boreholes (not a well in this example). PG&E anticipates similar discourse with the regulatory agencies based on future project-specific information in the development of future well decommissioning work plans.	No additional comments.
4	Department of Toxics Substances Control (DTSC) Document edits in redline strikeout DTSC-1	2nd paragraph	<u>However, California boreholes drilled to the water table must be decommissioned per water well standards.</u>	[DTSC Comment CG1]: Revise text. Clarify that an exploratory borehole drilled to the water table in California must comply with well decommissioning standards. Underlined text indicates new text inserted into document.	The text in **bold** will be added to the following statement. For the purpose of this SOP, an exploratory borehole (borehole) is defined as a drilled borehole in which no casings have been installed, regardless of whether or not the borehole was drilled to the water table. **However, California boreholes drilled to the water table must be decommissioned per water well standards.**	No additional comments.
5	DTSC-2	1.1	[1.] San Bernardino County does not require permits for the installation or decommissioning of boreholes that do not reach the water table.	[DTSC Comment CG2]: Please note that DTSC may request that some exploratory boreholes that do not reach the water table be decommissioned as wells under certain circumstances (e.g., deep boreholes that almost reach the water table). Please incorporate this concept into the SOP.	The text in **bold** will be added to the following statement. The California Well Standards identify well destruction (or decommissioning for this SOP) requirements for both water supply wells (Part III of Bulletin 74-81), and monitoring wells and exploratory boreholes[1]. **Although San Bernardino County does not require permits for the decommissioning of boreholes that do not reach the water table, DTSC has stated that they may request that some exploratory boreholes that do not reach the water table be decommissioned as wells under certain circumstances. For example, a borehole that terminates within 10 to 20 feet the water table and is located in an area where the potential for infiltration (e.g., wash channels) or future spills (e.g., an area of active industrial operations) is greater.**	No additional comments.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
6	DTSC-3	1.3	However, the County of San Bernardino will need to be consulted in the event a variance to the California Well Standards is required.	[DTSC Comment CG3]: As the SOP is now sufficiently developed, it is important to have San Bernardino review the next version and provide input as they are a key decision maker regarding well decommissioning.	After PG&E response to comments from ADWR, DTSC, Fort Mojave Indian Tribe and the Hualapai Dept of Cultural Resources included in this table have been addressed and discussed by the Well Decommissioning Subgroup, a draft of this SOP will be submitted to the County San Bernardino for their review and input.	No additional comments.
7	DTSC-4	2.0	Involved oversight agencies will be notified in advance of any decommissioning activities <u>to ensure concurrence with decommissioning of a particular well(s).</u>	Underlined text indicates new text inserted into document.	The proposed text has been added to the document.	No additional comments.
8	DTSC-5	2.1	drilling and well installation information	[DTSC Comment YA4]: A repository of drilling logs and installation notes should be put into a central archive for access by involved stakeholders.	Drilling logs and installation notes, where available, have been included in various documents submitted to the agencies following field work. As specific well decommissioning work plans are developed, this information will be included in those plans. **Further, as requested by DTSC, the well inventory spreadsheet (electronic file) and available well logs associated with the Topock Project will be archived on the DTSC website. This archive will be updated periodically as additional wells and boreholes are installed.** The text above in **bold** will be added to Section 1.3, first bullet (Topock Well Inventory Data Package).	No additional comments.
9	DTSC-6	2.1	Topock Well Inventory	[DTSC Comment CG5]; Include the current Topock Well Inventory as an electronic attachment to this SOP.	The text in **bold** will be added to the following statement. The majority of this information will be available through review of drilling and well installation information, the Topock Well Inventory, groundwater sample collection logs, or other related documents**. An electronic copy of the Topock Well Inventory has been included in this SOP under Attachment A.**	No additional comments.
10	DTSC-7	2.1	Geophysical survey – Depending on the well casing type, depth to water, <u>presence or absence of centralizers</u>, and other variables, select geophysical survey tools may be useful.	Underlined text indicates new text inserted into document.	The modified text in **bold** will be added to the statement. Geophysical survey – Depending on the well casing type, depth to water, **potential <u>presence of metallic centralizers or other well construction components</u>**, and other variables, select geophysical survey tools may be useful.	No additional comments.
11	DTSC-8	2.2.1	Bentonite cannot be used as a sealing material opposite zones of fractured rock, unless otherwise approved by <u>lead agencies (DTSC/DOI).</u>	Underlined text indicates new text inserted into document. Deleted text includes "the permitting" agency. Subsequent comment from DTSC regarding when bentonite is appropriate as a sealing material…	The proposed edit has been incorporated into the document. In addition, based on subsequent discussion with DTSC, the following text in **bold** has been added to Section 2.2.1, fourth bullet (bentonite clay): **In addition, bentonite is not recommended for application in high TDS environments (e.g., >5,000 parts per million) due to the adverse effects on its ability to properly swell and seal in these conditions.**	No additional comments.
12	DTSC-9	2.2.3	If the material was generated as drill cuttings, then <u>lead agencies</u> must agree that the material can be used as a component of either sealing or filler material for the purpose of well or borehole decommissioning (a variance may be required).	[DTSC Comment CG6]: Change text as a permit exemption may be used and since DOI and DTSC will, at a minimum, be approving agencies. Underlined text indicates new text inserted into document. Deleted text includes "the permitting" agency.	The proposed edit has been incorporated into the document.	No additional comments.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
13	DTSC-10	2.3	Following evaluation of the well or borehole and in coordination with the lead agencies, it must be determined if the well can be decommissioned in place (with or without modification) or if the well materials must be removed.	Underlined text indicates new text inserted into document. Deleted text includes "the permitting" agency.	The proposed edit has been incorporated into the document.	No additional comments.
14	DTSC-11	2.3	The following subsections define the decommissioning scenarios that may apply pending completion of the well evaluation and coordination with lead agencies, responsible agencies **(San Bernardino County or Arizona Department of Water Resources)**, affected land owner, **Tribes,** and other stakeholders.	Underlined text indicates new text inserted into document. Deleted text includes "the permitting" agency.	The proposed edit has been incorporated into the document.	Tech in **bold and underlined** in the "Reference Text" column has been added globally as requested during the call.
15	DTSC-12	2.3.2	1. Conduct evaluation of the well as detailed in Section 2.1 and verify with lead agencies, responsible agencies, affected land owner, and other stakeholders that the well should be decommissioned in place.	[DTSC Comment CG7]: The urban versus non-urban terms created concern to some tribes and distracted from the technical issues at hand. It is recommended that explicit reference to the term be minimized (see highlights in text and Figure 1). Perhaps just referencing the standards will suffice. Underlined text indicates new text inserted into document. Deleted text includes "the permitting" agency.	The proposed edit has been incorporated into the document. See response to comment DTSC-16 regarding the urban and non-urban topic. Reference June 6, 2014 RTC Discussion and what changes result (e.g. Type 1 and Type 2).	As a result of the June 6, 2014 RTC Discussion the terms "urban" and "non-urban" have been removed from the SOP. These terms have been replaced throughout with "Type 1" and "Type 2". A definition for these terms has been added to the beginning of Section 2.3. In addition, Figure 1 has been revised to include the new terminology.
16	DTSC-13	2.3.2	a. Non-urban Area – Place sealing material from total depth to near ground surface.	Yellow highlight added.	See response to comment DTSC-16.	See summary for comment DTSC-12.
17	DTSC-14	2.3.2	b. Urban Area – Place sealing material from total depth to within 5 feet of the ground surface (bgs).	Yellow highlight added.	See response to comment DTSC-16.	See summary for comment DTSC-12.
18	DTSC-15	2.3.2	c. For urban or non-urban area wells located outside an area of known or potential pollution or contamination as determined by the soil and/or groundwater quality data available for the location, evaluate using filler material in lieu of sealing material in portions of the well casing.	[DTSC Comment CG8]: Made edit assuming that well is left in place and could only fill well casing with filler or sealing material. Yellow highlight added. Underlined text indicates new text inserted into document. Deleted text includes "borehole".	The proposed edits have been incorporated into the document. See response to comment DTSC-16 regarding highlighted text.	See summary for comment DTSC-12.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
19	DTSC-16	2.3.2	a. Non-urban Area – Remove all well head protection and excavate around the well casing to a depth of approximately 5 feet bgs, or as practicable. Remove all well materials to a depth of approximately 5 feet bgs, or as practicable, cap casing with sealing material such that it extends beyond the diameter of the borehole and will drain fluids away from the borehole. Backfill the void created with displaced site material, or filler material if displaced site material is not available or appropriate. b. Urban Area – Remove all well head protection and excavate around the well casing to a depth of 5 <u>feet</u> bgs. <u>Remove</u> all well materials to a depth of 5 feet bgs, cap casing with sealing material <u>such that it extends beyond the diameter of the borehole and will drain fluids away from the borehole</u>. Backfill the void created with displaced site material, or filler material if displaced site material is not available or appropriate.	[DTSC Comment YA9]: Urban and non-urban decommissioning scenarios appear to be the same. If that the case, let's not differentiate between the two. Yellow highlight added. Underlined text indicates new text inserted into document.	The proposed edits have been incorporated into the document. The following text in **bold** has been added at the end of Section 2.3.2 to address the comment regarding the urban and non-urban topic: **Note that the urban and non-urban scenarios are only subtly different. While the urban scenario requires the removal of all well materials to a depth of 5 feet bgs (per CA well standards), non-urban areas do not require the removal of any well materials. The removal of well materials to a depth of approximately 5 feet bgs, or as practicable, is not required by CA well standards, but included per stakeholder comments.** To further clarify this difference in the text, bullet 4a (decommission well head, non-urban area) has been revised to indicate a range of 1 to 5 feet bgs. The same revision has been made to Section 2.3.3, bullet 4a, and Figure 1.	See summary for comment DTSC-12.
20	DTSC-17	2.3.3	1. Conduct evaluation of the well as detailed in Section 2.1 and verify with <u>lead agencies</u>, <u>responsible agencies</u>, affected land owner, and other stakeholders that the well should be decommissioned in place, what modification work is required, and whether it is in a location considered to be urban.	Underlined text indicates new text inserted into document. Deleted text includes "the permitting".	The proposed edit has been incorporated into the document.	See summary for comment DTSC-11.
21	DTSC-18	2.3.3	a. Non-urban Area – Place sealing material from total depth to near ground surface, or in the event casing is removed, the new top of casing depth. If a portion of the casing is removed, sealing or filler material requirements for the interval above the top of casing must be determined through discussion with <u>lead agencies, responsible agencies</u>, affected land owner, and other stakeholders.	Yellow highlight added. Underlined text indicates new text inserted into document. Deleted text includes "the permitting".	The proposed edit has been incorporated into the document. See response to comment DTSC-16 regarding highlighted text.	See summary for comment DTSC-12.
22	DTSC-19	2.3.3	b. Urban Area – Place sealing material from total depth to within 5 feet of the ground surface (bgs). If a portion of the casing is removed, sealing or filler material requirements for the interval above the top of casing must be determined through discussion with <u>lead agencies, responsible agencies</u>, affected land owner, and other stakeholders.	Yellow highlight added. Underlined text indicates new text inserted into document. Deleted text includes "the permitting".	The proposed edit has been incorporated into the document. See response to comment DTSC-16 regarding highlighted text.	See summary for comment DTSC-12.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
23	DTSC-20	2.3.3	c. For urban or non-urban area wells located outside an area of known or potential pollution or contamination, evaluate using filler material in lieu of sealing material in portions of the borehole.	Yellow highlight added.	See response to comment DTSC-16.	See summary for comment DTSC-12.
24	DTSC-21	2.3.3	a. Non-urban Area –Remove all well head protection and excavate around the well casing to a depth of approximately 5 bgs, or as practicable. Remove all well materials to a depth of approximately 5 feet bgs, or as practicable, cap casing with sealing material such that it extends beyond the diameter of the borehole and will drain fluids away from the borehole. Backfill the void created with displaced site material, or filler material if displaced site material is not available or appropriate. b. Urban Area – Remove all well head protection and excavate around the well casing to a depth of 5 bgs. Removal all well materials to a depth of 5 feet bgs, cap casing with sealing material such that it extends beyond the diameter of the borehole and will drain fluids away from the borehole. Backfill the void created with displaced site material, or filler material if displaced site material is not available or appropriate.	[DTSC Comment CG10]: See Comment YA9 above. Urban and non-urban decommissioning scenarios appear to be the same. If that the case, let's not differentiate between the two. Yellow highlight added.	See response to comment DTSC-16.	See summary for comment DTSC-12.
25	DTSC-22	2.3.4	Further, when removal is practicable, <u>lead agencies, responsible agencies</u>, affected land owner, or other stakeholders may determine this method preferable to others. Removal is typically conducted by over-drilling the existing well materials with larger diameter drilling tools.	Underlined text indicates new text inserted into document. Deleted text includes "the permitting".	The proposed edit has been incorporated into the document.	See summary for comment DTSC-11.
26	DTSC-23	2.3.4	1. Conduct evaluation of the well as detailed in Section 2.1 and verify with <u>lead agencies, responsible agencies</u>, affected land owner, and other stakeholders that the well should be decommissioned by removal.	Underlined text indicates new text inserted into document. Deleted text includes "the permitting".	The proposed edit has been incorporated into the document.	See summary for comment DTSC-11.
27	DTSC-24	2.4	Following completion of well decommissioning tasks, reporting of field activities must be completed in compliance with the <u>lead agencies</u> requirements.	Underlined text indicates new text inserted into document.	The proposed edit has been incorporated into the document.	No additional comments.
28	DTSC-25	2.4	<u>The Well Decommissioning Report will be submitted to lead agencies no later than 90 days after completion of well decommissioning activities.</u>	Underlined text indicates new text inserted into document.	The proposed text and text deletions have been incorporated into the document.	No additional comments.
29	DTSC-26	Figure 1	Between steps 3 and 4	Insert step: "Obtain approval to proceed from lead agencies"	The proposed revision to Figure 1 has been incorporated.	

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
30	DTSC-27	Figure 1	After step 13	Insert step: "Document all activities in a Well Decommissioning Report to be submitted no later than 90 days after the decommissioning event.	The proposed revision to Figure 1 has been incorporated.	
31	DTSC-28	Figure 1	Step 12	Delete "e.g., urban area vs. non-urban area" within the brackets.	The proposed revision to Figure 1 has been incorporated.	
32	Hargis + Associates, Inc. Fort Mojave Indian Tribe (FMIT) April 19, 2013 Letter FMIT-1	General	No specific text.	The Tribe has asked for and supported this effort to proceduralize the decommissioning of the physical intrusions into the landscape created by the drilling of wells and boreholes. Nevertheless, the alternatives available for the decommissioning procedure remain hurtful as they represent a permanent disfiguration of the hallowed landscape across which the project will be constructed. Basically, once a well/borehole is in place, the options for decommissioning involve either the emplacement of foreign, unnatural materials in place of the materials emplaced for during well construction/operation, or attempting to destroy the original downhole materials. In the process of well destruction, however, an even greater disturbance results. Neither option is attractive to the Tribe. Avoiding further disturbances by not constructing additional wells/boreholes of course is the Tribe's preference, particularly recognizing that the cumulative number of anticipated intrusions will perhaps be 350 or more before the project is over. Nevertheless, considering the reality that more disturbances will be created as a result of the remedy, the Tribe emphasizes that flexibility must be maintained. The decision as to how to proceed with decommissioning will necessarily be case-specific and requires advance discussions and consultations with the Tribes.	Comment noted. PG&E has drafted this SOP in coordination with the agencies and Tribes to meet regulatory requirements and minimize both disturbance and the placement of foreign materials. PG&E anticipates further discussions with and input from the Tribes on future work plans, as well as consultation with Tribes in accordance with the consultation protocol detailed in the Programmatic Agreement.	
33	FMIT-2	Preface	"This document was developed as a direct result of Tribal concerns …	The preface claims that "This document was developed as a direct result of Tribal concerns …" While this is in part true, it should be acknowledged that it would have been necessary to develop and SOP for this purpose for overall project purposes anyway. The Tribal request is consistent with the ARARs identified for this action.	Comment noted. The second sentence of the first paragraph has been edited to read as follows (new text in **bold**): This document was developed**, in part,** as a direct result of Tribal concerns that included dialog regarding future decommissioning activities at the site between PG&E, agencies, and Native American Indian Tribes (Tribes).	No additional comments.
34	FMIT-3	Preface	"… use of displaced site material in the decommissioning process …"	The preface also asserts that the "… use of displaced site material in the decommissioning process …" is based on Tribal input. This again is not a possibility related to Tribal input or preference. Provisions for backfilling certain boreholes with drill cuttings is an option that is commonly exercised, such as for exploratory borings. Nevertheless, the Tribe generally regards the earth materials removed from their natural place as a disturbance and potentially a desecration of the land. This section should probably also reference the preparation of an SOP for the handling and disposition of soils displaced as a result of project activities.	While permits are not required for the decommissioning of exploratory boreholes that do not reach the water table, based on the regulations~~, it is not best industry practice to backfill boreholes with drill cuttings~~. The SOP for the handling of disposition of soils displaced as a result of project activities (Management Protocol for Handling and Disposition of Displaced Site Material) is referenced in Section 1.3. A reference to the use of displaced site material (Section 2.2.3) is already included in the first paragraph of the document.	The response has been revised per the discussion. Changes shown in ~~strikeout~~.
35	FMIT-4	Preface	"exploratory borehole."	The preface offers a definition of an "exploratory borehole." Considering that the shelf life of this document is anticipated to be in excess of three decades, there should be a definition section for this term as well as others used throughout the text, such as "decommissioning," "displaced site material," "sealing material," "filler material," "monitor well," "production or extraction well," "injection well," etc. It is understood that some of these terms do not presently appear in the text, but it is necessary to establish the types of wells/boreholes to which this SOP applies. Perhaps a section further explaining the applicability and scope of this SOP is needed.	The first sentence of the second paragraph of the SOP has been revised as follows (new text in **bold**): This SOP will be used as a reference to guide the development of future work plans required for agency, Tribal, and stakeholder review prior to conducting **all** well and borehole decommissioning tasks **associated with the groundwater remedy**. Based on the revised text definition of well types would only add complexity to the SOP. The definition of "sealing material", "filler material", and "displaced site material" is provided in detail in Sections 2.2.1, 2.2.2, and 2.2.3, respectively.	No additional comments.

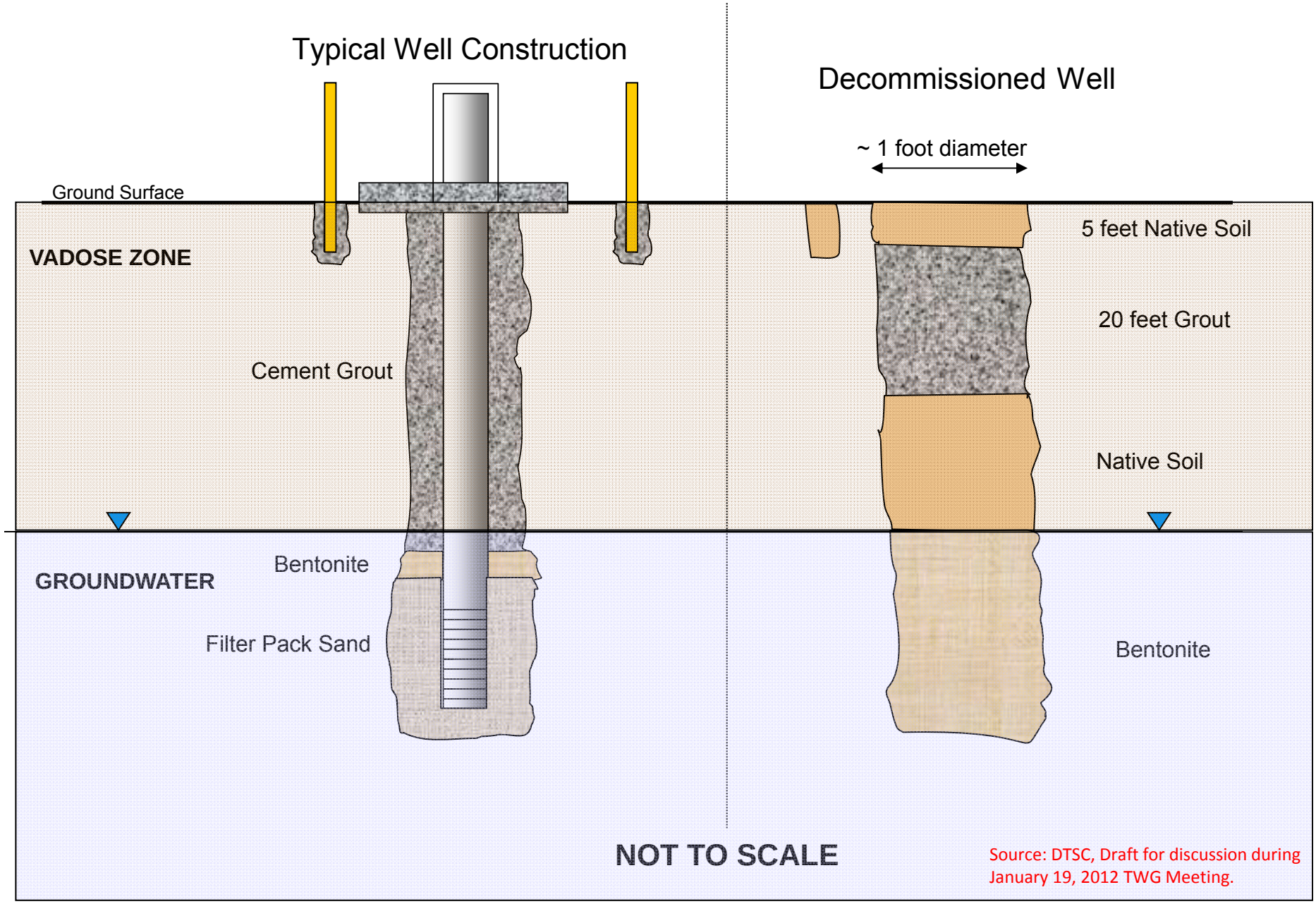
Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
36	FMIT-5	Section 1.0		Both California and Arizona regulatory requirements are outlined in Section 1.0, however, the respective subsections fail to mention provisions for variances within the regulations and guidance documents cited. Additionally, are there any conflicts between the rules promulgated by the two states?	Section 1.2 (Regulatory Information – Arizona [ARARs #48 and #49]) states: *If an alternative method of decommissioning is proposed in lieu of the standard method, further substantive review is performed by ADWR to verify that the proposed methods apply, and whether appropriate fill materials were chosen. A proposal to use an alternative decommissioning method requires an application to ADWR for a variance from the well decommissioning rule (a deviation from the standard decommissioning method).* The technical specifications and procedures for decommissioning well and exploratory boreholes presented in Section 2 of the SOP were developed to be in compliance with both California and Arizona regulations.	No additional comments.
37	FMIT-6	Section 1.3		Section 1.3 discusses CERCLA exemptions for permitting proposed well abandonment. It refers to various discussions with San Bernardino County authorities in this regard and further indicates that, to date, no discussions have been scheduled. It is strongly recommended that PG&E initiate the further discussions with the respective regulatory authorities in both California and Arizona. In fact, it may be advisable to familiarize the regulatory personnel with the context of this particular procedure. The Tribe notes that a preliminary exchange has been made with the Arizona Department of Water Resources (ADWR) through the Arizona Department of Environmental Quality (ADEQ) in regard to the decommissioning of borings proposed in support of exploration for a freshwater source in Arizona. The February 28, 2013, letter from ADWR addresses a proposed variance for this purpose. This seems to indicate ADWR's willingness to work with PG&E in regard to such requests. Accordingly, further liaison with these agencies may be helpful in future situations. If the Tribe can do anything to facilitate such discussions in the interest of its preferences, it stands ready to support such an effort.	PG&E appreciates the Tribe's willingness to assist with discussions with state permitting agencies related to well decommissioning variance options. PG&E anticipates holding these discussions with the agencies when future work plans that involves well decommissioning are being developed so that specific aquifer and well conditions can be contemplated in the context of potential variance options. Further, given that the groundwater remediation project is estimated to last for tens of years, the evaluation of variance options at the time each well decommissioning plan is developed will allow for potential changes in well decommissioning regulations to also be considered.	No additional comments.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
38	FMIT-7	Section 2.0		Section 2.0 discusses general procedures for decommissioning. Considering the subsections that follow, it appears that PG&E is targeting a specific recommendation for the well/borehole decommissioning procedure under consideration. As discussed earlier, the Tribe requires discussion and consultation on a case-by-case basis because of the variation in construction characteristics, location, and other factors that enter into the decision. Accordingly, at the outset of such discussions, the Tribe would need information in regard to the alternative procedures available for each case. This information would facilitate the Tribes' decisions on the long-term fate of the intrusions.	As stated at the beginning Section 2.0, *The information provided in this section is intended to be applicable for wells or boreholes located in either California or Arizona; however, it is assumed that the details included in the specific work plan(s) will be designed in compliance with the appropriate state regulations, and reviewed by the appropriate permitting agency.* To more clearly acknowledge that potential for well decommissioning procedures that would require a variance to the applicable state regulations, the following statement in **bold** has been added to the document after the text referenced above: **In addition, depending on the condition of the aquifer and well(s) subject to decommissioning, potentially applicable variance options that include the minimization of the placement of sealing material should be evaluated with the lead agencies during well decommission work plan development (e.g., Arizona Alternative 4 – variance option).** In addition, the following text has been added to the end of the second paragraph in Section 1.2 (new text in **bold**): *The Well Abandonment Handbook (WAH) provides a standard well decommissioning method to be used for the post-installation of any well or borehole, regardless of the aquifer or vadose zone conditions applicable to the well (Section IV A). In addition, the WAH details five alternative abandonment methods. The five alternatives are for specific vadose zone and aquifer conditions which may include contamination, single or multiple aquifers, or dry wells (Section IV B).* ***For example, Alternative 4, which applies to wells that only penetrate a single aquifer without vertical flow components and no water quality contamination issues, might be applicable to wells in the Topock area that are 8-inches or greater in diameter. A variance option to Alternative 4 permits the use of clean fine sand to fill the well being decommissioned.*** Further, the text included in box number 13 on the decision flow chart presented in Figure 1 has been revised as follows (including text strikeout per comment DTSC-28 and with new text in **bold**): Place sealing/filler material within the borehole or well casing in accordance with regulatory and project-specific guidance**, and any permitting agency-approved variance conditions**.	During the June 6, 2014 subgroup discussion, the Tribes requested that additional information on potential variance conditions that had been previously developed by DTSC be added to this SOP. Please advise if the three schematics included in new Attachment A to this SOP are appropriate and meet the intent of this comment. Thank you.
39	FMIT-8	Section 2.2		The subsections under Section 2.2 do not appear to recognize provisions for variances as discussed earlier. Indeed such scenarios need to be developed and discussions held with the respective regulatory authorities as to the acceptability, need and justifications, and technical rationale for such requests. To this point, the subcommittee has spent time on alternative conceptual designs. This SOP does not include or acknowledge this work.	The subsections under Section 2.2 simply present the different types of materials that can be used for various well or borehole decommissioning scenarios, and not is not intended to evaluate or disqualify variance well decommissioning options. See the response to FMIT-7, which adds text to more clearly acknowledge the potential for variance options.	During the June 6, 2014 subgroup discussion, the Tribes requested that additional information on potential variance conditions that had been previously developed by DTSC be added to this SOP. Please advise if the three schematics included in new Attachment A to this SOP are appropriate and meet the intent of this comment. Thank you.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
40	FMIT-9	Section 2.3		Section 2.3 develops different scenarios. However, these scenarios only relate to standard situations and again do not consider the possibilities of variances. The situations in which variances are appropriate and applicable for consideration need to be developed in this procedure, otherwise those following the procedure will simply adhere strictly to the content. Additionally, this section appears to only consider the California rules, which distinguish between "urban" and "non-urban" areas. This, for example, is not a relevant consideration for the Site and is not referenced in the Arizona guidelines. The design for well decommissioning should not have to be a choice between these two options.	The evaluation of scenarios in Section 2.3 were developed in consideration of both California and Arizona regulations. The distinction between urban and non-urban is subtle and has been clarified as detailed in the response to comment DTSC-16. Both California and Arizona regulations detail specific procedures depending on aquifer and well conditions. California regulations do not reference any variance conditions, while the Arizona regulations reference alternatives to the recommended standard decommissioning procedure and some variance options associated with those alternatives. Variance conditions or potential scenarios that may or may not be approved by regulatory agencies should not be included in an SOP. Also, see comment FMIT-7.	During the June 6, 2014 subgroup discussion, the Tribes requested that additional information on potential variance conditions that had been previously developed by DTSC be added to this SOP. Please advise if the three schematics included in new Attachment A to this SOP are appropriate and meet the intent of this comment. Thank you.
41	FMIT-10	Section 2.4		Section 2.4 discusses "Well Decommissioning Reporting," and specifies that the information be reported in the Topock Well Inventory. Is this information also reported in the Well Registry for the respective states?	Yes, well decommissioning reports are filed with ADWR and California DWR in accordance with the respective well standards for each state. As noted in the first sentence of Section 2.4 (including edit made in accordance with comment DTSC-24): Following completion of well decommissioning tasks, reporting of field activities must be completed in compliance with the lead agencies requirements.	No additional comments.
42	FMIT-11	Figure 1		Figure 1 needs to be changed to reflect the above comments.	See response to comment FMIT-7.	No additional comments.
43	Hualapai Department of Cultural Resources (HDCR) April 24, 2013 Letter HDCR-1			On behalf of the Hualapai Tribe, we feel that is very important to have minimal disturbance in an area that has been under constant environmental change due to the operations of the Topock Compressor Station. As wells and well materials are intrusive, we feel that it is best that all well casings be left in-situ when and if wells are to be decommissioned. This will be the least intrusive and create the least amount of disturbance.	PG&E agrees that the decommissioning procedure which involves the least amount of disturbance that is acceptable to the regulatory agencies should be implemented. The following text in **bold** has been added to Section 2.3.2 (Decommissioning a Well in Place): **This decommissioning option should be utilized whenever acceptable to the regulatory agencies as it represents the field procedures that are least intrusive and create the least amount of disturbance.**	No additional comments.
44	HDCR-2			In the process of decommissioning, Hualapai prefer that natural materials from the immediate vicinity be placed inside the well-casings, and that wells be capped with the least amount of invasive materials, i.e. concrete, steel bolts, etc. As wells come under the decommissioning process, Hualapai would like to be informed about each well that is going to be subject to decommissioning.	See response to comment FMIT-1 regarding consultation with the Tribes on future work plans, and FMIT-7 regarding clarifying information that is being added to the document to acknowledge the potential for variance conditions.	No additional comments.

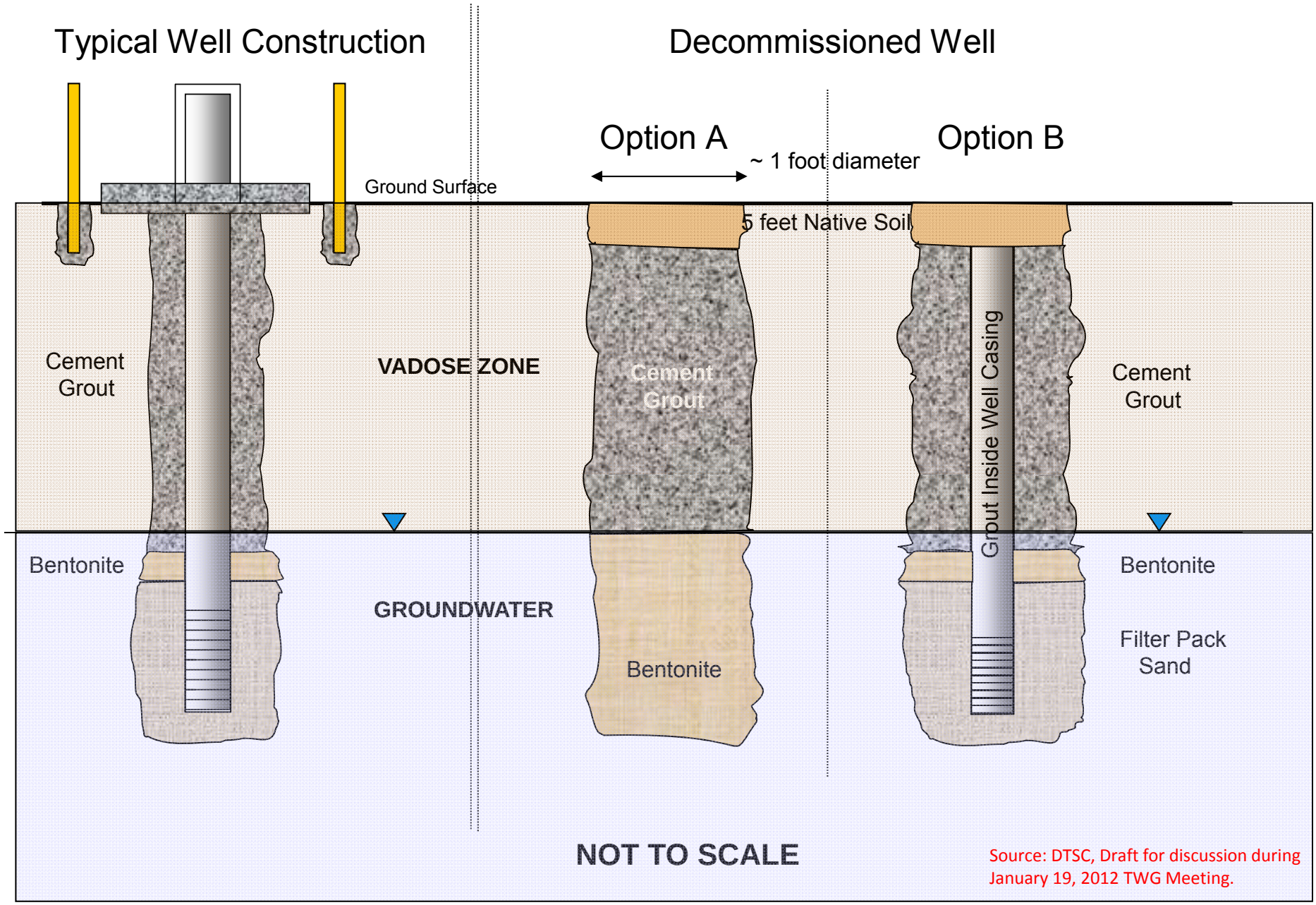
Attachment B
Draft DTSC Concepts for Well and Borehole Decommissioning

Category 1: Contaminant Free – No Variance



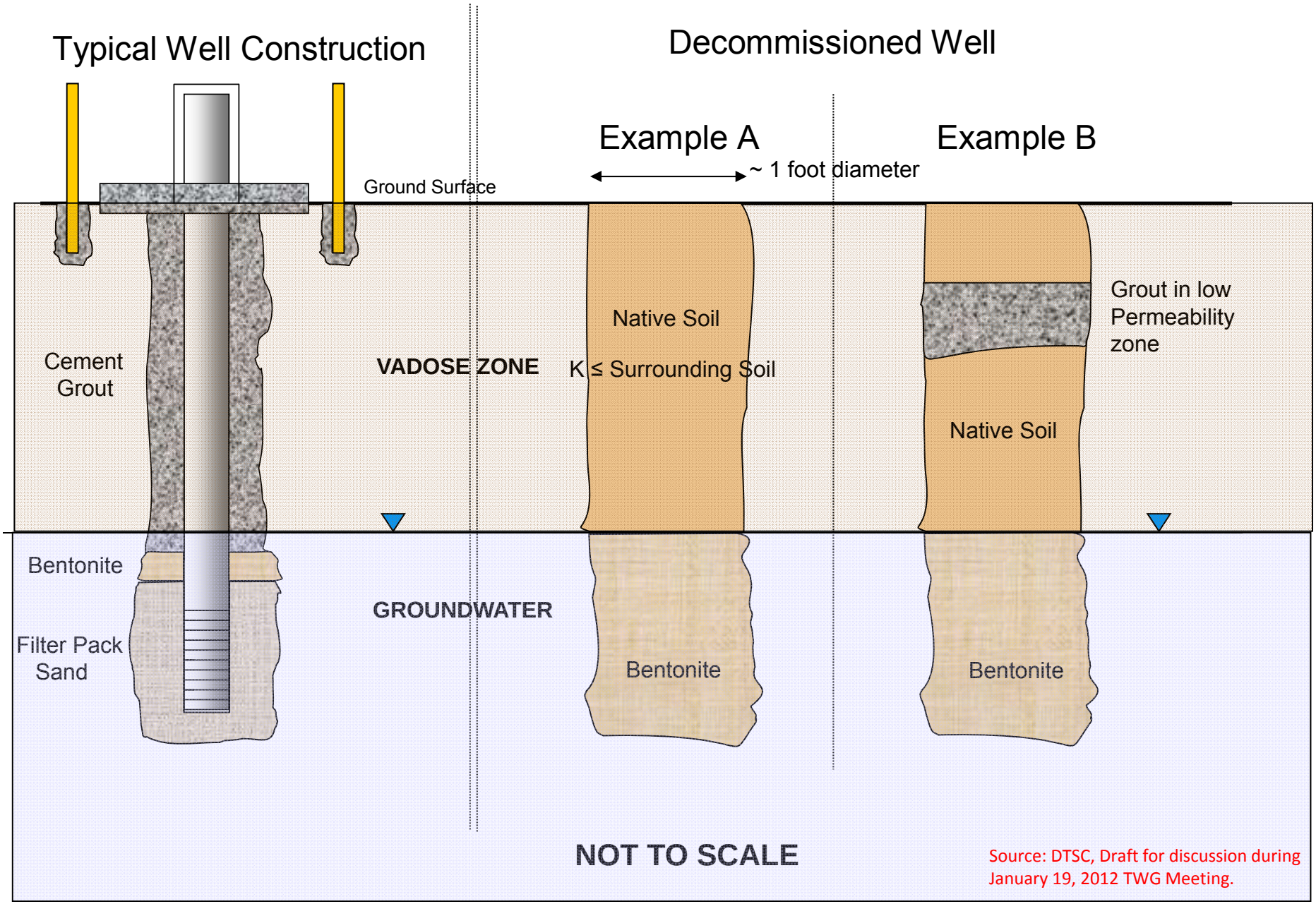
Source: DTSC, Draft for discussion during January 19, 2012 TWG Meeting.

Category 2: Contaminanted Area – No Variance



Source: DTSC, Draft for discussion during January 19, 2012 TWG Meeting.

Category 3: Contaminant Free – Variance



Source: DTSC, Draft for discussion during January 19, 2012 TWG Meeting.

SOP-A1

Purging and Sampling of Groundwater Monitoring Wells
Well-Volume Method
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for purging and sampling all groundwater monitoring wells at the Topock site with casing diameters in excess of 1-inch. This SOP will be used for sampling groundwater monitoring wells using a dedicated electric submersible pump with a single discharge rate, a dedicated electric pump with a controllable discharge rate, or a portable electric pump with a controllable discharge rate. A peristaltic pump or inertial pump (Waterra or similar) can be used if an electrical submersible pump is not appropriate. A well-volume based purging and sampling method will be used for these wells. This SOP does not apply to FLUTe wells, or Blatypus pump equipped wells (MW-58BR). Those wells will be sampled according to the relevant Field Activities Work Plan (available from on-site field coordinator).

REQUIRED DOCUMENTS:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, and Field Procedures Manual and QAPP (Procedures Manual), Operation and Maintenance Manual (O&M Manual), as required.
- Topock Program Health and Safety Plan (HSP)
- Applicable SOP's
- Well construction logs/specifications
- Mobile Integrated Sample Tracking (MIST) handheld database
- Previous sampling logs or tabular historic field data tables
- Current site access map
- Blank sampling logs, maps, sample labels, chains of custody (COC's), and the designated groundwater sampling field notebook

REQUIRED EQUIPMENT:

- 2 or more (i.e. one is backup) YSI-556 WQ instruments with flow through cells, or equivalent.
- Hach 2100P turbidimeter or equivalent.
- 200 foot (or longer as needed) water level indicator (WLI).
- Trimble Rugged Reader hand held instrument for MIST data collection.
- Two, 200 gallon capacity purge tanks.

- Utility vehicles (UTV's) as necessary.
- Back-up 2-inch pump and controller.
- Honda 2000 watt generator or alternate power source.

PREPARATION & SETUP:

- Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, HSP, and groundwater sampling supplies and equipment check list. (NOTE: the PST should also be reviewed for required "non-analytical event activities" such as water level measurements or other data collection that is planned in association with the groundwater sampling event).
- Acquire the existing field logbook for groundwater sampling and initiate entries.
- Inspect all equipment and verify that the field water quality (WQ) meters have been calibrated prior to use according to the manufacturer's instructions and SOP-A9, *Calibration of Field Instruments*.
- Inventory sample bottles, build sample sets for the required analytes at each sample location, ensure a sufficient supply of lab de-ionized water for equipment blanks, and confirm the lab courier schedule.
- Field-check sampling equipment and supplies: water level indicator (WLI), WQ meters, flow-through cell, pump controller, power supply, pump discharge/sampling tubing, N-dex gloves, D.I water sprayers, 5 gallon buckets, paper towels, 0.45 micron in-line filters, etc.

FIELD PROCEDURES:

- **Prior to opening any monitor well, remove all pens, lighters, calculators, or any other loose items from vest pockets, or from any other location where they could fall into the well.**
- Upon arrival at the monitoring well, at least 2 members of the sampling team must confirm the well ID. Wells should be clearly marked on the well monument. If the well cannot be positively identified by the marking, measure total depth of the well and compare to the well installation details to confirm the correct location. Report worn or unclear well markings to the on-site field coordinator.
- Place spill containment according to SOP A-13, *Spill Prevention, Containment, and Control Measures for Monitoring Well Sampling.*
- Collect an "EB", equipment blank, ***prior to pump installation*** if necessary according to the PST.
- Open the protective casing lid and, ***prior to moving it***, note the exact configuration of the transducer installation if present. Measure static WL according to SOP-A7, *Water level Measurements,* moving the transducer if necessary, and record WL value in MIST and on the sampling log.

- If the well is equipped with a transducer and does not have a dedicated pump installed, remove the transducer from the well according to SOP-C1, *Solinst Pressure Transducers*.
- If the well does not have a dedicated pump installed, but does have dedicated sample tubing, attach the dedicated tubing to the appropriate pump and install decontaminated pump at the same intake/sampling depth as used in prior events. There is a marking on the purge tubing which corresponds with the monitor well top of casing (TOC) to facilitate this requirement. Purge and sample the well as described below.
- If the well does not have a dedicated pump ***or*** tubing, or has not been previously sampled, use new low-density polyethylene tubing and install the pump with the intake 15 feet below the surface of the static water column, or at the depth prescribed by the Project Manager (PM) or Field Team Manager (FTM), and record the intake depth in MIST and on the field data sheet. Purge and sample the well as described below.
- If the well ***does*** have a dedicated pumping system, connect the discharge tubing and purge and sample the well as described below.
- Collect daily equipment blanks and duplicate samples as required by the PST and instructed by the field team leader.

PURGING AND SAMPLING PROCEDURES:

- Prepare the groundwater sampling log. Use the static water level and the total depth provided on the field data sheet and in the PST to calculate the volume of one casing of standing water in the well.
- Calculate 3 casing volumes for the minimum required purge amount and record on sampling log.
- Evaluate previous purge rates, amount of drawdown, stability of field parameters, and total purge volume prior to sample collection from previous sampling records and historical data tables (Appendix B of *Monitoring Plan for Groundwater and Surface Water Monitoring Program*). If the well has not been previously sampled, estimate the expected purge rate using previous sampling information from nearby wells.
- If the pumping rate is in excess of one gpm, install the provided flow splitter so that the pumping rate does not need to be decreased to collect the sample. If the flow rate is at two gpm or above, install a second flow splitter to control the flow through the flow through cell.
- Install the pump as previously described. Immediately after installation, stuff a large trash bag, or place another barrier into the well bore around the pump discharge tubing. This will help to prevent foreign objects from falling into the well.
- Ensure that all tubing connections are properly tightened and then start the pump. Check for any leaks, monitor drawdown, and calculate/set the purge rate. The purge rate can be determined using the fill-time of a graduated container, or using a flow meter if available. The well specific purge rate and pump setting should be available on the previous purge form. Record pump setting (i.e. hertz) on sampling log if available.
- Purge water should be contained in a portable purge water storage tank. If approved by well owner and the governing regulatory agencies, water may be discharged directly to

the ground (this presently applies to PM-03 and PM-04 water supply wells), as directed by the FTM.

- Continue purging, measuring WL and field indicator parameters periodically (time, pH, conductivity, turbidity, dissolved oxygen, temperature, salinity, TDS, ORP, appearance, and any odors present). Time the readings such that there are a minimum of 4 sets of data collected over the course of the full purge.
- If significant drawdown is observed or turbidity increases dramatically, decrease the purge rate and measure/record new purge rate. Significant drawdown is considered to be 5 percent of the total height of the water column or to the top of screen. Record time for all measurements collected. Note and provide qualifying remarks if parameter readings are anomalous or unstable due to instrument problems and change out the instrument.
- During the purge, compare the field parameters to historical purge data. If the parameters are significantly different (greater than 50% difference for SC, pH, and/or ORP) re-confirm the ID of the well. If the well ID is re-confirmed by 2 crew members, and the readings continue to be significantly different than prior readings, set up a second WQ instrument in series to confirm readings. If the anomalous readings are confirmed by the second instrument, contact the field coordinator to resolve the issue. If the second WQ instrument produces readings that are comparable to historic values, note an instrument change and use the second instrument's readings.
- Continue purging until ***3-casing volumes*** have been removed ***and*** field parameters stabilize. Indicator parameters are considered stabilized when 3 consecutive readings made several minutes apart fall within the following EPA stabilization criteria:
    - pH +/- 0.1 pH units
    - Specific conductance +/- 3%
    - ORP +/- 10 millivolts
    - Turbidity +/- 10% NTU units (when turbidity is >10 NTUs)
    - Dissolved oxygen +/- 0.3 mg/L
    - Temperature +/- 2° Celsius

- When the requirements above have been satisfied and the purge cycle is complete, disconnect the flow through cell and prepare to collect samples directly from the pump discharge tubing for analyses according to event-specific PST.
- If flow splitters have been used, do not change the flow rate, and collect the sample from the dedicated sampling port of the first splitter in line.
- Prepare sample containers and collect gas-sensitive analytes first. The preferred collection order will be volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]; see SOP-A6), then general chemistry (cations, anions, stable isotopes).
- For filtered samples, attach a 0.45 micron in-line filter to the pump discharge and allow approximately 500 mL of sample to pass through the filter before beginning sample collection in accordance with SOP A-6, *Field filtration* and the QAPP.

- When sample collection is complete, record sample information, final WL, and purge volume data in MIST and on the field sampling log.
- If transient pump previously installed, remove the pump from the well, detach the dedicated tubing and carefully drain any residual water to the purge water tank. Install appropriate tubing cap to prevent any residual water from leaking from the sample tubing. Store the dedicated tubing in a sealed, labeled trash bag. Decontaminate the pump according to SOP A-10, *Decontamination of Water Sampling Equipment.*
- If well was equipped with a transducer, replace the transducer in exactly the same configuration in which it was found and in accordance with SOP-C1, *Solinst Pressure Transducers*.
- Close and secure well protection lid.
- Follow appropriate SOPs, O&M Manual, and the Program Procedures Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

LOW VOLUME AND POOR RECOVERY WELLS:

Some groundwater monitoring wells under the GMP may exhibit slow or poor recovery upon purging. These monitoring wells may not recharge sufficiently during purging, and may run completely dry without an opportunity to collect the required series of groundwater stabilization parameters, or requisite samples. The following procedures will be followed for collecting representative groundwater samples from wells that go dry during purging.

PREPARATION & SETUP:

Follow the steps above.

PURGING AND SAMPLING PROCEDURES FOR LOW RECOVERY WELLS:

- Prepare the groundwater sampling log. Use the static water level and the total depth provided on the field data sheet (comparing to the previous values used on the PST) to calculate the volume of one casing of standing water in the well.
- Calculate 3 casing volumes for the minimum required purge amount, and record on purge log.
- Evaluate previous purge rates, amount of drawdown, stability of field parameters, and total purge volume prior to sample collection from previous sampling records and historical data tables (Appendix B of *Monitoring Plan for Groundwater and Surface Water Monitoring Program*). If the well has not been previously sampled, estimate the expected purge rate using previous sampling information from nearby wells.
- Connect the dedicated purge tubing if available or use new tubing if necessary. Install the pump as previously described and start the purge. Monitor drawdown, and calculate/set the purge rate. Record the pump setting (i.e. hertz) on the sampling log if available.

- Continue purging, measuring WL and field indicator parameters periodically (time, pH, conductivity, turbidity, dissolved oxygen, temperature, salinity, TDS, ORP, and any odors present). Space the readings such that there are a minimum of 4 sets of data collected over the course of the available purge volume.
- During the purge, compare the field parameters to previous purge data. If the parameters are significantly different (greater than 50% difference for SC, pH, and/or ORP) confirm the ID of the well. If the well ID is confirmed by 2 crew members, and the readings continue to be significantly different than prior readings, set up a second WQ instrument in series to confirm readings. If the anomalous readings are confirmed by the second instrument, contact the field coordinator to resolve the issue. If the second WQ instrument produces readings that are comparable to historic values, note an instrument change and use the second instrument's readings.
- Continue purging until ***3-casing volumes*** have been removed ***and*** field parameters stabilize, or until the well purges dry. If 3 casing volumes are removed, sample as described above. If the well runs dry, continue as instructed below.
- If previously installed, remove the pump from the well and decontaminate according to SOP A-10, *Decontamination of Water Sampling Equipment*. The pump may also be left in place to facilitate subsequent purging and sampling.
- Record the final water level, time, the volume of water discharged and the elapsed time for the dewatering of the well.
- Allow the well to recharge to 80 percent of the original height of the water column. Ideally, this should be within 24 hours of the monitoring well being purged dry. The recovery period to achieve 80 percent of the height of the water column could take longer than 24 hours in some instances (MW-48).
- ***At MW-24BR only,*** return to the well the following day and continue purging until a total of 190 gallons have been removed, then sample normally.
- Once recovery has reached 80%, or 48 hours have elapsed (whichever comes first), a bailer can be used for sample collection. Collect samples for analyses according to PST. Prepare sample containers and collect gas-sensitive analytes first. The preferred collection order will be volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]), then general chemistry (cations, anions, stable isotopes).
- If an insufficient volume of water is available to fill all of the sample containers, first contact laboratory personnel to determine the minimum allowable volumes needed for the required analyses. *(Talk to FTM as the FTM may have already contact lab personnel and may have the instructions for you.)* Then verify the critical analyte list with the PM or the FTM and prioritize the sample collection to obtain the critical analytes for the main contaminants of concern first. Continue collecting samples until all samples have been collected, or the groundwater supply is exhausted. Unfiltered samples are to be filled by transferring water directly from the bailer to the sample container.
- For filtered samples, attach a 0.45 micron in-line filter to the bailer and allow approximately 200 mls of sample to pass through the filter before beginning sample

collection in accordance with SOP A-6 *Field filtration*. If gravity flow is insufficient to filter the sample, use a pressurized bailer and filter for sample filtration.

- When sample collection is complete, record sample information, final WL, and purge volume data in MIST and on the field sampling log.
- If well was equipped with a transducer, replace the transducer in exactly the same configuration in which it was found and according to SOP-C1, *Solinst Pressure Transducers*.
- Close and secure well protection lid.
- Follow appropriate SOPs, O&M Manual, and Procedures Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

SOP-A2

Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells Modified Well-Volume Method Standard Operating Procedures for PG&E Topock Program

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This standard operating procedure (SOP) addresses the procedures and equipment to be used for purging and sampling all groundwater monitoring wells at the Topock site with 1-inch casing diameters. This SOP will be used for sampling groundwater monitoring wells using dedicated tubing and a peristaltic pump. A well-volume based purging and sampling method will be used for such wells.

REQUIRED DOCUMENTS:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual and QAPP (Procedures Manual), and Operations and Maintenance Manual (O&M Manual), as required.
- Topock Program Health and Safety Plan (HSP)
- Applicable SOP's
- Well construction logs/specifications
- Mobile Integrated Sample Tracking (MIST) handheld database
- Previous sampling logs or tabular historic field data
- Current site access map
- Blank sampling logs, maps, sample labels, chains of custody (COC's), and the designated groundwater sampling field notebook

REQUIRED EQUIPMENT:

- 2 or more YSI-556 water quality (WQ) instruments with flow through cells, or equivalent.
- Hach 2100P turbidimeter or equivalent.
- 200 foot Water level indicator (WLI).
- Trimble Rugged Reader hand held instrument for MIST data collection.
- 30 gallon purge water tank.
- Decontamination spray bottles
- Utility vehicles (UTV's) as necessary.
- 12 volt peristaltic pump.

- 12 volt power source.

PREPARATION & SETUP:

- Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, O&M Manual, HSP, and groundwater sampling supplies and equipment check list. (NOTE: the PST should also be reviewed for required "non-analytical event activities" such as water level measurements or other data collection to be performed in association with the groundwater sampling event).
- Acquire the existing field logbook for groundwater sampling and initiate entries.
- Inspect all equipment and verify that the field WQ meters have been calibrated prior to use according to the manufacturer's instructions and SOP-A9, *Calibration of Field Instruments*.
- Inventory sample bottles, build sample sets for the required analytes at each sample location, ensure a sufficient supply of lab de-ionized water for equipment blanks, and confirm the lab courier schedule.
- Field-check sampling equipment and supplies: WLI, WQ meters, flow-through cell, peristaltic pump, power supply, pump discharge/sampling tubing, N-dex gloves, deionized water sprayers, 5 gallon buckets, paper towels, 0.45 micron in-line filters, etc.
- Field-check and setup sampling equipment: WLI, WQ meters, flow-through cell, pump and power supply, pump discharge/sampling tubing, etc. Install dedicated tubing and connect to peristaltic pump. Connect peristaltic pump to 12 volt power supply.

FIELD PROCEDURES:

- **Prior to opening any monitor well, remove all pens, lighters, calculators, or any other loose items from vest pockets, or from any other location where they could fall into the well.**
- Upon arrival at the monitoring well, at least 2 members of the sampling team must confirm the well ID. Wells should be clearly marked on the well monument. If the well cannot be positively identified by the marking, measure total depth of the well and compare to the well installation details to confirm the correct location.
- Place spill containment according to SOP A-13, *Spill Prevention, Containment, and Control Measures for Monitoring Well Sampling.*
- Open the protective casing lid and, ***prior to moving it***, note the exact configuration of the transducer installation if present. Measure static water level (WL) according to SOP-A7, *Water Level Measurements,* moving the transducer if necessary, and record WL value in MIST on the sampling log.
- If the well is equipped with a transducer, remove the transducer from the well according to SOP-C1, *Solinst Pressure Transducers*.
- Collect daily equipment blanks and duplicate samples as required by the PST and instructed by the field team leader.

PURGING AND SAMPLING PROCEDURES:

- Prepare the groundwater sampling log. Use the static water level determined above and the total depth provided on the field data sheet and in the PST to calculate the volume of one casing of standing water in the well. Calculate 3 casing volumes for the minimum required purge amount, and record on purge log.
- Prior to purging, evaluate previous purge rates, amount of drawdown, and purge volume from previous sampling records and historical data tables (Appendix B of *Monitoring Plan for Groundwater and Surface Water Monitoring Program*). If the well has not been previously sampled, estimate the expected purge parameters using previous sampling information from nearby wells.
- Install the dedicated tubing if available, or use new tubing as necessary. Connect the tubing to the peristaltic pump, check that all fittings are tight, and start purging the well. Check for leaks. Measure WL and calculate the purge rate immediately and adjust if necessary. Purge rate will be measured by using the fill-time of a graduated container. The well specific purge rate and pump setting should be available on the previous purge form.
- Allow the flow through cell to fill and field parameters to stabilize, then start recording field indicator parameters on the sampling sheet and in MIST.
- Continue purging, measuring WL and field indicator parameters periodically (time, pH, conductivity, turbidity, dissolved oxygen, temperature, salinity, TDS, ORP, appearance, and any odors present). Time the readings such that there are a minimum of 5 sets of data collected over the course of the full purge.
- If significant drawdown is observed, or turbidity increases dramatically, decrease the purge rate and measure/record new purge rate. Significant drawdown is considered to be 5 percent of the total height of the water column or to the top of screen. Record time for all measurements collected. Note and provide qualifying remarks if parameter readings are anomalous or unstable due to instrument problems.
- During the purge, compare the field parameters to historical purge data. If the parameters are significantly different (greater than 50% difference for SC, pH, and/or ORP) confirm the ID of the well. If the well ID is confirmed by 2 crew members, and the readings continue to be significantly different than prior readings, set up a second WQ instrument in series to confirm readings. If the anomalous readings are confirmed by the second instrument, contact the field coordinator to resolve the issue. If the second WQ instrument produces readings that are comparable to historic values, note an instrument change and use the second instrument's readings.
- Continue purging until ***3-casing volumes*** have been removed ***and*** field parameters stabilize. Indicator parameters are considered stabilized when 3 consecutive readings made several minutes apart fall within the following EPA stabilization criteria:
    - pH +/- 0.1 pH units
    - Specific conductance +/- 3%
    - ORP +/- 10 millivolts
    - Turbidity +/- 10% NTU units (when turbidity is >10 NTUs)
    - Dissolved oxygen +/- 0.3 mg/L

- Temperature +/- 2° Celsius

- When the requirements above have been satisfied and the purge cycle is complete, disconnect the flow through cell and prepare to collect samples directly from the pump discharge tubing for analyses according to event-specific PST. For all samples, decrease the discharge rate as necessary to reduce water turbulence at the pump discharge point. Prepare sample containers and collect gas-sensitive analytes first. The preferred collection order will be volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]; see SOP-A6), then general chemistry (cations, anions, stable isotopes).
- For filtered samples, attach a 0.45 micron in-line filter to the pump discharge and allow approx. 500 mls of sample to pass through the filter before beginning sample collection in accordance with SOP A-6, *Field filtration*.
- When sample collection is complete, record sample information, final WL, and purge volume data in MIST and on the field sampling log.
- If previously installed, remove the pump from the well, detach the dedicated tubing and carefully drain any residual water to the purge water tank. Fold both ends of the purge tubing and secure with wire ties as a further deterrent to leakage. Store the dedicated tubing in a sealed, labeled trash bag. Decontaminate the pump according to SOP A-10, *Decontamination of Water Sampling Equipment.*
- If well was equipped with a transducer, replace the transducer in exactly the same configuration in which it was found and according to SOP-C1, *Solinst Pressure Transducers*.
- Close and secure well protection lid.
- Follow SOPs in Program Procedures Manual and O&M Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

LOW VOLUME AND POOR RECOVERY WELLS:

Some groundwater monitoring wells under the GMP may exhibit slow or poor recovery upon purging. These groundwater monitoring wells may not recover sufficiently during purging and run completely dry without an opportunity to collect the required series of groundwater stabilization parameters, or run dry prior to sampling. The following procedures should be followed for collection representative groundwater samples from wells that go dry during purging activities in preparation for groundwater sampling.

PREPARATION & SETUP:

Follow steps above.

PURGING AND SAMPLING PROCEDURES FOR LOW RECOVERY WELLS:

- Prepare the groundwater sampling log. Use the static water level determined above and the total depth provided on the field data sheet and in the PST to calculate the volume of one casing of standing water in the well.
- Calculate 3 casing volumes for the minimum required purge amount, and record on purge log.
- Evaluate previous purge rates, amount of drawdown, stability of field parameters, and total purge volume prior to sample collection from previous sampling records and historical data tables (Appendix B of *Monitoring Plan for Groundwater and Surface Water Monitoring Program*). If the well has not been previously sampled, estimate the expected purge rate using previous sampling information from nearby wells.
- Connect the dedicated purge tubing if available, or use new tubing if necessary. Install the pump as previously described and start the purge. Monitor drawdown, and calculate/set the purge rate.
- Continue purging, measuring WL and field indicator parameters periodically (time, pH, conductivity, turbidity, dissolved oxygen, temperature, salinity, TDS, ORP, and any odors present). Space the readings such that there are a minimum of 5 sets of data collected over the course of the available purge volume.
- During the purge, compare the field parameters to previous purge data. If the parameters are significantly different (greater than 50% difference for SC, pH, and/or ORP) confirm the ID of the well. If the well ID is confirmed by 2 crew members, and the readings continue to be significantly different than prior readings, set up a second WQ instrument in series to confirm readings. If the anomalous readings are confirmed by the second instrument, contact the field coordinator to resolve the issue. If the second WQ instrument produces readings that are comparable to historic values, note an instrument change and use the second instrument's readings.
- Continue purging until ***3-casing volumes*** have been removed ***and*** field parameters stabilize, or until the well purges dry. If 3 casing volumes are removed, sample as described above. If the well runs dry, continue as instructed below.
- If previously installed, remove the pump from the well and decontaminate according to SOP A-10, *Decontamination of Water Sampling Equipment*. The pump may also be left in place to facilitate subsequent purging and sampling.
- Record the final water level, time, the volume of water discharged and the elapsed time for the dewatering of the well.
- Allow the well to recharge to 80 percent of the original height of the water column. Ideally, this should be within 24 hours of the monitoring well being purged dry. The recovery period to achieve 80 percent of the height of the water column could take longer than 24 hours in some instances (MW-48).
- Once recovery has reached 80%, or 48 hours have elapsed (whichever comes first), a bailer can be used for sample collection. Collect samples for analyses according to PST. Prepare sample containers and collect gas-sensitive analytes first. The preferred collection order will be volatile organic compounds (VOCs), semi-volatile organic

compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]), then general chemistry (cations, anions, stable isotopes).

- If an insufficient volume of water is available to fill all of the sample containers, first contact laboratory personnel to determine the minimum allowable volumes needed for the required analyses, then verify the critical analyte list with the PM or the FTM and prioritize the sample collection to obtain the critical analytes for the main contaminants of concern first. Continue collecting samples until all samples have been collected, or the groundwater supply is exhausted. Unfiltered samples are to be filled by transferring water directly from the bailer to the sample container.
- For filtered samples, attach a 0.45 micron in-line filter to the bailer and allow approx. 200 mls of sample to pass through the filter before beginning sample collection in accordance with SOP A-6, *Field filtration*. If gravity flow is insufficient to filter the sample, use a pressurized bailer and filter for sample filtration.
- When sample collection is complete, record sample information, final WL, and purge volume data in MIST and on the field sampling log.
- If well was equipped with a transducer, replace the transducer in exactly the same configuration in which it was found and according to SOP-C1, *Solinst Pressure Transducers*.
- Close and secure well protection lid.
- Follow Procedures Manual and the O&M Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

SOP-A3

Purging and Sampling of Active and Inactive Water Supply Wells Standard Operating Procedures for PG&E Topock Program

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This standard operating procedure (SOP) addresses the procedures and equipment to be used for purging and sampling active and inactive water supply wells in the vicinity of the Topock site. This procedure also applies to the collection of water quality samples from long-screen extraction, injection, and test wells. Active and inactive water supply wells with functional dedicated pumps and a sampling port will be sampled directly from the sampling port. Inactive supply wells without functional pumps will be sampled using a temporary submersible pump following the well-volume sampling procedure.

REQUIRED DOCUMENTS:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual (Procedures Manual), Operation and Maintenance Manual (O&M Manual), QAPP and Addendum to the QAPP, as required.
- Topock Program Health and Safety Plan (HSP)
- Applicable SOP's
- Well construction logs/specifications
- Mobile Integrated Sample Tracking (MIST) handheld database
- Previous sampling logs or tabular historic field data
- Current site access map
- Blank sampling logs, maps, sample labels, chains of custody (COC's), and the designated groundwater sampling field notebook

REQUIRED EQUIPMENT:

- 2 or more YSI-556 water quality (WQ) instruments with flow through cells, or equivalent.
- Hach 2100P turbidimeter or equivalent.
- 200 foot Water level indicator (WLI).
- Trimble Rugged Reader hand held instrument for MIST data collection.
- 200 gallon capacity purge tanks (2).
- Utility vehicles (UTV's) as necessary.
- Back-up 2 inch pump and controller.
- Honda 2000 watt generator or alternate power source.

PREPARATION AND SETUP:

- Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, O&M Manual, QAPP and the Addendum to the QAPP, HSP, and groundwater sampling supplies and equipment check list.
- Acquire the existing field logbook for surface water sampling and initiate entries.
- Inspect all equipment and verify that the field WQ meters have been calibrated prior to use according to the manufacturer's instructions and SOP-A9, *Calibration of Field Instruments*.
- Inventory sample bottles, build sample sets for the required analytes at each sample location, ensure a sufficient supply of lab de-ionized water for equipment blanks, and confirm the lab courier schedule.
- Field-check sampling equipment and supplies: WLI, WQ meters, flow-through cell, pump controller, power supply, pump discharge/sampling tubing, N-dex gloves, D.I water sprayers, paper towels, etc.

PURGING AND SAMPLING PROCEDURES FOR *ACTIVE* WATER SUPPLY WELLS:

- **Prior to opening any well, remove all pens, lighters, calculators, or any other loose items from vest pockets, or from any other location where they could fall into the well.**
- Upon arrival at the well, at least 2 members of the sampling team must confirm the well ID. If the well cannot be clearly identified by the marking, measure total depth of the well and compare to the well installation details to confirm the correct location.
- Access the well and, ***prior to moving it***, note the exact configuration of the transducer installation if present. If the well has been inactive for more than 24 hours, a water level measurement can be taken. Measure static water level (WL) according to SOP-A7, *Water Level Measurements,* moving the transducer if necessary, and record WL value in MIST on the sampling log.
- If the well is equipped with a transducer and transducer removal is required for sampling, follow SOP-C1, *Solinst Pressure Transducers*.
- If it is known that 3-casing volumes have been purged from the well in the last 24-hour period, purging will not be necessary prior to sampling. Connect one end of a new or dedicated piece of LDPE tubing to the pump discharge port and connect the other to the inlet of the flow through cell. If it is not possible to connect the flow-through cell, a clean 5-gallon bucket may be used by filling the bucket with purge water and inserting the instrument probes directly into the bucket. If a bucket is used, turbulence in the bucket should be minimized to the extent possible.
- Carefully open the valve at the sampling port until the desired flow rate is achieved, then allow the flow through cell to fill and the parameters to stabilize before collecting a single set of water quality parameters. Record in MIST and on the field data sheet. Note and provide qualifying remarks if parameter readings are anomalous or unstable due to instrument problems. Purge water should be contained in a portable purge water storage tank. If approved by well owner and the governing regulatory agencies, water may be discharged directly to the ground, as directed by the Field Team Manager (FTM).

- Observations on sample appearance and clarity during purging and at sampling are required! For standardization, use a clear glass jar to collect and record observations of discharge water appearance during purging. Also note characteristics such as any odors associated with the discharge water.
- Compare the field parameters to historical purge data. If the parameters are significantly different (greater than 50% difference for SC, pH, and/or ORP) confirm the ID of the well. If the well ID is confirmed by 2 crew members, and the readings continue to be significantly different than prior readings, set up a second WQ instrument in series to confirm readings. If the anomalous readings are confirmed by the second instrument, contact the field coordinator to resolve the issue. If the second WQ instrument produces readings that are comparable to historic values, note an instrument change and use the second instrument's readings.
- Disconnect the flow through cell and collect samples for analyses according to the PST. Sample containers are to be filled by transferring water directly from the pump discharge or sampling spigot to the appropriate sample container.
- For filtered samples, attach a 0.45 micron in-line filter to the pump discharge and allow approx. 500 mls of sample to pass through the filter before beginning sample collection in accordance with SOP A-6, *Field filtration*.
- When sample collection is complete, record sample information, final WL, and purge volume data on field log. If the pump is equipped with a flow meter, record the flow rate as well.
- If well was equipped with a transducer, replace transducer according to SOP-C1, *Solinst Pressure Transducers*.
- Close and secure well including access gates or fences.
- Follow SOPs in Program Procedures and O&M Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

PURGING AND SAMPLING PROCEDURES FOR *INACTIVE* WATER SUPPLY WELLS:

Inactive water wells may include: (1) wells with functioning dedicated pumps, (2) wells without dedicated pumps, and (3) wells with non-functioning dedicated pumps. A well-pump subcontractor may be required to install temporary pumps for purging wells without pumps and non-functioning dedicated pumps.

- **Prior to opening any monitor well, remove all pens, lighters, calculators, or any other loose items from vest pockets, or from any other location where they could fall into the well.**
- Upon arrival at the well, at least 2 members of the sampling team must confirm the well ID. Wells will be clearly marked on the well monument. If the well cannot be clearly identified by the marking, measure total depth of the well and compare to the well installation details to confirm the correct location.
- Access the well and, ***prior to moving it***, note the exact configuration of the transducer installation if present. If the well has been inactive for more than 24 hours, a water level

measurement can be taken. Measure static WL according to SOP-A7, *Water Level Measurements,* moving the transducer if necessary, and record WL value in MIST on the sampling log.

- If the well is equipped with a transducer and transducer removal is required for sampling, follow SOP-C1, *Solinst Pressure Transducers*.
- If the well has had well volumes purged in the last 24 hours, then it is an active well and purging before *sampling may be limited to volume sufficient fo*r field parameter measurement.
- If it is determined that 3-casing volumes ***have not*** been purged in the last 24-hours, calculate 3-casing volumes using measured WL depth, casing diameter, and total well depth information. If it is not possible to measure the depth to water or total depth of the well, use well records or prior knowledge to calculate 3-casing volumes.
- Start purging using the functional dedicated equipment, if available. Check for any leaks, monitor drawdown, and calculate/set the purge rate.
- If dedicated equipment is not present or nonfunctional, a portable pump installed by subcontractor may be used for purging and sampling. Install a decontaminated pump at the same intake/sampling depth used in prior events and record intake depth. If the well has not been previously sampled, install the pump with the intake in the middle of the screened interval ,or the midpoint of the saturated interval if the water level is lower than the top of the screen, or at the depth proscribed by the Project Manager or FTM.
- Purge water should be contained in a portable purge water storage tank. If approved by well owner and the governing regulatory agencies, water may be discharged directly to the ground, (at present this is only the case at PM-03 and PM-04 supply wells), as directed by the Field Team Manager.
- Continue purging, measuring WL and field indicator parameters periodically (time, pH, conductivity, turbidity, dissolved oxygen, temperature, salinity, TDS, ORP, and any odors present). Time the readings such that there are a minimum of 5 sets of data collected over the course of the full purge.
- Decrease the purge rate and measure/record new purge rate if significant drawdown is observed or turbidity increases dramatically. Significant drawdown is considered to be 5 percent of the total height of the water column or to the top of screen. Record time for all measurements collected. Note and provide qualifying remarks if parameter readings are anomalous or unstable due to instrument problems.
- During the purge, compare the field parameters to previous purge data. If the parameters are significantly different (greater than 50% difference for SC, pH, and/or ORP) confirm the ID of the well. If the well ID is confirmed by 2 crew members, and the readings continue to be significantly different than prior readings, set up a second WQ instrument in series to confirm readings. If the anomalous readings are confirmed by the second instrument, contact the field coordinator to resolve the issue. If the second WQ instrument produces readings that are comparable to historic values, note an instrument change and use the second instrument's readings.

- Continue purging until ***3-casing volumes*** have been removed ***and*** field parameters stabilize. Indicator parameters are considered stabilized when 3 consecutive readings made several minutes apart fall within the following EPA stabilization criteria:
  - pH +/- 0.1 pH units
  - Specific conductance +/- 3%
  - ORP +/- 10 millivolts
  - Turbidity +/- 10% NTU units (when turbidity is >10 NTUs)
  - Dissolved oxygen +/- 0.3 mg/L
  - Temperature +/- 2° Celsius
- When the requirements above have been satisfied and the purge cycle is complete, disconnect the flow through cell and prepare to collect samples directly from the pump discharge tubing for analyses according to event-specific PST. For all samples, decrease the discharge rate as necessary to reduce water turbulence at the pump discharge point. Prepare sample containers and collect gas-sensitive analytes first. The preferred collection order will be volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]; see SOP-A6), then general chemistry (cations, anions, stable isotopes).
- For filtered samples, attach a 0.45 micron in-line filter to the pump discharge and allow approx. 500 mls of sample to pass through the filter before beginning sample collection in accordance with SOP A-6, *Field filtration*.
- When sample collection is complete, record sample information, final WL, and purge volume data in MIST and on the field sampling log.
- If previously installed, remove the pump from the well and decontaminate according to SOP A-10, *Decontamination of Water Sampling Equipment.*
- If well was equipped with a transducer, replace the transducer in exactly the same configuration in which it was found and according to SOP-C1, *Solinst Pressure Transducers*.
- Close and secure well, including fences and gates.
- Follow SOPs in Program Procedures and O&M Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

SOP-A5

Groundwater Sampling from Sonic Drilling Boreholes
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for purging and collection of grab groundwater samples from boreholes during sonic drilling. When a pump sampling system (Prosonic "Isoflow") is available and feasible, Isoflow sampling is the preferred method. When Isoflow sampling is not available or not feasible then a bailer method will be used for grab groundwater sampling while drilling.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP), Work Plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.
2) Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual (Procedures Manual), Operation and Maintenance (O&M) Manual, QAPP, and the Addendum to the QAPP, as required.
3) Topock Program Health and Safety Plan (HSP)
4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available
5) Blank sampling log and field notebook

PREPARATION & SETUP

1) Review event-specific Work Plan or event-specific field instructions, Procedures Manual, O&M Manual, QAPP and the Addendum to the QAPP, and HSP.
2) Initiate field logbook for sampling activity.
3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.
4) Inspect all required field equipment and calibrate field water quality (WQ) meters according to SOP-A9, *Calibration of Field Instruments*.
5) Inventory sample bottles, review required analyses, and understand lab courier schedule.
6) Field-check and setup sampling equipment: Decontaminated Isoflow pump or stainless steel bailer, rig hoist, generator, containers for purge water management, water level (WL) meter, WQ meters, flow-through cell, pump control and power supply, pump discharge/sampling tubing, health and safety equipment, etc.

PURGING AND SAMPLING PROCEDURES FOR ISOFLOW SAMPLING FROM BOREHOLE

7) Prepare groundwater sampling log (use field notebook and summarize relevant information on sampling form).

8) Insert the Isoflow into the sonic casing. After the Isoflow is set, retract the sonic casing approximately 10 feet. Record the top and bottom of this open borehole interval and identify the grab groundwater sample as the mid-point of this interval. If possible, a water level measurement can be taken before Isoflow pumping begins. Measure initial static WL according to SOP-A7, *Water Level Measurements*. Record WL value on sampling log. Monitor and record Isoflow pumping rate and WL measurements made while pumping. The length of the open borehole interval will be a field decision based on the frequency of Isoflow sampling and the formation conditions. Shorter open borehole intervals (as short as 5 feet) are appropriate for Isoflow sampling frequency of every 20 feet of drilled depth, or in heterogeneous conditions where it is desired to sample from a specific conductive zone. Longer open borehole intervals of up to 20 feet are appropriate if the Isoflow sampling frequency is every 50 to 60 feet of drill depth.

9) Measure water quality parameters using a flow-through cell connected directly to the sampling port. If it is not possible to connect the flow-through cell, a clean 5-gallon bucket may be used by filling the bucket with purge water and inserting the instrument probes directly into the bucket. If the bucket is used, turbulence in the bucket should be minimized to the extent possible. Record time for all measurements collected. Note and provide qualifying remarks if parameter readings are anomalous or unstable due to instrument problems. Record the purge rate. Purge water should be contained in a portable water storage tank, as directed by the Field Team Manager.

10) Observations on sample appearance and clarity during purging and at sampling are required. For standardization, use a clear glass jar to collect and record observations of discharge water appearance during purging. Also note characteristics such as any odors associated with the discharge water. Record the following water quality data on the field data sheet: pH, specific conductance, ORP, turbidity, TDS, and dissolved oxygen, and temperature. Indicator parameters are considered stabilized, and thus sampling may commence, when 3 consecutive readings made several minutes apart fall within the following EPA-recommended stabilization criteria:

    - pH +/- 0.1 pH units
    - Specific conductance +/- 3%
    - ORP +/- 10 millivolts
    - Turbidity +/- 10% NTU units (when turbidity is >10 NTUs)
    - Dissolved oxygen +/- 0.3 mg/L

    However, parameter stabilization is not a requirement for sampling from open boreholes. Typically, TDS is used as a reliable indicator for borehole sampling at the site, given the known increasing concentration with depth across the site.

11) Collect samples for analyses according to event-specific SAP. For all samples, decrease the discharge rate to reduce water turbulence at the pump discharge point. Prepare sample containers and collect gas-sensitive analytes first. The preferred collection order

will be volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]), then general chemistry (cations, anions, stable isotopes). Sample containers are to be filled by transferring water directly from the pump discharge to the appropriate sample container.

12) Record sample information, final WL, and purge volume data on field log.

13) Oversee the driller's removal and decontamination of the Isoflow sampling pump.

14) Oversee the driller in resuming drilling and soil sampling.

15) Follow SOPs in Program Procedures Manual and O&M Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

PURGING AND SAMPLING PROCEDURES FOR BAILER SAMPLING FROM BOREHOLE

7) Prepare groundwater sampling log (use field notebook and summarize relevant information on sampling form).

8) Collect the grab groundwater sample by bailing the open hole interval below the sonic casing after removing a 10 to 20-foot sonic core run.

9) Sound the bottom of the borehole after removing the core barrel. Measure initial static WL according to SOP-A7, *Water Level Measurements*. Record WL value on sampling log.

10) Calculate 1-casing volume using measured WL depth, casing diameter, and total well depth information. Insert the decontaminated stainless steel bailer into the borehole and begin bailing a minimum of one casing volume. Purge water should be contained in a portable water storage tank, as directed by the Field Team Manager.

11) Measure water quality parameters using a clean 5-gallon bucket and inserting the instrument probes directly into the bucket. If the bucket is used, turbulence in the bucket should be minimized to the extent possible. <u>Record time for all measurements collected</u>. Record the following water quality data on the field data sheet: pH, specific conductance, ORP, turbidity, TDS, dissolved oxygen, sample appearance, and odor. Parameter stabilization is not a requirement for sampling from open boreholes. Typically, TDS is used as a reliable indicator for borehole sampling at the site, given the known increasing concentration with depth across the site.

12) Collect samples for analyses according to event-specific SAP. Prepare sample containers and collect gas-sensitive analytes first. The preferred collection order will be volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]), then general chemistry (cations, anions, stable isotopes). Sample containers are to be filled by transferring water directly from the bailer to the appropriate sample container. For all samples, handle the bailer with care and decant from the bailer slowly to minimize the potential for aeration and turbulence as containers are filled.

13) Record sample information, final WL, and purge volume data on field log.

14) Follow SOPs in Program Procedures Manual and O&M Manual for sample handing and management, equipment decontamination, and IDW management.

SOP-A6

Sample Field Filtration and Preservation for Metals Analyses
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for collecting groundwater / surface water samples for field filtered metals analyses at the Topock site. Refer to SOP- A1, A2, A3, or A4 for specific groundwater and surface water sampling methods.

REQUIRED DOCUMENTS

1) Event-specific planned sample table (PST).
2) Applicable project work plan or monitoring plan. Refer to the PG&E Program Quality Assurance Project Plan, (QAPP) or the Addendum to the PG&E Program Quality Assurance Project Plan for the Topock Groundwater Remedy, as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling logs or tabular table of historic field data.
5) Blank sampling logs and field notebook.

PREPARATION & SETUP

1) Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, Operation and Maintenance (O&M) Manual, and HSP.
2) Initiate field logbook for sampling activity.
3) Inventory sample containers and labels, required analyses, and lab courier schedule.
4) Field-check and setup sampling equipment: field filters, buffering solution, acid, and sample containers.

FIELD-FILTRATION AND SAMPLE COLLECTION PROCEDURES FOR GROUNDWATER FROM MONITORING AND EXTRACTION WELLS

1) Follow SOPs A1 and A2.

Sample Collection

1) Once parameters are stabilized and a minimum 3-casing volumes have been removed from the well, disconnect the tubing from the flow-through cell and connect the inline 0.45 micron filter. (Note: do not change the pump rate, continue to purge from the well at the same rate as used during the stabilization of the parameters.)
2) Allow 500 milliliters (mL) to flow through the inline filter, prior to sample collection. Fill the sample container by transferring water directly from the filter discharge to the appropriate sample container.

Total Chromium and Metals analyzed by the 6000 / 7000 Series of SW 846 Methods and metals analyzed by EPA Methods of the 200 Series

i. Fill a laboratory provided pre-preserved sample container (250 or 500 mL poly containing (HNO_3). CARE MUST BE TAKEN NOT TO OVERFILL THE CONTAINER.

In the event that no pre-preserved sample containers are available, the sampling team will need to follow the following protocol.

ii. If you are preserving the container in the field, check the pH of the sample with laboratory provided pH paper. If the pH of the sample is greater than 2, add 5 drops of HNO_3. Close the container, shake and check the pH. Continue adding HNO_3 in 5-drop increments until the pH is less than 2.

iii. Record the total amount of HNO_3 added to the sample and the pH on the chain of custody and field form. Seal, label, and place the sample on ice.

Hexavalent Chromium Method SM3500 and EPA 218.6

i. Fill a laboratory provided pre-preserved sample container (250 mL poly containing (NH4)2S O4/NH4OH buffer solution) to the top of the container neck.

ii. Seal, label, and place the sample on ice.

In the event that no pre-preserved sample containers are available, the sampling team will need to follow the following protocol.

i. If you are preserving the container in the field, fill a laboratory provided sample container (250 mL poly) to approximately 235 mL, leaving headspace for the addition of buffer solution.

ii. Add 5 mL of laboratory provided buffer solution using a pipette. Place the lid on the sample container and shake gently. Check the pH using laboratory provided pH strips.

iii. If the pH is less than 9.3, add one drop of 20% NaOH, close container, gently shake, and check the pH. Continue until the pH is between 9.3 and 9.7.

iv. When the pH of the sample is between 9.3 and 9.7, record the total amount of pH buffer and NaOH added to the sample and the pH of the sample on the chain of custody and field form. Seal, label, and place the sample on ice.

3) Discard used pH paper(s) and filter in IDW bin.

4) Record sample information, final WL, and purge volume data on field log.

SOP-A7

Water Level Measurements
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for manually measuring the depth to water at surface water locations, groundwater monitoring wells, and production wells.

REQUIRED DOCUMENTS:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual (Procedures Manual), Operation and Maintenance (O&M) Manual, QAPP, and Addendum to the QAPP, as required.
- Topock Program Health and Safety Plan (HSP)
- Well construction logs/specifications
- Current site access map
- Previous water level data
- Water level data collection sheet and field notebook
- Blank sampling logs, if applicable

PREPARATION & SETUP:

- Review event-specific PST or event-specific field instructions, previous sampling logs, Field Procedures Manual, O&M Manual, and HSP.
- Ensure that the water level indicator (WLI) has been decontaminated (check for label/tag) or decontaminate as needed following SOP-A10, *Decontamination of Water Sampling Equipment*.
- Initiate field logbook for sampling activity.
- Inspect all equipment and calibrate WLIs if multiple meters are being used according to SOP-A9, *Calibration of Field Instruments*.
- If a transducer is present in the well and it is necessary to remove the transducer to allow well access, first note the exact position of the transducer and refer to SOP-C1, *Solinst Pressure Transducers*, before proceeding.

REQUIRED EQUIPMENT/SUPPLIES:

- 200-foot or 400-foot WLI
- A set of spare batteries for the field equipment
- Well access keys, including gate keys if necessary
- De-ionized (DI) water spray bottle
- Nitrile gloves, paper towels, clipboard

MEASUREMENT PROCEDURES:

1. Prepare groundwater sampling log or water level data collection form.

2. Decontaminate the lower 5 feet of the water level probe before using by rinsing thoroughly with DI water according to SOP-A10*, Decontamination of Water Sampling Equipment*.

3. Place WLI probe into well, or measure from surface water monitoring point and lower the probe until the tone sounds. Raise the probe out of the water and gently shake the line to remove any retained water. Adjust the WLI sensitivity if necessary. (The groundwater onsite is highly conductive and may cause a constant tone from the WLI. This means that the sensitivity is set too high; turn the knob to the left to decrease sensitivity. Conversely, if measuring surface water which typically has very low conductance, and you are having difficulty getting a tone, the sensitivity may be set too low; increase the sensitivity by turning the knob to the right.) Slowly lower the probe once again just until the tone sounds. Note depth to water (DTW) value at the measuring point on the PVC well casing. If there is no mark on the PVC casing, measure DTW at the northern edge of the PVC casing. Repeat the measurement 3 times to confirm DTW, and record to the nearest hundredth of a foot on the sampling log. Record well identification, time, date, DTW, and WLI number.

4. Replace pressure transducer if removed. Ensure that transducer is placed exactly as it was before removal.

5. Compare DTW measurement with previous data and note discrepancies on the sampling form. Repeat the previous steps as necessary if an unexpected discrepancy is noted.

6. Decontaminate any portion of the instrument that came in contact with water by rinsing thoroughly with DI water, or wiping with a DI water moistened paper towel according to SOP-A10, *Decontamination of Water Sampling Equipment*.

7. Close and secure well.

Note: Field water level measurements will be loaded into the PG&E database regularly. Once loaded into the database, manual water levels will be adjusted to groundwater elevations and converted to freshwater equivalent heads following the procedures outlined in SOP-A22, *Procedures for Calculation of Freshwater Equivalent Heads*.

SOP-A8

Field Water Quality Measurements Using a Flow-through Cell
Standard Operating Procedures for PG&E Topock Program

This Standard Operating Procedure (SOP) provides general guidelines for using the YSI-556® water quality (WQ) meter and flow-through cell, or similar device for field measurements of pH, specific conductance, turbidity, dissolved oxygen, oxidation-reduction potential (ORP), and temperature of groundwater samples. Also addressed are procedures for measuring water sample turbidity using the Hach turbidity meter. All instruments will be calibrated daily in accordance with the manufacturer's instructions and SOP-A9, *Calibration of Field Instruments*.

REQUIRED DOCUMENTS:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual (Procedures Manual), Operation and Maintenance (O&M) Manual, QAPP, and the Addendum to the QAPP, as required.
- Topock Program Health and Safety Plan (HSP)
- Applicable SOP's
- Well construction logs/specifications
- Mobile Integrated Sample Tracking (MIST) handheld database
- Previous sampling logs or tabular historic field data
- Current site access map
- Blank sampling logs, maps, sample labels, chains of custody (COC's), and the designated groundwater sampling field notebook

REQUIRED EQUIPMENT:

- YSI-556 WQ meter or equivalent
- YSI-556 flow through cell or equivalent
- Hach 2100P turbidimeter or equivalent
- Trimble Rugged Reader hand held device with the CH2M HILL event specific MIST electronic data collection database loaded
- Spare batteries for each piece of equipment

PREPARATION & SETUP:

- Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
- Acquire the existing field logbook for the specific field activity and initiate entries.
- Inspect all equipment : YSI-556 WQ meter or similar device, flow-through cell, o-rings, and fittings , Hach turbidity meter, distilled water in spray bottle.
- Prior to each day's use, clean the probes and flow-through cell and calibrate the field water quality (WQ) meters according to SOP-A9, *Calibration of Field Instruments* and the manufacturer's instructions.

YSI-556 WQ Meter (or equivalent):

- Attach the probe body securely to the flow through cell. Attach the pump discharge line to the bottom fitting of the flow through cell, and a second discharge line to the top fitting of the flow through cell. Route the flow through cell discharge line to the purge water storage tank and secure.
- Prior to starting the pump, place the flow through cell into a 5 gallon bucket, ensure that all fittings are properly tightened and that spill containment is in place in accordance with SOP A-13, *Spill Prevention, Containment, and Control Measures for Monitoring Well Sampling.*
- Start the pump and allow the flow through cell to fill. Check for excessive leakage from the cell. A small amount of leakage is typical and allowable, and will be caught by the 5 gallon bucket. If leakage is excessive, stop the pump, remove the probe body from the flow through cell and inspect the O-ring and threads for damage. Replace if necessary, re-attach to flow through cell, and restart the pump.
- Ensure that there are no air bubbles entering the flow through cell since this will skew the dissolved oxygen and ORP readings.
- Allow instrument readings to stabilize and collect water quality data in MIST and on the field data sheet. Time the readings such that there at least 5 sets of readings collected over the length of the full purge.
- When sampling is complete, carefully remove the fittings and drain the flow through cell into the bucket. Rinse the instrument probes and flow through cell thoroughly with de-ionized water in accordance with SOP A-10, *Decontamination of Water Sampling Equipment,* catching the rinsate in the bucket.
- Mount the specially cut "dumping lid" on the bucket, and carefully pour the contents into the purge water storage tank.
- Carefully clean and store the WC instrument in accordance with the manufacturer's recommendations in preparation for the next use.

HACH 2100P TURBIDIMETER:

- Turn the turbidity meter on and select the auto-range mode.

- Inspect the measurement vial for scratches, dirt or staining. Replace or clean as necessary.
- Fill the measurement vial with water and carefully wipe dry.
- If bubbles cling to the side of the vial, gently swirl the sample to sweep them loose.
- Place the measurement vial in the instrument, close the lid and press the measure button.
- Record the value on the sample sheet and in MIST.
- Clean and store the instrument and vial. Fill the vial with DI water for storage, this prevents water spotting.

SOP-A9

Calibration of Field Instruments
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for calibration of field instruments at the Topock site. This SOP will be used for calibration of water level meters, YSI-556 water quality (WQ) meter, In-Situ Troll 9500 WQ meter, and Hach turbidity meter.

Required Documents:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual (Procedures Manual), Operation and Maintenance (O&M) Manual, QAPP, and Addendum to the QAPP, as required.
- Equipment Manufacturers' Manuals
- Previous Calibration Records
- Field Equipment Binder (documents equipment servicing, calibration, etc…)
- Blank Calibration Sheets (see attached)
- Zobells ORP vs. temperature chart

YSI-556 WQ Meter Calibration Equipment List:

- pH 4, 7, and 10 buffer solutions
- 1000 micro-mhos/cm conductivity solution
- Zobell's ORP check solution
- Spare batteries
- DI water sprayer
- Rinsate bucket
- Calibration vessels

In-situ Troll 9500 WQ Meter Calibration Equipment List:

- Quick-cal. solution
- DI water sprayer
- Spare batteries
- Rinsate bucket
- Calibration vessels
- Dissolved oxygen bubbler

Hach Turbidity Meter Calibration Equipment List:

- LabDI water, NTU = <1
- Standard Hach solutions, NTU= 10 and NTU=100
- Spare Batteries
- Paper towels or cloth rag

Preparation and Setup:

- Acquire the existing field logbook for the specific sampling activity and initiate entries.
- Always use fresh, unexpired solutions for calibration.
- Calibration should be performed prior to use each day, but, with the exception of dissolved oxygen (DO) on the YSI-556, may also be completed in the afternoon of the day before use.
- DO calibration on the YSI-556 is dependent on the current barometric pressure and should be calibrated immediately before use.
- The Rugged Dissolved Oxygen (RDO) sensor on the Troll 9500 is very resistant to drift and only requires a 100% saturated water calibration once every 3 months. The 0% oxygen calibration is only required once every 3 months as well.
- Review Field Equipment Binder and equipment servicing records to anticipate next service.
- All equipment and solutions are stored in an air-conditioned office onsite to maintain their integrity.
- The YSI-556, and In-Situ Troll 9500 WQ meters and Hach turbidity meter will be used as the principal field instruments for measuring water quality parameters during groundwater and surface water sampling.

Calibration Procedures:

YSI-556 WQ Meter:

- Check expiration date of calibration solutions and discard if expired.
- Dissolved oxygen (DO) calibration: Remove the protective probe cover and thoroughly rinse probes and probe cover with DI water. Gently shake the probe body to remove excess water. Pour about ¼ to ½ inch of water into the protective probe cover and screw slightly onto the probe body. The idea is that the ambient atmospheric pressure be maintained within the vessel, while retaining the water saturated air necessary for calibration. Turn the YSI-556 instrument on, it will be in "run" mode. Using the navigation buttons on the face of the instrument, hit "escape", then scroll down to "calibrate" and hit the "enter" key to begin calibration. Select DO, 2 mil PE (the probe style), then DO %. Enter the current barometric pressure in millimeters of Hg. Of the two YSI-556's on site, one has an on board barometer and the other doesn't. When calibrating the instrument with no barometer, simply enter the barometric pressure displayed by the other instrument. The barometric pressure is also available at various web sites and also at airports. Press the "enter" key again to begin the calibration. Wait for 10 to 15 minutes

for the DO probe to stabilize. When satisfied that that the reading is stable, press the "enter" key a final time to lock in the calibration. Record the temp., barometric pressure, and DO value on the calibration sheet.

- pH calibration: Thoroughly rinse the probes and calibration cups with DI water and gently shake off the excess liquid. Pour a sufficient volume of pH buffer 4 into a calibration cup and insert the probe body, ensuring that the pH probe is fully immersed, and stir gently. Using the navigation keys as above, "escape" from "run" mode and enter "calibration" mode. You may still be in calibration mode if you've just completed the DO calibration. Scroll down to the "pH" entry and push the "enter" key to begin the pH probe calibration process. Select a "3 point calibration", and enter the first pH buffer value (usually 4.00). Allow several minutes for the probe to stabilize, then press the "enter" key to lock in the calibration. Enter the calibration value on the calibration form. Repeat the above steps for the remaining 2 pH buffers, 7.00 and 10.00, rinsing the probe and calibration cup with DI water between buffers. Dispose of used solutions in the rinsate bucket and thoroughly rinse the calibration vessels with DI water.
- Specific conductance (SC) calibration: Thoroughly rinse the probes and calibration cups with DI water and gently shake off the excess liquid. Pour a sufficient volume of 1000 micro-mhos/cm specific conductivity (SC) solution into a calibration cup and insert the probe body, ensuring that the conductivity probe is fully immersed, and stir gently. The SC probe has sensors located very high in the probe, so near full submergence is required. Using the navigation keys as above, "escape" from "run" mode and enter "calibration" mode. You may still be in calibration mode if you've just completed the DO or pH calibrations. Scroll down to the "conductivity" entry and push the "enter" key to begin the SC probe calibration process. Select "specific conductance" and enter the SC solution value (usually 1.000 milli-mhos/cm) making sure of the correct units. The instrument may measure in **milli**-mhos/cm or micro-mhos/cm, and the calibration standard is commonly referenced in **micro**-mhos/cm (1.000 milli-mhos = 1000 micro-mhos). Allow several minutes for the probe to stabilize, then press the "enter" key to lock in the calibration. Enter the calibration value on the calibration form. Dispose of used solutions in the rinsate bucket and thoroughly rinse the calibration cups with DI water.
- ORP calibration: Thoroughly rinse the probes and calibration cups with DI water and gently shake off the excess liquid. Pour a sufficient volume of Zobells ORP solution into a calibration cup and insert the probe body, ensuring that the pH/ORP probe is fully immersed, and stir gently. Using the navigation keys as above, "escape" from "run" mode and enter "calibration" mode. You may still be in calibration mode if you've just completed the DO, pH or SC calibrations. Scroll down to the "ORP" entry and push the "enter" key to begin the ORP probe calibration process. Consult the Zobells ORP vs. temp. table provided with the ORP solution, and enter the temperature corrected ORP value into the instrument. Allow several minutes for the probe to stabilize, then press the "enter" key to lock in the calibration. Enter the calibration value on the calibration form. Dispose of used solutions in the rinsate bucket and thoroughly rinse the calibration vessels with DI water.
- Proceed with field measurements as needed while noting:
    - probes must be rinsed thoroughly with DI water after each well.

- probes must always be submersed in liquid (DI water or pH 7 buffer when not in use).
- absolutely no air bubbles or leaks should be present in the flow-through cell, repair and/or replace as needed.
- ensure all readings have stabilized prior to recording a measurement.
- all field parameters must be compared with historic data and documented on the field data sheet.

In-Situ Troll 9500 WQ multisensor probe:

- Check expiration date of calibration solutions and discard if expired.
- Connect the Troll 9500 to a data collection device (Trimble Recon or equivalent) and start the Win-situ 4 or Pocket-situ 4 program. Tap to highlight the "COM-1-19200" on the start-up screen, then tap "Find" at the bottom left of the screen to connect to the Troll 9500.
- While waiting for the device to connect, spray the Troll 9500 multi-sensors thoroughly with DI water and shake gently over the rinsate bucket to remove excess water. Fill the In-Situ calibration vessel to the "fill" line with "Quick Cal" solution and gently screw the calibration vessel onto the probe body.
- After the data collection device "finds" the Troll 9500, tap "parameters" near the top of the screen and wait for the device to change screens, then tap "Quick Cal" at the bottom right of the screen. After the screen changes, ensure that the correct parameters are checked (pH, SC, and ORP, but ***not*** DO), then tap "Next" to access the calibration screen.
- Tap "Run" in the middle left of the screen to start the calibration stabilization process. A tone will sound when the pH, ORP, SC, and temperature stabilize to nominal values. The calibration values can be accepted at this point, but it is better to continue to wait until a second tone sounds to indicate that the calibration values are completely stable.
- Tap the "Accept" button at the bottom of the screen to lock the calibration values. After accepting the calibration you will be asked if you want to view the calibration reports. Tap "yes", review, and document on the field calibration data sheet.

Dissolved oxygen (DO) calibration: (Note: DO calibration is only required once every 3 months) Remove the protective probe cover and thoroughly rinse probes and probe cover with DI water.

- Fill the In-Situ DO calibration bubbler with room temperature potable water and activate the pump to begin oxygenation of the water. Place the multi-sensor into the bubbler and ensure that the Rugged Dissolved Oxygen (RDO) sensor is not in the direct stream of the rising bubbles.
- Connect the Troll 9500 to a data collection device (Trimble Recon or equivalent) and start the Win-situ 4 or Pocket-situ 4 program. Tap to highlight the "COM-1-19200" on the start-up screen, then tap "Find" at the bottom left of the screen to connect to the Troll 9500.
- After the data collection device "finds" the Troll 9500, tap "parameters" near the top of the screen and wait for the device to change screens, then double tap on "DO" in

the parameter list. This will open the DO calibration menu. Tap "Calibrate" to continue.

- You will be asked if you want to edit the barometric pressure, tap "Yes", review and record the barometric pressure on the field calibration sheet. Tap "Next" to continue.
- The next screen will show three choices for calibration: "Calibrate", "Restore defaults then calibrate", and "Restore defaults and don't calibrate". Select option one or option two.
- Tap "Run" to begin the 100% DO saturation calibration routine. A tone will sound when the DO and temperature stabilize to nominal values. The calibration values can be accepted at this point, but it is better to continue to wait until a second tone sounds to indicate that the calibration values are completely stable.
- Tap "Accept" to lock in the 100% DO saturation calibration.
- Tap "Next" to continue. You will then be asked if you want to conduct a 0% DO calibration (Note: This calibration is only required once every 3 months). If you are completing a 100% saturated water calibration only, hit "Next", then "Next" again to complete the single point calibration.
- If you want to complete the 0% calibration as well, immerse the probe in the 0% DO solution (Sodium sulfite (Na2SO3), Catalog No. 0017670) and tap "Next", then "Run". The calibration routine will run as before. When the readings are stable hit "Accept", then review the calibration report and record on the field calibration data sheet. This will complete the DO calibration routine.
- Close the calibration report, tap "Parameters", then "Profiler" to enter run mode.
- If you intend to collect electronic data, name the file and hit "Next" to proceed to the live parameters screen. In this screen you may choose to collect continuous or snapshot data.
- If you do not intend to collect electronic data simply hit "Next" to go to the live parameters screen and record the data by hand as necessary.

- Proceed with field measurements as needed while noting:
  - probes must be rinsed thoroughly with DI water after each well.
  - probes must always be submersed in liquid (DI water when not in use).
  - absolutely no air bubbles or leaks should be present in the flow-through cell, repair and/or replace as needed.
  - ensure all readings have stabilized prior to recording a measurement.
  - all field parameters must be compared with historic data and documented on the field data sheet.

Hach Turbidity Meter:

- Perform a check as per manufacturer's instructions with Hach DI water and standard solutions. Wipe each calibration vial carefully to remove any dust and place into instrument.
- Press the measure button and record the result on the calibration sheet. Record reading, time, and date on calibration sheet for both DI water and standard solution.

- If the readings are within 10%, proceed with turbidity measurements; If not within this range, troubleshoot and repeat as needed.

Water-level Meters:

When using multiple water-level meters at the site it is necessary to calibrate each against the other at least once during the sampling event using the following procedure:

- At a well with shallow depth to water (less than 20 feet), without dedicated tubing, piping, pump, or transducer, lower each water level meter into the well and record the reading to the nearest hundredth of a foot on the calibration sheet along with water-level meter number, time, and date.
- Repeat step #1 at a well with deep depth to water (greater than 70 feet).

SOP-A10

Decontamination of Water Sampling Equipment
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for decontamination of sampling equipment at the Topock site.

REQUIRED DOCUMENTS:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual and QAPP (Procedures Manual), and Operation and Maintenance (O&M) Manual, as required.
- Topock Program Health and Safety Plan (HSP)
- Applicable SOP's

REQUIRED EQUIPMENT AND SUPPLIES:

- 2 each decontamination vessels
- Potable water source
- Purified water source
- 120 volt power source
- 12 volt power source
- Alconox or Liquinox detergent
- Scrub brushes, nitrile gloves, and spray bottle
- Spill containment
- Pump specific submersible pump controllers

PREPARATION AND SET-UP:

- Acquire the existing field logbook for specific activity and initiate entries.
- Inspect all equipment necessary to carry out decontamination activities.
- Place spill containment in accordance with *SOP A-13 Spill Prevention, Containment, and Control Measures for Monitoring Well Development, Purging, and Sampling.*
- Fill a clean tub, bucket , PVC pipe, or similar vessel about 2/3 full of potable water and add the appropriate amount of Alconox or Liquinox detergent. If a new or clean vessel is not available a trash bag can be used to line the vessel prior to use.

- Fill a second tub, bucket , PVC pipe, or similar vessel about 2/3 full with clean potable water.
- Have purified water ready for final decon rinse use.

FIELD EQUIPMENT DECONTAMINATION PROCEDURES:

- Water-level Indicators: Any portion of a water-level indicator that contacts the groundwater must be decontaminated after use by rinsing with purified water, or wiping thoroughly with a paper towel moistened with purified water.
- Instrument probes: Water quality instrument probes (e.g., pH or specific ion electrodes, etc.) that come into contact with groundwater will be decontaminated by rinsing thoroughly with purified water.
- Submersible pumps - Grundfos Rediflo2: TransientRediflo2 submersible pumps will be decontaminated after each use with the following procedure:
    - If attached, detach the discharge tubing from the pump. Carefully drain any excess water to a bucket or the purge water tank. If dedicated, install the dedicated tubing cap to prevent leakage. Coil and store the dedicated tubing in a sealed and marked trash bag. If the tubing is not dedicated, discard.
    - Immerse the pump completely in an Alconox or Liquinox and potable water solution and run the pump at low to medium speed for one minute. A scrub brush will then be used to clean the outside of the pump body using the detergent solution.
    - Allow the pump to drain back into soapy water vessel, then immerse completely in clear potable water and run the pump at low to medium speed for one minute to rinse it. Ensure that the body of the pump is properly rinsed as well.
    - Allow the pump to drain back into clear water vessel, then rinse the pump body thoroughly by pouring purified or bottled water over the entire pump, ensuring that the purified water runs through the internal pump stages as well. Place the pump in a clean plastic bag and store in a plastic tub with the pump reel.
    - If the pump is not to be used immediately, or is to be stored, tag the pump or plastic tub as "decontaminated" with the date and team members initials.
    - If the decontamination vessels contain less than 2 gal. of volume each be sure to change all decontamination fluids for new solutions ***after each use***.
- Submersible pumps – 12V GeoSub, Typhoon, Mega-Monsoon: Transient DC-powered submersible pumps will be ***decontaminated*** after each use as above ***or*** using the following procedures. Pressurized gas powered bladder pumps will be decontaminated after each use using the following procedures:
    - If attached, detach the discharge tubing from the pump. Carefully drain any excess water to a bucket or the purge water tank. If dedicated, install the dedicated

tubing cap to prevent leakage. Coil and store the dedicated tubing in a sealed and marked trash bag. If the tubing is not dedicated, discard.

- Using the tools provided, disassemble the pump body to expose the pumping mechanism. Immerse all parts in an Alconox or Liquinox and potable water solution and scrub thoroughly with a clean scrub brush. Gently shake the pump parts to remove excess soapy water, taking care not to spill or splash any fluids outside of the decon. vessel. Immerse all pump parts in clean potable water and rinse thoroughly. Gently shake the pump parts to remove excess rinse water, taking care not to spill or splash any fluids outside of the decon. vessel. Carefully pour purified (or bottled) water over and through all pump parts. Gently shake the pump parts to remove excess purified rinse water, taking care not to spill or splash any fluids outside of the decon. vessel. Reassemble the pump and place in a clean plastic bag, then store in a plastic tub with the pump reel.
- Bladder pumps do not typically include a reel and will be stored in a clean plastic bag only.
- If the pump is not to be used immediately, or is to be stored, tag the pump or plastic tub as decontaminated with the date and team members initials.
- If the decontamination vessels contain less than 2 gallons of volume each, be sure to change all decontamination fluids for new solutions ***after each use***.

- Water-level Indicators: Any portion of a water-level indicator that contacts the groundwater must be decontaminated after use by rinsing with purified water, or wiping thoroughly with a paper towel moistened with purified water.
- Instrument probes: Water quality instrument probes (e.g., pH or specific ion electrodes, etc.) that come into contact with groundwater will be decontaminated by rinsing thoroughly with purified water.
- Follow SOPs in Program Procedures Manual and O&M Manual for handling of investigation-derived waste (IDW). Such IDW is typically disposed to the process stream at *IM-3. Se*e *an IM-3 operato*r for assistance in off-loading the decon fluids.

SOP-A11

Total Depth Measurements
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for manually measuring the total depth at groundwater monitoring wells and production wells.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual and QAPP (Procedures Manual), and Operation and Maintenance (O&M) Manual, as required.
3) Topock Program Health and Safety Plan (HSP)
4) Well construction logs/specifications
5) Previous total depth data
6) Blank sampling logs and field notebook

PREPARATION & SETUP

1) Review event-specific SAP or event-specific field instructions, previous sampling logs, Procedures Manual, O&M Manual, and HSP.
2) Ensure that the measurement probe (weighted tape measure) has been decontaminated (check for label/tag) or decontaminate as needed following SOP-A10 *Decontamination of Water Sampling Equipment.*
3) Ensure the tape measure is not crimped and that it will hang free and clear of any obstructions enabling it to fully extend to the bottom of the well.
4) Initiate field logbook for sampling activity.
5) If a transducer is present in the well and it is necessary to remove transducer to allow well access, refer to SOP-C1, *Solinst Pressure Transducers.*
6) Calibrate wrist-watch to the atomic clock at the Topock Compressor Station.

MEASUREMENT PROCEDURES

7) Prepare Total Depth measurement log (use attached form dated March 2005).
8) Decontaminate the entire length of the measuring tape before using, according to SOP-A10*, Decontamination of Water Sampling Equipment*.
9) Place measurement tape into well and lower until the bottom of the probe touches the bottom of the well. Note total depth (TD) measurement to mark on well casing, if there is no mark on casing measure to the north. Repeat 3 times and record final TD to the

nearest hundredth of a foot on the log. Also note the condition of the well bottom (i.e. hard bottom, soft bottom). Record well identification, time, date, TD, and measurement tape identification.

10) Compare TD measurement with previous data and note discrepancies on the sampling form. Repeat step #8 if an unexpected discrepancy is noted.

11) Decontaminate the entirety of the measuring tape, or any portion of the instrument that came in contact with water, following SOP-A10, *Decontamination of Water Sampling Equipment*.

SOP-A12

Field Water Quality Measurements for Grab Samples
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides general guidelines for using the YSI-556 water quality (WQ) meter or similar device for field measurements of grab groundwater samples for pH, specific conductance, turbidity, dissolved oxygen, oxidation-reduction potential, and temperature. This SOP specifically covers collection of WQ measurements when a flow-through cell cannot be used (for example, surface water sample collection, active extraction well sampling, screening samples collected during drilling operations, grab samples from a well using a bailer, groundwater sample using a Hydrasleeve sampler, etc.). Instruments will be calibrated daily in accordance with the manufacturer's instructions and SOP-A9, *Calibration of Field Instruments*.

REQUIRED DOCUMENTS:

- Event-specific planned sample table
- Monitoring Plan for Groundwater and Surface Water Monitoring Program (current revision)
- Topock Program Sampling, Analysis, Field Procedures Manual (Procedures Manual), Operation and Maintenance (O&M) Manual, and Quality Assurance Project Plan and Addendum to the QAPP for site-wide groundwater monitoring requirements
- Topock Program Health and Safety Plan
- Manufacturer's instructions for the YSI-556 WQ meter or equivalent
- SOP-A9, *Calibration of Field Instruments*
- SOP-A10, *Decontamination of Water Sampling Equipment*
- Well construction logs/specifications
- Previous sampling logs or tabular historic field data
- Current site access map
- Blank sampling logs
- Groundwater sampling field notebook

REQUIRED EQUIPMENT:

- YSI-556 WQ meter or equivalent
- YSI-556 storage cap or equivalent
- De-ionized water in a spray bottle
- Electronic data collection unit with a Topock-event-specific database
- Bucket and pouring lid

PREPARATION AND SETUP:

- Review event-specific planned sample table or event-specific field instructions, previous sampling logs, the Procedures Manual and O&M Manual, and the Health and Safety Plan.

- Acquire the existing field logbook for the specific field activity, and initiate entries documenting field activities.
- Inspect all equipment: YSI-556 WQ meter or similar device, de-ionized water in spray bottle, and electronic data collection unit.
- Prior to each day's use, calibrate the YSI-556 WQ, and clean the probes and storage cup of the field WQ meters according to SOP-A9, *Calibration of Field Instruments,* and the manufacturer's instructions. Document that instrument calibration has occurred and that parameters are calibrated to within the specifications in SOP-A9 in the field logbook.

MEASUREMENTMEASUREMENT PROCEDURES:

1. Transfer a small volume of sample water—enough to immerse all probes—into the WQ instrument storage cup or a small container. (The instrument storage cup is preferred as it can be sealed and will reduce risk for small volume water spills.)
2. Submerge the probes of the WQ meter into the water.
3. Allow instrument readings to stabilize, and collect WQ data in the electronic data collection unit and on the field data sheet.
4. Note in the field forms that the dissolved oxygen and oxidation-reduction potential results are approximate because a flow-through cell could not be used.
5. Water used for the WQ reading will be emptied into the purged wastewater tank.
6. When sampling is complete, rinse the instrument probes and the storage cup or small container with de-ionized water in accordance with SOP-A10, *Decontamination of Water Sampling Equipment,* catching the rinsate in the bucket.
7. Mount the specially cut "pouring lid" on the bucket, and carefully pour the contents into the purge water storage tank.
8. After sampling is complete, carefully clean and store the WQ instrument in accordance with the manufacturer's recommendations in preparation for the next use.

SOP-A13

Spill Prevention, Containment, and Control Measures for Monitoring Well Development, Purging, and Sampling Standard Operating Procedures for PG&E Topock Program

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This standard operating procedure (SOP) addresses the procedures and equipment to be used for spill prevention, containment, and control associated with monitor well activities at the Topock site. This SOP applies to containment and control of potential spills from purge and equipment decontamination water generated during the development, purging, and sampling of monitoring wells.

REQUIRED DOCUMENTS:

- Topock Program Health and Safety Plan (HSP).
- Emergency Notification Binder.
- SOP-A16 Access Routes and Sensitivity to Biological and Cultural Resources.
- SOP-B6 Disposal of Waste Fluid and Solids (IDW).

REQUIRED EQUIPMENT:

- Large (10′ by 11′ by 4″ deep) bermed spill containment pad. This pad is to be placed on the ground beneath the truck or UTV mounted purge water tank. It will be placed so that the work area at the rear of the vehicle is covered and so that small spills or drips from the purge tank or work area are captured.
- Medium (4′ by 8′ by 4″ deep) bermed spill containment pad. This pad is used at the FLUTe wells, Blatypus wells, and peristaltic wells, or for additional work space at any well.
- Small (4′ by 4′ by 4″ deep) bermed spill containment. This pad fits inside the UTV beds beneath the purge tank when sampling using UTVs (flood plain and special access wells, see SOP-A16).
- Small (2′ by 4′ by 4″ deep) bermed "pizza cut" spill containment pad for placement around well heads.
- Additional spill containment pads as necessary or as directed by the field team leader.
- Purge water tanks as appropriate for the task.
- Extra spring clamps, fittings, paper towels, and tools, etc…
- Small trash bags for temporary storage of dedicated transducers removed from wells.
- Trash pump, for transferring purge and decon. water at IM-3.
- 4 or more 5-gallon buckets and specially cut "pouring lid"
- Hydrophilic sorbent material (absorbent pads, booms, or mats)
- Plastic sheeting
- Shovel and/or other hand tools
- Plastic bags or buckets for storage and disposal of used sorbent material

PREPARATION & SETUP:

- Review this and other applicable SOP's, as well as the Emergency Notification Binder.
- Inspect all required spill containment pads for holes or tears that would compromise their effectiveness. Report such damage to the CH2M HILL Topock site coordinator or field team leader. Repair or replace damaged spill containment pads before use.
- Load spill containment equipment onto appropriate vehicle(s) and secure.

GENERAL SPILL PREVENTION PRACTICES:

- Topock is a "No Spill" site. We have all the necessary spill containment equipment, ***use it!***
- Place all items exposed to purge or decon water on the spill containment pads, not directly on the ground.
- No drops of well or purge water should ever hit the ground. Use 5-gallon buckets and spill containment pads to prevent any water from sampling equipment reaching the ground.
- Double check all fittings and connections for tightness before activating any pump.
- Check all fittings and connections for leaks immediately after starting the pump.
- Place the flow through cell and associated fittings in a 5 gal. bucket. There is often a small amount of leakage from the cell.
- If a spill does occur, immediately stop the pump, or take such action as is necessary to safely mitigate the volume or severity of the spill.
- Report all spills to the CH2M HILL site coordinator or field team leader immediately, no matter how small.
- Only use restroom facilities at the CH2M HILL job trailer or the IM3 facility.

SPILL RESPONSE ACTIONS:

In the event purge water is spilled outside of containment basins, the field team will take the following actions:

PROCEDURES:

- Stop the pump or take what action is necessary to safely stop or mitigate the volume or severity of the spill.
- Notify the CH2M HILL Site Coordinator or field team leader immediately, no matter how small the spill, and follow their instructions. PG&E and CH2M HILL staff may want to photo document the incident, so do not proceed with any clean-up until cleared to do so.
- The CH2M HILL Site Coordinator will perform the notifications as required in the Emergency Notification Binder and complete the Notification Documentation Form provided in the Binder.
- When cleared to do so, use sorbent material and bermed spill containment to absorb and contain the spilled purge water if possible.

- Transfer any contained purge water into the purge water tank.
- When cleared to do so, manually dig up any saturated soil and place in 5-gallon bucket(s) or other appropriate containers for disposal.
- Dispose of containerized soil, used sorbent material, and gloves in accordance with SOP-B6, *Disposal of Waste Fluids and Solids (IDW)*.

CONTAINMENT SCENARIO 1: SAMPLING OF UTV ACCESS WELLS USING DEDICATED OR TRANSIENT PUMPS:

For monitor well sampling at UTV access wells with dedicated or transient pumps, purge water is pumped to a tank placed on 4′ X 4′spill containment pad in the back of the UTV. The UTV is parked on a 10′ X 11′ spill containment pad adjacent to the monitoring well to be sampled. Purge water is pumped directly to a YSI flow through cell contained in a 5 gal. bucket in the work area, and then into the purge tank through a discharge tube at the appropriate purge rate for that well. The small amount of leakage from the YSI flow cell is contained in a 5-gallon bucket and is manually transferred into the purge water tank using the special "pouring lid" to prevent spills.

Potential Spill Scenarios:

- Overfill of UTV-mounted purge water tank
- Failing to place lid on purge tank before mobilizing to next well
- Spills at time of tubing disconnection from tank or during manual transfer into tank from bucket
- Spills from tubing disconnection or leakage from flow cell
- Spills from tubing disconnection at well head between dedicated and non-dedicated tubing
- Spilled bucket of purge water from flow cell
- During removal of dedicated transducers from wells

PROCEDURES:

- Before mobilization to any well, place appropriately sized tanks on small 4′ X 4′ bermed spill containment pads in UTV beds.
- Evaluate the remaining capacity of the tank prior to initiating well purging to ensure that there is sufficient capacity to hold the amount of purge water anticipated to be generated during purging of the well. Offload if needed following procedures under Containment Scenario 4.
- At the well, deploy the large 10′ X 11′ bermed spill containment pad adjacent to the well. Park the UTVs with purge water tanks on the spill pad and as close to the well head as possible, while still leaving room to work. Deploy a second or third spill containment pad as necessary to ensure adequate coverage. There should be no exposed soil between the work area and the well.
- Place the small 2′ X 4′ "pizza cut" bermed spill containment around well head.

- For a dedicated pump well: Attach the transfer tubing to the existing dedicated pump tubing at the top of the well so that the tubing connection is located ***inside*** the well protective casing and any leakage will be contained within the well head.
- Secure the transfer tubing to the bottom connection of the flow cell using hose clamps. Attach the flow through cell discharge tubing to the top fitting of the flow through cell and place the cell into a 5 gal. bucket to contain any leakage from the cell.
- Route the discharge tubing to the purge tank opening and secure using spring clamps.
- Stuff a large, unused trash bag into the top of the protective casing above the tubing connection so that any leakage or spray will be contained inside the protective casing.
- For a transient pump well: Attach the new or well specific dedicated discharge tubing to a decontaminated transient submersible pump and install into well following *SOP-A1 Purging and Sampling of Groundwater Monitoring Wells*. Transport the pump to the well head in a 5 gal. bucket to contain leakage of any residual water. With no tubing connections at the top of the well, no additional spill containment is necessary at the well head.
- All equipment is to be placed on the 10′ X 11′ bermed spill containment pad prior to the start of purging.
- Double check all tubing connections for tightness before activating the pump.
- Double check that discharge tubing is properly secured with spring clamp at purge water tank.
- Immediately after starting the pump, check all tubing connections for leakage.
- During purging, field staff will monitor the transfer of water into the purge water tank. When the tank reaches 80% full, discontinue purging to that tank. Depending on the situation, either stop the pump and properly dispose the purge water according to the SOP's in Program Procedures Manual and Operation and Maintenance (O&M) Manual for handling of investigation-derived waste (IDW), or briefly stop the pump and switch to a different purge tank. Such IDW is typically disposed to the process stream at IM-3, see Containment Scenario 4 below for instructions.
- At the completion of purging, stop the pump and carefully disconnect the discharge tubing from both ports of the flow through cell, working inside the bucket and over containment, and allow the tubing and flow cell to drain inside of the bucket.
- Working over containment, clamp the pump discharge tubing inside a 5 gal. bucket and start the pump at low speed. Collect the sample directly from the pump discharge line, allowing excess flow to pump into the 5 gallon bucket.
- When sampling is complete, stop the pump and carefully disconnect and drain all other tubing while working over spill containment to ensure that any drips of purge water are contained on the pad.
- If a transient pump was installed, double fold the end of the dedicated down-hole tubing and secure with wire-ties to prevent leakage during pump removal. Carefully remove the

pump from the well while wiping the water and power lines as they emerge with a paper towel, and coiling the tubing neatly. As the pump clears the well, place it immediately in a 5 gal. bucket, over containment, to drain.

- Disconnect the dedicated tubing from the pump and double fold the end of the tubing, securing with wire ties to prevent leakage of the residual water still contained in the tubing. Place the tubing in its designated storage bag. At the end of the day, use compressed air from the sampling truck to carefully push the residual water out of the dedicated tubing and into the purge tank.
- Place the specially cut "pouring lid" on any 5 gallon buckets containing purge water and carefully pour contents into the purge water tank.
- If any purge water is present on the containment pad, either wipe up the water using paper towels, or collect it a bucket and dump it to the purge tank. Dispose the wet paper towels with the rest of the contaminated trash.
- Close purge water tank openings and ensure that the tank is well secured to the UTV.
- Before mobilization, check back of UTVs for any drips that may have occurred and wipe up with a paper towel if needed.
- Pull the UTV off of the spill containment pad, fold the pad, load, and secure.
- Mobilize to the next well to be sampled and repeat the preceding steps.
- When the UTV-mounted purge water tank is 80% full, continue with procedures under Containment Scenario 4 to dump the water at IM-3.

CONTAINMENT SCENARIO 2: SAMPLING UTV ACCESS WELLS USING A PERISTALTIC PUMP:

For monitor well sampling using a peristaltic pump, purge water is placed in a small UTV or truck mounted purge tank, or 5 gallon bucket with lid. The purge tank or bucket is situated adjacent to the monitoring well to be sampled. Purge water is pumped directly to a YSI flow cell in a 5 gal. bucket, then to a 5-gallon bucket with lid, or purge tank for storage. The purge water in the bucket is manually dumped to the purge tank using the specially cut "pouring lid" to prevent spills.

Potential Spill Scenarios:

- Spills at time of hose disconnection from pump mechanism
- Spills during manual transfer into purge tank from bucket
- Spills from leakage from flow cell
- During removal or placement of tubing
- Disrupted bucket of purge water

PROCEDURES:

- Before mobilization to any well, place appropriately sized tank on small 4′ X 4′ bermed spill containment pad in UTV bed.
- Evaluate the remaining capacity of the tank prior to initiating well purging to ensure that there is sufficient capacity to hold the amount of purge water anticipated to be generated during purging of the well. Offload if needed following procedures under Containment Scenario 4.
- At the well, deploy the large 10′ X 11′ bermed spill containment pad adjacent to the well. Park the UTV with the purge water tank on the spill pad and as close to the well as possible, while still leaving room to work. Deploy a second or third spill containment pad as necessary to ensure adequate coverage. There should be no exposed soil between the work area and the well head.
- Place the small 2′ X 4′ "pizza cut" bermed spill containment around well head. With no tubing connections at the well, there is no need for additional spill containment at the well-head.
- Install the dedicated down-hole tubing. Take care to ensure that any residual water in the tubing is contained on spill pads. In the slant wells (MW-52's, 53's and 56's) the dedicated tubing is stored in the well itself.
- Attach the peristaltic pump-head tubing to both the dedicated down-hole tubing and the pump discharge tubing, and use a wire-tie to secure each. Clamp the pump-head tubing into the peristaltic pump, ensuring that it is not pinched in the clamp (this could wear a hole), and place the pump on the 10′ X 11′ bermed spill containment pad.
- Attach the pump discharge tubing to the bottom connection of the flow cell and secure with a wire-tie. Attach the flow cell discharge tubing to the top fitting of the cell, secure with a wire-tie and place the cell into a 5 gal. bucket to contain any leakage.
- Route the discharge tube to a 5-gallon bucket or purge tank and secure with a spring clamp. Make sure additional empty purge buckets are available.
- All equipment is to be placed on the 10′ X 11′ bermed spill containment pad prior to the start of purging.
- Double check all tubing connections for tightness before activating the pump.
- Double check that discharge tubing is properly secured with spring clamp at purge water tank or bucket.
- Immediately after starting the pump, check all tubing connections for leakage.
- During purging, field staff will monitor the transfer of water into the bucket or purge water tank. If purging to a 5 gallon bucket, briefly shut down the pump and move the discharge line to another 5 gal. bucket when the bucket reaches 50% full, then use the specially cut "pouring lid" to transfer the water from the purge bucket to the purge tank. If purging to the UTV mounted purge tank, discontinue purging to that tank when the tank reaches 80% full. Depending on the situation, either stop the pump and properly

dispose the purge water according to the SOP's in Program Procedures Manual and O&M Manual for handling of investigation-derived waste (IDW), or briefly stop the pump and switch to a different purge bucket or tank. Such IDW is typically disposed to the process stream at IM-3. Refer to Containment Scenario 4 below for instructions.

- At the completion of purging, stop the pump and carefully disconnect the discharge tubing from the flow through cell, working inside the bucket and over containment, and allow the tubing and flow cell to drain inside of the bucket.
- Working over containment, clamp the pump discharge tubing inside a 5 gal. bucket and start the pump. Collect the sample directly from the pump discharge line, allowing excess flow to pump into the 5 gallon bucket.
- When sampling is complete, stop the pump and carefully disconnect and drain all other tubing while working over spill containment to ensure that any drips of purge water are contained on the pad.
- Remove the dedicated tubing from the well and carefully drain any remaining water into purge tank. Working over containment, coil the tubing and place it into the marked ziplock bag from which it was removed.
- Place the specially cut "pouring lid" on any 5 gallon buckets containing purge water and carefully pour contents into the purge water tank.
- If any purge water is present on the containment pad, either wipe up the water using paper towels, or collect it a bucket and dump it to the purge tank. Dispose the wet paper towels with the rest of the contaminated trash.
- Close purge water tank openings and ensure that the tank is well secured to the UTV.
- Before mobilization, check back of UTVs for any drips that may have occurred and wipe up with a paper towel if needed.
- Pull the UTV off of the spill containment pad, fold the pad, load, and secure.
- Mobilize to the next well to be sampled and repeat the preceding steps.
- When the UTV-mounted purge water tank is 80% full, continue with procedures under Containment Scenario 4.

CONTAINMENT SCENARIO 3: SAMPLING TRUCK ACCESS MONITOR WELLS:

For monitor well sampling in upland, truck accessed areas of the site, purge water is placed in a 400-gallon truck-mounted tank. Purge water is pumped directly into this tank via a transfer tube at rates up to 10 gpm. Purge water leakage from the YSI flow cell is contained in a 5-gallon bucket and is manually transferred into the purge water tank using the specially cut "pouring lid". For upland wells that are UTV access only, follow procedures under Containment Scenarios 1 or 2, as applicable.

Potential Spill Scenarios:

- Overfill of truck-mounted purge water tank

- Spills at time of hose disconnection from tank or during manual transfer into tank from bucket
- Spills from hose disconnection at well head between dedicated and non-dedicated tubing
- Spills from hose disconnection or leakage from flow cell
- During removal of dedicated transducers in wells
- Disrupted bucket of purge water
- During removal or placement of pump and/or tubing
- Spills or leaks from "splitter" if used at wells with higher velocity purge rates

PROCEDURES:

- Evaluate the remaining capacity of the tank prior to initiating well purging to ensure that there is sufficient capacity to hold the amount of purge water anticipated to be generated during purging of the well. Offload if needed following procedures under Containment Scenario 4.

- At the well, deploy the large 10′ X 11′ bermed spill containment pad adjacent to the well. Park the sampling truck on the spill pad and as close to the well as possible, while still leaving room to work. Deploy a second or third spill containment pad as necessary to ensure adequate coverage. There should be no exposed soil between the work area and the well head.

- Place the small 2′ X 4′ "pizza cut" bermed spill containment around well head.

- For a dedicated pump well: Attach the transfer tubing to the existing dedicated pump tubing at the top of the well using the riser and valve provided.

- If a splitter is used to split the flow between the flow cell and the purge tank at high flow wells, wrap the splitter with a fresh trash bag such that any leakage or spray will be contained inside the well head or on containment. Route the high flow purge line to the purge tank and secure.

- For a transient pump well: Working over containment, attach the well specific dedicated discharge tubing to a decontaminated transient submersible pump and install into well following *SOP-A1 Purging and Sampling of Groundwater Monitoring Wells.* Transport the pump to the well head in a 5 gal. bucket to contain leakage of any residual water. With no tubing connections at the top of the well, no additional spill containment is necessary at the well head.

- Secure the transfer tubing to the bottom connection of the flow cell using hose clamps. Attach the flow through cell discharge tubing to the top fitting of the flow through cell and place the cell into a 5 gal. bucket to contain any leakage from the cell.

- Route the flow cell discharge tubing to the purge tank opening and secure using spring clamps.

- All equipment is to be placed on the 10′ X 11′ bermed spill containment pad prior to the start of purging.

- Double check all tubing connections for tightness before activating the pump.

- Double check that discharge tubing is properly secured with spring clamp at purge water tank.
- Immediately after starting the pump, check all tubing connections for leakage.
- During purging, field staff will monitor the transfer of water into the purge water tank. When the tank reaches 90% full, discontinue purging to that tank. Stop the pump and properly dispose the purge water according to the SOP's in Program Procedures Manual and O&M Manual for handling of investigation-derived waste (IDW). Such IDW is typically disposed to the process stream at IM-3. Refer to Containment Scenario 4 below for instructions. Resume pumping to the empty tank.
- At the completion of purging, stop the pump and carefully disconnect the discharge tubing from the flow through cell, working inside the bucket and over containment, and allow the tubing and flow cell to drain inside of the bucket.
- Clamp the pump discharge line to the sink at the rear of the sampling truck and start the pump at low speed. Collect the sample over containment directly from the pump discharge line, allowing excess flow to pump into the sink.
- When sampling is complete, stop the pump and carefully disconnect and drain all other tubing while working over spill containment to ensure that any drips of purge water are contained on the pad.
- If a transient pump was installed, double fold the end of the dedicated down-hole tubing and secure with wire-ties to prevent leakage during pump removal. Carefully remove the pump from the well while wiping the water and power lines as they emerge with a paper towel, and coiling the tubing neatly. As the pump clears the well, place it immediately in a 5 gal. bucket, over containment, to drain.
- Disconnect the dedicated tubing from the pump and double fold the end of the tubing, securing with wire ties to prevent leakage of the residual water still contained in the tubing. Place the tubing in its designated storage bag. At the end of the day, use compressed air from the sampling truck to carefully push the residual water out of the dedicated tubing and into the purge tank.
- Place the specially cut "pouring lid" on any 5 gallon buckets containing purge water and carefully pour contents into the purge water tank.
- If any purge water is present on the spill containment pad, either wipe up the water using paper towels, or collect it a bucket and dump it to the purge tank. Dispose the wet paper towels with the rest of the contaminated trash.
- Ensure that all water is pumped from sink into the truck-mounted tanks. Inspect back of truck and sink and wipe off any purge water drops with paper towel.
- Before mobilization, ensure that all tank openings are secure, and wipe up any drips that may have occurred in the work area.
- Mobilize to the next well to be sampled and repeat the preceding steps.

- When the truck mounted purge water tank is 90% full, continue with procedures under Containment Scenario 4 below.

CONTAINMENT SCENARIO 4: TRANSFER OF PURGE WATER FROM TRUCK MOUNTED TANK OR UTV MOUNTED TANK TO IM-3:

When the truck or UTV mounted purge water tank requires emptying, the following procedures will be used. Purge water is transferred into a 5,500-gallon storage tank at the IM3 Treatment Plant, at rates up to 20 gpm. The 5,500-gallon tank is located within a permanent containment structure.

Potential Spill Scenarios:

- Overfill of tank at final storage location
- Pump or transfer hose leakage during pumping into tank or at time of hose disconnection.

PROCEDURES:

- See an IM-3 plant operator for assistance in transferring purge water.
- Park the truck or UTV on the bermed spill containment pad at the IM-3 transfer location.
- Follow the instructions of the IM-3 plant operator and use the trash pump to transfer purge water from the purge tank to the receiving tank. The IM-3 plant operator and field staff will be present during the entire transfer to monitor the water level in the receiving tank and to ensure no leakage or spills occur. If the receiving tank approaches being full, discontinue transfer operations.
- At the completion of transfer operations, take care when removing the transfer hose from the truck or UTV mounted purge water tank opening, since some residual water will be present in the hose.
- Secure tank openings on the truck-mounted or UTV-mounted purge water tank.
- Proceed to the next well for sampling.

SOP-A16

Access Routes
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures to be used when accessing wells or other sampling stations at the Topock site. This SOP should be used for all travel to collect data on site. All field personnel and subcontractors are required to read this SOP and sign on the Employee Signoff Form. Although no groundwater sampling is currently planned to be conducted at any SWFL habitat wells during SWFL nesting season, the procedures below will be used if such sampling does become necessary.

OVERVIEW:

Figure 1 at the end of this SOP shows the Topock project groundwater and surface water data collection locations. The map also shows the access routes used for sampling and transducer downloads. These lines indicate vehicle access on existing roads, and indicate where utility vehicle (UTV) or foot access is used at locations where pickup truck access is not allowed. Purple lines on the map indicate where either pickup trucks or UTVs are used. Blue lines indicate routes with allowed access by UTV but not by pickup truck. Black dotted lines indicate foot access routes. Where the black dots overlay the blue routes on the floodplain area, the access is on foot or by electric UTV during the southwestern willow flycatcher (SWFL) nesting season (May 1st through September 30th), and by any UTV outside of nesting season. The access routes with specific mitigation measures or access procedures discussed herein are highlighted in green.

There are 3 access procedures that are to be followed depending on when/where fieldwork is to occur:

A = Universal for the site

B = SWFL habitat during SWFL summer nesting season (May 1st through September 30th)

C = Upland close to cultural resources (Year-round)

A site sensitivity orientation is to be provided to all field personnel regarding cultural and biological resources and the spiritual importance of the geographic area and the river to local tribes. The orientation will emphasize the need to stay within the established, marked access routes and work areas, and to prevent enlargement of previously used areas.

A SITES ACCESS PROCEDURES – APPLIES TO ALL SITES:

Personnel must obey the following procedures when accessing all data collection sites (refer to Figure 1):

- Access by vehicles is restricted to established roads or tracks. For off-road access the number of vehicles used should be minimized.
- All vehicles are to observe a 10-mph speed limit on Historic Route 66 (H-66), drive in the center of H-66 to avoid wear on the H-66 shoulders, and not cut corners when exiting H-66 to access well locations.
- All vehicles are to travel slowly off-road (5 mph speed where possible) to give time to observe and avoid wildlife and minimize noise, dust, and vehicle rutting.
- Most off-road access is to be by low-impact utility vehicles (UTV's) which carry sampling or data collection equipment as well as purge water tanks.
- Access beyond the purple lines on the map is by UTV (blue lines). Dotted black lines indicate access by foot or electric UTV. Access follows consistent routes or paths.
- Minimize time near possible wildlife habitat.
- Coordinate with on-site field client representative (FCR) to prevent unauthorized access to site areas.

These minimum procedures are followed for all data collection locations. More rigorous procedures are to be used at locations where potential concerns have been identified.

B SITES ACCESS PROCEDURES:

Field crews are to follow the following mitigation measures for the floodplain wells listed below during the SWFL nesting season, May 1st through September 30th. The universal A sites measures that were outlined above will also apply at these locations. Site B locations include:

- Well clusters MW-27, MW-34, and shoreline location R-27 on the Bureau of Land Management (BLM) managed area
- Well clusters MW-22, MW-43, MW-52, MW-53, and shoreline location R-22 on the Havasu National Wildlife Refuge (HNWR) area

Well sampling, transducer data collection, and any other work activities will not occur during the biennial protocol survey for SWFL's. Upon completion of the surveys, the onsite biologist will approve/disapprove of work activities depending on the survey results. If a SWFL is not detected, then the biologist will permit the activities. If a SWFL is detected, then the biologist will not permit the work activities, and the regulatory agencies will be consulted.

Specialized Field Equipment:

An electric UTV will be utilized while accessing B sites on BLM and HNWR property during the nesting season. The electric UTV will minimize noise and enable the sampling crew to minimize the number of trips needed to transport equipment to a well cluster in SWFL habitat.

Power supply outlets have been installed at PE-1 and a leak detection vault north of MW-39. By using this power supply to power the groundwater pumps instead of a generator, the sampling operation is virtually noiseless when sampling the MW-34 monitor well cluster.

New ½" I.D. LDPE tubing will be used to connect the pumps at the well head to the purge tanks at the staging areas. Spill containment will be placed under any hose connections where multiple hose segments are required to reach more distant wells. The hose will be cleared of all water after sampling is completed. Clearing water from the hose will be accomplished by lifting the hose to shoulder height to drain the water into the purge water storage tank.

New dedicated pumps were installed in late 2005 in MW-27, MW-34, and MW-43 well clusters. Therefore, pumps and decontamination equipment will no longer need to be transported to these wells, decreasing the overall impact associated with sampling at these locations.

Access Procedures for Wells on BLM Property:

Well clusters MW-27, MW-30, MW-34, MW-36, MW-39, MW-42 and MW-45 will be accessed directly by UTV's from the south access, under the railroad tracks. For sampling the MW-34 cluster, an electric UTV will be used to carry equipment and access the wells, and a second UTV with the purge tank will park in the staging area at the PE-1 location. New or dedicated ½" ID LDPE tubing and a power cord will be stretched from the well heads to the purge tank and power source at PE-1. For sampling the MW-27 cluster and R-27 when necessary, the electric UTV will be used to carry equipment and access the wells, and a second UTV with the purge tank will park in the staging area just north of the railroad bridge between MW-42 and MW-27. New or dedicated ½" ID LDPE tubing and a power cord will be stretched from the well heads to the purge tank and generator at the staging area.

Access Procedures for Wells on HNWR Property:

Monitor well clusters MW-22, MW-43, MW-52, and MW-53 and shoreline station R-22 are located on HNWR property, south of the railroad bridge. UTV mounted equipment is to be staged at the cleared and graded area to the west of well cluster MW-32 (Figure 1). All power generation equipment and purge water storage tanks are staged at this location. The electric UTV will be used to carry equipment and access the wells, and a second UTV with the large purge tank will park in the staging area described above. New or dedicated ½" ID LDPE tubing and a power cord will be stretched from the well heads to the purge tank and power source at the staging area. For MW-22 and the MW-52 and MW-53 clusters, a peristaltic pump and battery are used for purging directly to a small tank on the electric UTV.

Sampling Procedures for B Site Wells:

The following list summarizes the modified "nesting season" sampling procedures for the B site monitoring wells with dedicated pumps. These modified procedures will be followed each year during May 1st through September 30th:

- A biologist or authorized individual will pre-survey the planned work area for the presence of nesting listed-bird species, and sampling will proceed if the survey results are negative. BLM and DTSC will be contacted and sampling will not proceed if the pre-survey finds nesting listed-bird species.
- New sampling procedures and biological resource sensitivity will be reviewed at each field event kickoff briefing.
- The UTVs will maintain low speeds and low revolutions per minute to minimize noise. The target speed will be 5 mph on the floodplain, per BLM direction. The UTVs will maintain a reduced speed to the extent possible while avoiding getting lodged or stuck.
- A biologist will accompany the sampling team upon startup of activities and will provide a reconnaissance "sweep" during the sampling event.
- A generator will be operated at the staging areas only when there is no nearby power supply (HNWR).
- Water level measurements are to be taken at the beginning and end of the purge only. No measurements will be taken during the purge.
- Spill prevention, containment, and control measures outlined in SOP-A13 will be implemented.
- At all times, conversation noise and abrupt or unnecessary movements will be avoided, and equipment noise will be minimized. Equipment will be muffled or padded during transport and setup to avoid clanging or other impact noises from bottles and metal components.
- A biologist's report of the sampling activities will be completed within a week of the sampling and submitted to DTSC and BLM.

C SITES ACCESS PROCEDURES:

Field crews are to implement the following mitigation measures for the upland wells listed below to prevent impact from data collection on cultural or biological resources.

- East Mesa wells (IW-2, IW-3, OW-1, OW-2, and OW-5 well clusters)
- West Mesa wells (OW-3 well cluster)
- Compliance wells (CW-1, CW-2, CW-3, and CW-4 well clusters).
- Monitoring wells MW-14, MW-15, MW-16, MW-18, and MW-25.

The goal of these additional precautions is to prevent any excursion onto areas that were not previously disturbed and minimize the impact of field work. Unlike the B sites access procedures that were developed for use on the floodplain only during the summer SWFL nesting season, the precautions for these upland area C sites will be applied on a year-round

basis. The universal A sites measures that were outlined above will also apply at these locations year round.

- Personnel and vehicles are required to stay within the areas that were previously disturbed. The work areas are delineated where possible using straw "wattles", these barriers are not to be crossed with any vehicle.
- For the less frequent quarterly or semiannual access to wells MW-15, MW-16, MW-18, and MW-25, crews must stay on the clearly defined gravel access roads to each well.
- Use lathe stakes to mark boundaries during construction and well installation, rather than orange plastic fencing. These boundary stakes will be maintained, and if needed a similar marker for both access routes and work area boundaries may be substituted in the future. Any replacement should have limited visual impacts, such as straw wattles to prevent travel off existing designated work areas. Specific areas where these boundary markings are maintained include:
  - Access route on and off H-66 and edges of the East Mesa.
  - Access route from H-66 and a turnaround/work area near OW-3 on the West Mesa.
  - Access route from H-66 and a turnaround/work area near CW-4 in the unnamed wash.
  - Access routes past CW-2 and turnaround area at CW-3.
  - Defined access turn-off from H-66 to CW-1 and MW-14.
- Drive one-way on the CW-2 and CW-3 access track and turn vehicles only at the established turnaround at CW-3.
- Drive in only the active channel area of the wash when accessing CW-4. Follow the previous access path, marked where possible with straw wattles.
- Stay on established roads to access MW-15 and MW-16.

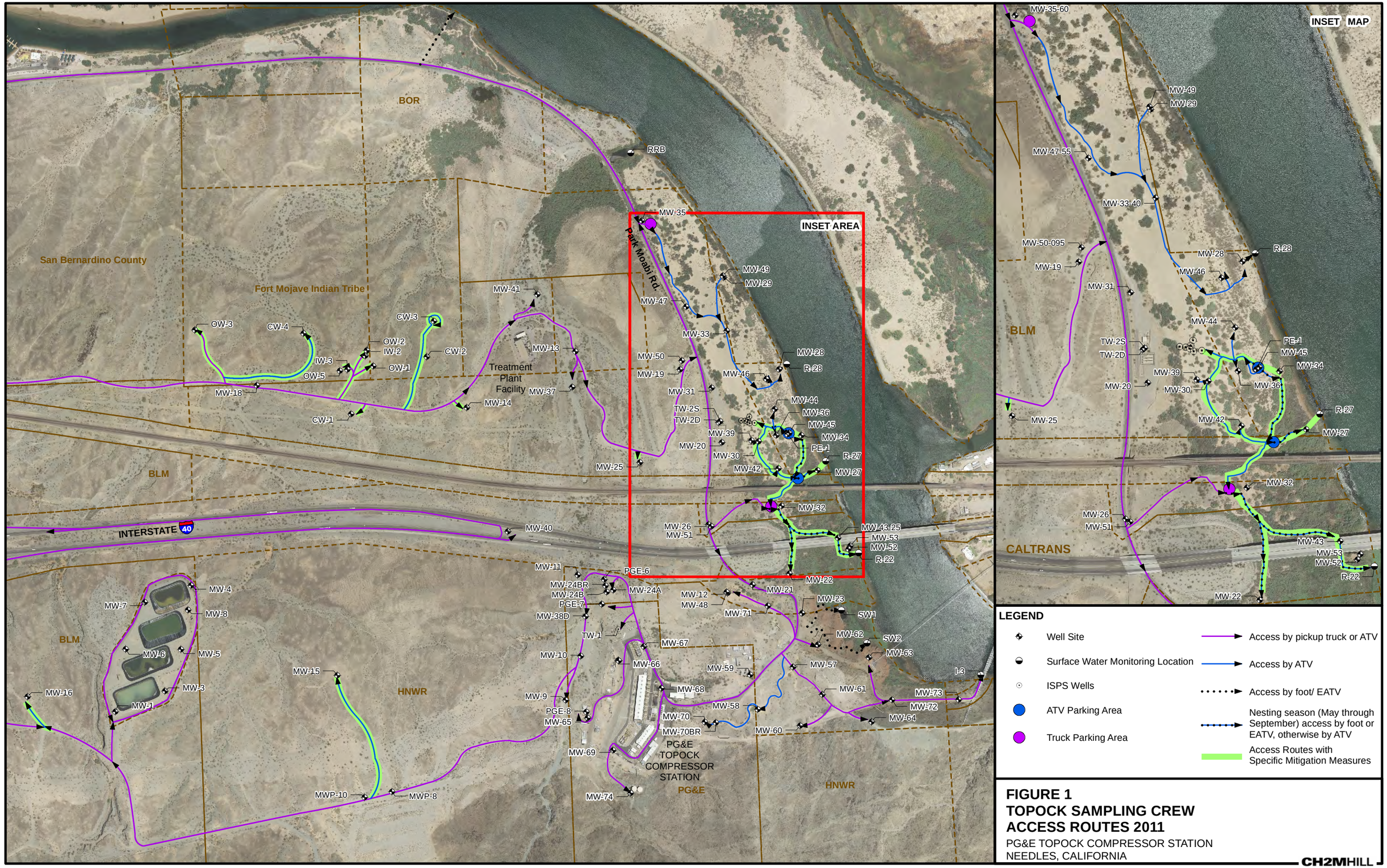

FIGURE 1
TOPOCK SAMPLING CREW ACCESS ROUTES 2011
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: D:\Projects\Topock\MapFiles\2012\AccessRoutes.mxd Date Saved: 4/25/2012 10:47:40 AM

SOP-A17

Groundwater and Surface Water Mobile Integrated Sample Tracking Standard Operating Procedures for PG&E Topock Program

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This standard operating procedure (SOP) addresses the procedures and tools to be used for collecting and managing field data as well as managing analytical samples collected in the field associated with the Topock Monitoring Programs. This SOP is a guideline to be used during the collection of surface water and groundwater data. This includes the Groundwater Monitoring Program (GMP), Compliance Monitoring Program (CMP), and River Monitoring Program (RMP) samples.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual, and Operation and Maintenance (O&M) Manual, as required.
3) Mobile Integrated Sample Tracking (MIST) Operators Manual
4) PG&E Programs Data Management Plan
5) Topock Quality Assurance Program Plan (QAPP)

FIELD DATABASE PREPARATION & SETUP

This section describes the upfront planning a preparation steps necessary to properly set-up a groundwater or surface water sampling event using the Topock Field Database. This SOP provides the how-to information for properly entering information into the field database.

1) Ensure that you have the latest version of the Topock field database. This actually consists of two database files. The "Front end" that is the interface for information entry and management and the "backend" that stores the field data and sampling information.

2) Set up the "Project Name" in the field database using the established Topock Event nomenclature, year-program-event number. For example, if you are preparing the field database for the 144th GMP sampling event, which will occur in 2008, the event title will be 2008-GMP-144.

3) Sample IDs will be entered into the database using the following convention: well ID--event number. For example, well MW-34-100 sampled during event 2008-GMP-144 would be named MW-34-100-144.

4) Analyses will be entered into the field database in accordance with the most recent SAP and any modifying documents or correspondences. Modifying documents may include the most recent Contract Work Assignment, correspondences from the regulatory agencies and client, and additional direction from project managers.

QUALITY CONTROL PROCEDURES PRIOR TO SAMPLING EVENT

The following steps describe the QC procedures prior to the initiation of sampling activities necessary to ensure all the required samples are collected.

1) Prepare a planned sample table (PST) from the database including all locations and analyses for the sampling event to be performed. An example of the PST is included as an attachment to this SOP.

2) The PST is to be reviewed by the project manager (PM) responsible for the upcoming event and the designated QC manager. If the PM and the QC manager concur with the PST, both will sign the form indicating that the samples listed are complete in accordance with all guidance documents.

3) When the PST is reviewed and accepted, prepare the event paperwork from the field database. This includes sample labels, purge forms and blank chains of custody. In addition, a list of bottles can be generated to be used to order sample bottles from the analytical laboratories. Compare the forms against the approved PST for completeness and accuracy.

USING THE MIST HANDHELD UNIT AND FIELD DATABASE

The Topock monitoring program uses the CH2M HILL proprietary Mobile Integrated Sample Tracking (MIST) system for field data acquisition and analytical sample tracking. This SOP provides an outline of steps for using the system. Details for using the MIST system are provided in the MIST operator's manual.

1. Load the appropriate field database onto the computer that is to be used for sample tracking during the field sampling event. Follow the steps in the users manual to properly prepare the database for upload into the handheld unit (Recon).

2. Load the data for the upcoming sampling event(s) onto the MIST handheld computer. Boot the system and check to ensure that the complete sampling set is included.

3. Upon arrival at a monitoring well or other sample location select the correct sample location ID manually or scan the radio frequency identification (RFID) tag if the location is so equipped. The RFID tag is a black disc approximately the size of a quarter that is attached to the well casing. Upon scanning the RFID tag, the well ID and construction information will appear on the Recon screen. **Confirm that you are at the location you intend to sample. If the well cannot be properly identified via RFID tag and or clear marking, the location is to be identified by measuring the total depth of the well.** Wells sampled on a monthly sampling frequency are indicated by a colored band around the top of the well casing.

4. Purge and sample the location in accordance with the appropriate sampling SOP (see SOPs A-1 through A-4 for sampling procedures). Record the well and purge information in the MIST unit as directed by the MIST Operator's Manual. In addition, record all field data on a hardcopy purge form. The hardcopy forms will serve as backup in case the data on the handheld unit is lost.

5. When the necessary purge volume has been purged, use the MIST unit to confirm that the field parameters are stable in accordance with site SOPs. If the parameters are not stable, continue purge. If stabilization is achieved, collect the analytical samples.

6. The MIST handheld unit will provide a table of samples to be collected at the location. The table will also indicated required preservation and filtration. Confirm that the appropriate bottle, preservative and filtration is used for each analyte. Confirm the collection of the bottle for each analyte by entering the sample time and date. Doing so indicates that the sample has been collected and it will be recorded as such in the database.

7. After the completion of each sample location, run the "Sprite Backup" tool on the Recon unit to ensure that no data is lost in the event of power loss or other unforeseen mishap. Backup the Recon before changing battery units as well.

8. At the end of sampling each day, the data in the handheld unit is to be uploaded to the field database as directed by the MIST Operator's Manual. Once the upload is completed, run the automated COC forms from the field database.

POST SAMPLING QUALITY CONTROL

This section describes the quality control steps required at the end of each sampling day. In addition, proper sample packing and shipment are discussed.

1. After the field data has been collected and uploaded into the field database as described above, COCs forms are to be generated from the field database. Compare the COC forms to the sample bottles collected to confirm all samples are properly recorded in the COC forms.

2. Compare the COC forms to the PST to confirm that all samples were collected. Certain quality control samples may be required to be held by the lab and not analyzed unless there is a data discrepancy. Confirm that these samples are labeled "Hold" in the comments column of the COC form. If there are any deviations from the PST that are intentional record the reasons for the change on the appropriate purge form and daily log. **If there are any sampling inconsistencies that cannot be explained, the location that needs additional or other samples will need to be re-sampled. The Sampling coordinator, Project Chemist and Project Manager should be notified as soon as possible, at a minimum on each day of the sampling event, of any inconsistencies that are identified.**

3. The field database has an additional tool to compare planned samples versus samples that were actually collected. Run the Planned vs. Actual (PvA) at the end of each day to confirm that all samples were collected as planned. If there are any deviations from the PST that are intentional record the reasons for the change on the appropriate purge form and daily log. **If there are any sampling inconsistencies that cannot be explained, the location that needs additional or other samples will need to be re-sampled. The Sampling coordinator, Project Chemist and Project Manager should be notified as soon as possible, at a minimum on each day of the sampling event, of any inconsistencies that are identified.**

4. At the end of each day, forward the purge forms and COCs to the sampling task lead via email or fax. The sampling task lead is responsible for additional review of the purge and sampling information for the following:
    - Appropriate purge and sampling techniques were used.
    - The purge was complete.
    - The purge parameters are in-line with historic purge data.
    - The correct samples were collected from each location.

If there are discrepancies in the purge or sample the location may need to be re-sampled.

SOP-A18

Purging and Sampling of Groundwater Monitoring Wells
Minimal Drawdown Method
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for purging and sampling all groundwater monitoring wells approved for the minimal drawdown sampling approach. This SOP will be used for sampling groundwater monitoring wells using an adjustable rate, positive displacement pump.

REQUIRED DOCUMENTS:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual and QAPP (Procedures Manual), and Operation and Maintenance (O&M) Manual, as required.
- Topock Program Health and Safety Plan (HSP)
- Applicable SOP's
- Well construction logs/specifications
- Mobile Integrated Sample Tracking (MIST) handheld database
- Previous sampling logs or tabular historic field data tables
- Current site access map
- Blank sampling logs, maps, sample labels, chains of custody (COC's), and the designated groundwater sampling field notebook

REQUIRED EQUIPMENT:

- 2 or more (i.e. one is backup) WQ instruments with flow through cells, or equivalent.
- Hach 2100P turbidimeter or equivalent.
- 200 foot (or longer as needed) water level indicator (WLI).
- Trimble Rugged Reader hand held instrument for MIST data collection.
- Two, 200 gallon capacity purge tanks.
- Utility vehicles (UTV's) as necessary.
- Honda 2000 watt generator or alternate power source.
- Adjustable-rate, positive-displacement pump
- Sample containers, cooler and ice

PREPARATION & SETUP:

- Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, O&M Manual, HSP, and groundwater sampling supplies and equipment check list. (NOTE: the PST should also be reviewed for required "non-analytical event activities" such as water level measurements or other data collection that is planned in association with the groundwater sampling event).
- Acquire the existing field logbook for groundwater sampling and initiate entries.
- Inspect all equipment and verify that the field water quality (WQ) meters have been calibrated prior to use according to the manufacturer's instructions and SOP-A9, *Calibration of Field Instruments*.
- Inventory sample bottles, build sample sets for the required analytes at each sample location, ensure a sufficient supply of lab de-ionized water for equipment blanks, and confirm the lab courier schedule.
- Field-check sampling equipment and supplies: water level indicator (WLI), WQ meters, flow-through cell, pump controller, power supply, pump discharge/sampling tubing, N-dex gloves, D.I water sprayers, 5 gallon buckets, paper towels, 0.45 micron in-line filters, etc.

FIELD PROCEDURES:

- **Prior to opening any monitor well, remove all pens, lighters, calculators, or any other loose items from vest pockets, or from any other location where they could fall into the well.**
- Upon arrival at the monitoring well, at least 2 members of the sampling team must confirm the well ID. Wells should be clearly marked on the well monument. If the well cannot be positively identified by the marking, measure total depth of the well and compare to the well installation details to confirm the correct location. Report worn or unclear well markings to the on-site field coordinator.
- Place spill containment according to SOP A-13 *Spill Prevention, Containment, and Control Measures for Monitoring Well Development, Purging, and Sampling.*
- If using a transient pump,collect an "EB", equipment blank, ***prior to pump installation*** if necessary according to the PST.
- Open the protective casing lid and, ***prior to moving it***, note the exact configuration of the transducer installation if present. Measure static WL according to SOP-A7, *Water level Measurements,* moving the transducer if necessary, and record WL value in MIST and on the sampling log.
- If the well is equipped with a transducer and does not have a dedicated pump installed, remove the transducer from the well according to SOP-C1, *Solinst Pressure Transducers*.
- If the well does not have a dedicated pump installed, but does have dedicated sample tubing, attach the dedicated tubing to the appropriate pump and install decontaminated pump at the same intake/sampling depth as used in prior events. There is a marking on

the purge tubing which corresponds with the monitor well top of casing (TOC) to facilitate this requirement. Purge and sample the well as described below.

- If the well does not have a dedicated pump ***or*** tubing, or has not been previously sampled, use new low-density polyethylene tubing and install the pump with the intake at approximately the midpoint of the well screen. Purge and sample the well as described below.
- If the well ***does*** have a dedicated pumping system, connect the discharge tubing and purge and sample the well as described below.
- Collect daily equipment blanks and duplicate samples as required by the PST and instructed by the field team leader.

PURGING AND SAMPLING PROCEDURES:

- Install the pump in the well. Slowly lower the pump (with the attached tubing and safety line) into the well to the desired depth. The pump will be set near the middle of the well screen, if possible. At a minimum, the pump intake will not be positioned lower than 2 feet from the bottom of the well. The depth to the pump intake will be recorded on the Groundwater Sampling Form. If there is less than 3 feet of available water, the groundwater well will be purged and sampled using a bottom-loading bailer.
- Measure the water level in the well after pump insertion. Leave the water level probe in the well to facilitate continued water level monitoring during purging activities.
- Start purging the well at a low flow rate between 0.2 and 0.5 liters per minute. Measure the purge rate using a container of known volume, and record this information on the Groundwater Sampling Form
- The water level should be monitored during purging, and ideally, the purge rate should equal the well recharge rate so there is limited drawdown in the well. (The water level should stabilize for the specific purge rate). The purge rate may be increased above 0.2 and 0.5 liters per minute as long as a constant water level in the well can be maintained. There should be at least 1 foot of water over the pump intake. This assures that there is no risk of the pump suction being broken, or of entrainment of air in the sample. Record adjustments in the purge rate and changes in depth to water on the field data sheet. Purge rates should, if needed, be decreased to the minimum capabilities of the pump (0.1 to 0.2 liters per minute) to avoid affecting well drawdown. If using a pulse style pump, measure the water level at the end of the pressure cycle when the water level has recovered as much as it will, before again filling the pump during the fill cycle. This method will generate consistent drawdown data.
- During purging, the water quality parameters will be measured periodically (every 3 to 5 minutes) until the parameters have stabilized as shown below. If parameter stabilization has not occurred after 4 hours, purging activities will be considered complete.
    - pH +/- 0.1 pH units
    - Specific conductance +/- 3%
    - ORP +/- 10 millivolts
    - Turbidity +/- 10% NTU units (when turbidity is >10 NTUs)

- Dissolved oxygen +/- 0.3 mg/L
- Temperature +/- 2° Celsius

- When the requirements above have been satisfied and the purge cycle is complete, disconnect the flow through cell and prepare to collect samples directly from the pump discharge tubing for analyses according to event-specific PST. Prepare sample containers and collect gas-sensitive analytes first. The preferred collection order will be volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]; see SOP-A6), then general chemistry (cations, anions, stable isotopes).
- For filtered samples, attach a 0.45 micron in-line filter to the pump discharge and allow approximately 500 mL of sample to pass through the filter before beginning sample collection in accordance with SOP A-6 *Field filtration* and the QAPP.
- When sample collection is complete, record sample information, final WL, and purge volume data in MIST and on the field sampling log.
- If transient pump previously installed, remove the pump from the well, detach the dedicated tubing and carefully drain any residual water to the purge water tank. Fold both ends of the purge tubing and secure with wire ties as a further deterrent to leakage. Store the dedicated tubing in a sealed, labeled trash bag. Decontaminate the pump according to SOP A-10, *Decontamination of Water Sampling Equipment.*
- If well was equipped with a transducer, replace the transducer in exactly the same configuration in which it was found and in accordance with SOP-C1, *Solinst Pressure Transducers*.
- Close and secure well protection lid.
- Follow SOPs in Program Procedures Manual and O&M Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

SOP-A19

Sampling of Groundwater Monitoring Wells
HydraSleeve No Purge Method
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for sampling all groundwater monitoring wells approved for the HydraSleeve sampling approach.

REQUIRED DOCUMENTS:

- Event-specific planned sample table (PST).
- Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, Field Procedures Manual and QAPP (Procedures Manual), and Operation and Maintenance (O&M) Manual, as required.
- Topock Program Health and Safety Plan (HSP)
- Applicable SOP's
- Well construction logs/specifications
- Mobile Integrated Sample Tracking (MIST) handheld database
- Previous sampling logs or tabular historic field data tables
- Current site access map
- Blank sampling logs, maps, sample labels, chains of custody (COC's), and the designated groundwater sampling field notebook

REQUIRED EQUIPMENT:

- 2 or more (i.e. one is backup) YSI-556 WQ instruments, or equivalent.
- Hach 2100P turbidimeter or equivalent.
- 200 foot (or longer as needed) water level indicator (WLI).
- Trimble Rugged Reader hand held instrument for MIST data collection.
- HydraSleeve samplers (from supplier)
- Pointed plastic discharge tube (included with sampler)
- Polypropylene strapping (from supplier)
- Stainless steel weights
- Small cable ties
- String reel

- Utility knife
- Scissors (stainless steel)
- Well caps with small eyelet on bottom allowing a string to be tied off
- Sample containers, cooler and ice

PREPARATION & SETUP:

- Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, HSP, and groundwater sampling supplies and equipment check list. (NOTE: the PST should also be reviewed for required "non-analytical event activities" such as water level measurements or other data collection that is planned in association with the groundwater sampling event).
- Acquire the existing field logbook for groundwater sampling and initiate entries.
- Inspect all equipment and verify that the field water quality (WQ) meters have been calibrated prior to use according to the manufacturer's instructions and SOP-A9, *Calibration of Field Instruments*.
- Inventory sample bottles, build sample sets for the required analytes at each sample location, ensure a sufficient supply of lab de-ionized water for equipment blanks, and confirm the lab courier schedule.
- Field-check sampling equipment and supplies: water level indicator (WLI), WQ meters, HydraSleeve supplies, N-dex gloves, D.I water sprayers, 5 gallon buckets, paper towels, 0.45 micron in-line filters, etc.

FIELD PROCEDURES:

- **Prior to opening any monitor well, remove all pens, lighters, calculators, or any other loose items from vest pockets, or from any other location where they could fall into the well.**
- Upon arrival at the monitoring well, at least 2 members of the sampling team must confirm the well ID. Wells should be clearly marked on the well monument. If the well cannot be positively identified by the marking, measure total depth of the well and compare to the well installation details to confirm the correct location. Report worn or unclear well markings to the on-site field coordinator.
- Place spill containment according to SOP A-13 *Spill Prevention, Containment, and Control Measures for Monitoring Well Development, Purging, and Sampling.*
- Open the protective casing lid and, ***prior to moving it***, note the exact configuration of the transducer installation if present. Measure static WL according to SOP-A7, *Water level Measurements,* moving the transducer if necessary, and record WL value in MIST and on the sampling log.
- If the well is equipped with a transducer and does not have a dedicated pump installed, remove the transducer from the well according to SOP-C1, *Solinst Pressure Transducers*.

PURGING AND SAMPLING PROCEDURES:

HydraSleeve Deployment

1. Remove HydraSleeve sampler from package and pinch the top to create an opening. See Attachment 1 for a representation of an unfilled HydraSleeve sampler.
2. Use a HydraSleeve Spring Clip to fasten the pre-looped string to the top of the HydraSleeve sampler. Fold the two holes at the bottom of the HydraSleeve together and attach a weight using a HydraSleeve Stainless Steel weight clip. Attach the weight clip to the pre-measured string.
3. If using two HydraSleeve samplers, follow steps 1 and 2 above for placing the second sampler below the first on the pre-measured string.
4. Lower the sampler into the well until the pre-marked hanging location is level with the ground surface.
5. Following placement in the well, fasten the end of the string to the locking tab on the well casing, secure with a cable tie and the well lock.
6. Place cap back onto well.
7. Secure monitoring well and area prior to demobilization.

HydraSleeve Sample Recovery

Once a sufficient period of time has elapsed so that re-equilibration of the water within the well with surrounding groundwater conditions has occurred (typically a minimum of 48 hours), the HydraSleeve samplers can be recovered and samples collected for analysis.

For standard HydraSleeve sampler recovery, the following procedures will be performed at each well:

1. Measure the depth to water to the nearest 0.01 foot.
2. Remove all securing cable ties and remove the sampler from the well. The best method is to pull the HydraSleeve sampler upward continuously from its starting point, at a rate of one to two feet per second or faster, until the sampler is full, which is a vertical distance of 36 to 72 inches for a 36-inch long sampler.
3. The condition of the sampler should be recorded in the field sampling sheets, including the presence of any headspace within the sampler.

HydraSleeve Sample Collection

Samples for chemical analysis will be collected from the HydraSleeve samplers immediately following removal from the well. The following sampling procedures will be used at each well:

1. Identification labels for sample bottles will be filled out for each sample.
2. Hang the filled HydraSleeve from the hanger device after removal from the well.
3. Squeeze the full sampler just below its top to expel water resting above the flexible check valve.
4. Push the pointed discharge tube perpendicularly through the outer polyethylene sleeve approximately three to four inches above the bottom of the HydraSleeve.
5. Transfer the sample from both HydraSleeve samplers into a 2.5 liter compositing container. Pinching the sample sleeve just above the discharge tube will control the flow of the sample. The sample sleeve can also be squeezed, forcing fluid up through the discharge tube, similar to squeezing a tube of toothpaste.
    - The preferred collection order will be volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), metals (including hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]; see SOP-A6), then general chemistry (cations, anions, stable isotopes).
    - For filtered samples, transfer the sample out of the compositing container using a peristaltic pump through a 0.45 micron in-line and allow approximately 250 mL of sample to pass through the filter beginning sample collection. The limited volume in the HydraSleeve sampler requires that less sample be run through the filter than is dictated in SOP A-6 *Field filtration* and the QAPP.
6. If sample volume allows, transfer water into a container to obtain field parameter readings with a YSI-556 WQ or equivalent instrument (note in the field forms the results are approximate because a flow-through cell could not be used). Field parameter readings are to be recorded on the groundwater sample form.
7. Excess sampler water will be emptied into the purged waste water tank.
8. Samples will be preserved and managed as detailed in the QAPP. Time of sampling will be recorded in the field logbook, field sample sheets, sample labels, MIST and chains of custody.
9. After the samples have been collected, immediately place the sample bottles in an ice-filled cooler. Before decontamination of field equipment, the well cap will be replaced and locked.
10. If redeployment of a new HydraSleeve sampler is not intended, sampling equipment, except for string, stainless steel weight and rubber stopper, will be discarded as with other PPE trash, and the blank string with weight will be Stored for later use. However, if deployment of a new sampler is required, the new

sampler will be reattached to the existing string and stainless steel weight. The sampler can then be deployed in the well for the next sampling event.

11. If well was equipped with a transducer, replace the transducer in exactly the same configuration in which it was found and in accordance with SOP-C1, *Solinst Pressure Transducers*.
12. Prior to leaving the site, field documentation, including the chain-of-custody form, will be completed.
13. Secure monitoring well and area prior to demobilization.
14. Follow SOPs in Program Procedures Manual and O&M Manual for sample handing and management, equipment decontamination, and investigation-derived waste (IDW) management.

Attachment 1
Representation of HydraSleeve Sampler

SOP-A23

Sample Handling and Custody
Standard Operating Procedures for PG&E Topock Program

PURPOSE

The purpose of this standard operating procedure (SOP) is to delineate protocols for sample handling and custody for the PG&E Topock Program environmental monitoring activities associated with the Topock Compressor Station (TCS) in Needles, California. An example chain-of-custody (CoC) form and sample custody seals are provided as part of this procedure (see Attachment 1). Other formats with essentially identical information are acceptable.

SCOPE

This procedure applies to all CH2M HILL personnel and subcontractors engaged in collecting environmental samples for the Topock environmental program.

GENERAL

An essential part of the sampling activities of any environmental project is assuring the integrity of the sample from collection through data reporting. This SOP will address all sample custody issues up through sample relinquishment to the courier to deliver samples to the laboratory final destination. Sample labels, CoC forms and custody seals are used to document identification and handling/control (custody) of samples from the time of collection through the completion of chemical analysis. Accountability of the history of a sample must be available to demonstrate that the data are a true representation of the environment. The CoC record is used as evidence to demonstrate that a sample was not tampered with or altered in any way that might bias the analytical accuracy of the laboratory results since the time of its collection. It is extremely important that chain-of-custody records be complete, accurate, and consistent. In some projects, including this one, sample custody records and analytical data may be used in litigation. In all cases of custody, the accuracy and completeness of records is critical for evidentiary use whether as part of the normal data validation procedure or in a litigious project environment. All sampling activities for the Topock environmental program must adhere to the procedures in this SOP in order to ensure complete, accurate, and consistent project data.

DEFINITIONS

1. Custody: A sample is under custody if it is in physical possession or under control so as to prevent tampering or alteration of its characteristics. A sample is considered to be in an individual's custody if it is (1) in the physical possession of the responsible party, (2) in view of the responsible party after being in their possession, or (3) placed by the responsible party in a designated, secure area that is controlled with restricted access.

2. Sample Label: A record attached to samples to ensure legal documentation of traceability. Attachment 1 includes an example of the sample labels that are used.

3. Chain-of-Custody Record: Legal documentation of custody of sample materials and instructions for the analytical laboratory. Attachment 1 includes an example of a CoC form.

RESPONSIBILITIES

Project Manager

The *Project Manager* (PM) shall ensure that staff conducting these procedures are properly trained. Prior to the sampling event, the PM shall review and approve the planned sample table (PST). In addition, sampling staff must consult the PM if any complications arise with following these critical sample handling and custody procedures.

Project Chemist

The *Project Chemist* shall review and approve the PST. In addition the chemist shall be consulted in the event any questions surface concerning sample handling and custody procedures.

Field Team Leader/Sampling Coordinator

The *Field Team Leader/ Sampling Coordinator*(FTL/SC) shall assure that the systems are maintained to create CoC forms from the sample-tracking database. In addition, the FTL/SC is responsible for production of CoC forms and sample labels for the field crews. The FTL/SC shall also take responsibility for or delegate the packing of the sample shipping coolers, ensure that the CoC forms are correct, and ship the samples (or transfer to laboratory sample pickup) as described in this SOP. The FTL/SC shall determine or seek guidance as to which samples are potentially hazardous and the appropriate shipping method, if needed.

Sample Collector

The *Sample Collector* shall ensure that the samples are correctly collected (following the appropriate SOP), labeled, and stored until the FTL/SC takes custody of the samples for shipping to the laboratory. The Sample Collector shall maintain custody of the samples until said time that the FTL/SC takes custody. The Sample Collector shall be responsible for informing the FTL/SC of sampling conditions. (Note: The FTL/SC, Sample Collector, and Sample Shipper may be the same person.)

Sample Custodian

The *Sample Custodian* is any individual who is responsible for the custody of samples and completion of associated documentation and may include the FTL/SC, Sample Collector, or on large events, a separate Sample Shipper.

PROCEDURE

Sample Custody

Sample custody procedures are designed to ensure that sample integrity is maintained from collection to the final receipt of the analytical report. A critical aspect of sound sample collection and analysis protocols is the maintenance of strict CoC procedures, as described in this SOP. CoC procedures include tracking and documentation during sample collection and shipment.

As noted above, a sample is considered to be in an individual's custody if it is (1) in the physical possession of the responsible party, (2) in view of the responsible party after being in their possession, or (3) placed by the responsible party in a designated, secure area that is controlled with restricted access.

Custody will be documented throughout all sampling activities by the electronic sample-tracking database or on the official CoC record for each day of sampling. The electronic data will be used to generate the official CoC if an electronic sample-tracking database program is used. In either case the official CoC will accompany the samples from the site to the laboratory. The sampling team member who relinquishes the samples to the courier or laboratory personnel is required to sign, date, and note on the CoC the time when relinquishing samples from his or her immediate custody. Once signed by the FTL/SC/Sample Collector and the laboratory courier, a copy of the CoC will be made and kept with the other sampling related paperwork. Any discrepancies in the custody procedure noted and corrected must be communicated to the PM and project chemist immediately to determine possible corrective action(s).

Samples will be shipped to subcontractor laboratories via laboratory courier. In some cases, samples may be hand-delivered to the laboratory; hand delivery will be noted on the CoC form. In the event the laboratory is not within driving distance, an overnight air courier will be used. Bills of lading will be used in addition to other custody documentation during this time and will be retained as part of the permanent sample custody documentation. The subcontractor laboratory is responsible for sample custody once samples are relinquished to their custody and at that point laboratory SOPs for custody must be followed. Final completed CoCs from the field and shipping efforts as well as internal laboratory custody records will be provided with the final laboratory data submission.

Sample Labels

A sample label must be attached to all sample containers prior to collecting the sample. (**Note**: Do not attach new labels to pre-weighed soil volatile organic compound or gasoline range organic vials; use the labels attached by the laboratory. Additional labels may be affixed to the recloseable plastic bag if needed). The label may be generated along with the CoC form using a sample-tracking database (use waterproof labels), or may be hand-generated using a blank sample label purchased or provided by the laboratory with the sample bottles. For certain types of samples (for example, Summa™ soil gas canisters), blank labels are provided by the laboratory when the lab provides sample containers. All sample labels generated will contain the following information in indelible ink:

- Unique Sample ID
- Analyses requested
- Preservative used
- Date and time of sample collection
- Sampler's initials

Once the sample has been collected and the sample labeling is complete, the Sample Collector will place the samples in recloseable plastic bags and place in a cooler on ice. Labeling for other types of containers (such as soil gas and air samples) will follow the same labeling procedure except that the labels are attached to the sample containers (summa canisters, filters or tubes) via a sample tag attached to the container by the laboratory.

Chain-of-Custody Record

CoC forms are legal documents that record the custody of the sample from collection through reporting. If the sampling event is using an electronic sample-tracking database, the CoC will be

generated at the end of the day; if not, CoC form(s) will be filled out for each sample at each sampling location to maintain a record of sample collection, shipment of samples, and receipt of samples by the laboratory.

The FTL/SC or Sample Collector will generate the CoC form. Information entered on the CoC includes:

- Project name and project number or task order
- CH2M HILL address and contact information
- Name and address of laboratory to receive the samples
- Unique sample ID
- Matrix type
- Analyses requested
- Field quality control (QC) for matrix spike and matrix spike duplicate (MS/MSD) samples, if applicable
- Container type, size and number (recommended*)
- Preservatives used (recommended*)
- Turn-around-time for laboratory analysis
- Comments to Laboratory, if applicable
- Date of collection
- Time of collection (24-hour format)

The FTL/SC or Sample Collector shall verify that the CoC record is complete, accurate in all aspects, and consistent with all other sample documentation (for example, number of samples, sample labels, purge forms, field logs). The FTL/SC or Sample Collector will sign the "Relinquished By" fields on the CoC record, marking the date and time custody is transferred to the laboratory courier or other common carrier service (e.g., FedEx, UPS, U.S. Postal Service, Golden State).

If using a common carrier service, the Sample Shipper will perform the following duties:

- Obtain any required signatures from sampling team.
- Record the carrier service and airbill number on the CoC.
- Sign and enter the date and time relinquished to the common carrier service or courier.

Corrections: If there are any corrections to the CoC form needed, corrections will be made by a single-line strike mark through the incorrect item, and then entering the correct entry adjacent to the strikeout item. Corrections will be initialed and dated by the person making the change. After the form has been inspected and determined to be satisfactorily complete, the Sample Shipper will sign, date, and note the time of transferal and will reference a shipper tracking number on the form (if applicable). If the samples are being shipped by common carrier service, the CoC form will be placed in a recloseable plastic bag and placed inside the cooler after the

sample packer has detached or made an appropriate copy of the form. Field copies of the completed CoC forms are maintained in project files by on site personnel.

Overnight Sample Storage

In some cases, samples cannot be shipped immediately to a laboratory and must be temporarily stored in a secured onsite facility. There are two locations where secured refrigeration is available onsite.

The IM-3 field lab has limited space for samples in its refrigerator and can be used to temporarily store samples associated with the IM-3 operations. The facility is manned 24 hours a day 7 days a week and has restricted access.

The Topock field office trailer has a refrigerator that is dedicated to short-term sample storage, as well as two freezers that can be used for samples that require freezing. The field trailer is locked during non-business hours and the refrigerator is locked when staff are not present.

The samples placed in the refrigerators cannot be in coolers, but should be stored in recloseable plastic bags, grouped by sample location and laboratory. The refrigerators must be maintained at a temperature between 2° and 6°C.

Custody Seals

For normal shipping (samples sent via laboratory courier) no custody seals are required. For shipping via common carrier service, the shipping cooler must have two custody seals: one on the front and one on the side of the cooler, signed, dated, and marked with the time the cooler was sealed (the signed CoC should be in a recloseable plastic bag, taped to the inside of the cooler's lid). In addition, each custody seal will be covered with transparent packing tape.

RECORDS

The FTL is responsible for the distribution of the CoC record:

- Original: Sealed in plastic bag and taped inside the top of the shipping container (if shipped via common carrier service) or handed to the laboratory representative.
- Copies to Project Chemist and PM or Task Manager

Attachment 1
Sample Chain-of-Custody Form and Sample Custody Seal

CH2MHILL

CHAIN OF CUSTODY RECORD

Project Name PG&E Topock
Location Topock
Project Manager
QC Manager
Project Number
Project
Turnaround Time 10 Days
Shipping Date:

			Container:	8oz soil jar	8oz soil jar	8oz soil jar	8oz soil jar	3-40ml vials	8oz soil jar	8oz soil jar	8oz soil jar			
			Preservatives:	4°C	4°C	4°C	4°C	1-MEOH 2-DI H2O <0°C	4°C	4°C	4°C			
			Filtered:	NA	NA	NA	NA	NA	NA	NA	NA			
			Holding Time:	14	14	14	14	14	14	14	14			
	DATE	TIME	Matrix	Hexavalent Chromium (SW7199/3060A)	Title 22 Metals (SW6010B/SW7471A)	PH (SW9045)	Dioxins/Furans (SW8290)	TPH-Purgable (SW8015B)	TPH-Extractable (SW8015B)	SVOC (8270C)	PAHs (SW8270Sim)		Number of Containers	COMMENTS

Signatures	Date/Time
Approved by	
Sampled by	
Relinquished by	
Received by	
Relinquished by	
Received by	

Shipping Details

Method of Shipment: Lab Courier
On Ice: yes / no
Airbill No:
Lab Name: ADVANCED TECHNOLOGY LABORATO
Lab Phone: (702) 307-2659

ATTN:

Sample Custody
and
Marlon

Special Instructions:

Report Copy to

Shawn Duffy
530-229-3303
sduffy@ch2m.com

CH2MHILL CUSTODY SEAL

Date ____________________

Signature ____________________

CH2MHILL CUSTODY SEAL

Date ____________________

Signature ____________________

CH2MHILL CUSTODY SEAL

Date ____________________

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Signature ____________________

SOP-B3

Borehole Sampling and Logging of Soil Borings
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance for sample collection from soil borings during the drilling process, and proper documentation necessary. Detailed guidance for sample collection, preservation and handling is provided in Section 4.0 of the site Quality Assurance Project Plan (QAPP) and in the Topock Program *Sampling, Analysis, and Field Procedures Manual* (Procedures Manual). SOP-B2 provides detailed guidance for soil characterization and logging.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP), work plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.

2) Applicable project work plan or monitoring plan. Refer to the Procedures Manual and QAPP, as required.

3) Topock Program Health and Safety Plan (HSP).

4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available.

5) Blank sampling log and field notebook.

PREPARATION AND SETUP

1) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.

2) Initiate field logbook for sampling activity.

3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.

Equipment List

- Field logbook
- Borehole log
- Blue or black waterproof or permanent ink pens
- Trash bags
- Plastic sandwich bags
- Paper towels

- Stainless steel sampling equipment (provided by driller)
- Decontamination equipment (Alconox® solution in spray bottle, brushes, buckets, rinse water spray bottle)
- Soil sample containers appropriate for sample analysis and preservation as called for in SAP and QAPP (glass jars, brass sleeves, Encore® containers, sandwich bags, etc.)
- Soil sampling equipment not provided by driller (spatula or putty knife, stainless steel compositing bowl, hand auger, etc.)
- Groundwater sample containers appropriate for sample analysis and preservation as called for in SAP and QAPP (glass jars, VOA vials, plastic jars, etc.)
- Groundwater sample equipment not provided by driller (pump, filters, tubing, power supply, etc.)
- Water quality meters
- Water level indicator
- Distilled water
- Coolers with ice
- Protective waterproof gloves (nitrile or latex)

GUIDELINES

Soil Boring Logs Documentation

Soil boring logs will be completed on the soil boring log forms during the drilling activities at the time of the logging and soil descriptions. Information collected will be consistent with the standard CH2M HILL form (See SOP-B2 attachment A). Sample data may also be documented in the comments section of the boring log.

Items documented on the borehole log include:

1) **Sample Interval:** The top and bottom depth of each sample run should be recorded on the borelog. Sampling includes samples collected for analysis as well as core retrieved for logging purposes.

2) **Sample Type and Number:** Enter the sample type and number consistent with the sampling and analysis plan at the correct depth intervals. An "x" should be placed across the vertical interval where the environmental soil, grab groundwater, or geotechnical sample was collected.

3) **Sample Recovery:** Enter the length of retrieved core to the nearest 0.1 foot of sample recovered, and record the value in feet. Do not count slough or caved material as part of the total recovered length of core. Record total length and percent of sample recovered. If using a 5-foot sample barrel, multiply the total length by 2 and 100 to get a percentage number. Similarly, if using a 2.5-foot sampler, multiply by 4 and 100 to get the percent recovery.

4) **Sampling:** Sampling difficulties shall be noted. Disturbed samples shall be noted on the log as well as the sample recovery. The top of the sample shall be marked on the container.

5) **Water Levels:** Water-level measurements, where groundwater is encountered, are required for each boring. Changes in soil moisture shall be noted and, if there is no water encountered, a note to that effect shall be included on the borehole log. The date and time of water-level measurements shall be documented.

At a minimum, sample identifiers (IDs) should be noted on boring logs at the depth collected. When time and space allows, a summary of analytical sample information can be included. When inclusion of these data prevents documentation of drilling information, sample data should be omitted in order to document drilling.

Borehole Sampling by Drilling—General Procedure

Split-spoon sampling procedures shall be executed in accordance with American Society for Testing and Materials (ASTM) D1586, "Standard Method for Penetration Test and Split-barrel Sampling of Soils" (ASTM 1984). California (2-inch) or Modified California (2.5-inch) split-barrel samplers may also be used.

1) The split-spoon or split-barrel sampler shall be advanced to the top of the sampling interval using a wire-line or sample rods such as A or AW. The larger-diameter samplers may be fitted with three 6-inch-long stainless-steel sleeves. The sampler shall be driven 18 inches or to refusal, with a 140-pound hammer dropping repeatedly 30 inches. Refusal shall be defined as requiring 50 blows with the hammer to advance the sampler less than 6 inches.

2) The number of blows required to drive the sampler each 6 inches shall be recorded on the borelog.

3) As the sample tubes are disassembled, an organic vapor monitor probe shall be inserted into the gap between two sample liners, and the liner exhibiting the highest reading shall be selected for analysis.

4) In general, the middle liner is collected for laboratory analysis, and 10 percent of the bottom liners are collected for quality assurance testing. A sample of the soil in the top liner typically is placed in a re-sealable plastic bag or 8-ounce clear glass jar and left in the sun for approximately 15 minutes to allow any volatile organic compounds (VOC) to volatilize.

5) After the 15 minute volatilization period, the soil vapor in the plastic bag is then measured for VOCs by taking a reading of the headspace. Background VOCs for the bag are determined by monitoring the air in an empty bag.

6) Results of the organic vapor monitoring are recorded on the boring log.

7) Small portions of soil at the ends of the sleeve are scraped off for classification.

Borehole Sampling by Drilling—Split Spoon Sampling

1) Samples collected for laboratory analysis using split spoon sampling device will be separated and transferred from the split-spoon halves into sample jars by clean stainless-steel utensils.

2) Samples for VOCs will be separated and collected first, followed by semivolatile organic compounds samples.

3) For VOC samples, avoid mixing the soil before sampling and sample directly from the split spoon. See SOPs for guidance on homogenizing soil samples and for VOC sampling using EnCore samplers, respectively.

Borehole Sampling by Drilling—Direct-push Sampling

1) Samples collected for laboratory analysis using a direct-push sampling drill rig will be handled by either opening the tube and placing the soil in sample jars or cutting the acetate tube and submitting it the laboratory directly.

2) For samples that will be removed from the acetate tube, the tube will be cut open longitudinally using a double-bladed razor knife.

   - Soil will be inspected and logged prior to removal of soil samples.
   - A short section of soil will be removed from the acetate sleeve using a stainless-steel utensil, homogenized in a clean stainless-steel bowl, and placed in sample jars.
   - Soil collected for VOC analysis will be sampled directly from the split acetate sleeve using EnCore samplers.

3) Alternatively, a short (6-inch) length of liner will be cut from the acetate sleeve and collected directly for laboratory analysis.

   - The section of acetate liner will be removed, capped with Teflon sheeting and plastic end caps at both ends, and taped with clear label or packing tape.
   - Labels shall be affixed to the liners with job designation, time, boring number, sample depth interval, sample number, date sampled, and the initials of the sampler clearly marked.
   - The samples shall then be enclosed in a plastic bag and stored in a cooler maintained at 4°C.
   - Sample information shall be placed on the chain-of-custody, the borelog, and the field logbook. All samples shall be handled in accordance with *Chain of Custody Procedures*.

Borehole Sampling by Drilling—Split-barrel Sampling

Soil samples can also be collected using a 3-foot-long or 5-foot-long split-barrel sampler. The split-barrel sampler is similar to the split-spoon sampler that is used to hold steel or brass sampling sleeves, but the split-barrel sampler typically is not used to hold sample sleeves.

1) The sampler is lowered to the base of the drill bit and is advanced slightly ahead of the drill bit and augers (or conductor casing). The weight of the drill string and sample barrel along with the drilling and cutting action of the drill bit advances the face of the split-barrel sampler into the formation.
2) Once the desired depth interval is reached, the split-barrel sampler is retrieved using a cable or tool steel sections.
3) The retrieved sampler is unscrewed, and one or both halves are laid on the sample table. The soil typically will form a continuous column of soil in one of the split-barrel halves.
4) The soil column is split longitudinally for soil descriptions using a putty knife or spatula.
5) Samples for VOC analysis are collected immediately directly from the soil column.
6) Other soil samples are collected after the core section has been described and logged. The soil is described following the procedures in the following sections.

Groundwater Sampling

1) Groundwater samples can be collected by hydropunch by bailer or by pumping from an isolated zone. Collection of groundwater by bailing is not an accurate method of collection depth discrete groundwater samples, as the zone sampled is poorly isolated.
2) Hydropunch samples are collected below the bit of the drill stem, in relatively undisturbed soil zone. This method of sample collection may be difficult in fine-textured soils and in very rocky soils. To collect these samples, a point is driven below the depth of the drill bit, then a screen zone is opened within this point and water allowed to flow in. The hydropunch tool must be decontaminated between samples.

Groundwater can also be collected from the open or cased borehole with a bailer. A disposable or decontaminated stainless-steel bailer is lowered into the boring, and water is collected. This method is preferable for collection of groundwater from the water table. Attempts can be made to collect discrete groundwater samples beneath the water table; however, the boring must be cased with watertight, stainless-steel pipe, and the boring must be evacuated prior to collection of samples.

Alternatively, discrete groundwater samples can be collected by isolating a zone with casing and packers. To collect these samples, the borehole is first advanced to the depth at which a sample is required. Then casing is advanced to within 20 feet of the sample zone. Next, a pump and packers are lowered into the hole. The zone from which samples are to be collected is isolated with a packer, and water is pumped directly from the target zone.

Sample Handling

Sample preservation and sampling procedures are detailed in Section 4.0 of the QAPP. Additional information is provided in the Procedures Manual and in the appropriate SAP.

KEY CHECKS AND ITEMS

- Check entries to the soil boring log and field logbook in the field during sampling activities because the samples will be disposed at the end of the fieldwork, confirmation and corrections cannot be made later.

- Check that the sample numbers and intervals are properly specified.
- Ensure that drilling equipment is decontaminated prior to the beginning of work and between each borehole.
- All materials generated during sampling (debris, PPE, decontamination liquids, etc.) will be placed in 55-gallon drums or roll-off bins for storage pending analysis and disposal off site, as outlined in SOP 39, Standard of Practice H-83, and Appendix D of the project *Soil and Groundwater Management Plan*.

ATTACHMENT A

Examples of Soil Bore Logs

CH2MHILL

PROJECT NUMBER	BORING NUMBER SHEET OF

SOIL BORING LOG

PROJECT _____ LOCATION _____

ELEVATION _____ DRILLING CONTRACTOR _____

DRILLING METHOD AND EQUIPMENT _____

WATER LEVELS _____ START _____ FINISH _____ LOGGER _____

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION

REV 9/96 FORM D1586

PROJECT NUMBER: 326128.01.16.EN

BORING NUMBER: *MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006 / **DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
5			6	SP	**POORLY GRADED SAND (SP)** - very lt brn (10YR7/3), =2% fines, 98% f to m lithic quartz sand, subang to subrnd, dry - fine roots, iron staining, some iron oxide coating on grains	Hand augured to 5' bgs
10			10	SP	- slightly moist - dry	Rapid drill rate, no chatter
15				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - lt yellowish brn (10YR6/4), 45% gravel up to 7cm, 50% f to m sand, 5% fines, loose, met subang gravel, dry(moist@ 17')	
20			16	SW	- cobble present in slough - one subrnd chert gravel - Possible Fluvially Reworked Alluvium - lt grey (10YR7/2), subang to rnd met gravel up to 9cm, 2% to 5% fines - dk yellowish brn (10YR4/4), mostly c sand subang to ang, met, some Miocene conglomerate gravel	
25				SW	- 65% sand, 30% gravel up to 4cm, 5% fines	
30				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dk yellowish brn (10YR3/6), 35% gravel up to 4cm, 55% m to c sand, 10% silty fines, met clasts are grain supported some mm siltstone - some oxide staining	
35				SW	**WELL GRADED SAND w/ GRAVEL AND CLAY (SW)** - dk yellowish brn (10YR3/6), 30% subang met gravel up to 7 cm, 55% subrnd to subang m to c sand, 15% clayey fines, m density, moist	Drill rate slowed to clean out 8" pipe

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
			2.5	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dr yellowish brn (10YR3/6), 30% gravel, 60% sand, 10% silty fines	Drilling smooth but preceeds less rapidly
40			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - 40% subang met gravel up to 6cm, 55% subrnd to ang sand, 5% fines - more gravel below 38' - gravel is mostly fine	
45						
50			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - Pale brn (10YR6/3), 30% subang met gravel up to 5cm, 60% subrnd to subang m to c met sand, 10% silty fines, wet	Soil sample collected
				SP	**POORLY GRADED SAND w/ GRAVEL (SP)** - pale brn (10TR6/3), 30% f subang gravel up to 2 cm, 65% mostly c sand, =2% fines	
55				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 40% subang met gravel up to 9cm, 55% f to c met sand, 5% silty fines, clast supported, m density, wet	
60			9.5	GW	**WELL GRADED GRAVEL w/ SILT AND SAND (GW)** - brn (7.5YR5/4), 55% subang to ang met gravel up to 4cm, 25% f to c sand, 20% silty fines, dense, moist to dry - soil dries out	Collected Isoflow sample
65					- lt grey (10YR7/2) and powder dry - moist sandy zone, 55% gravel, 35% sand, 10% fines - dry silty lt grey GW below 65'	Drill rate slows to 2' / min
70				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 35% subang met gravel up to 4cm, 60% subrnd sand, 5% silty fines, loose, moist to wet	Moderate Drill Rate

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
	X		6	SP	**POORLY GRADED SAND w/ SILT (SP)** - brn (7.5YR4/4), 5% subrnd to subang met gravel up to 4cm, 85% f to c sand, 10% fines, poorly graded, wet, no odor	
145	X		3	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 20% subang to subrnd gravel up to 6cm, 60% f to c sand, 20% silty fines, well graded, m consolidated, met, wet, no odor	
150	X		5	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 25% subang to subrnd up to 4cm met gravel, 60% well graded f to c sand, 15% fines, wet, no odor	
155	X		4	SW	**WELL GRADED SAND w/ SILT AND SAND (SW)** - dr yellowish brn (10YR4/4), 10% subang to subrnd up to 3cm met gravel, 75%well graded f to c sand, 15% fines, moist to wet	
	X		2	SW	**SILTY SAND (SM)** - brn (7.5YR4/4), 5% ang to subrnd met gravel up to 1.5cm increasing with depth, 85% poorly graded m to c sand, 10% fines, loose, wet	
	X		2	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 15% subang to subrnd up to 2.5cm met gravel, 75% well graded f to c sand, 10% fines, mostly met, trace chert, loose, wet, no odor	Collected Isoflow sample
160	X		4	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 25% subang to subrnd gravel up to 6.5cm, 60% m to c sand, 15% silty fines, well graded, m consolidated, met, wet, no odor	Drill rate = 0.75' to 1.5' / min
165	X		4	SW	**SILTY SAND (SW)** - mottled dk reddish brn (5YR3/4), 10% subang to subrnd gravel up to 2.5cm, 50% well graded f to m sand, 40% silt, metamorphic, dry to damp, no odor, interbedded sandy silt laminations	
170	X		5.5	SW	**SAND w/ GRAVEL (SW)** - dk reddish brn (5YR3/4), 20% subang to subrnd gravel up to 5cm, 75% f to c sand, 5% fines, well graded, loose, met, wet	
175	X		2.5	SM	**SILTY SAND w/ GRAVEL (SM)** - brn (7.5YR4/4), 15% subang to subrnd gravel, 70% f to m sand, 15% fines, poorly graded, met,increasingly consolidated, slightly to moderately calcareous, moist to wet	

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
285			0	BR	**MIOCENE CONGLOMERATE BEDROCK (BR)** - 60% well graded subang to rnd gravel up to 10cm, 30% well graded sand, 10% fines, very calcareous, well consolidated to mostly hard, mod to very altered locally, mostly met, dry to moist	

Boring Terminated at 288 ft

ABBREVIATIONS

cc = continuous core run
brn = brown
lt = light
dk = dark
vf = very fine-grained
f = fine-grained
m = medium-grained
c = coarse-grained
vc = very coarse-grained
ang = angular
subang = subangular
subrnd = subrounded
rnd = rounded
br = bedrock formation
ss = sandstone
conglom = conglomerate
comptd = compacted
qtz = quartz

CH2MHILL

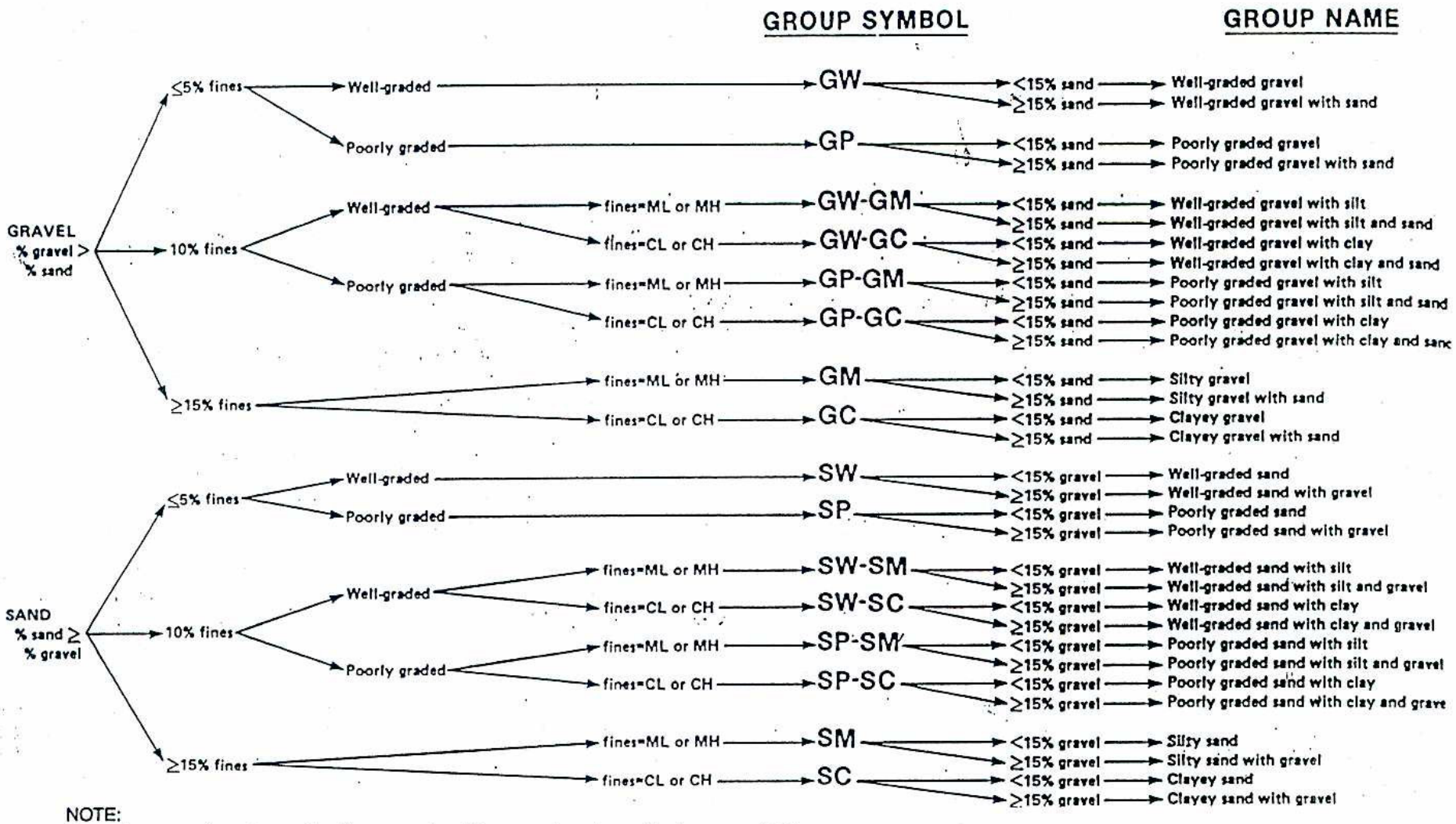
ATTACHMENT B

Unified Soil Classification System and Logging Criteria

GENERAL SOIL CATEGORIES			SYMBOLS	TYPICAL SOIL TYPES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVEL More than half coarse fraction is larger than No. 4 sieve size	Clean Gravel with little or no fines	GW	Well Graded Gravel, Gravel-Sand Mixtures
			GP	Poorly Graded Gravel, Gravel-Sand Mixtures
		Gravel with more than 12% fines	GM	Silty Gravel, Poorly Graded Gravel-Sand-Silt Mixtures
			GC	Clayey Gravel, Poorly Graded Gravel-Sand-Clay Mixtures
	SAND More than half coarse fraction is smaller than No. 4 sieve size	Clean sand with little or no fines	SW	Well Graded Sand, Gravelly Sand
			SP	Poorly Graded Sand, Gravelly Sand
		Sand with more than 12% fines	SM	Silty Sand, Poorly Graded Sand-Silt Mixtures
			SC	Clayey Sand, Poorly Graded Sand-Clay Mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILT AND CLAY Liquid Limit Less than 50%		ML	Inorganic Silt and Very Fine Sand, Rock Flour, Silty or Clayey Fine Sand, or Clayey Silt with Slight Plasticity
			CL	Inorganic Clay of Low to Medium Plasticity, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay
			OL	Organic Clay and Organic Silty Clay of Low Plasticity
	SILT AND CLAY Liquid Limit Greater than 50%		MH	Inorganic Silt, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silt
			CH	Inorganic Clay of High Plasticity, Fat Clay
			OH	Organic Clay of Medium to High Plasticity, Organic Silt
HIGHLY ORGANIC SOILS			PT	Peat and Other Highly Organic Soils

UNIFIED SOIL CLASSIFICATION SYSTEM

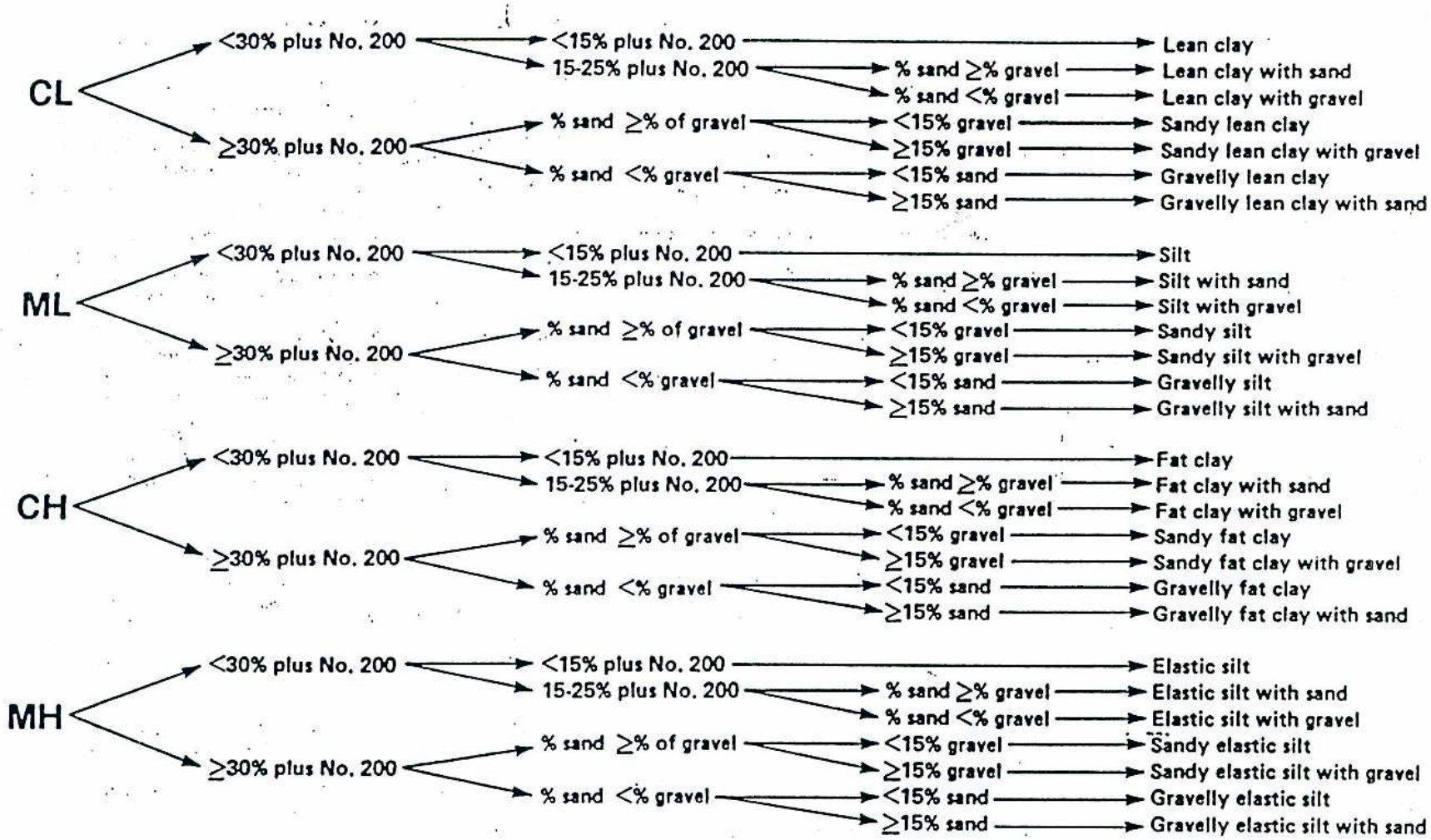
JOB NUMBER	DATE	APPROVED	PLATE



NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Coarse-grained Soil
(50% or more retained on No. 200 sieve)

Field Guide for Soil Classification and Logging Procedures



NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Fine-grained Soil
(50% or more passing No. 200 sieve)

Field Guide for Soil Classification and Logging Procedures

similar, the material is classified as poorly graded or well sorted. If fines represent less than 5 percent of the total mass, the symbol SP is used for a poorly-graded sand and SW for a well graded sand. If silts and/or clays exceed 12 percent, the symbols GC, SC, GM, and SM are used, respectively.

If the silts and clays are between 5 to 12 percent of the total sample weight, a dual classification with two group symbols is used. The first symbol is GW, GP, SW, or, SP, and the second is GC, GM, SC, or SM. The group name corresponds to the first group symbol plus the modifying words "with clay" or "with silt" to indicate the plasticity characteristics. If the fines plot on the CL-ML range on the plasticity chart (Figure 2-2), possible dual classification group names are:

GW-GM	well graded gravel with silt
GW-GC	well graded gravel with clay
GP-GM	poorly graded gravel with silt
GP-GC	poorly graded gravel with clay
SW-SM	well graded sand with silt
SW-SC	well graded sand with clay
SP-SM	poorly graded sand with silt
SP-SC	poorly graded sand with clay

If silts and clays exceed 12 percent of the total weight of sample, the modifiers "M" and "C" are used, respectively. If a sand or gravel has more than 15 percent of the other coarse-grained constituent, the words "with gravel" or "with sand" are added to the group name. A flow chart for classifying coarse-grained soils is presented in Figure 2-3.

2.2 Fine-grained Soils

Particles passing the No. 200 sieve are silts (M) and clays (C). These soils must undergo testing in order to differentiate between them. Typical tests used are: dry strength, dilatancy, toughness, and plasticity. These terms are further discussed in Tables 2-2 through Table 2-6. Silts have little or no dry strength when dry, while clays have considerable dry strength. Dry strength, dilatancy, and toughness are also used to identify the fine-grained fraction of coarse-grained soils.

TABLE 2-2
Criteria for Describing Dry Strength

Description	Criteria
None	The dry specimen crumbles into powder with the mere pressure of handling.
Low	The dry specimen crumbles into powder with some finger pressure.
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure.
High	The dry specimen cannot be broken with finger pressure. The specimen will break into pieces between the thumb and a hard surface.
Very high	The dry specimen cannot be broken between the thumb and a hard surface.

TABLE 2-3
Criteria for Describing Dilatancy

Description	Criteria
None	There is no visible change in the specimen.
Slow	Water appears slowly on the surface of the specimen during shaking, and does not disappear, or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking, and disappears quickly upon squeezing.

TABLE 2-4
Criteria for Describing Toughness

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness.
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness.

TABLE 2-5
Identification of Inorganic Fine-grained Soils from Manual Tests

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot form
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	None	High

TABLE 2-6
Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A 1/8-inch (3-mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to read the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier that the plastic limit.

Fine-grained soils are accurately determined in the laboratory using the Atterberg Limits test. This test include liquid limit, plastic limit, and plasticity index measurements. The liquid limit is the water content of a soil at the point of transition from a plastic to a liquid state. The plastic limit is the water content of a soil at the point of transition from a semisolid to a plastic state. The plasticity index is the difference between the liquid limit and the plastic limit.

As shown in the Figure 2-2, five fields have been identified. These include:

- Silty Clays (CL), Organic Silts (OL) or Organic Silty Clays (OL) of low plasticity
- Fat Clays (CH) and Organic Clays (OH)
- Inorganic Silts (ML) and Organic Silty Clays (OL) of low plasticity
- Silts (MH) and Organic Clays (OH) of a high plasticity
- Silty Clays to Clayey Silt (CL-ML) of low plasticity

Fine-grained soils with a liquid limit > 50 are modified by the symbol H (MH or CH), and those with a liquid limit < 50 are modified by the symbol L (ML or CL). Fine-grained soils containing 30 percent or more coarse-grained fraction should be modified by descriptive terms, such as "gravelly" or "sandy." If the coarse fraction is between 15 and 30 percent, the words" with sand and/or gravel" should be added to the group name. A flow chart for classifying fine-grained soils is presented in Figure 2-4.

2.3 Organic Soils

To classify organic soils, the percentage organic material present in the soil as well as the non-organic fines must be estimated. When the organic content ranges from 18 to 36 percent, the material is an organic clay or an organic silt, depending on the nature of the fine-grained constituents. When the organic content is between 36 and 90 percent, the material is designated a muck or peaty muck (OL or OH). A flow chart for classifying organic soil is presented in Figure 2-4. The term "peaty" is added if the organic remains are

SOP-B4

Boring Abandonment
Standard Operating Procedures for PG&E Topock Program

The purpose of this standard operating procedure (SOP) is to describe methods to abandon drill borings to the surface. The guideline covers all drilling methods and includes borings through surface casings.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan, work plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.

2) Applicable project work plan or monitoring plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan* (Procedures Manual), as required.

3) San Bernardino County Department of Health well abandonment (destruction) permit.

4) Topock Program Health and Safety Plan (HSP).

5) Blank sampling log and field notebook.

PREPARATION AND SETUP

1) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.

2) Initiate field logbook for sampling activity.

3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.

4) Inspect all required field equipment.

Equipment List

- Truck-mounted drilling rig, skid rig, or barge-mounted tripod rig
- Hollow-stem augers and associated equipment or either rotary-drilling or sonic- drilling equipment
- Steel or Schedule 40 PVC casing, of appropriate diameter for required installations (at least 6.25-inch inside diameter if surface casing is required)
- Approved water source
- Cement
- Bentonite

GUIDELINES

California Department of Water Resources, June 1991, Bulletin 74-90 (Supplement to Bulletin 74-81) *California Well Standards*.

PROCEDURES

Abandonment

1) The borehole will be grouted from total depth to the surface with bentonite-cement grout. The cement-bentonite grout will be installed continuously in one operation from the bottom of the space to be grouted to the ground surface.

2) The grout mixture will consist of 94 pounds of cement (1 bag) per 6 gallons of water and 2 to 3 pounds of powdered bentonite per bag of cement to reduce shrinkage.

3) The source of the water used in the grout mixture must be from a pre-approved source.

4) If there is any risk of borehole collapse upon removal of the drill casing, then the grout will be added prior to the removal of the drill casing. The grouting can be completed in stages, grouting 50 to 100 feet at a time, removing 50 to 100 feet of drill casing, and then repeating until the grout has reached the surface and the final casing removed.

5) When installing grout in soil borings, the grout will be installed through a tremie pipe that is placed inside the drill casing to the bottom of the borehole.

6) The production of grout will be completed to eliminate the preparation of excess/waste grout.

Waste Disposal

1) The soil cuttings are to be drummed and managed as described in SOP *Disposal of Waste Fluids and Soils* and the investigation-derived waste management plan.

2) Minimal quantities of grout may be included in the water or soil waste streams. The quantity of grout will be limited to that produced during cleaning of grouting equipment or decontamination of drill casing.

KEY CHECKS AND PREVENTATIVE MAINTENANCE

- Check that the drilling rig or soil-coring rig is in working order.
- Check that the borehole is grouted to the ground surface at the completion of drilling and sampling.

SOP-B5

Decontamination of Personnel and Equipment, Well Drilling, and Subsurface Sampling and Investigations
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure provides general guidelines for the decontamination of personnel, sampling equipment, and monitoring equipment used in potentially-contaminated areas.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan, which includes a health and safety plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan*, as required.

PREPARATION AND SETUP

1) Initiate field log sampling book for activity.
2) Inspect all equipment necessary to carry out activities detailed in event-specific SAP.
3) Review decontamination guidelines for equipment necessary to carry out activities.

Equipment List

- Demonstrated analyte-free, deionized water (specifically, ASTM Type II water)
- Distilled water
- Potable water; must be from a municipal water supplier, otherwise an analysis must be run for appropriate volatile and semivolatile organic compounds and inorganic chemicals (e.g., Target Compound List and Target Analyte List chemicals)
- 2.5% (W/W) Liquinox® and water solution
- Large plastic pails or tubs for Liquinox® and water, scrub brushes, spray or squirt bottles for Liquinox® solution, and distilled or deionized water, plastic bags, and sheets
- Department of Transportation (DOT)-approved 55-gallon drum for disposal of waste
- Nitrile or latex gloves
- Decontamination pad and steam cleaner/high pressure cleaner for large equipment

GUIDELINES

Personnel Decontamination

Decontamination should be performed after completion of tasks whenever personnel come in contact with contaminated (or potentially-contaminated) soils or fluids. Full or emergency decontamination should be performed when contaminant concentrations are not known and when potentially-contaminated fluids come into contact with skin beneath clothing, eyes, nose, or ears.

Procedures for full/emergency decontamination are to:

1) Remove contaminated clothing.
2) Step into containment area (decontamination pad or large pail).
3) Rinse away fluids and soil.
4) Wash skin with Liquinox® solution in such a way as to not abrade skin. (Liquinox® solution should be made with potable water and sufficient detergent to create foamy suds.) Eyes and mucus membranes in contact with contaminants must be washed with eye wash or drinking water continuously for at least 15 minutes.
5) Rinse with potable water.
6) If no other clothes are available, wash affected clothes in Liquinox® solution prior to donning. If other clothes are available, contaminated clothes may be isolated for later wash or disposed of along with personal protective equipment (PPE).
7) Any PPE worn (including disposable latex booties, gloves, and disposable coveralls) should be discarded into DOT-approved 55-gallon drum located at the MW-20 bench.
8) Dispose of wash and rinseate water in an appropriate container with other chromium contaminated fluids. These fluids may be taken to the MW-20 bench for treatment or to a Baker® tank within the PG&E facility for containerization.
9) Replace all appropriate clothing and PPE before resuming work or departing site.

Moist soil or water containing known concentrations of hexavalent chromium less than 50 parts per billion that comes into contact with hands need not require full decontamination. Dry soil containing chromium that comes into contact with clothing can also be decontaminated in an abbreviated manner.

Daily decontamination and minor exposure contact decontamination procedures are to:

1) Wash hands and skin that comes in contact with soils or water that may contain small concentrations of chromium as soon as possible after contact. Wash with Liquinox® solution and rinse with potable water.
2) If contaminated soil or water contacts hands through hole or over lip of gloves, remove gloves and wash hands thoroughly before donning new gloves.
3) Discard gloves into DOT-approved 55-gallon drum located on the MW-20 bench at the end of the day or event.

4) Remove coveralls or dry soils from clothing before leaving site. Clothing contaminated by moist soil or water containing hexavalent chromium should be removed and promptly washed.

5) At the end of the work day, shower entire body, including hair, either at the work site or at hotel.

Sampling Equipment Decontamination—Groundwater Sampling Pumps

Sampling pumps are decontaminated after each use as follows:

1) Don waterproof (nitrile or latex) gloves.

2) Run pump and reusable tubing through with Liquinox® solution (made with potable water) so that the pump and all portions or the tubing have been flushed with the solution for at least 30 to 60 seconds. More time is required if water is present in the tubing. If unsure, run for 2.5 minutes. Outside of the tubing should also be submerged and washed in the solution.

3) Run pump and reusable tubing through first rinse (with potable or distilled water) so that the pump and all portions or the tubing have been flushed with the solution for at least 60 seconds. More time is required if any suds are present in the pump or tubing.

4) Run pump and reusable tubing through second rinse (with distilled water) so that the pump and all portions or the tubing have been flushed with the solution for at least 30 seconds. More time is required if water from first rinse is present in tubing.

5) Equipment blank samples may be taken at this point using ASTM Type II water or distilled water as required by laboratory.

Sampling Equipment Decontamination—Other Equipment

Reusable sampling equipment is decontaminated after each use as follows:

1) Don nitrile or latex gloves.

2) Wash all equipment surfaces that contacted the potentially contaminated soil/water with Liquinox® solution (made from potable water). Water quality meters that are not placed within wells should not be washed with detergent, as this will degrade sensors; these meters should be double-rinsed. Any portion of equipment that is placed inside wells (including cables and pipe) and that comes in contact with moisture should be washed with detergent.

3) Rinse equipment and supplies with potable water, if the equipment is not used to collect groundwater or soil samples. Equipment used to collect samples or take water quality parameters should be rinsed with distilled water.

4) Air dry or towel dry with paper towels.

5) Collect all rinseate and dispose of in Baker® tank within the PG&E facility or Denbeste® tank at the MW-20 bench.

6) Decontamination materials (e.g., plastic sheeting, tubing, etc.) that have come in contact with used decontamination fluids or sampling equipment will be disposed of in DOT-approved 55-gallon drums if highly contaminated. If not contaminated, equipment can be washed and disposed of in trash.

7) Preserved bottles may need to be washed before being packed or handed without gloves. The outsides of filled bottles should be rinsed and toweled dry to prevent contact with strong acids or based.

Heavy Equipment and Tools

Heavy equipment such as drilling rigs, drilling rods/tools, and the backhoe will be decontaminated upon arrival at the site and between locations as follows:

1) Set up a decontamination pad in designated area.

2) Steam clean heavy equipment until no visible signs of dirt are observed. This may require wire or stiff brushes to dislodge dirt from some areas.

KEY CHECKS AND ITEMS

- Clean with solutions of Liquinox® and potable water. Rinse with distilled or deionized water if equipment is used to collect samples or water readings; otherwise, rinse with potable water.
- Equipment placed within wells should be thoroughly decontaminated and before being placed in a well. All potions of this equipment that come into contact with moisture should be decontaminated.
- Decontaminate filled sample bottles before relinquishing them to anyone.

SOP-B7

Homogenization of Soil and Sediment Samples
Standard Operating Procedures for PG&E Topock Program

The homogenization of soil and sediment samples is performed to minimize any bias of sample representativeness introduced by the natural stratification of constituents within the sample. Standard techniques for soil and sediment homogenization and equipment are provided in this SOP. These procedures do not apply to aliquots collected for volatile organic compounds (VOCs) or field gas chromography screening; samples for these analyses should NOT be homogenized.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan,* as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling logs.
5) Blank sampling logs and field notebook.

PREPARATION AND SETUP

1) Review event-specific SAP or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Initiate field logbook for sampling activity.

EQUIPMENT LIST

- Sample containers
- Stainless-steel spoons or spatulas
- Stainless-steel pans
- Phthalate-free gloves

PROCEDURES

Sample Homogenization

1) Soil and sediment samples to be analyzed for semivolatiles, pesticides, polychlorinated biphenyls, metals, cyanide, or field x-ray fluorescence screening should be homogenized in the field.
2) After a sample is taken, a stainless-steel spatula should be used to remove the sample from the split spoon or other sampling device. The sampler should not use fingers to do this, as gloves may introduce organic interferences into the sample.

3) Samples for VOCs should be taken immediately upon opening the spoon and should not be homogenized.

4) Prior to homogenizing the soil or sediment sample, any rocks, twigs, leaves, or other debris should be removed from the sample.

5) The sample should be placed in a decontaminated stainless-steel pan and thoroughly mixed using a stainless-steel spoon. The soil or sediment material in the pan should be scraped from the sides, corners, and bottom, rolled into the middle of the pan, and initially mixed.

6) The sample should then be quartered and moved to the four corners of the pan. Each quarter of the sample should be mixed individually, then rolled to the center of the pan and mixed with the entire sample again.

Equipment Decontamination

1) All stainless-steel spoons, spatulas, and pans must be decontaminated following procedures specified in SOP *Decontamination of Personnel and Equipment* prior to homogenizing the sample.

2) A composite equipment rinse blank of homogenization equipment should be taken each day it is used.

SOP-B9

Drilling--Sonic Method
Standard Operating Procedures for PG&E Topock Program

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP), Work Plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.

2) Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, and Field Procedures Manual and QAPP (Procedures Manual), as required.

3) Topock Program Health and Safety Plan (HSP)

4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available

5) Blank sampling log and field notebook

Equipment List:

- Drilling rig (Sonic)
- Drill rods and core barrel

GUIDELINES

PRIOR TO INTRUSIVE ACTIVITIES AT ANY DRILLING LOCATION THE AREA WILL HAVE BEEN CLEARED OF ALL UTILITIES AND THE CLEARANCE RECORDED IN THE FIELD LOGBOOK. It is also the field team leader's responsibility to confirm that all required access permits are in place.

Prior to the start of drilling, the area of site activity will be identified and delineated using stakes and/or flagging. The extent of impact will be mineralized at all times and the delineated area of activity decreased when possible. All sensitive vegetation or habitats will be delineated with stakes and/or flagging and no impact will occur in these areas.

Sampling depths and total depths of holes shall be determined by temporary marking of drill equipment, by reference to standard equipment dimensions (for example, 5-foot hollow-stem auger flights), or by measurement using a fiberglass tape. Final total depth measurements will be confirmed using a weighted fiberglass tape. Observations by the field geologist or engineer shall be recorded directly in the borehole log.

The field borehole log is the standard form used to document subsurface geologic conditions. The borehole log is divided into two areas. One portion contains spaces for noting information on the drilling and sampling methods. The second portion contains space for noting lithologic descriptions. All sheets shall be filled out completely, legibly, and in ink. The borehole log will be filled out in the field at the time of the drilling and sampling. The original logs shall be permanent records, and information on the logs may not be

erased. If corrections are needed, information shall be crossed out with a single line and the correction shall be initialed and dated.

The use of water and drilling fluid to assist in sonic drilling for monitoring well installation will be avoided, unless required for such conditions as running sands or drilling bedrock formations.

Temporary outer casing, drill rods, core barrels, and other downhole drilling tools will be properly decontaminated prior to the initiation of drilling activities and between each borehole location. Core barrels and other downhole soil sampling equipment will also be properly decontaminated before and after each use.

Sonic inner casing (sample tube) will have an inside diameter of at least 3.25 inches. Samples may be collected for chemical analysis. For sonic drilling, these samples are collected in a metal trough. A continuous core is collected and the sample interval is selected from the length of core run.

Surface casing may be installed where soil borings will penetrate a confining layer or when there is risk of eroding soil during the drilling process if water is used.

PROCEDURES

Instructions for Completing Soil Boring Logs

Soil boring logs will be completed in the field log books. Information collected will be consistent with that required for Form D1586 (attached), a standard CH2M HILL form or an equivalent form that supplies the same information. Procedures will follow the SOP "*Soil*

Non-Core Collection Drilling

At locations or depths from which core collection is not required, drilling may proceed without the recovery of soil cores. The drilling will include advancing the larger outer casing and the use of water to facilitate cuttings removal from the boring. The inner casing drill rods may or may not be used, depending on the cuttings recovery when drilling with the larger outer casing.

Continuous Core Drilling

At locations or depths when core collection is required, drilling will proceed using an outer casing and an inner core sample tube. The inner core sampling tube will be advanced first without the use of water. Before removal of the sampling tube, the outer casing will be advanced, using water only as needed for cuttings removal, to the same total depth as the inner casing. The outer casing will stabilize the boring when the sampling tube is removed. The process is repeated in 10 to 20 foot intervals, as the lithology of the boring permits.

The length of each drilling interval should be adjusted depending on the lithology and the quality and recovery percentage of the sample cores retrieved. At locations with very hard drilling (i.e. with large cobbles or hard materials) or when percent recovery decreases, the drilling interval should be decreased until such time that the conditions change.

After retrieval of the inner sampling core tube, the minimally disturbed sample cores will be collected into plastic liner sleeves in intervals of 2 to 3 feet. The plastic sleeves will be

immediately sealed on both ends. The cores will be used for visual descriptions and may be used for analysis for geochemical and geotechnical parameters.

KEY CHECKS AND ITEMS

- Check entries to the soil boring log and field logbook in the field during sampling activities because the cores will be disposed at the end of the fieldwork, confirmation and corrections cannot be made later.
- Check that the sample numbers and intervals are properly specified.
- Ensure that drilling equipment is decontaminated prior to the beginning of work and between each borehole.
- All materials generated during sampling (debris, PPE, decontamination liquids, etc.) will be placed in approved IDW storage containers pending analysis and disposal off site as outlined in SOP-B6, *Disposal of Waste Fluids and Solids (IDW)*.

SOP-B11

Site Clearance and Permitting
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures for site clearance and permitting at the Topock site. This SOP should be used to obtain proper site clearance and permits before any work is performed at a site.

REQUIRED DOCUMENTS

1) Applicable project work plan, event-specific sampling and analysis plan (SAP), and/or Procedures Manual, if applicable.
2) Topock Program Health and Safety Plan (HSP).
3) Site map with work locations identified.

PREPARATION AND SETUP

1) Review applicable project work plan, event-specific SAP, Procedures Manual, and HSP.
2) Identify locations where work will be performed, determine if any subsurface work will be needed.
3) Before the start of any work obtain approval by the appropriate land agencies (such as BLM, USFWS, County of San Bernardino). Activities located on PG&E property fall under the jurisdiction of the County; however, approval may also be required from BLM and/or USFWS for activities such as access, waste management, etc. Work in Topock, Arizona falls under the jurisdiction of the Arizona Department of Water Resources.
4) Before the start of any work obtain appropriate approval by the regulatory agencies. These include at a minimum the DTSC if in California, and ADEQ is in Arizona. Other regulatory approvals that may be required include, but are not limited to CDFG, USFWS, USACE and RWQCB. Approval from the Arizona Land Department may also be required for wells drilled in Arizona.

If subsurface work will be involved, follow the following steps:

1) Follow the guidelines of the Southern California Underground Service Alert (USA) agency to mark the edges of the work location as outlined on their web page (http://www.digalert.org). If in Arizona, the Arizona Blue Stake should be contacted for location of buried facilities (www.azbluestake.com). Make sure to:
   - Identify delineated areas with white markings with the requesters company name or logo within the pre-marked zones
   - Delineate the exact area of excavation with white paint through the use of dots or dashes, or a continuous solid line. Limit the size of each dash to approximately 6" in length and 1" width with interval spacing not less that approximately 4 feet. Dots of

approximately 1" diameter are typically used to define arcs or radii and may be placed at closer intervals in lieu of dashes. Limit width of lines to 1".

- For point locations (such as a soil boring or well) mark the exact location in the USA or Blue Stake box with a stake. Make sure the delineated area around the stake is of adequate radius (50 to 100 feet is appropriate for drilling).

2) Call USA at 1-800-227-2600 or Arizona Blue Stake at 1-800-782-5348 at least three working days before the start of work at the identified location and provide them with the information requested on the location request form. Be ready to give the location in terms of feet relative to I-40 and to Park Moabi Road when calling. You will be assigned a Dig Alert Number, file this number until work at the delineated area is complete. (The number does expire after two weeks and a new number may need to be obtained if work has been delayed.)

3) Mark the Dig Alert Number in the delineated area using white paint as soon as possible after calling USA or Arizona Blue Stake.

4) If the location is in a developed area, contact a private utility locator and have them perform a sweep of the delineated work area. Util-Locate at (866) 421-5325 is typically used for this service.

5) In some cases the utility companies may need to be contacted directly by CH2M HILL. If the following companies do not respond to the USA or Blue Stake ticket or if we are working in their easements, use the following contact information and procedures:

Southwest Gas: Main contact is Jim Default/702-365-2097
(The required minimum clearance distance from gas pipelines is 18-inches**.** Potholing may need to be performed in advance of design completion Southwest Gas should be called prior to construction activities). If Southwest Gas does not come to the site after the USA call, contact them at their Bullhead City office at (928) 763-7766

Southern California Gas Co.: Main contact is Frank Castro/818-701-4566; secondary contact is Martin Woodsworth/818-701-4543. If we need to work in their easement, we must provide a letter from BLM giving us permission to be on the property. Southern California Gas Co. also requires advance notification of construction activities. They may also require a copy of the design drawing, potholing activities, and the issuance of a "Non-Interference" letter, if applicable, before work can proceed. One of their representatives may need to be in the field when digging is occurring near their pipeline.

TransWestern Pipeline Co.: Main contacts are Ron Westbrook (ROW Department)/713-345-3067 and Mike Baxter (Operations)/928-757-3620. They may require potholing if proposed construction activities are near their pipelines. Crossing pipeline requires filling out a simple form.

Burlington Northern Santa Fe Railroad: Main contact is Greg Rousseau (BNSF)/909-386-4079. Prior to work in their easements submit the proper application with the $250 fee to the Staubach Company.

City of Needles Utility Dept: Main contact is Ron Myers/760-326-5700 (ext. 7 for the utilities department). Work activities may need to be a minimum of 10 to 15 feet from their utility poles.

6) Do not start subsurface work at the site until the delineated area has been marked or cleared by the appropriate utility agencies.

If the work includes a performing a well installation or abandonment, or drilling a boring in California:

1) Apply for a San Bernardino County well permit two to three weeks before the start of drilling (one permit per well; cost is /$212.00 per well). Obtain a permit application by calling the Environmental Health Services Department at 1-909-387-4666 (open Monday through Friday, 8:00 a.m. to 5:00 p.m. The fee schedule for permits is located at http://www.sbcounty.gov/ dehs/FEESCHEDULE/feeschedule.htm#wateranchor. Fill out the appropriate permit form and provide it to the California-licensed driller contracted to perform the well installation. The driller is expected to review and file the permit with the San Bernardino County Department of Environmental Health Services (Steve Sesler), address below.

   Environmental Health Services
   385 N. Arrowhead, 2nd Floor
   San Bernardino, CA 92415-0160

2) A well permit needs to be obtained from San Bernardino County for well abandonment by the same procedure described in #11. Check the 'destruction' box on the same permit form used for well installation.

3) A permit also needs to be obtained from San Bernardino County for any boring that reaches to or below the water table, even if a well is not actually installed. The permit process is the same as described in #11.

If the work includes a performing a well installation or abandonment, or drilling a boring in Arizona:

1) Apply for an Arizona Department of Water Resources (DWR) well permit two to three weeks before the start of drilling (one permit per well; cost is /$150.00 per well). Obtain a permit application by calling the DWR at 1-(602) 771-8500 (open Monday through Friday, 8:00 a.m. to 5:00 p.m. MST). All ADW permits and instructions can be found at http://www.azwater.gov/dwr/Content/Find_by_Category/Permits_Forms_Applications/default.htm
   Fill out the appropriate permit form (55-44A) and provide it to the Arizona-licensed driller contracted to perform the well installation. The driller is expected to review and file the permit with the Arizona Department of Water Resources address below.

   Arizona Department of Water Resources
   3550 N. Central Avenue
   Phoenix, AZ 85012

   Upon completion of the well, the driller must submit a Driller Report and Well Log (Form 55-55) to the DWR within 30 days. The form and instructions can be found on the DWR webpage.

2) A well abandonment permit needs to be obtained from the Arizona Department of Water Resources prior to well abandonment (form 55-38). Exploratory wells that are abandoned before the drill rig leaves the site are exempt from the well abandonment permit requirements. The well abandonment form and instructions are included as Attachment 4 and can be found at the ADW webpage . No fee is required for filing this form.

   Within 30 days of well abandonment a Well Abandonment Completion Report (Form 55-58) must be filed with the DWR.

SOP-B16

Field-portable X-Ray Fluorescence Soil Sampling Standard Operating Procedures for PG&E Topock Program

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This SOP describes the analysis of *in-situ* and *ex-situ* soil samples using a field portable X-Ray Fluorescence instrument (XRF). SOP-B2 and SOP-B3 in the *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (CH2M HILL, 2005) provide additional guidance for soil characterization and logging.

Required Documents

1) Event-specific planned sample table (PST).
2) Applicable project work plan or monitoring plan. Refer to the Procedures Manual, Operation and Maintenance (O&M) Manual and QAPP as required.
3) Topock Program Health and Safety Plan (HSP).
4) Field notebook.
5) Database generated chain-of-custody.
6) XRF Functional Check Log

Preparation and Setup

1) Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Coordinate with the Project Chemist for coolers, sample containers, and courier pickup of the samples.
3) Initiate field logbook for sampling activity.
4) Initiate electronic file for X-Ray Fluorescence (XRF) instrument download.
5) Review sampling procedures and planned sample depths with field crew.
6) Field-check and set up equipment for functional checks, sampling, decontamination, spill prevention, and health and safety.

Equipment List

- Niton XRF Meter and stand
- Spare battery chargers
- Field notebook
- Trowel for smoothing soil surfaces
- Reusable plastic bags or stainless steel tray
- Disposable Sample cups with X-ray film and lids

- X-Ray window film (Mylar, Kapton, Spectrolene, polypropylene, or equivalent; 2.5 – 6.0 micrometers (um) thick)
- Disposable scoops, stainless steel spoons or other appropriate mixing tools
- Appropriate quality control (QC)/quality assurance (QA) standards, and blank sand
- Chemwipes
- Decontamination equipment (Alconox® solution (or equivalent) in spray bottle, brushes, buckets, rinse water spray bottle) for mixing tools and trowels
- Protective waterproof gloves (nitrile or latex)

XRF SOIL ANALYSIS DOCUMENTATION

The XRF sample results will be recorded by the associated software in an excel format. The files will be downloaded at the end of each day and emailed to the project chemist for review. Any additional sample logging and sample collection should follow the protocol and procedures found in the *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (CH2M HILL,2005). Detailed notes should be recorded in the sampler's field notebook or in a log generated from the field database. Items to be documented on the sampling log include (note: include as much of the following information in the XRF software as possible):

1) Record type of boring or excavation equipment and the total boring or excavation depth.
2) If multiple samples are being collected at one location at a variety of depths, record all sample depths.
3) Record date and time of sample collection in addition to the full sample ID that is listed in the PST.
4) Sampling difficulties shall be noted (i.e. difficult slope or abnormal debris in sample location).
5) Analysis start time and the source count time (i.e. 60 sec, 90 sec, or 120 sec etc.) will be documented on sample collection sheet. Note: analysis and count time are automatically recorded in the XRF software.

Field-portable X-Ray Fluorescence Soil Sampling- COLLECTION OF SAMPLES FOR ANALYSIS

In-Situ Sample Preparation

When the soil moisture is less than 20 percent, the error associated with moisture may be minimal. If areas are encountered where the moisture content is greater than 20 percent (moisture is visible), consult with the project chemist for options available for proceeding with field analysis.

For *in-situ* analysis,

1) Large or non-representative debris must be removed from the selected location. This debris includes rocks, gravel, vegetation and concrete.

2) The location chosen for analysis should be homogenized by mixing in place an area approximately 4″ by 4″ by 3″ deep, using a clean (or decontaminated) stainless steel or disposable spoon. The location should then be smoothed and firmly tamped to provide as flat and smooth an area as possible.

3) A section of x-ray window film should be stretched over the area to be tested to maintain a dust free environment for the nose of the instrument. (Note: use in-situ analysis for metals only samples).

4) To initiate a reading, the nose of the XRF will be positioned against the x-ray film, squeezing the shutter release, and firmly pressing the instrument flat against the surface. Source count times for *in-situ* analysis usually range from one to two minutes, varying among instruments and depending on requirement detection limits.

5) After the *in-situ* field screening is performed, inspect the nose of the instrument for contamination, which may affect future analysis. If necessary, clean it with a soft cloth or tissue.

For confirmation samples, or where samples for organic analysis are to be collected the soil samples should be treated as *ex-situ* samples, below.

***Ex-Situ* Sample Preparation**
For *ex-situ* analysis,

There are several possible correct methods for the ex-situ analysis of samples. The area that previously would have been homogenized for the in-situ analysis should be scooped out and placed into a clean (or decontaminated) stainless steel or disposable pan (do not use plastic if organic analysis will be performed on any of this homogenized sample), using a stainless steel or disposable spoon or spatula (do not use plastic if organic analysis are associated with the homogenized sample). The sample should then be thoroughly mixed (homogenized) using the same spoon or spatula.

1) The preferred method is to setup the portable field stand in an area where the XRF can be stationed and left in place for the day. Use the Niton software and a laptop computer to setup the method criteria and control the XRF instrument during the soil analysis.
   a) Starting with the previously homogenized sample, use the supplied soil sieves, bowl, and mortar to generate a finely ground well homogenized sample. (Note: This step is not required if the soil sample was passed through a sieve during the homogenization step.)
   b) Transfer the prepared sample into a new sample cup (order replacement supplies from Niton), place the X-ray film over the cup and snap the lid in place. Place the sample cup in the portable field test stand (The XRF points upward, the sample rests on top of the XRF with the X-ray film directly in contact with the nose of the XRF - cup lid facing down).
   c) Using the computer, start the analysis. The source count time should be at least two minutes for chromium. Consult previous analysis to determine if multiple scan frequencies are required (or contact the project chemist).
   d) Prepare the next sample while the XRF is analyzing the current sample.

2) An alternative method to using the portable field stand is to identify the sample for XRF analysis and homogenize the sample (as described above).
   a) Transfer the sample to a re-sealable plastic bag and firmly molded into a flat smooth surface.
   b) Use the Niton software and a laptop computer or the included PDA to setup the method criteria.
   c) To start the analysis, position the nose of the XRF against the flat smooth surface of the sample and squeeze the shutter release (or press the start button on the laptop or PDA). Be sure to maintain constant pressure against the sample. If contact is broken, the analysis will need to be restarted. The source count time for *ex-situ* analysis usually range from one to two minutes, depending on the required detection limits (see *c* above for count times).
   d) After the ex-situ field screening is performed, inspect the nose of the instrument for contamination, which may affect future analysis. If necessary, clean it with a soft cloth or tissue.

3) Transfer the sample to a labeled glass jar for shipment to the confirmation laboratory (if applicable).

Sample Analysis
In today's modern XRF models:

1) An X-ray source is used for detection. Expose the sample to the X-ray source for a minimum of one minute. Longer exposure times may be needed depending on the media that is being analyzed and the required detection levels. The time needed for analysis will be determined in the field by analyzing standards that have concentrations of the metals of concern near the required detection levels. Better detection limits can usually be obtained by homogenizing the sample, increasing the exposure time, and using two or more scan frequencies (Use a minimum of a two minute exposure for Chromium analysis).

2) When the XRF instrument displays the results they include the analyte, the result, and a percent confidence (displayed as a ± value). The result is displayed as non-detect for analytes that do not meet the percent confidence established in the instrument. The lower the required detection levels, the longer the analysis time required to meet the percent confidence.

3) Download saved data from XRF instrument daily (if data is collected in PDA). Foreword the data files to the project chemist daily.

4) All samples collected for off-site confirmation will also be analyzed using the XRF and treated as *ex-situ* samples.

Using older models:

1) Expose the sample to the energy source for a minimum of one minute. Longer exposure times may be needed depending on the media that is being analyzed as well as the age of the detector (non X-ray detectors). The time needed for analysis will be determined in the field by analyzing standards that have concentrations of the metals of concern near the required detection levels. Better detection limits can usually be obtained by homogenizing the sample, increasing the exposure time. (Use a minimum of a two minute exposure for Chromium)

2) When the XRF instrument indicates the results for the suite of analyzed elements and their concentrations, it includes a standard deviation for the reported concentrations. An analyte concentration is considered **not detected** if the result value is **less than two times the standard deviation**. The lower the required detection levels, the longer the analysis time required to reduce the result's standard deviation.

3) Record the readings (electronically or documented on the sampling log). Review the standard deviations for the elements of interest and determine if a longer analysis time is needed to reduce the standard deviations, thereby allowing the desired accuracy and precision for the concentrations. The standards will be analyzed using increasingly longer times until the required detection level is achieved.

4) Record values in field notebooks.

5) Download saved data from XRF instrument daily.

6) Samples collected for off-site confirmation will also be analyzed using the XRF and will be treated as *ex-situ* samples.

Calibration
Two forms of calibration are important with XRF testing: an energy calibration and a sample matrix calibration.

Energy Calibration
The Niton XLi 702 automatically re-calibrates the energy scale when powered on. The energy scale can also be re-calibrated by pressing "Reset" on the instrument. The energy calibration should be performed every two hours.

Sample Matrix Calibration
Modern XRF instruments, such as the Niton Xli 702, do not require site specific calibrations to account for sample matrix effects. EPA Method 6200 allows both fundamental parameters and Compton normalization as two techniques to eliminate site specific calibrations. Niton uses the Compton normalization method to automatically correct for sample specific matrix effects. The XRF is calibrated internally at the factory on NIST standard reference soil samples. Ensure the annual factory calibration certification is on file. This internal calibration is used for subsequent field work, without need for adjustment or recalibration at other sites.

Quality Assurance and Quality Control (Functional Checks)
Even though no onsite calibration will be performed, the method does require QA/QC Functional check testing protocols. The QA/QC that will be used to document that the XRF is operating properly will have the following steps:

- A startup operations check
- Analysis of a blank sample (clean sand)
- Analysis of standard sample(s)
- Analysis of duplicate samples
- QA/QC procedures will be compliant with manufacture's instructions.

1) At the beginning of each day perform QA/QC functional check procedure or when the instrument is turned on after more than 2 hours of down time or if the operating environment changes, such as a temperature change of more than 20 degrees Fahrenheit.

2) Two types of blanks should be analyzed, an instrument blank and a method blank. An instrument blank sample (silicon dioxide, provided by Niton) will be analyzed at the start and end of each day and once every 20 samples, to confirm proper zero calibration of the XRF. The blank will be analyzed following the procedure for the *ex-situ* sample analysis. A method blank is used to monitor for any field induced contamination. The method blank should follow any preparation procedures performed on the samples, such as mixing or *exsitu* analysis. **A method blank will be analyzed each day**.

3) A set of three to ten QC samples will be collected from the site during the initial field activities. These samples will be well homogenized, and a portion sent to the off-site laboratory for characterization. The remaining sample will be collected in re-sealable bags, labeled and stored with the XRF for use as standards. Three to five of the on-site standards will be analyzed at the start of each day. The results of the standards will be plotted against the original XRF results and a correlation value calculated. A correlation coefficient of 0.90 or greater must be achieved to meet the project objectives. A running log of all on-site standards analyzed will be maintained. One of the standards will be analyzed after every 20 samples. The readout from the XRF **must be within 20 percent RPD of the known QC sample concentration**.

4) The last QA/QC step will be to analyze duplicate samples (two separate aliquots) at a rate of 1 in 10. These duplicate measurements must be within 35 percent of each other for the analysis to continue. If the sample results are not in agreement, then the reason for this discrepancy must be determined.

5) The Niton XL3t 600 displays both concentration and precision for each sample analyte measurement. The precision displayed by the Niton's 95% (2-sigma) confidence intervals; where as the precision calculated in EPA method 6200 is at a 68% (1-sigma) level. The Niton also calculates and displays detection limits for analytes if the concentration is below three standard deviations. This bypasses the need for replicate measurements on low level standards.

Note: VOC, SVOC, and other organic samples can not be collected from the homogenized soil if plastic is used for homogenizing or after XRF analysis, if contacted by plastic.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Hexavalent Chromium Analysis by Hach Method 1560
Number: SOP-L01_Rev3
Revision Date: 4/1/2014

Scope

Standard Operating Procedure (SOP) for the analysis of hexavalent chromium (Cr^{+6}).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach DR 4000V spectrophotometer or equivalent.
- Vacuum filter apparatus: 47 mm magnetic filter funnels, 1,000 mL Erlenmeyer flask, and vacuum pump. Use a 0.45 µm, 47 mm diameter filter membrane.
- 0.45 µm filter disc fitted to a disposable 50 mL syringe (syringe filter).
- pH meter.
- Reaction vessel and cap or means of sealing the reaction vessel (Hach sample cell, 50 mL beaker, vial capable of holding 30 mL and parafilm if the vessel doesn't have a cap).
- 1 packet of ChromaVer® 3 Reagent per sample.
- 2.5 mg/L hexavalent chromium (Cr^{+6}) (working) standard.

Procedure

1. Collect the sample(s) following the appropriate SOP (see list below). Samples should be analyzed as soon as possible (within 24 hours). **Note: all samples must be filtered**.
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
    - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
    - SOP-A4 – Depth-Specific Surface Water Sampling
    - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
    - SOP-A14 – Pore Water Sampling
    - Remedy-SOP-01 – Process Water Sampling

2. Filtering can be performed using an inline filter at the time of sampling (see SOP–A6, Sample Field Filtration and Preservation for Metals Analyses) or in the laboratory by vacuum filter:

   - Set up the vacuum filter apparatus.
   - Filter ~100 mL of sample.

3. Measure the pH of the raw sample (**Record the results in the Cr^{+6} bench log book**).

4. Verify the spectrophotometer is set for **Hexavalent Chromium (Cr^{+6})** (Hach DR/4000V program **1560)** and verify all reagents are for 25 mL sample size (or adjust accordingly).

5. Transfer 25 mL of filtered sample into a reaction vessel (sample cell, beaker, etc.)

6. Add one packet of ChromaVer® 3 Reagent to the sample.

7. Invert sample 4–5 times or swirl the sample until powdered reagent is dissolved.

8. Start timer (8 mins.).

9. Run a blank: Use a 25 mL aliquot of filtered sample to "zero" the spectrophotometer.

   - Transfer 25 mL of raw filtered sample into the pour-thru-cell funnel.
   - Allow the meter to stabilize and press the Zero button.

10. After 8 minute timer, pour the sample with the reagent added into a syringe filter to remove the excess reagent powder. Transfer the sample into the pour-thru-cell funnel (sample port of the Hach DR/4000V).

11. Record the instrument reading in the Cr^{+6} bench log book.

12. If the result is out of range for the spectrophotometer, reanalyze the sample using a dilution.

    Note: if a dilution is required, the spectrophotometer should be zeroed using sample from the same dilution.

    <u>Common dilutions:</u>

    - 1:2 dilution: 25 mL of sample are diluted with 25 mL of deionized (DI) water; multiply the instrument reading (result) by 2 for the adjusted value.

      Example: instrument reading is 0.304
      x 2
      = .608 mg/L (final result)

    - 1:5 dilution: 10 mL of sample are diluted with 40 mL of DI water; multiply the instrument reading (result) by 5 for the adjusted value.

      Example: instrument reading is 0.304
      x 5
      = 1.52 mg/L (final result)

    - 1:10 dilution: 10 mL of sample are diluted with 90 mL of DI water; multiply the instrument reading (result) by 10 for the adjusted value.

- 1:20 dilution: 5 mL of sample are diluted with 95 mL of DI water; multiply the instrument reading (result) by 20 for the adjusted value.

Quality Control (QC)

- With the first analysis of hexavalent chromium each shift, **analyze a CCV** (Continuing Calibration Verification) standard as a **Quality Control** check:
  - Carefully measure 24 mL of DI water into a reaction vessel (sample cell, beaker, etc.).
  - Add 1 mL of 2.5 mg/L hexavalent chromium (Cr^{+6}) standard.
  - Add the hexavalent chromium reagent pillow at the same time as your samples. (ChromaVer® 3 Reagent).
  - Invert the CCV sample 4–5 times, or swirl the sample, until powdered reagent is dissolved.
  - Use the same 8 minute timer for CCV and field samples. **Note:** The blank for the CCV should be DI water.
  - **Record the CCV results in the Cr^{+6} bench log book.** If the instrument reading is not between 0.075 mg/L and 0.125 mg/L, re-prepare the standard and reanalyze.
- Periodic **Matrix Spikes (MSs)** should be analyzed. Any time a sample result appears anomalous, consider analyzing an MS of that sample.
  - Determine what dilution if any is required for the matrix spike (note: you will be adding 0.1 mg/L to the sample concentration [the instrument reading]).
  - Carefully measure 24 mL of filtered sample (diluted if required) into a reaction vessel (sample cell, beaker, etc.)
  - Add 1 mL of 2.5 mg/L hexavalent chromium (Cr^{+6}) standard to the 24 mL of filtered sample (this solution is called the MS)**.**
  - Add ChromaVer® 3 Reagent to the MS.
  - Invert sample 4 – 5 times – or swirl the sample; until powdered reagent is dissolved.
  - Start timer (8 min)
  - Use a 25 mL aliquot of filtered sample to Zero the Spectrometer. (Blank)
    - Transfer 25 mL of raw filtered sample into the pour-thru-cell funnel.
    - Allow the meter to stabilize and press the Zero button.
  - After 8 minute timer, pour the sample into a syringe filter to remove the excess reagent powder. Transfer the sample into the pour-thru-cell funnel (sample port of the Hach DR/4000V).
  - Record the instrument reading in the Cr^{+6} bench log book.

- Check the recovery of the MS:

  Example: Matrix Spike (0.117 mg/L) - Sample (0.006 mg/L) = 0.111 mg/L

  Concentration of Spike Standard = 0.100 mg/L

  % recovery is = 0.111/0.100 = 111%

  MS % recovery must be between 75 – 125% or you will need to reanalyze.

- If the CCV or MS are still not between 0.075 mg/L and 0.125 mg/L after reanalyses, call the Project Chemist (Shawn Duffy) at 530-229-3303.

Known Interferences

- Iron may interfere at levels above 1 mg/L.
- Highly buffered samples or extreme sample pH may exceed the buffering capacity of the reagents.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Ferrous Iron Analysis by Hach Method 8146
Number: SOP-L02_Rev02
Revision Date: 4/1/2014

Scope

Standard operating procedure (SOP) for analysis of ferrous iron (Fe^{+2}).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach DR 4000V spectrophotometer or equivalent.
- pH meter.
- Reaction vessel and cap or means of sealing the reaction vessel (Hach sample cell, 50 mL beaker, vial capable of holding 30 mL and parafilm if the vessel doesn't have a cap).
- 1 packet of Ferrous Iron Reagent per sample.
- 0.45 µm filter disc fitted to a disposable 50 mL syringe (syringe filter).

Procedure

1. Collect the sample(s) following the appropriate SOP (see list below). Ferrous iron samples should be analyzed as soon as possible (within 6 hours).
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
    - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
    - SOP-A4 – Depth-Specific Surface Water Sampling
    - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
    - SOP-A14 – Pore Water Sampling
    - Remedy-SOP-01 – Process Water Sampling
2. Measure the pH of the raw sample. (Record the results in the Fe+2 bench log book.)
3. Verify the spectrophotometer is set for Ferrous Iron (Hach DR/4000V, program 2150) and verify all reagents are for 25 mL sample size (or adjust accordingly).
4. Transfer 25 mL of the sample into a reaction vessel (sample cell, beaker, etc.).
5. Add one packet of Ferrous Iron Reagent.

6. Invert sample 4–5 times or swirl the sample until powdered reagent is dissolved.
7. Start timer (3 mins.).
8. Run a blank: Use a syringe filter to filter 25 mL of the raw sample and use to "zero" the spectrophotometer.
   - Transfer 25 mL of raw filtered sample into the pour-thru-cell funnel.
   - Allow the meter to stabilize and press the Zero button.
9. After 3 minute timer, use a syringe filter to filter the sample with the reagent added and transfer the sample into the pour-thru-cell funnel (the sample port of the Hach DR/4000V).
10. Record the instrument reading in the Fe+2 bench log book.
11. If the result is out of range for the spectrophotometer, reanalyze the sample using a dilution.

    Note: if a dilution is required, the spectrophotometer should be zeroed using sample from the same dilution.

    Common dilutions:

    - 1:2 dilution: 25 mL of sample are diluted with 25 mL of deionized (DI) water; multiply the instrument reading (result) by 2 for the adjusted value.

      Example: instrument reading is 0.304
      x 2
      = .608 mg/L (final result)

    - 1:5 dilution: 10 mL of sample are diluted with 40 mL of DI water; multiply the instrument reading (result) by 5 for the adjusted value.

      Example: instrument reading is 0.304
      x 5
      = 1.52 mg/L (final result)

    - 1:10 dilution: 10 mL of sample are diluted with 90 mL of DI water; multiply the instrument reading (result) by 10 for the adjusted value.
    - 1:20 dilution: 5 mL of sample are diluted with 95 mL of DI water; multiply the instrument reading (result) by 20 for the adjusted value.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Total Chromium Analysis by Hach Method 8024
Number: SOP-L03_Rev01
Revision Date: 4/1/2014

Scope

Standard operating procedure (SOP) for analysis of total chromium (Cr^{+3}).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach DR 4000V spectrophotometer or equivalent.
- Vacuum filter apparatus: 47 mm magnetic filter funnels, 1,000 mL Erlenmeyer flask, and vacuum pump. Use a 0.45 µm, 47 mm diameter filter membrane.
- 0.45 µm filter disc fitted to a disposable 50 mL syringe (syringe filter).
- pH meter.
- Hach sample cell or vial capable of holding 30 mL.
- 1 packet of ChromaVer® 3 Reagent per sample.
- 1 packet of Chromium 1 Reagent per sample.
- 1 packet of Chromium 2 Reagent per sample.
- 1 packet of Acid Reagent per sample.
- 2.5 mg/L Chromium, Total (Cr^{+3}) (working) standard.
- Hot plate and water bath or heating block.
- Ice bath (baking pan with water and ice - approximately 1” deep)

Procedure

1. Collect the sample(s) following the appropriate SOP (see list below). The samples should be analyzed within 24 hours if possible. Note: all samples must be filtered.
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
    - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells

- SOP-A4 – Depth-Specific Surface Water Sampling
- SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
- SOP-A14 – Pore Water Sampling
- Remedy-SOP-01 – Process Water Sampling

2. Filtering can be performed using an inline filter at the time of sampling (see SOP–A6, Sample Field Filtration and Preservation for Metals Analyses) or in the laboratory by vacuum filter:
   - Set up the vacuum filter apparatus.
   - Filter ~100 mL of sample.
3. Turn on the hot plate and set to 390°F.
   - Make sure the water bath is ~ ½ inch below the top.
4. Measure the pH of the raw sample. (**Record the results in the Cr^{+3} bench log book.**)
5. Verify the spectrophotometer is set for **Chromium, Total (Cr^{+3})** (Hach DR/4000V program **1580)** and verify all reagents are for 25 mL sample size (or adjust accordingly).
6. Transfer 25 mL of filtered sample into a sample cell or vial.
7. Add Chromium 1 Reagent to each of the sample cells/vials.
8. Invert samples 4–5 times or swirl the sample until powdered reagent is dissolved.
9. Place the samples into the sample rack in the hot water bath (water should be boiling) and start the 5-minute "Heat" timer.
10. After 5 minutes, remove the sample cells/vials and cool to room temperature in an ice bath.
11. Add Chromium 2 Reagent to each of the sample cells/vials.
12. Invert samples 4–5 times or swirl the sample until powdered reagent is dissolved.
13. Add Acid Reagent to each of the sample cells.
14. Invert samples 4–5 times or swirl the sample until powdered reagent is dissolved.
15. Add ChromaVer® 3 Reagent to each of the sample cells/vials; invert samples 4–5 times or swirl the sample until powdered reagent is dissolved.
16. Start the 5-min. "wait" timer.
17. Run a blank: Use a 25 mL aliquot of filtered sample to "zero" the spectrophotometer:
    - Transfer 25 mL of raw filtered sample into the pour-thru-cell funnel.
    - Allow the meter to stabilize and press the Zero button.
18. After 5 minute "wait" timer, pour the sample with the reagent added into a syringe filter to remove the excess reagent powder. Transfer the sample into the pour-thru-cell funnel (sample port of the Hach DR/4000V).
19. Record the instrument reading in the Cr^{+3} bench log book.

20. If the result is out of range for the spectrophotometer, reanalyze the sample using a dilution.

    Note: if a dilution is required, the Spectrometer should be zeroed using sample from the same dilution.

    Common dilutions:

    - 1:2 dilution: 25 mL of sample are diluted with 25 mL of deionized (DI) water; multiply the instrument reading (result) by 2 for the adjusted value.

      Example: instrument reading is 0.304
      x 2
      = .608 mg/L (final result)

    - 1:5 dilution: 10 mL of sample are diluted with 40 mL of DI water; multiply the instrument reading (result) by 5 for the adjusted value.

      Example: instrument reading is 0.304
      x 5
      = 1.52 mg/L (final result)

    - 1:10 dilution: 10 mL of sample are diluted with 90 mL of DI water; multiply the instrument reading (result) by 10 for the adjusted value.
    - 1:20 dilution: 5 mL of sample are diluted with 95 mL of DI water; multiply the instrument reading (result) by 20 for the adjusted value.

Quality Control (QC)

- With the first analysis of Chromium, Total each shift, **analyze a CCV** (Continuing Calibration Verification) standard as a **Quality Control** check:
  - Carefully measure 24 mL of DI water into a reaction vessel (sample cell).
  - Add 1 mL of 2.5 mg/L Chromium, Total (Cr^{+3}) standard.
  - Add the Chromium 1 Reagent at the same time as your samples.
  - Follow the remaining procedures as listed above for the samples (hot water bath, cool with ice, add additional reagents, filter, and analyze). **Note:** The Blank for the CCV should be DI water.
  - **Record the CCV results in the Cr^{+3} bench log book.** If the instrument reading is not between 0.075 mg/L and 0.125 mg/L, re-prepare the standard and reanalyze.
- Periodic **Matrix Spikes (MSs)** should be analyzed. Any time a sample result appears anomalous, consider analyzing a matrix spike of that sample.
  - Determine what dilution, if any, is required for the matrix spike (note: you will be adding 0.1 mg/L to the sample concentration [the instrument reading]).
  - Carefully measure 24 mL of filtered sample (diluted if required) into a reaction vessel (sample cell/vial).

- Add 1 mL of 2.5 mg/L Chromium, Total (Cr^{+3}) standard to the 24 mL of filtered sample (this solution is called the MS).
- Add the Chromium 1 Reagent at the same time as your samples.
- Follow the remaining procedures as listed above for the samples (hot water bath, cool with ice, add additional reagents, filter and analyze).
- Run a blank: Use a 25 mL aliquot of filtered sample to zero the spectrophotometer:
  - Transfer 25 mL of raw filtered sample into the pour-thru-cell funnel.
  - Allow the meter to stabilize and press the Zero button.
- After the 5-minute "wait" timer, pour the sample into a syringe filter to remove the excess reagent powder. Transfer the sample into the pour-thru-cell funnel (sample port of the Hach DR/4000V).
- Record the instrument reading in the **Cr^{+3}** bench log book.
- Check the recovery of the MS.

  Example: Matrix Spike (0.117 mg/L) - Sample (0.006 mg/L) = 0.111 mg/L

  Concentration of Spike Standard is = 0.100 mg/L

  % recovery is = 0.111/0.100 = 111%

  MS % recovery must be between 75 – 125% or you will need to reanalyze.
- If the CCV or MS are still not between 0.075 mg/L and 0.125 mg/L after reanalyses, call the Project Chemist (Shawn Duffy) at 530-229-3303.

Known Interferences

- High concentrations of organic material may inhibit complete oxidation of trivalent chromium.
- Highly buffered samples or extreme sample pH may exceed the buffering capacity of the reagents.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Conductivity Analysis by Hach Method 8160
Number: SOP-L04_Rev01
Revision Date: 04/01/2014

Scope

Standard operating procedure (SOP) for analysis of conductivity.

Conductivity is the measure of the ability of a solution to conduct an electric current and is dependent on temperature. The conductivity can then be multiplied by an empirically derived factor to calculate the approximate amount of total dissolved solids (TDS) in the sample.

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach sensION 378 Multiparameter Meter or equivalent
- Hach Quick Reference Guide booklet for the sensION156 and sensION378 Multiparameter Meters (54650-23)
- Conductivity Standards – 1000 µS/cm (Hach 14400-42) (Ensure that the conductivity standard solution is not expired.)
- Deionized (DI) water
- 100 mL beakers
- Calibration sheet
- Kimwipes
- Magnetic stir plate and magnetic stir bar.

Procedure

1. Collect the sample(s) following the appropriate SOP (see list below). Samples should be analyzed as soon as possible (within 24 hours).
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
    - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
    - SOP-A4 – Depth-Specific Surface Water Sampling
    - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes

- SOP-A14 – Pore Water Sampling
- Remedy-SOP-01 – Process Water Sampling

2. Verify the meter is in COND mode.
3. Rinse the conductivity probe with DI water and shake it to remove excess water. (Check to make sure there are no bubbles in probe cell.) The meter should read below 10 µS/cm.
4. Confirm the calibration by checking the conductivity of the 1000 µS/cm standard at the beginning of each shift.
   a. Pour ~50 mL of 1000 µS/cm standard in a 100 mL beaker.
   b. Add a clean stir rod to the standard.
   c. Start the stir plate at a moderate rate (fast enough to stir the sample, but not fast enough to cause a vortex to form).
   d. Allow the meter to stabilize.
   e. After the reading stabilizes, record value on the calibration sheet.
5. If not within 10% of the true value (900 to 1100 µS/cm), recalibrate the meter following the steps on page 5 of the Hach **Quick Reference Guide** booklet for the **sensION156** and **sensION378** Multiparameter Meters (54650-23).

   Be sure to clean the probe cell first. If DI water does not clean the cell, try cleaning the cell as follows: Wash with warm water and laboratory soap and rinse with copious amounts of DI water before use. Alternatively a 3% HCl acid solution may be used. Solvents such as acetone or ethanol should only be used as a last resort, and the cell should not be immersed for longer than 5 minutes. Always completely rinse with DI water. Re-calibrate after these cleanings.
6. If the standard results are within 10% of the true value (900 to 1100 µS/cm), continue with analysis for each of the samples. (Ensure the temperature of the sample is between 20°C and 25°C.)
7. Pour a fresh portion (~ 50-mL) of the sample into a clean 100 mL beaker.
8. Add a clean stir rod to the sample.
9. Start the stir plate at a moderate rate (fast enough to stir the sample, but not fast enough to cause a vortex to form).
10. Place probe in sample.
11. Allow the meter to stabilize.
12. Record the conductivity result on the Conductivity bench sheet and <u>include the units</u>. (Note: The meter automatically changes the units from µS/cm to mS/cm above 1999 µS/cm.) The result is automatically corrected to the reference temperature of 20°C.
13. Rinse the probe and cell with DI water after each sample.

Calculations

- To convert from mS/cm to µS/cm multiply the result by 1000.
- TDS, mg/L (ppm) ≅ Conductivity (µS/cm) * 0.63.

References

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF). 1998. *Standard Methods for the Examination of Water and Wastewater*. 20th Edition. Method 2510.

Hach Company. 2003. *Water Analysis Handbook*. 4th Edition. Method 8160.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Spike Preparation
Number: SOP-L08_Rev01
Revision Date: 06/05/2014

Scope

Standard operating procedure (SOP) for preparing "working concentration" spike solutions for the analysis of reagent spikes (Continuing Calibration Verifications or CCVs) and sample matrix spikes (MSs).

Equipment and Supplies

- Safety glasses
- Latex gloves
- 100 mL or 1000 mL volumetric flask with cap
- 1 mL or 5 mL pipette
- Deionized (DI) water
- Glass standards bottle or 1 liter poly bottle and labels
- Chemical standard:

    a. Hexavalent Chromium: 50 mg/L hexavalent chromium standard; also see SOP-L01, Hexavalent Chromium Analysis by Hach Method 1560

    b. Total Chromium: 50 mg/L total chromium standard; also see SOP-L03, Total Chromium Analysis by Hach Method 8024

    c. Manganese: 25 mg/L manganese standard; also see SOP-L18, Manganese Analysis by Hach Method 8149

    d. Nitrate: 100 mg/L nitrate standard; also see SOP-L13, Nitrate Analysis by Hach Method 8171

    e. Sulfate: 1000 mg/L sulfate standard and 1 packet of SulfaVer® 4 Reagent; also see SOP-L14, Sulfate Analysis by Hach Method 8051

    f. Total Organic Carbon (TOC): 1000 mg/L TOC standard (potassium hydrogen phthalate [KHP]); also see SOP-L16, Total Organic Carbon Analysis by Hach Method 10129

Procedures

a. Hexavalent Chromium

1. Add ~50 mL of DI water to a 100 mL volumetric flask.
2. Add 5 mL of a 50 mg/L hexavalent chromium standard using a 1 mL pipette.
3. Bring the volume of the flask to 100 mL using DI water.

4. Cap, and mix thoroughly.
5. The resultant concentration of the standard is 2.5 mg/L. This standard solution can be used to prepare an MS and/or a CCV standard as outlined in SOP-L01, Hexavalent Chromium Analysis by Hach Method 1560.
6. Transfer the 2.5 mg/L working standard to a glass standards bottle and label.
7. Verify the concentration by following the CCV procedure as detailed in SOP-L01, Hexavalent Chromium Analysis by Hach Method 1560.

b. Total Chromium

1. Add ~50 mL of DI water to a 100 mL volumetric flask.
2. Add 5 mL of a 50 mg/L total chromium standard using a 1 mL pipette.
3. Bring the volume of the flask to 100 mL using DI water.
4. Cap, and mix thoroughly.
5. The resultant concentration of the standard is 2.5 mg/L. This standard solution can be used to prepare an MS and/or a CCV standard as outlined in SOP-L03, Total Chromium Analysis by Hach Method 8024.
6. Transfer the 2.5 mg/L working standard to a glass standards bottle and label.
7. Verify the concentration by following the CCV procedure as detailed in SOP-L03, Total Chromium Analysis by Hach Method 8024.

c. Manganese

1. Add ~25 mL of DI water to a 50 mL volumetric flask.
2. Add 2 mL of a 25 mg/L manganese standard using a 1 mL pipette.
3. Bring the volume of the flask to 50 mL using DI water.
4. Cap, and mix thoroughly.
5. The resultant concentration of the standard is 1 mg/L. This standard solution can be used to prepare an MS and/or a CCV standard as outlined in SOP-L18, Manganese Analysis by Hach Method 8149.
6. Transfer the 1 mg/L working standard to a glass standards bottle and label.
7. Verify the concentration by following the CCV procedure as detailed in SOP-L18, Manganese Analysis by Hach Method 8149.

d. Nitrate

1. Add ~50 mL of DI water to a 100 mL volumetric flask.
2. Add 25 mL of a 100 mg/L nitrate standard using a 5 mL pipette.
3. Bring the volume of the flask to 100 mL using DI water.

4. Cap, and mix thoroughly.
5. The resultant concentration of the standard is 25 mg/L. This standard solution can be used to prepare an MS and/or a CCV standard as outlined in SOP-L13, Nitrate Analysis by Hach Method 8171.
6. Transfer the 25 mg/L working standard to a glass standards bottle and label.
7. Verify the concentration by following the CCV procedure as detailed in SOP-L13, Nitrate Analysis by Hach Method 8171.

e. Sulfate

1. Add ~500 mL of DI water to a 1000 mL volumetric flask.
2. Add 70 mL of a 1000 mg/L sulfate standard using graduated cylinder.
3. Bring the volume of the flask to 1000 mL using DI water.
4. Cap, and mix thoroughly.
5. The resultant concentration of the standard is 70 mg/L. This working standard can be used at this concentration for a CCV standard as outlined in SOP-L14, Sulfate Analysis by Hach Method 8051.
6. Transfer the 70 mg/L working standard to a 1 liter poly bottle and label.
7. Verify the concentration by following the CCV procedure as detailed in SOP-L14, Sulfate Analysis by Hach Method 8051.

f. TOC

1. Add ~500 mL of DI water to a 1000 mL volumetric flask.
2. Add 10 mL of a 1000 mg/L TOC standard (KHP) using a 5 mL pipette.
3. Bring the volume of the flask to 1000 mL using DI water.
4. Cap, and mix thoroughly.
5. Transfer the 10 mg/L working standard to a glass standards bottle and label.
6. The resultant concentration of the standard is 10 mg/L. This standard solution can be used to prepare an MS and/or a CCV standard as outlined in SOP-L16, TOC Analysis.
7. Transfer the 10 mg/L working standard to a 1 liter poly bottle and label.
8. Verify the concentration by following the CCV procedure as detailed in SOP-L16, TOC Analysis by Hach Method 10129.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: pH Measurement
Number: SOP-L09_Rev01
Revision Date: 04/01/2014

Scope

Standard operating procedure (SOP) for pH measurement.

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach sensION 378 Multiparameter Meter or equivalent

  Note: Store the pH electrode in the pH 4 or 7 buffer solution when it's not in use, or use the manufacturer's storage solution. Replace the storage solution every week.
- Hach Quick Reference Guide for sensION156 and sensION378 Multiparameter Meters (54650-23).
- pH buffer solutions for pH 4, 7 and 10. (Make sure the buffer solutions are not expired.)
- 100 mL beakers
- De-ionized (DI) water (squirt bottle)
- Calibration beakers. (Calibration beakers are provided by the instrument manufacturer and have sealable lids that allow the calibrations standards to be reused. Do not pour the calibration standards back into the original bottles. Replace the working buffer solution at least twice a week or if re-calibrating the meter is required.)
- Calibration sheet
- Kimwipes
- Magnetic stir plate and magnetic stir bar.

Procedure

1. Collect the sample(s) following the appropriate SOP (see list below). Samples should be analyzed as soon as possible (within 24 hours).
   - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
   - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method

- SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
- SOP-A4 – Depth-Specific Surface Water Sampling
- SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
- SOP-A14 – Pore Water Sampling
- Remedy-SOP-01 – Process Water Sampling

Notes prior to beginning calibration:

- The pH meter must be calibrated at the beginning of each day and any time the pH reading does not make sense.
- Make sure the electrode is rinsed well between samples.
- Make sure the buffers and samples are at a constant temperature before beginning the calibration or analysis procedure (pH is affected by temperature).

2. To start the calibration pour fresh portions (~ 50-mL) of the pH 4, 7 and 10 buffers into the calibration beakers (buffers should be replaced at least twice per week). Rinse each calibration beaker 3 times with small portions of buffer before filling the beaker with the portion to be analyzed.
3. Add a clean stir rod to each standard.
4. Start the stir plate at a moderate rate (fast enough to stir the sample, but not fast enough to cause a vortex to form).
5. Turn the pH meter on.
6. Make sure the meter is in pH mode.
7. Rinse the electrode with DI water.
8. Follow the calibration procedures on page 3 in the Hach **Quick Reference Guide** for **sensION156** and **sensION378** Multiparameter Meters (54650-23).
   - Be careful not to hit the electrode end against the sides of the beaker.
9. If the pH probe does not recognize the pH 4 buffer within 2 – 3 minutes, re-rinse the electrode with DI water, dry with a Kimwipe and try again. If you've cleaned the probe three times and the pH meter still doesn't recognize the pH 4 buffer, call the Project Chemist (Shawn Duffy) at 530-229-3303.
10. Rinse the electrode with DI water between each buffer solution.
11. After calibrating with the pH 4, 7 and 10 buffers, record the Slope value on the calibration sheet and press Enter to accept and return to the reading mode.
12. Rinse the electrode with DI water.
13. To analyze samples, pour a fresh portion (~ 50-mL) of the sample into a clean 100 mL beaker.

14. Add a clean stir bar.
15. Start the stir plate at a moderate rate (fast enough to stir the sample, but not fast enough to cause a vortex to form).
16. Place the pH meter electrode in the sample.
17. Allow the meter to stabilize, record the pH in the appropriate bench log book.
18. If the meter does not stabilize during a pH measurement a new calibration may be needed. Rinse the electrode with DI water and re-start the calibration.

Standard Operating Procedure
PG&E Topock Program

Title: Hach Model 2100P Turbidimeter Calibration and Analysis
Number: SOP-L10 Rev01
Revision Date: 04/01/2014

Scope

Standard Operating Procedure (SOP) for the analysis of turbidity. This SOP covers the calibration and operating procedures for the Hach Model 2100P turbidimeter.

Precautions/Hazards

- Operators should not attempt the full calibration task until they have been properly trained.
- Hazards include exposure to Formazin and silicone oil (please refer to material safety data sheets [MSDSs] for all chemicals).

Equipment and Supplies List

- Safety glasses
- Latex gloves
- Kimwipes
- Oiling cloths
- Hach Model 2100P portable turbidimeter
- Model 2100P Turbidimeter Instrument and Procedure Manual (Cat. No. 46500-88)
- Carrying case
- Four AA alkaline batteries
- Sample cells with caps
- Check and calibration log
- Turbidimeter kit (small blue tool box located in cabinet under counter below mixer)
- Reagents:
  - Formazin Primary Standards: Hach Part # 26594-05, StablCal® Standards, <0.1, 20, 100, 800 NTU ampoules
  - Gelex Secondary Standards: Hach Part # 24641-05
  - Silicone oil: Hach Part # 1269-36

Daily Gelex Check Procedure

1. Turn on turbidimeter and select automatic range mode. You should see "AUTO RNG" on display.
2. Thoroughly clean the outside of all three Gelex vials with Kimwipes, apply one drop of silicone oil to each vial, and wipe with oiling cloth.
   - Dirty, scratched, or damaged cells can cause inaccurate readings. Handle cells only by the top to minimize dirt, scratches and fingerprints in the light path.
   - The silicone oil is used to eliminate the effects of fine scratches in the glass cell. If the vial has any large visible scratches, notify the supervisor so a replacement Gelex set can be ordered.
   - Avoid excess coating of oil. Oil is not needed if the sample cells are properly maintained.
3. Beginning with Gelex standard 0-10 NTU, place Gelex cell into compartment so that the diamond aligns with orientation mark on the turbidimeter. Close the lid.
4. When taking a reading, place the instrument on a level, stationary surface. It should not be held in the hand during measurement.
5. Press the Read button.
6. If 9.99 or 99.9 are flashing on display, press 'Range' button to change range of meter.
7. Record the displayed value in the check and calibration log.
8. Repeat steps 2 through 5 for remaining Gelex standards.

If any of the Gelex standards are +/- 5% from assigned value, the turbidimeter must be calibrated.

Turbidimeter Calibration Procedure

For expediency you will be referred to the instrument manual (Section 3.6, pages 35-54) to perform these procedures.

1. Prepare Formazin standards, located in the turbidimeter kit (small blue tool box located in cabinet under counter below mixer), according to procedure on page 37, **Section 3.6.1.3** of **Model 2100P Turbidimeter Instrument and Procedure Manual**.
2. Cap the sample cells to prevent spillage of Formazin into the instrument.
3. Begin calibration procedure on page 42, **Section 3.6.3** of **Model 2100P Turbidimeter Instrument and Procedure Manual**.
4. After the turbidimeter has accepted the calibration, assign new values to all Gelex standards using the Daily Gelex Check Procedure above.

Sample Analysis Procedure

1. Transfer sample into a vial dedicated to turbidity measurements "cell." **Do not dilute the samples.**
   - Always use clean sample cells in good condition. Properly clean cells between measurements. Do not use a brush on the sample cell, always use Kimwipes or equivalent optical wipes to dry the cells.
   - Dirty, scratched, or damaged cells can cause inaccurate readings. Handle cells only by the top to minimize dirt, scratches and fingerprints in the light path.
2. Cap the sample cell to prevent spillage of sample into the instrument.
3. Avoid settling of sample prior to measurement. Allow samples to degas but do not allow settling of solids.
4. Thoroughly clean the outside of cell with Kimwipes, apply one drop of silicone oil if needed, and wipe with oiling cloth. Oil is not needed if the sample cells are properly maintained.
   - The silicone oil is used to eliminate the effects of fine scratches in the glass cell. If the vial has any large visible scratches, discard and use another cell.
   - Avoid excess coating of oil.
5. Place the sample cell into the compartment so that the diamond aligns with orientation mark on the turbidimeter. Close the lid.
6. Place the instrument on a level, stationary surface. It should not be held in the hand during measurement.
7. Press the Read button.
8. If 9.99 or 99.9 are flashing on display, press 'Range' button to change range of meter.
9. Record the displayed value in the bench logbook.
10. Do not leave a sample cell in the cell compartment for extended periods of time. This may compress the spring in the cell holder.
11. Always close the sample compartment lid during storage. Remove sample cell and batteries from instrument if the instrument is stored for extended time period (more than a month).

Quality Control

- QC activities that will help ensure the accuracy and precision of this method include:
  - **Using optically matched (or single) cells for Low Level Turbidity** - Precise measurements of low turbidity (< 2 NTU) samples require using a single cell for all measurements or using optically matched cells – *see Hach instruction manual Section 2.3.3 pages 22-25*.
  - **Use dedicated cells** – The use of cells dedicated to turbidity measurement is recommended.

- **Removing trapped gases** - *See Hach instruction manual Section 2.3.3 pages 22-25.* This would only be a problem for samples that exhibit foaming or where gas bubbles are observed.
- **<u>Do not dilute</u> the samples**.
- The calibration of the turbidimeter must be verified, using the more convenient Gelex® secondary standards, at the beginning of each day and any time the turbidity reading does not make sense. The turbidimeter must be fully calibrated using Formazin primary standards every three months as per manufacturer standards, and also whenever the daily Gelex check standards fail to meet the +/- 5% quality control (QC) criteria.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Nitrate Analysis by Hach Method 8171
Number: SOP-L13_Rev00
Revision Date: 4/1/2014

Scope

Standard operating procedure (SOP) for analysis of nitrate (NO_3^--N).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach DR 4000V spectrophotometer or equivalent
- pH meter
- Reaction vessel and cap or means of sealing the reaction vessel– (Hach sample cell, 50 mL beaker, vial capable of holding 30 mL, and parafilm if the vessel doesn't have a cap)
- 1 packet of NitraVer® 5 Reagent per sample
- 25 mg/L nitrate (NO_3^--N) (working) standard
- 0.45 µm filter disc fitted to a disposable 50 mL syringe (syringe filter)
- Deionized (DI) water
- Timer

Procedure

1. For each lot of reagents, analyze a reagent blank. Transfer 25 mL of DI water into a reaction vessel and follow steps 4 through 12 below. Sample concentration may need to be adjusted based on the reagent's contribution. If the concentration is greater than 0.25 mg/L call the Project Chemist (Shawn Duffy) at 530-229-3303.
2. Collect the sample(s) following the appropriate SOP (see below). Nitrate samples should be analyzed as soon as possible (within 24 hours).
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
    - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
    - SOP-A4 – Depth-Specific Surface Water Sampling
    - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes

- SOP-A14 – Pore Water Sampling
- Remedy-SOP-01 – Process Water Sampling

3. Measure the pH of the raw sample. Record the results in the NO_3^--N Bench Logbook.
4. Verify the spectrophotometer is set for Nitrate (Hach DR/4000V, program 2520) and verify all reagents are for 25 mL sample size (or adjust accordingly).
5. Transfer 25 mL of the sample into a reaction vessel. (Note: the sample cell or vessel must be able to be sealed with a cap or parafilm.)
6. Add 1 packet of NitraVer® 5 Reagent.
7. Start the 1 minute timer.
8. Shake the sample for the entire 1 minute, using a 90° rotation of the wrist and back to the original position with a timing of once per second.
9. After the 1 minute shake time set the sample down and start the 5 minute reaction timer.
10. Run a blank: Use a syringe filter to filter 25 mL of the raw sample, and then use the raw sample to "zero" the spectrophotometer. Note: if the sample needs dilution, then use the same dilution water for the blank.
    - Transfer 25 mL of raw filtered sample into the pour-through-cell funnel.
    - Allow the meter to stabilize and press the Zero button.
11. After 5 minute timer, use a syringe filter to filter the sample with the reagent added and transfer the sample into the pour-through-cell funnel (the sample port of the Hach DR/4000V). Analyze within 2 minutes.
12. Record the instrument reading in the NO_3^--N Bench Logbook.
13. If the result is out of range for the spectrophotometer, reanalyze the sample using a dilution.

    Note: if a dilution is required, the spectrophotometer should be zeroed using a sample from the same dilution.

    <u>Common dilutions:</u>

    - 1:2 dilution: 25 mL of sample are diluted with 25 mL of DI water; multiply the instrument reading (result) by 2 for the adjusted value.

      Example: instrument reading is 3.54
      x 2
      = 7.08 mg/L (final result)

    - 1:5 dilution: 10 mL of sample are diluted with 40 mL of DI water; multiply the instrument reading (result) by 5 for the adjusted value.

      Example: instrument reading is 3.54
      x 5
      = 17.7 mg/L (final result)

- 1:10 dilution: 10 mL of sample are diluted with 90 mL of DI water; multiply the instrument reading (result) by 10 for the adjusted value.
- 1:20 dilution: 5 mL of sample are diluted with 95 mL of DI water; multiply the instrument reading (result) by 20 for the adjusted value.

Quality Control (QC)

- With the first analysis of Nitrate each shift, **analyze a Continuing Calibration Verification (CCV) standard** as a **Quality Control** check:
  - Carefully measure 24 mL of DI water into a sample cell.
  - Add 1 mL of 25 mg/L Nitrate (NO_3^--N) standard.
  - Add 1 packet of NitraVer® 5 Reagent at the same time you add the reagent to your samples.
  - Follow the remaining procedures as listed above for the samples (steps 7 through 12). The Blank for the CCV should be DI water.
  - **Record the CCV results in the NO_3^--N Bench Logbook.** If the instrument reading is not between 0.75 mg/L and 1.25 mg/L re-prepare the standard and reanalyze.
- Periodic **Matrix Spikes (MSs)** should be analyzed. Any time a sample result appears anomalous, consider analyzing an MS of that sample.
  - Determine what dilution, if any, is required for the MS (Note: you will be adding 1.0 mg/L to the sample concentration [the instrument reading]). If you have difficulty determining the dilution needed, call the Project Chemist (Shawn Duffy) at 530-229-3303.
  - Carefully measure 24 mL of filtered sample (diluted if required) into a reaction vessel (sample cell/vial).
  - Add 1 mL of 25 mg/L Nitrate (NO_3^--N) standard to the 24 mL of filtered sample—this is your MS**.**
  - Add 1 packet of NitraVer® 5 Reagent at the same time you add the reagent to your samples.
  - Follow the remaining procedures as listed above for the samples (steps 7 through 12), use a 25 mL aliquot of the same dilution water for the blank (use to zero the spectrophotometer).
  - Record the instrument reading in the NO_3^--N Bench Logbook.
  - Check the recovery of the MS:

    Example: Matrix Spike (3.17 mg/L) - Sample (2.06 mg/L) = 1.11 mg/L

    Concentration of MS Standard = 1.00 mg/L

    % recovery is = 1.11/1.00 = 111%

    Note: MS % recovery must be between 75 – 125% or you will need to reanalyze.

If the CCV or MS are still not between 0.075 mg/L and 0.125 mg/L after reanalyses, call the Project Chemist (Shawn Duffy) at 530-229-3303.

Known Interferences

- Chloride concentrations above 100 mg/L will cause low results.
- Ferric iron at all levels
- Highly buffered samples or extreme sample pH may exceed the buffering capacity of the Reagents.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Sulfate Analysis by Hach Method 8051
Number: SOP-L14_Rev0
Revision Date: 4/1/2014

Scope

Standard operating procedure (SOP) for analysis of sulfate (SO_4^{2-}).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach DR 4000V spectrophotometer or equivalent
- Vacuum filter apparatus: 47 mm magnetic filter funnels, 1000 mL Erlenmeyer flask, and vacuum pump. Use a 0.45 µm, 47 mm diameter filter membrane.
- pH meter
- Reaction vessel and cap (Hach sample cell)
- 1 packet of SulfaVer® 4 Reagent per sample
- 70 mg/L Sulfate (SO_4^{2-}) (working) standard
- Timer
- Deionized (DI) water

Procedure

1. For each lot of reagent, analyze a reagent blank. Transfer 25 mL of DI water into a reaction vessel and follow steps 4 through 11 below. Sample concentration may need to be adjusted based on the reagents contribution. (Do not dilute or filter this sample.)
2. Collect the sample(s) following the appropriate SOP (see below). Sulfate samples should be analyzed within 24 hours. If the sample is held for more than 24 hours, store at 4°C and allow the sample to equilibrate to room temperature prior to analysis.
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
    - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
    - SOP-A4 – Depth-Specific Surface Water Sampling
    - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes

- SOP-A14 – Pore Water Sampling
- Remedy-SOP-01 – Process Water Sampling.

3. Measure the pH of the raw sample (record the results in the SO_4^{2-} Bench Logbook).
4. Verify the spectrophotometer is set for Sulfate (Hach DR 4000V, program 3450) and verify all reagents are for 25 mL sample size (or adjust accordingly).
   - **Note: Turbid or colored samples must be filtered.**
     - Filtering can be performed using an inline filter at the time of sampling (see SOP–A6, Sample Field Filtration and Preservation for Metals Analyses) or in the laboratory by vacuum filter.
     - Set up the vacuum filter apparatus.
     - Filter ~100 mL of sample.
5. Due to the high concentration of sulfate, all samples will start with a 1:25 dilution.
   - Add 1 mL of sample to 24 mL of DI water.
   - Mix the sample by swirling or shaking the sample.
6. Add 1 packet of SulfaVer® 4 Reagent.
7. Swirl to mix until the reagent powder is dissolved. (Note that the reaction will generate a white particulate that can be confused with the Reagent powder so pay close attention to what the Reagent powder looks like.)
8. Start the 5-minute reaction timer. **Do not disturb the sample cell during this time.**
9. After the 5 minutes has elapsed, run a blank. If the sample was filtered, use the filtered sample to "zero" the spectrophotometer.
   - **Note: do not use flow-through cell or Sipper Cell Modules.**
   - Wait until the 5 minute timer beeps before placing the blank into the cell holder and zeroing the instrument.
10. Analyze the samples immediately. **Note: do not filter at this stage.**
11. Record the instrument reading in the Lab SO_4^{2-} Bench Logbook.
12. Multiply the instrument reading by the dilution factor (25) and record in the result column.

    If the result is out of range for the spectrophotometer, reanalyze; if still out of range call the Project Chemist (Shawn Duffy) at 530-229-3303.

    Note: if an additional dilution is required, the spectrophotometer should be zeroed using a sample from the same dilution.

Quality Control (QC)

- With the first analysis of sulfate each shift, **analyze a Continuing Calibration Verification (CCV) standard** as a **Quality Control** check:
  - Transfer 25 mL of 70 mg/L Sulfate standard into a sample cell.

- Add 1 packet of SulfaVer® 4 Reagent at the same time you add the reagent to your samples.
- Follow steps 7 through 11 listed above (swirl, timer, blank, analyze, record). **Note:** The Blank for the CCV should be DI water.
- **Record the CCV results in the SO_4^{2-} Bench Logbook.** If the instrument reading is not between 52.5 mg/L and 87.5 mg/L, re-prepare the standard and reanalyze.

  If the CCV is still not between 52.5 mg/L and 87.5 mg/L after reanalyses, call the Project Chemist (Shawn Duffy) at 530-229-3303.

Known Interferences

- Calcium at concentrations greater than 20,000 mg/L as $CaCO_3$.
- Chloride at concentrations greater than 40,000 mg/L as Cl.
- Magnesium at concentrations greater than 10,000 mg/L as $CaCO_3$.
- Silica at concentrations greater than 500 mg/L as SiO_2.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Alkalinity Analysis
Number: SOP-L15_Rev0
Revision Date: 4/1/2014

Scope

Standard operating procedure (SOP) for analysis of alkalinity.

Equipment and Supplies

- Safety glasses
- Latex gloves
- pH meter
- Phenolphthalein Indicator Solution
- Bromcresol Green-Methyl Red Indicator Solution
- Sulfuric acid standard solution, 0.020 N (Titrant)
- Buret, buret clamp and stand
- 250-mL Erlenmeyer flask
- Graduated cylinder – 50-mL or 100-mL
- Magnetic stir plate and magnetic stir bar

Procedure

1. Collect the sample(s) following the appropriate SOP (see below). Alkalinity samples should be analyzed within 24 hours. If the sample is held for more than 24 hours, store at 4°C and allow the sample to equilibrate to room temperature prior to analysis.
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
    - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
    - SOP-A4 – Depth-Specific Surface Water Sampling
    - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
    - SOP-A14 – Pore Water Sampling
    - Remedy-SOP-01 – Process Water Sampling
2. Measure the pH of the raw sample (record the results in the Alkalinity Bench Logbook).

3. Fill the buret to the zero mark with 0.020 N Sulfuric Acid standard solution (Titrant).
4. Use the graduated cylinder to transfer 50 mL of the sample into an Erlenmeyer flask.
5. Add a clean stir bar.
6. Start the stir plate at a moderate rate (fast enough to stir the sample, but not fast enough to cause a vortex to form).

If the pH of the raw sample was greater than 8.3, proceed to Phenolphthalein Step (step 7 below). If the pH was equal to or less than 8.3, proceed directly to the Total Alkalinity Step (step 10).

Phenolphthalein Step:

7. Add six drops of Phenolphthalein Indicator Solution. Allow to mix with sample. Sample will be pink if Phenolphthalein alkalinity is present. If the sample does not turn pink, proceed to Total Alkalinity Step (step 10).
8. Slowly open the stop-cock allowing the Titrant to drip into the sample and mix. Stop the flow of Titrant as soon as the sample color changes from pink to colorless. (Note: the end point has not been reached until the sample remains colorless.)

   Calculate:
   mg/L phenolphthalein alkalinity as $CaCO_3$ = mL Titrant used × 20.

9. Record the phenolphthalein alkalinity in the Alkalinity Bench Logbook. Proceed to Total Alkalinity Step.

Total Alkalinity Step:

10. Add six drops of Bromcresol Green-Methyl Red Indicator Solution. Allow to mix with sample. There is no color change at this stage.
11. Slowly open the stop-cock allowing the Titrant to drip into the sample and mix. Stop the flow of Titrant as soon as the sample color changes from colorless to a light pink. (Note: the end point has not been reached until the sample remains light pink.)

    Calculate:
    mg/L Total alkalinity as $CaCO_3$ = total mL Titrant used × 20.

12. Record the Total alkalinity in the Alkalinity Bench Logbook.

    Note: if the sample's pH was 8.3 or less, the Total Alkalinity = Bicarbonate Alkalinity. If the pH was greater than 8.3, use the table below[1] to calculate the Carbonate, Bicarbonate, and Hydroxide Alkalinity.

[1] Table source: Hach Water Analysis Handbook, Fourth Edition, Rev. 2. Alkalinity, Buret Titration Method 8221. DOC316.53.01151.

Total alkalinity primarily includes hydroxide, carbonate, and bicarbonate alkalinities. The concentration of these types in a sample may be determined when the phenolphthalein and total alkalinities are known (*Alkalinity relationship* table).

Table 35 Alkalinity relationship

Row	Result of Titration	Hydroxide Alkalinity Equals:	Carbonate Alkalinity Equals:	Bicarbonate Alkalinity Equals:
1	Phenolphthalein Alkalinity equal to 0	0	0	Total Alkalinity
2	Phenolphthalein Alkalinity equal to Total Alkalinity	Total Alkalinity	0	0
3	Phenolphthalein Alkalinity less than one-half of Total Alkalinity	0	Phenolphthalein Alkalinity times 2	Total Alkalinity minus two times Phenolphthalein Alkalinity
4	Phenolphthalein Alkalinity equal to one-half of Total Alkalinity	0	Total Alkalinity	0
5	Phenolphthalein Alkalinity greater than one-half of Total Alkalinity	2 times Phenolphthalein Alkalinity minus Total Alkalinity	2 times the difference between Total and Phenolphthalein Alkalinity	0

Use the *Alkalinity relationship* table with the following procedure:

1. Does the phenolphthalein alkalinity equal zero? If yes, use Row 1.
2. Does the phenolphthalein alkalinity equal total alkalinity? If yes, use Row 2.
3. Divide the total alkalinity by 2 to calculate one-half the total alkalinity.
4. Select Row 3, 4 or 5 based on comparing the result of step c (one-half total alkalinity) with the phenolphthalein alkalinity.
5. Perform the required calculations if any.
6. Check your results. The sum of the three alkalinity types will equal the total alkalinity.

If you have any questions, call the Project Chemist (Shawn Duffy) at 530-229-3303.

Known Interferences

- Highly colored or turbid samples may mask the color change at the end points.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Total Organic Carbon Analysis by Hach Method 10129
Number: SOP-L16_Rev00
Revision Date: 6/5/2014

Scope

Standard operating procedure (SOP) for analysis of total organic carbon (TOC).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach DR 4000V spectrophotometer or equivalent
- Spectrophotometer manufacturer's manual
- Test 'N Tube™ adapter for the spectrophotometer
- pH meter and pH paper (capable of measuring down to pH 2)
- TOC Bench Logbook
- Chemical oxygen demand (COD) Reactor or similar digestion block
- Stir plate and magnet stir bar
- Low Range TOC Acid Digestion Solution vials (Acid Digestion vials)
- Low Range TOC Indicator Ampules (indicator ampules)
- Sulfate Buffer Solution
- TOC Persulfate Powder Pillow
- Pipet: 0.1 – 1.0 mL, and a 1 – 5 mL or 1 – 10 mL.
- 50 mL Erlenmeyer flask
- 0.45 µm filter disc fitted to a disposable 50 mL syringe (syringe filter)
- Deionized (DI) water
- Kimwipes
- Paper towels
- Timer
- Fine point Sharpie (indelible ink pen)
- Small funnel (comes with each batch of TOC Acid Digestion vials)
- Test tube rack
- 10 mg/L TOC Working Standard

Procedure

1. Collect the sample(s) following the appropriate SOP (see below). TOC samples should be analyzed as soon as possible (within 48 hours if possible).
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method

- SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
- SOP-A4 – Depth-Specific Surface Water Sampling
- SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
- SOP-A14 – Pore Water Sampling
- Remedy-SOP-01 – Process Water Sampling

2. Measure the pH of the raw sample. Record the results in the TOC Bench Logbook.
3. Turn on the COD reactor and make sure it's set at 105°C.
4. Transfer 10 mL of sample into a 50 mL Erlenmeyer flask containing a magnetic stir bar.
5. Add 0.4 mL of Sulfate Buffer Solution (use pH paper to verify the pH is 2.0 or below – if needed add additional buffer, 0.1 mL at a time until pH ≤2).
6. Place the flask on a stir plate and set at a moderate speed for 10 minutes (swirls the sample but does not form a vortex). Steps 7 through 10 may be performed while the flask is being stirred.
7. Remove the number of Low Range TOC Acid Digestion Solution vials you'll need from the manufacture's packaging and place in the test tube rack (remember one for the reagent blank).
8. Label the Acid Digestion vials for the samples, including the reagent blank.
9. Using the funnel provided with the Acid Digestion vials, add the contents of one TOC Persulfate Powder Pillow to each vial (labeled in step 7).
10. Using a pipet add 3 mL of organic-free water (use DI water) to the reagent blank vial.
11. After the 10 minutes for stirring the 50 mL Erlenmeyer flask have elapsed, use a pipet to transfer 3 mL of prepared sample (sample in the Erlenmeyer flask) to the labeled vial(s) with the persulfate powder already added.
12. Holding the blue Indicator Ampule by the top, carefully rinse with DI water and wipe dry with a Kimwipe.
13. Lower the unopened ampule into one of the labeled Acid Digestion vials. Align the score mark (the score mark is in the narrowed "neck" of the ampule) with the top of the vial and snap off the top of the ampule allowing the ampule to drop into the Acid Digestion vial.
    - **Do not** tip or tilt the vial after the ampule is in the vial. **You do not want the indicator solution mixing with the sample.**
14. Repeat steps 12 and 13 for each sample and the reagent blank.
15. Cap the vials tightly and place in the COD Reactor. Start the reactor timer (2 hours). Verify the reactor is at 105°C.
16. After the 2 hour timer, remove the vials from the COD Reactor and place in the test tube rack, being careful to handle the vials by their caps which will have remained cool.

17. Allow the vials to cool for one hour.
18. Verify the Test 'N Tube™ adapter is installed in the spectrophotometer (see the manufacturer's manual for instructions).
19. Verify that the spectrophotometer is set for Low Range TOC (Hach DR/4000V, program 3655).
20. Holding the vial by its cap wipe the reagent vial with a damp paper towel and then with a dry Kimwipe to remove any fingerprints or other marks.
21. Use the reagent blank to "zero" the spectrophotometer.
    - Place the vial in the adapter and close the light shield.
    - Allow the meter to stabilize and press the Zero button.
22. After the spectrophotometer has been zeroed, repeat step 20 for each vial, place the vial in the adapter, close the light shield, allow the meter to stabilize, and record the instrument reading in the TOC Bench Logbook.
23. If the result is out of range for the spectrophotometer, reanalyze the sample using a dilution.

    Common dilutions:

    - 1:2 dilution: 25 mL of sample are diluted with 25 mL of DI water; multiply the instrument reading (result) by 2 for the adjusted value.

      Example: instrument reading is 3.54
      x 2
      = 7.08 mg/L (final result)

    - 1:5 dilution: 10 mL of sample are diluted with 40 mL of DI water; multiply the instrument reading (result) by 5 for the adjusted value.

      Example: instrument reading is 3.54
      x 5
      = 17.7 mg/L (final result)

    - 1:10 dilution: 10 mL of sample are diluted with 90 mL of DI water; multiply the instrument reading (result) by 10 for the adjusted value.
    - 1:20 dilution: 5 mL of sample are diluted with 95 mL of DI water; multiply the instrument reading (result) by 20 for the adjusted value.

Quality Control (QC)

- With the first analysis of TOC each shift, **analyze a Continuing Calibration Verification (CCV) standard** as a **Quality Control** check:
  - Carefully measure 9 mL of the DI water into a 50 mL Erlenmeyer flask containing a magnetic stir bar.
  - Add 1 mL of 10 mg/L TOC Working Standard to the DI water—this is your CCV.
  - Follow steps 5 – 22 with your "other" samples.

- Check the recovery of the CCV. The concentration should be between 0.75 and 1.25 mg/L.

- Periodic **Matrix Spikes (MSs)** should be analyzed. Any time a sample result appears anomalous, consider analyzing an MS of that sample.
  - Determine what dilution, if any, is required for the MS (Note: you will be adding 1.0 mg/L to the sample concentration [the instrument reading]). If you have difficulty determining the dilution needed, call the Project Chemist (Shawn Duffy) at 530-229-3303.
  - Carefully measure 9 mL of the sample (diluted if required) into a 50 mL Erlenmeyer flask containing a magnetic stir bar.
  - Add 1 mL of 10 mg/L TOC standard to the sample—this is your MS**.**
  - Follow steps 5 – 22 with your "other" samples.
  - Check the recovery of the MS:

    Example: Matrix Spike (1.60 mg/L) - Sample (0.36 mg/L) = 1.24 mg/L

    Concentration of MS Standard = 1.0 mg/L

    % recovery is = 1.24/1.00 = 124%

    Note: MS % recovery must be between 75 – 125% or you will need to reanalyze.

    If the CCV or MS are still not between 0.75 mg/L and 1.25 mg/L after reanalyses, call the Project Chemist (Shawn Duffy) at 530-229-3303.

Known Interferences

- Many metals can cause interference at concentrations above 10 mg/L.
- Manganese above 1 mg/L.
- Alkalinity greater than 600 mg/L (reduce the pH to <7 with sulfuric acid); call the Project Chemist (Shawn Duffy) at 530-229-3303 before proceeding.
- Chloride above 500 mg/L.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Orthophosphate Analysis by Hach Method 8048
Number: SOP-L17_Rev00
Revision Date: 6/3/2014

Scope

Standard operating procedure (SOP) for analysis of orthophosphate (PO_4^{3-}).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach DR 4000V spectrophotometer or equivalent
- pH meter
- PO_4^{3-} Bench Logbook
- Reaction vessel and cap or means of sealing the reaction vessel– (Hach sample cell, 50 mL beaker, vial capable of holding 30 mL, and parafilm if the vessel doesn't have a cap)
- 1 packet of PhosVer 3 Reagent per sample
- 5 mg/L phosphate (PO_4^{3-}) (working) standard
- 0.45 µm filter disc fitted to a disposable 50 mL syringe (syringe filter)
- Deionized (DI) water

Procedure

1. Collect the sample(s) following the appropriate SOP (see below). Orthophosphate samples should be analyzed as soon as possible (within 24 hours).
    - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
    - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
    - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
    - SOP-A4 – Depth-Specific Surface Water Sampling
    - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
    - SOP-A14 – Pore Water Sampling
    - Remedy-SOP-01 – Process Water Sampling

2. Measure the pH of the raw sample in accordance with SOP-L9—pH Measurement. Record the results in the PO43- Bench Logbook.
3. Verify that the spectrophotometer is set for Reactive Phosphoros (Hach DR/4000V, program 3025) and verify all reagents are for 25 mL sample size (or adjust accordingly).
4. Transfer 25 mL of the sample into a reaction vessel. (Note: the sample cell or vessel must be able to be sealed with a cap or parafilm.)
5. Transfer 25 mL of DI water into a reaction vessel (this will be the "Blank").
6. Add 1 packet of PhosVer 3 Reagent to the blank and to each sample.
7. Shake the blank and the sample(s), using a 90° rotation of the wrist and back to the original position with a timing of once per second; until the powder is dissolved.
8. Start the 2 minute reaction timer.
9. After the 2 minute timer, use a syringe filter to filter any reagent powder that has not dissolved from the blank and then use the blank to "zero" the spectrophotometer.
   - Transfer the blank into the pour-through-cell funnel.
   - Allow the meter to stabilize and press the Zero button.
10. After the spectrophotometer has been zeroed, use a syringe filter to filter any reagent powder that has not dissolved from the sample(s) and transfer the sample into the pour-through-cell funnel (the sample port of the Hach DR/4000V). Analyze as soon as possible.
11. Record the instrument reading in the PO_4^{3-} Bench Logbook.
12. If the result is out of range for the spectrophotometer, reanalyze the sample using a dilution.

    <u>Common dilutions:</u>

    - 1:2 dilution: 25 mL of sample are diluted with 25 mL of DI water; multiply the instrument reading (result) by 2 for the adjusted value.

      Example: instrument reading is 3.54
      x 2
      = 7.08 mg/L (final result)

    - 1:5 dilution: 10 mL of sample are diluted with 40 mL of DI water; multiply the instrument reading (result) by 5 for the adjusted value.

      Example: instrument reading is 3.54
      x 5
      = 17.7 mg/L (final result)

    - 1:10 dilution: 10 mL of sample are diluted with 90 mL of DI water; multiply the instrument reading (result) by 10 for the adjusted value.
    - 1:20 dilution: 5 mL of sample are diluted with 95 mL of DI water; multiply the instrument reading (result) by 20 for the adjusted value.

Quality Control (QC)

- With the first analysis of orthophosphate each shift, **analyze a Continuing Calibration Verification (CCV) standard** as a **Quality Control** check:
  - Carefully measure 24 mL of DI water into a sample cell.
  - Add 1 mL of 5 mg/L Phosphate (PO_4^{3-}) standard.
  - Add 1 packet of PhosVer 3 Reagent (include the CCV with your other samples).
  - Follow the remaining procedures as listed above for the samples (steps 6 through 10).
  - **Record the CCV results in the PO_4^{3-} Bench Logbook.** If the instrument reading is not between 0.15 mg/L and 0.25 mg/L, re-prepare the standard and reanalyze.
- Periodic **Matrix Spikes (MSs)** should be analyzed. Any time a sample result appears anomalous, consider analyzing an MS of that sample.
  - Determine what dilution, if any, is required for the MS (Note: you will be adding 0.2 mg/L to the sample concentration [the instrument reading]). If you have difficulty determining the dilution needed, call the Project Chemist (Shawn Duffy) at 530-229-3303.
  - Carefully measure 24 mL of filtered sample (diluted if required) into a reaction vessel (sample cell/vial).
  - Add 1 mL of 5 mg/L Phosphate (PO_4^{3-}) standard to the 24 mL of filtered sample—this is your MS**.**
  - Add 1 packet of PhosVer 3 Reagent at the same time you add the reagent to your "other" samples.
  - Follow the remaining procedures as listed above for the samples (steps 6 through 10).
  - Record the instrument reading in the PO_4^{3-} Bench Logbook.
  - Check the recovery of the MS:

    Example: Matrix Spike (1.60 mg/L) - Sample (1.36 mg/L) = 0.24 mg/L

    Concentration of MS Standard = .20 mg/L

    % recovery is = 0.24/0.20 = 120%

    Note: MS % recovery must be between 75 – 125% or you will need to reanalyze.

    If the CCV or MS are still not between 0.075 mg/L and 0.125 mg/L after reanalyses, call the Project Chemist (Shawn Duffy) at 530-229-3303.

Known Interferences

- Metal concentrations above 100 mg/L.
- Highly buffered samples or extreme sample pH may exceed the buffering capacity of the Reagents (sample pH should be between 2 and 10).

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Manganese Analysis by Hach Method 8149
Number: SOP-L18_Rev00
Revision Date: 5/30/2014

Scope

Standard Operating Procedure (SOP) for the analysis of manganese (Mn).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Hach DR 4000V spectrophotometer or equivalent
- Fume hood
- Vacuum filter apparatus: 47 mm magnetic filter funnels, 1,000 mL Erlenmeyer flask, and vacuum pump (use a 0.45 µm, 47 mm diameter filter membrane)
- 0.45 µm filter disc fitted to a disposable 50 mL syringe (syringe filter)
- pH meter
- Reaction vessel and cap or means of sealing the reaction vessel (Hach sample cell and Parafilm if the vessel doesn't have a cap)
- Deionized (DI) water
- 1 packet of Ascorbic Acid Reagent powder per sample
- Rochelle Salt Solution
- Alkaline-Cyanide Reagent Solution
- 0.1% PAN Indicator Solution
- 1 mg/L Manganese (working) standard
- Manganese Bench Log Book
- HNO_3 pH<3 (preservative if the samples can't be analyzed within 24 – 48 hours)

Safety

Caution and special procedures must be maintained when performing this analysis. The alkaline cyanide solution contains cyanide so **the waste must be collected and disposed of as a Reactive waste**.

To prevent the release of hydrogen cyanide gas, the cyanide waste should be stored in a caustic solution with pH >11. The waste must be stored as a base until properly disposed of.

Because the analysis has the potential of releasing hydrogen cyanide gas, **all solutions/reagents must be added in a fume hood.**

Procedure

1. Collect the sample(s) following the appropriate SOP (see list below). Samples should be analyzed as soon as possible. If the samples can't be analyzed within 24 – 48 hours, preserve with HNO_3 pH<3 until ready to analyze. Before starting the analyzing adjust the pH to a pH 4 – 5. **Note: all samples must be filtered prior to preservation/analysis**.
   - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
   - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
   - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
   - SOP-A4 – Depth-Specific Surface Water Sampling
   - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
   - SOP-A14 – Pore Water Sampling
   - Remedy-SOP-01 – Process Water Sampling
2. Filtering can be performed using an inline filter at the time of sampling (see SOP–A6, Sample Field Filtration and Preservation for Metals Analyses) or in the laboratory by vacuum filter:
   - Set up the vacuum filter apparatus.
   - Filter ~100 mL of sample.
3. Measure the pH of the raw sample in accordance with SOP-L9— pH Measurement (**Record the results in the Mn Bench Log Book**). Adjust the pH (see step #1 above).
4. Verify that the spectrophotometer is set for **Manganese (Mn) (Hach DR/4000V program 2260)** and verify all reagents are for 10 mL sample size (or adjust accordingly).
5. In the fume hood, transfer 10 mL of filtered sample into a reaction vessel. Use DI water for a blank.
6. Add one packet of Ascorbic Acid Reagent powder to each sample (including the blank). Swirl to mix.
7. Add ten drops of Rochelle Salt Solution to each sample (including the blank). Swirl to mix.
8. Add 15 drops of Alkaline-Cyanide Reagent Solution to each sample (including the blank). Swirl to mix.
9. Add 21 drops of PAN Indicator Solution, 0.1%, to each sample (including the blank). Swirl to mix.
10. Start the 2 minute reaction timer.

11. After the 2 minute timer has sounded, use the blank to "zero" the spectrophotometer.
12. After zeroing the spectrophotometer analyze each sample.
13. Record the instrument reading in the Mn Bench Log Book.
14. If the result is out of range for the spectrophotometer, reanalyze the sample using a dilution.

    Common dilutions:

    - 1:2 dilution: 25 mL of sample are diluted with 25 mL of DI water; multiply the instrument reading (result) by 2 for the adjusted value.

      Example: instrument reading is 0.304
      x 2
      = .608 mg/L (final result)

    - 1:5 dilution: 10 mL of sample are diluted with 40 mL of DI water; multiply the instrument reading (result) by 5 for the adjusted value.

      Example: instrument reading is 0.304
      x 5
      = 1.52 mg/L (final result)

    - 1:10 dilution: 10 mL of sample are diluted with 90 mL of DI water; multiply the instrument reading (result) by 10 for the adjusted value.
    - 1:20 dilution: 5 mL of sample are diluted with 95 mL of DI water; multiply the instrument reading (result) by 20 for the adjusted value.

Quality Control (QC)

- With the first analysis of manganese each shift, **analyze a CCV** (Continuing Calibration Verification) standard as a **Quality Control** check:
  - Carefully measure 9 mL of DI water into a reaction vessel.
  - Add 1 mL of 1 mg/L Mn Standard. Swirl to mix.
  - Analyze with the samples - follow steps 6 – 13 above.
  - **Record the CCV results in the Mn Bench Log Book.** If the instrument reading is not between 0.075 mg/L and 0.125 mg/L, re-prepare the standard and reanalyze.
- Periodic **Matrix Spikes (MSs)** should be analyzed. Any time a sample result appears anomalous, consider analyzing an MS of that sample.
  - Determine what dilution if any is required for the matrix spike (note: you will be adding 0.1 mg/L to the sample concentration [the instrument reading]).
  - Carefully measure 9 mL of filtered sample (diluted if required) into a reaction vessel.
  - Add 1 mL of 1 mg/L Mn Standard to the 9 mL of filtered sample. Swirl to mix (this solution is called the MS).
  - Analyze with the other samples - follow steps 6 – 13 above.

- Record the instrument reading in the Mn Bench Log Book.
- Check the recovery of the MS:

  Example: Matrix Spike (0.117 mg/L) - Sample (0.006 mg/L) = 0.111 mg/L

  Concentration of Spike Standard = 0.100 mg/L

  % recovery is = 0.111/0.100 = 111%

  MS % recovery must be between 75 – 125% or you will need to reanalyze.
- If the CCV or MS are still not between 0.075 mg/L and 0.125 mg/L after reanalyses, call the Project Chemist (Shawn Duffy) at 530-229-3303.

Standard Operating Procedure – Laboratory
PG&E Topock Program

Title: Total Dissolved Solids Analysis
Number: SOP-L19_Rev00
Revision Date: 5/29/2014

Scope

This Standard Operating Procedure (SOP) covers the determination of Total Dissolved Solids (TDS) in groundwater or process water samples. The practical range of the method is 10 mg/L to 20,000 mg/L.

Summary

A sample is passed through a filter, weighed, and then placed in an oven at 180°C until dried. The sample is allowed to cool in a desiccator, and then weighed to determine the dry weight of the original sample.

Safety

Extreme caution should be used when working around the drying oven (risk of severe burns).

Because of the high temperature of the drying oven the associated glassware is more prone to break on impact (risk of broken glass).

Equipment and Supplies

- Safety glasses
- Latex gloves
- Drying oven (capable of 180°C)
- Analytical balance (capable of measuring weights of 0.1 mg)
- Vacuum pump or other source of applying a vacuum
- Vacuum filter apparatus and filters (glass fiber filter discs, 47 mm, without organic binder, Reeve Angel type 934-AH, Gelman type A/E, or equivalent)
- 250 mL Pyrex glass beakers or equivalent
- Deionized (DI) water
- Conductivity meter
- Desiccator (capable of holding 5 – 6 250 mL Pyrex glass beakers
- Oven mitt or metal tongs (to transfer the hot beakers from the drying oven to the desiccator)
- Graduated cylinder(s) 20 mL, 50 mL, 100 mL

- TDS Bench Log Book

Procedure

1. Preparation of the evaporation vessels (beaker) must be performed ahead of time:
   - Thoroughly clean and dry a 250 mL Pyrex glass beaker.
   - Heat the clean vessel to 180° +/- 2°C for one hour.
   - Carefully transfer the hot beaker to the desiccator with the oven mitt or tongs for cooling and storage until needed.
2. Collect the sample(s) following the appropriate SOP (see list below). The samples should be analyzed within 7 days.
   - SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
   - SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
   - SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
   - SOP-A4 – Depth-Specific Surface Water Sampling
   - SOP-A5 – Groundwater Sampling from Sonic Drilling Boreholes
   - SOP-A14 – Pore Water Sampling
   - Remedy-SOP-01 – Process Water Sampling
3. Measure the Conductivity using SOP-L4 – Conductivity Analysis by Hach Method 8160. Refer to Table 1 for sample volume.

Table 1
Conductivity vs. Sample Volume Table

Conductivity of Sample	Sample Volume to Use for TDS
<1,500 µS/cm	100 mL
≥1,500 µS/cm and <4,700 µS/cm	50 mL
≥4,700 µS/cm	20 mL

4. Filter the sample in the laboratory using a vacuum filter:
   - Assemble the vacuum filter holder/flask assembly using a clean vacuum flask.
   - Place a 47-mm filter disc (see Equipment and Supplies section above for type of filter) in the filter holder and add the funnel.
   - With vacuum applied to the flask, wash the filter with three separate 20-mL volumes of DI water.

- Continue applying vacuum for two to three minutes after the water has passed through the filter to ensure that all traces of the water are removed from the filter.
- Disconnect the vacuum and discard the water from the flask.
- Reconnect the filter holder/flask assembly to the vacuum.
- Shake the sample vigorously.
- Use a clean graduated cylinder to transfer the volume of sample determined from Table 1 above to the filter apparatus. Record the volume used in the TDS Bench Log Book.
- Filter the sample through the glass fiber filter.
- Rinse the filter with three 10 mL portions of DI water and continue to apply vacuum for about 3 minutes after filtration is complete to remove as much water as possible.

5. Retrieve a clean 250 mL Pyrex glass beaker from the desiccator and weigh to the nearest tenth of a milligram (0.1 mg); record the weight in the TDS Bench Log Book.
6. Transfer the filtered sample from the vacuum flask to the beaker. Rinse the flask with three 10 mL portions of DI water and pour into the beaker with the sample.
7. Place the sample in the drying oven; verify the oven is set at 180° +/- 2°C.
8. Allow the sample to reach complete dryness (4 hours or more).
9. Cool in a desiccator to approximately room temperature, and weigh the beaker (record the weight in the TDS Bench Log Book).
10. Repeat steps 7 through 9 (drying, cooling, desiccating, and weighing until a constant weight is obtained or until the change in weight is less than 0.5 mg between the consecutive cycles) and record the final weight in the TDS Bench Log Book.
11. Calculate the TDS using the formula shown below and record in the TDS Bench Log Book.

$$\text{mg total dissolved solids/L} = \frac{(A - B) \times 1000}{\text{sample volume, mL}}$$

where:

A = final weight of dried sample + dish (mg)
B = weight of dish (mg).

Appendix C
PG&E Program Quality Assurance Project Plan and Addendum
(On CD-ROM Only)

Revision 2

PG&E Program Quality Assurance Project Plan

Prepared for

Pacific Gas and Electric Company

August 2012

CH2MHILL®
155 Grand Ave. Suite 1000
Oakland, CA 94612

Document Title:	PG&E Program Quality Assurance Project Plan		
Site Name:	PG&E Program wide		
Site Location:	Multiple		
Anticipated Sampling Dates:	Various		
Prepared By:	CH2M HILL	Date:	August 2012
Address:	155 Grand Avenue, Suite 1000		
City/State/Zip:	Oakland, California 94612		
Telephone:	510/251-2426		
Program Manager:	Eliana Makhlouf	Phone:	(415) 728-0625 x37025

****

Approved _____ Date _____
CH2M HILL Program Manager

Approved _____ Date _____
CH2M HILL PG&E Program Chemist

Approved _____ Date _____
CH2M HILL PG&E Program Quality Officer

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Appendices

Appendix A Reporting Limits, Accuracy, and Precession Limits

Acronyms and Abbreviations

%D	percent difference or drift
%R	percent recovery
°C	degrees Celsius
µg/L	microgram(s) per liter
µmhos/cm	micromhos per centimeter
AB	ambient blank
AFCEE	Air Force Center for Engineering and the Environment (formerly the Air Force Center for Environmental Excellence)
ASTM	American Society for Testing and Materials
AutoDV	automated data validation
BTEX	benzene, toluene, ethylbenzene, and xylene
CAS	Chemical Abstract Service
CF-IRMS	continuous-flow isotope ratio mass spectrometry
CHHSL	California Human Health Screening Levels
CoC	chain-of-custody
COPC	contaminate of potential concern
DOC	dissolved organic carbon
DQO	data quality objective
DTSC	California Department of Toxic Substance Control
EB	equipment rinsate blank
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FB	field blank
FD	field duplicate
ICAL	initial calibration
ICP	inductively coupled plasma
ICP-MS	inductively coupled plasma/mass spectrometry
ID	identifier
IDW	investigation-derived waste
IPC	instrument performance check

LCS	laboratory control sample
MCT	matrix concentration threshold
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
ml	milliliter
MS	matrix spike
MSA	method of standard addition
MSD	matrix spike duplicate
MQO	method quality objective
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyls
pCi/L	picocuries per liter
PDF	portable document format
PG&E	Pacific Gas and Electric Company
PNA	polynuclear aromatic hydrocarbon
PPE	personal protective equipment
PST	planned sample table
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RT	retention time
SAP	sampling and analysis plan
SIM	selected ion monitoring
SOP	standard operating procedure
STLC	soluble threshold limit concentration
SVOC	semivolatile organic compound
TB	trip blank

TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TSS	total suspended solids
TTLC	total threshold limit concentration
VOA	volatile organic analysis
VOC	volatile organic compound

SECTION 1

Introduction

This *Pacific Gas and Electric Company Program Quality Assurance Project Plan* (QAPP), Revision 2 was prepared to ensure that data of appropriate quality are collected and used for multiple sites for Pacific Gas and Electric Company (PG&E) projects that CH2M HILL supports. Each project will have a sampling and analysis plan (SAP), this QAPP, and QAPP addenda required to meet the project-specific requirements.

1.1 Background

CH2M HILL has been providing services to PG&E since the 1970s. Currently, CH2M HILL and affiliate companies are working at approximately 35 sites for PG&E. CH2M HILL provides services for the following:

- **Site management.** Projects include soil and groundwater monitoring, site characterization, and remediation design systems.
- **Remediation construction.** Projects include soil excavation, disposal, and treatment system construction.
- **Ecosystems and permitting.** Projects include proponent's environmental assessments, California Environmental Quality Act documentation, and other permitting and planning projects.
- **Engineering design.** Projects include computer-aided design and support and structural analysis.

1.2 PG&E Program Objectives

1.2.1 PG&E Program Objectives and Scope

This QAPP presents the quality assurance (QA) and quality control (QC) requirements designed to ensure that environmental data collected for the PG&E Program will be of the appropriate quality to achieve the objectives defined in the project-specific SAPs or QAPP addenda, unless otherwise defined. Specific protocols for sampling, sample handling and storage, chain-of-custody (CoC), laboratory analyses, data handling, and data evaluation and assessment are discussed. Requirements for performance evaluations, corrective actions, and preventive maintenance of equipment are specified. The elements included in this QAPP are consistent with those specified in the *EPA Requirements for Quality Assurance Project Plans* (U.S. Environmental Protection Agency [EPA], 2001a) and *EPA Requirements for Quality Management Plans* (EPA, 2001b) (note that the latter was reissued in March 2006). The objectives of this QAPP are as follows:

- Ensure that data collection and measurement procedures are standardized among all participants.

- Monitor the performance of the various measurement systems within the PG&E Program to maintain statistical control and provide rapid feedback so that corrective measures, if needed, can be implemented before data quality is compromised.
- Periodically assess the performance of these measurement systems and their components.
- Verify that reported data are sufficiently complete, comparable, representative, unbiased, and precise so that they are suitable for their intended use.

This QAPP is intended for use by CH2M HILL and its subcontractors that provide services associated with the environmental data collection effort. The QAPP supplements all SAPs and any other project-specific documents. The PG&E Program quality officer and the program chemist are primarily responsible for implementation of this QAPP.

1.2.2 PG&E Program QAPP versus SAPs and QAPP Addenda

Elements such as the general description, sources of contamination, information from previous investigations, and proposed investigations are addressed in project or site-specific SAPs or QAPP addenda. PG&E Project-specific QAPP addenda will cover items not included in this QAPP or any in conflict with it. The guidance set forth in this QAPP will be followed in the absence of site specific SAPs or QAPP addenda.

The PG&E project-specific SAPs or QAPP addenda should specify project-specific analytes and analytical methods that differ from the QAPP. The project manager or a designee will determine the reporting limit (RL) requirements, evaluate the QAPP specifications to make certain they meet those requirements, and address any differences in a QAPP addendum. The QAPP addendum will be included as part of the project-specific documents when project requirements dictate variance from the QAPP.

Project-specific preliminary cleanup goals or action levels will be included in the SAPs or QAPP addenda, if available. The project-specific documents will indicate sources for the preliminary cleanup goals or action levels. In cases where available technology does not offer analytical methods that are sufficiently sensitive to detect concentrations at or below the reference levels cited by the source, the method RLs will be used as the preliminary cleanup goals or action levels. All goals are subject to revision and will be documented.

Appendix A presents the analytical requirements for Reporting Limits, Accuracy, and Precession Limits.

1.2.3 Analytical Project Planning

The PG&E Program has a laboratory procurement process, modeled after the Air Force Center for Engineering and the Environment (AFCEE) (formerly the Air Force Center for Environmental Excellence), EPA, the U.S. Navy, and other federal programs. The process balances the PG&E Program quality, defensible data, and costs. The model has identified three steps in planning the analytical needs of a project:

1. **Determine the requirements.** To determine project-specific requirements, the program chemist should attend kick-off meetings (or equivalent) to understand the project goals and help develop the analytical scope of work.

2. **Determine the laboratory needs and select the laboratory.** Factors influencing the selection of analytical, geotechnical, radiochemistry laboratories include the matrices sampled; laboratory capabilities, recent performance, and location; and price. The program chemist ensures that the laboratory selected is appropriate to meet project objectives. The more information regarding the project objectives given to the chemists, the better chance they have to control liabilities related to analytical work.

3. **Decide what level of data validation is required to provide defensible data at the appropriate level of QC.** See Section 6.3 for descriptions of the data validation process. When a request for proposal is received from PG&E, there is a kickoff meeting of key people, including the project manager, the responsible contract administrator, the program chemist (or sometimes a project-specific chemist), a representative from project delivery, and others, depending on the type of project. Laboratory scope is discussed and a plan is determined that will provide the appropriate analytical services.

1.2.4 Data Quality Objectives

The specific needs for the data collected during each activity will be examined to ensure that project objectives for each investigation will be optimally achieved. A graded approach will be used in developing the project data quality objectives (DQO) to ensure that the DQO process will be appropriate for the nature, size, cost, and risk associated with the task or project. All projects will begin by examining EPA's seven-step DQO process (EPA, 2000); based on the level of project complexity and intended use of the data, the level of detail and applicability of the seven-step process will be assessed. The DQO process should consider the following steps (if applicable):

1. **State the problem.** Concisely describe the problem to be investigated. This determines the need for data collection. Review existing information to define the problem.

2. **Identify the decision**. Identify the decision that will solve the problem by using the data to be collected.

3. **Identify the inputs to the decision**. Identify the information and environmental measurements that are needed to support the decision.

4. **Define the study boundaries**. Specify the times, spatial areas, and other conditions (e.g., target analytes) that determine when and where data should be collected.

5. **Develop a decision rule**. For each decision, define the conditions that would cause the decision maker to choose between alternate actions (the decision rule is usually in the form of an "if…then" statement).

6. **Specify tolerable limits for decision errors**. Define how much uncertainty can be tolerated by the decision maker. Determine the acceptable error rates based on the consequences of making an incorrect decision.

7. **Optimize the design**. Evaluate information from the previous steps and choose the most resource-efficient design for data collection that will support a reliable decision.

SECTION 2

PG&E Program Organization and Responsibility

2.1 PG&E Program Organization

The PG&E Program management team has been structured with a program manager, program quality control manager, program health and safety manger and a program chemist to ensure that the goals of the PG&E Program are met.

2.2 Project/Task Organization

The organization chart and descriptive text identifying task managers and individuals charged with specific responsibilities for each project can be found in project-specific SAPs. Lines of authority and the scope of authority given to each key member of the project team, including the authority to initiate and approve corrective actions, are discussed in the SAPs. All subcontractors and scopes of work are also identified in the project- or site-specific SAPs.

2.3 Training and Certification Requirements

All personnel engaged in field activities will have completed the Occupational Safety Health Administration, 40-hour health and safety training that meet the requirements of Title 29 Code of Federal Regulations Section 1910.120 and Title 8 Code of California Regulations Section 5192. All CH2M HILL personnel working on the PG&E Program will read applicable project-specific health and safety plans. Documentation will be maintained to demonstrate that all requirements of the plan are followed.

All laboratories contracted for analytical services will be certified under the California Department of Health Environmental Laboratory Accreditation Program, when appropriate and where accreditation is afforded under the California program. No analyses may be performed or reported if accreditation is revoked. Any loss or suspension of accreditation must be communicated to CH2M HILL within 24 hours of notification. Laboratory managers will ensure that all laboratory personnel have been properly trained and are qualified to perform the assigned tasks.

SECTION 3

Sampling Procedures

3.0 Standard Operating Procedures

All sample collection and related activities will follow the appropriate standard operating procedure (SOP). SOPs are located in the project work plan, SAP, QAPP addendum, or other project documents.

3.1 Sampling Design

The number and location of samples are specific to each site and are discussed in the project-specific SAPs. The rationale for the sampling design is also described in the SAPs as part of the project DQOs. The sampling design is a function of the medium sampled, information about the sampling site, the type of data to be collected, and how the data are to be used.

All projects should use the field database and provide a planned sample table (PST), CoC forms, and other database-generated paperwork whenever possible. All samples collected for offsite laboratories will be documented on a CoC form.

The procedures described in the following sections may be superseded or supplemented by the project-specific SAPs or QAPP addenda.

3.2 Sampling Method Requirements

This section addresses the requirements for soil and groundwater sampling. Many projects will require site-specific SOPs because of unique conditions that should be addressed in the project-specific work plan, SAP, QAPP addenda or other project-specific documents. Small projects will need to have sampling SOPs, but may find an existing SOP that can be adopted for the specific needs of the project.

3.2.1 Field Calibration

Field equipment will be calibrated before the start of work and recorded in the field notebook or daily calibration log. Any instrument drift from prior calibration should be noted. Calibration will be in accordance with procedures and schedules in the particular instrument's operations manual.

Calibrated equipment will be uniquely identified by using the manufacturer's serial number or other means. A label with the identification number and the date when the next calibration is due (scheduled calibrations) will be physically attached to the equipment. If this is not possible, records traceable to the equipment (e.g., showing the equipment identification) will be readily available for reference. Instrument identification and the results of calibrations and records of repairs will also be recorded in the logbook or daily calibration log.

Scheduled periodic testing equipment calibration does not relieve field personnel of the responsibility of using properly functioning equipment. If equipment malfunction is suspected, the device shall be removed from service, tagged so that it is not inadvertently used, and the appropriate personnel notified so that a recalibration can be performed or substitute equipment can be obtained. Equipment that fails calibration or becomes inoperable during use will be removed from service and either segregated to prevent inadvertent use or tagged to indicate it is out of calibration. Such equipment will be repaired and satisfactorily recalibrated. Equipment that cannot be repaired will be replaced.

3.2.2 Soil Sampling

Sampling locations will be specified in the project-specific SAPs, but the exact locations will be determined in the field based on such factors as accessibility and topography. The exact locations will be recorded in the field logbook or on the field sampling form when sampling is completed. A sketch of the sampling location will be entered into the logbook, if necessary, with reference points labeled including distances to the sampling location. Location of the sampling point by a global positioning system may be required.

Soil sampling using decontaminated equipment will be performed as described in the following sections. Each sample container will be closed as soon as it is filled; it will be chilled and processed for shipment to an offsite laboratory to allow laboratory analysis within the applicable holding time.

ALL SOILS SAMPLE RESULTS WILL BE REPORTED IN DRY WEIGHT UNLESS OTHERWISE SPECIFIED IN THE SAP.

3.2.2.1 Surface Soil Sampling

Surface soil sampling will follow the project-specific SOPs, but generally, samples will be collected as grab samples at the depth interval specified in the project-specific SAP for each location. Samples will be collected using a decontaminated stainless steel or nonmetallic hand trowel or equivalent equipment (sampling equipment should be chosen based on the analyte of concern for the specific sample). A Terra Core sampler, EasyDraw Syringe, cutoff disposable syringe or equivalent equipment will be used for volatile organic compounds (VOC), as described in Section 3.2.1.4. Samples to be analyzed for VOCs will be collected first. Samples to be analyzed for all other analytes should be placed in a sample-dedicated, 1-gallon, disposable pail or a decontaminated stainless steel bowl. The samples will be homogenized (using the trowel), and transferred to the appropriate containers. To prevent potential contaminant migration from the sample, sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being sealed.

3.2.2.2 Subsurface Soil Sampling

Subsurface soil sampling will follow the project-specific SOPs, but generally, samples will be collected by boring to the depth specified in the project-specific SAP using an appropriately sized hand auger or equivalent equipment. Once the specified depth is reached, the hand auger will be removed, and accumulated soil will be set aside in a sample-dedicated disposable pail or tarp. A different, clean hand auger will be inserted into the hole to collect the sample (decontamination of the boring implement is sufficient if multiple boring implements are not available). Other sampling devices, such as push tubes or split-spoon

samplers, may be used. A Terra Core sampler, EasyDraw Syringe, cutoff disposable syringe, or equivalent equipment will be used for VOCs, as described below. Samples to be analyzed for VOCs will be collected first. Samples to be analyzed for all other analytes should be placed in a sample-dedicated, 1-gallon, disposable pail or a decontaminated stainless steel bowl. The samples will be homogenized (using the trowel) and transferred to the appropriate containers. To prevent potential contaminant migration from the sample, sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being sealed.

3.2.2.3 Confirmation Sampling for Soil Excavation

This procedure is outlined in the project-specific SOPs. Confirmation sampling will be performed prior to closure of any excavation. Confirmation samples are usually collected from the bottom and sides of the excavation. The number and type of samples collected should be of sufficient quantity to be representative of the excavated site. The project- or site-specific SAP should address the number, type, and quantity of samples to be collected. All confirmation samples should be analyzed by the analytical methodology specified herein or in the project-specific QAPP addendum (collection of soil samples for determination of VOCs shall be in accordance with Section 3.2.1.4.). Field or laboratory screening data should not be used to verify that contamination has been removed below project action levels unless specifically approved by the overseeing regulatory agency.

3.2.2.4 Soil Sampling for Volatile Organic Compounds

See project-specific SOP for procedure. Guidelines for collecting soil samples for VOC analysis are provided in Method SW5035B. These sampling techniques are applicable to analysis by methods SW8260B or C and SW8015B or D (volatile parameters). Sampling for VOCs may be accomplished by using an EasyDraw Syringe, a Terra Core sampler, a cutoff plastic syringe, or any equivalent sampling device.

VOC samples will be collected into pre-tarred vials with or without preservatives. Preserved samples will be chilled and sent to the lab in accordance with the appropriate SOP. Unpreserved VOC samples will be frozen or chilled in the field. If chilled to 4 degrees Celsius (°C) (±2°C), the samples will be shipped by overnight express delivery (or courier) the same day they are collected. If frozen, appropriate measures should be taken to ensure that frozen samples remain frozen until receipt by the laboratory. If samples remain frozen, the laboratory has 14 days from date of collection to analyze the samples. If samples thaw to temperatures higher than 4°C (±2°C), they must be analyzed within 48 hours of collection. If the temperature does not exceed 4°C (±2°C), the laboratory may (1) freeze the samples between -7 and -20ºC within 48 hours of collection and keep them frozen or (2) preserve them in sodium bisulfate or methanol within 48 hours of collection. Either of these procedures will extend the holding time to 14 days.

Sampling Using Cutoff Syringe. A disposable syringe capable of measuring 1 to 5 milliliters (ml) (±0.5 ml) is required. Calibration in the field will be needed for the specific soil type and the type of syringe to determine the proper setting on the syringe to collect the samples. For example, the plunger is set to 5 ml, and the sample is collected and weighed; if 5 grams (±0.5 gram) are not obtained, the process is repeated until the correct plunger setting is identified. The same procedure is repeated for the 1-gram sample. Once the volume setting

is identified, all soils of similar type will be collected at this volume. Samples can be collected with or without field preservation. When field preservation is chosen, the samples are collected into vials pre-preserved with methanol or sodium bisulfate. Otherwise, samples can be collected into vials without preservative, and preservation can be performed by the laboratory upon receipt of the samples within 48 hours of collection.

Sampling with Terra Core Sampler or EasyDraw Syringe. The sample is collected into the Terra Core or equivalent sampler following the manufacturer's instructions. A minimum of three samples will be collected. Two aliquots are needed for low-level analysis and reanalysis if necessary. The third aliquot is needed for extraction in methanol by the laboratory in case high-concentration analysis is indicated. Exposure to air must be minimized.

Sampling with Field Preservation. Before using this option, determine if the soil is amenable to the sodium bisulfate preservative. Soil samples that contain carbonate minerals may effervesce upon contact with the preservative. If the amount of gas generated is small (little if any effervescence with the preservative), field preservation may be used. If rapid or vigorous gas generation is observed, the sample should be collected without field preservation. If the sample is amenable to field preservation, it is collected using one of the methods listed above and quickly transferred into a VOC vial with preservative. The vial should be quickly sealed to avoid significant loss of volatiles components. The laboratory will supply a minimum of three preweighed VOC vials with 5 ml of aqueous sodium bisulfate preservative as described in Method SW5035B, as well as a single preweighed VOC vial without the preservative for each sample to be analyzed for VOCs. Two 5-gram aliquots in bisulfate are required for low-concentration analysis and reanalysis, when necessary. One 5-gram aliquot without sodium bisulfate is required for extraction in methanol by the laboratory in case high-concentration analysis is indicated by a low-concentration or screening analysis of the sample. One 1-gram sample in bisulfate is needed because the possibility exists that neither the 5-gram sample intended for low-concentration analysis, nor the 5-gram sample intended for high-concentration analysis, will have all target analyte concentrations within the calibration range. Exposure of the sample to air must be minimized.

If VOC analyses are the only analyses being performed for samples collected from any location; an additional 2- or 4-ounce soil sample must also be collected to analyze for percent moisture.

Sampling without Field Preservation. The samples will be collected using one of the methods listed above and quickly transferred into a minimum of three preweighed, vials without preservative supplied by the laboratory. These preweighed vials may be empty, they may contain reagent water, or they may be preserved with methanol, depending on whether the contaminant concentration is at low- or high-level concentration. Two 5-gram aliquots are needed for low-concentration analysis and reanalysis, when necessary. In addition, one 5-gram aliquot is required for extraction in methanol by the laboratory in case high-concentration analysis is indicated by a low-concentration or screening analysis of the sample. One 1-gram sample is also recommended because the possibility exists that neither the 5-gram sample intended for low-concentration analysis, nor the 5-gram sample intended for high-concentration analysis, will have all target analyte concentrations within the calibration range. Exposure of the sample to air must be minimized. Freezing the samples

between -7 and -20º C within 48 hours and keeping them frozen until analysis allows a 14-day holding time.

If VOC analyses are the only analyses being performed for samples collected from any location; an additional 2- or 4-ounce soil sample must also be collected to analyze for percent moisture.

3.2.3 Groundwater Sampling

3.2.3.1 Water Level Measurement

See project specific SOP for procedure. Field meter probes and water level sounding equipment will be decontaminated before and after each use at each well. Water levels in wells that are known or suspected to be least contaminated will be measured first. Water levels in wells that are known or suspected to have the highest contamination will be measured last.

If well heads are accessible, all wells will be sounded from the top of the casing to determine the depth to water and total well depth prior to purging. An electronic sounder, accurate to ±0.01 foot, will be used to measure depth to water in each well. Annual calibration documentation shall be maintained on file. The serial number of the meters shall be recorded in the sampling logbook. When using an electronic sounder, the probe will be lowered down the casing to the top of the water column, and the graduated markings on the probe wire or tape will be used to measure the depth to water from the surveyed point on the rim of the well casing. (Typically, the measuring device emits a constant tone when the probe is submerged in standing water. Most electronic level sounders have a visual indicator consisting of a small light bulb or diode that turns on when the probe encounters water.) The total well depth will be sounded from the surveyed top of the casing by lowering the weighted probe to the bottom of the well. The weighted probe will sink into silt, if present, at the bottom of the well screen. The total well depth will be measured by recording the depth to the nearest 0.1 foot.

3.2.3.2 Well Purging

See project specific SOPs for procedure. All wells will be purged prior to sampling. All equipment that will contact the sample during purging and sampling will be decontaminated prior to each use.

Low-flow Purge. One option for well sampling is low-stress (low-flow) purging using a pump capable of a purge rate of 1 liter per minute or less. Typically, a pneumatic or small electric submersible pump is used. The water level should be monitored approximately every 5 minutes. The flow rate should be started at the minimum flow capacity of the pump, then gradually increased until initial drawdown is observed. The flow rate should then be reduced slightly to achieve a stabilized pumping level. This reduced rate should become the maximum purge rate for the well. Each adjustment to the flow rate and the water level measured after each adjustment should be recorded. The flow rate should not exceed 1 liter per minute. Care should be taken to maintain pump suction and avoid entrapment of air in the tubing.

Casing Volume Purge. Another option for well sampling is three casing volume (macro-purging) using a pump capable of purging 1 to 5 gallons per minute, usually an electrical

submersible pump. Purging will be conducted at a flow rate sufficient to remove water from the entire screened interval of the well. However, the purge rate should not result in substantial drawdown, which is defined as 5 percent of the water column or the top of the screened interval. Purging will consist of the removal of a minimum of three casing volumes of water.

For low-yield wells (wells that exhibit less than 80 percent recovery [%R], within 2 hours), one casing volume of water shall be removed. If pump capability allows, the well will be purged at a rate of less than 1 gallon per minute. The well will then be allowed to recover to 80 percent and sampled within 24 hours of purging.

Water Quality Parameter Stabilization. To ensure representative sampling, water quality parameters (dissolved oxygen, pH, redox potential, specific conductance, and turbidity) must be stable before samples are collected, regardless of purge technique. Parameters will be measured approximately every 3 to 5 minutes, depending on the rate and duration of the purge. Purging is considered complete when the following water quality parameters are stable (i.e., for three consecutive readings):

- The pH varies by no more than 0.1 pH unit.
- Specific conductance readings are within 10 percent of the average.
- The redox potential varies by no more than 10 millivolts.
- The dissolved oxygen readings are within 10 percent of the average.

The water used to make measurements will not be used to fill sample bottles.

If the macro-purge technique is used, three casing volume well purges must be complete **and** the water quality parameters must be stable before the sample is collected. The total amount of water purged will be recorded in the field logbook or well-specific purge and sample collection form.

Grab-sample Collection. In some instances, it is appropriate to collect a grab sample from a monitoring well. For example, when a low-yield well has been purged and allowed to recharge. A bailer can be used to collect the sample without additional purge, eliminating the need to deploy a well pump for sample collection.

If a bailer is used to collect samples, a sufficient volume of water must be collected to fill the sample bottles and perform one measurement of water quality parameters. The water quality parameters will be recorded in the field logbook or well-specific purge and sample collection form.

3.2.3.3 Well Sampling

See project specific SOPs for procedure. Prior to sampling each well, the water level will be measured and the well purged, as previously described. All wells will be sampled within 24 hours of purging. Wells without a dedicated pump will be sampled using a bailer of appropriate material, such as Teflon or stainless steel. Wells with a dedicated pump will be sampled directly from the tap closest to the well head. All aerators, strainers, and hoses will be removed from the tap prior to sample collection. The flow will be adjusted so that a gentle stream is obtained. To minimize volatilization, a flow rate of less than 100 milliliters per minute is recommended for samples to be analyzed for VOCs.

At each sampling location, sample bottles designated for a particular analysis will be filled sequentially before bottles designated for other analyses are filled. Vials for VOCs will be filled first to minimize aeration of water in the well. All vials for VOCs will be provided, pre-preserved by the subcontract laboratory. The vials will be filled directly from the tap. Each vial will be inverted and checked for air bubbles and checked for headspace. If a pea-size or larger air bubble appears, the cap can be removed and additional sample added to eliminate the air space. If there is any likelihood of contamination being introduced into the sample, the vial contents will be emptied into the container used to measure purge volumes, the vial discarded, and a new sample collected in a new vial.

If a duplicate sample is to be collected, all sample bottles designated for a particular analysis for both duplicates will be filled sequentially before bottles for another analysis are filled. For example, duplicate samples will be collected sequentially for semivolatile organic compounds (SVOC), followed by duplicate samples collected sequentially for metals. EPA recommends the following collection order:

1. Volatile organic compounds and total organic compounds
2. Dissolved gasses and total organic carbon
3. Semivolatile compounds – Acid/Base extractables, pesticides, and PCBs
4. Metals and general chemistry
5. Radionuclides

It is considered good management practice to plan sample collection from the least to the most contaminated area of the site to decrease the risk of cross contamination (assuming no other factors that drive the priority of sampling location order).

Groundwater samples will be transferred from the bailer, tap, or pump tubing directly into the appropriate pre-preserved sample containers, if required. When transferring samples, care must be taken not to touch any nondedicated equipment to the sample container. The containers will be chilled and processed for shipment to the laboratory.

3.3 Equipment Decontamination

See project specific SOPs for procedure. Sampling equipment must be consistently decontaminated to ensure the quality of the samples collected. All equipment that comes into contact with potentially contaminated soil or water samples will be decontaminated. Disposable equipment intended for one use will not be decontaminated but will be packaged for appropriate disposal. In addition, equipment that is dedicated for repeated use at only one location does not need to be decontaminated. Equipment decontamination will occur prior to each use.

The following decontamination sequence is recommended:

1. Nonphosphate detergent and tap water wash, using a brush if necessary
2. Tap water rinse
3. Two rinses with deionized/distilled water

4. Organic-free water rinse (high-performance liquid chromatography grade) for organic samples

Large and bulky sampling equipment might need to be steam cleaned. Equipment will be decontaminated in a predesignated area on pallets or plastic sheeting. The cleaned equipment will be wrapped or covered to prevent contamination and stored in an uncontaminated area.

3.4 Disposal of Investigation-derived Wastes

The disposal of investigation-derived waste (IDW) should be addressed in the project-specific SAP. Each project or task can have different IDW disposal requirements, depending on site-specific conditions and the work performed. The following potentially contaminated IDW might be generated during field activities:

- **Used personal protective equipment (PPE) and disposable equipment.** Used PPE will be double-bagged and placed in a municipal refuse dumpster onsite. PPE and disposable equipment that is still serviceable will be rendered unusable before disposal into the dumpster.
- **Decontamination fluids.** Decontamination fluids include dilute nitric acid, deionized water, residual contaminants, and water with nonphosphate detergent. These fluids will be collected and disposed of in accordance with site requirements and applicable regulatory requirements
- **Soil cuttings.** Soil cuttings generated during subsurface sampling will be collected and disposed of in accordance with site requirements and applicable regulatory requirements.
- **Purged groundwater and excess groundwater collected for sample container filling.** These wastes will be collected and disposed of in accordance with site requirements and applicable regulatory requirements.

Each project SAP should address IDW. Any samples collected for waste characterization should include IDW in the sample identifier (ID).

3.5 Field Quality Control Samples

QC samples will be collected to monitor accuracy, precision, and the potential presence of field contamination for analytical methods to be performed in the offsite laboratory. All field QC samples, except matrix spike/matrix spike duplicates (MS/MSD), will be sent blind to the laboratory along with regular field samples. These blind samples will be labeled similar to regular field samples to disguise them. Sampling frequencies may vary according to the project needs, as defined in the project-specific SAP or QAPP addendum. The recommended frequency of collection for QC samples is discussed in the following sections and should be reviewed and updated to achieve project-specific DQOs.

3.5.1 Field Duplicate Samples

A field duplicate (FD) is an independent sample collected as close as possible to the original sample, from the same source, and under identical conditions. FDs are used to document sampling and analytical precision. FDs will be collected at a minimum frequency of 10 percent or one per sampling event, whichever is more frequent, for each matrix and type of analysis. The sampling procedures described in Section 3.2 will be followed. The sampling locations for FD samples will be recorded in the field logbook or field sampling form, or both.

3.5.2 Equipment Blanks

Equipment blanks (EB) will be collected to evaluate field sampling and decontamination procedures by pouring deionized or organic free water over the decontaminated equipment. EBs will be collected at a frequency of one EB per day for each non-dedicated equipment type per sampling team. The EBs will be preserved, packaged, and shipped in the same manner described for the environmental samples. A separate sample ID will be assigned to each EB sample, and the sample will be submitted blind to the laboratory. EBs will be analyzed in the offsite laboratory for the same parameters specified for the corresponding matrix or for the main contaminate of potential concern (COPC).

3.5.3 Field Blanks

Field blanks (FB) (also known as ambient blanks [AB]) are collected to evaluate (or to monitor) whether contaminants have been introduced during sampling because of ambient conditions. FBs will be collected by pouring deionized water (or organic free water for organic samples) into a sample container at the sampling location and leaving the sample exposed to the atmosphere during the time a sample is collected. FBs will be collected at a frequency of one per location that warrants concern because of environmental conditions or project-specific QC concerns, as determined by the project chemist or project manager. Generally, FBs need to be collected if the analyte concentrations are high enough to allow mobile contaminants to affect the sample results and field conditions such as upwind environments cannot be controlled. FB will be analyzed for the same parameters specified for the associated samples.

3.5.4 Trip Blanks

Trip blanks (TB) are used to monitor contamination during sample shipping and handling and for cross contamination through VOC migration among the collected samples. They are prepared in the laboratory by pouring American Society for Testing and Materials (ASTM) Type II or organic-free water into a VOC sample container. They are then sealed, transported to the field, stay sealed while VOC samples are taken, and transported back to the laboratory in the same cooler as the VOC samples. One TB should accompany each VOC sample cooler.

3.5.5 Matrix Spike/Matrix Spike Duplicate

A MS/MSD consists of duplicate field sample aliquots spiked by the laboratory with analytes of concern to evaluate the effects of the matrix on the recoveries of these analytes. For every 20 field samples of each matrix collected at each site, additional duplicate aliquots

of one of the samples should be collected for each analysis and designated on the CoC form for use as an MS/MSD by the laboratory. Separate line entries are not required for matrix spikes. The increased number of sample containers should be noted. The duplicate aliquots for MS/MSD analyses should be collected simultaneously or in immediate succession with the parent sample. They will be treated in exactly the same manner as the parent sample during storage and shipment. The sampling locations for the MS/MSD will be documented in the field logbook or the field sampling form, or both if the MS/MSD are specifically requested by the project; if not, document the extra volume on the CoC and in the field logbook or on the field sampling form.

3.5.6 Split Samples

Split samples may be collected periodically for comparison of data between analytical laboratories. A split sample is collected from a thoroughly homogenized original sample and is used to document analytical precision. Split samples will be collected for each matrix and for each analytical method, except those for volatiles when project objectives dictate the need. The sampling procedures described in Section 3.2 or those described in the project- or site-specific SAPs or QAPP addenda will be followed. The sampling locations will be recorded in the field logbook or field sampling form, or both. Split samples will be sent to a second certified laboratory, and results will be compared with those from the primary laboratory.

SECTION 4

Sample Handling and Custody

4.1 Sample Documentation and Tracking

Projects with large sampling events should take advantage of the field database to provide a PST, CoCs, and sample container labels. The use of Mobil Integrated Sample Tracking (MIST) and the field database are recommended. All projects must keep sample documentation.

The laboratories will provide pre-preserved sample containers with labels identifying the preservative, unless approved by the project chemist. Laser-printed labels and indelible ink pens will be used whenever possible to complete sample labels. Immediately prior to sample collection, the sample ID, date, time of sampling and sampler's initials will be recorded onto the waterproof label. Samples will be placed into resealable bags, and ice used in shipping containers double bagged. Vital information regarding the collection of each sample will be recorded into a field logbook, field sampling form, or CoC form.

A separate logbook will be used for each project. It will be bound with consecutively numbered pages. All entries will be legibly written in black ink and signed and dated by the individual making the entries. Factual and objective language will be used. All entries will be complete and accurate to allow reconstruction of each field activity. A line will be placed through any portion of a field notebook that is unused. One line strike-through will be used to show corrections to entries. The strike-through will be initialed and dated. No correction fluid will be used. The following information for each sample will be recorded into the field logbook, field sampling form, or CoC form, whichever is appropriate:

- Sampling location and description. (Sketch and measured distances from reference points will be recorded if there is no established identification for the sample location.)
- Sample ID.
- Sampler's name.
- Date and time of sampling.
- Sample designation as composite or grab.
- Sample matrix.
- Type and ID of sampling equipment.
- Field measurement data (e.g., pH, temperature, conductivity).
- Field observations that may be relevant to the analysis or sample integrity (e.g., odor, color, and weather conditions).
- Associated QC blanks.

- Preservative used.
- CoC form number, custody seal number, and lot numbers of sample containers (when appropriate).
- Shipping details. (If the laboratory is providing courier service, the courier must sign and date the CoC forms. Copies of the signed CoC forms should be transmitted to the office as soon as practical. If Federal Express, United Parcel Service, or other courier is used, include shipping information for each shipment.)
- Destination laboratory.

4.2 Containers and Preservatives

The contracted analytical laboratory will provide the required sample containers for all samples including QC samples. All sample containers for PG&E projects will be pre-cleaned and certified to EPA standards. No sample containers will be reused. The contracted laboratory will add preservatives, if required, prior to shipping the sample containers to the field or supply the preservative as appropriate. The laboratory, upon receipt of the samples, will verify and record the adequacy of preservation and will add additional preservative, if necessary. For VOCs, the sample label or CoC will indicate the presence of preservative and the laboratory will verify and record the pH after the analysis. The containers, minimum sample quantities, required preservatives, and maximum holding times for many parameters are shown in Table 4-1 (tables appear at the end of the section in which they are first referenced). The project- or site-specific SAP or QAPP addendum will contain the specific containers required for each project if they differ from the containers listed in Table 4-1.

4.3 Chain-of-Custody

Collecting data of known quality begins at the point of sample collection. Legally defensible data are generated by using proven evidentiary procedures. These procedures are described in the following sections and must be followed to preserve and ensure the integrity of all samples from the time of collection through analysis. Sample custody records must be maintained in the field and subcontractor laboratory. A sample is considered to be in custody if it is either in physical possession or view, locked up, or kept in a secured and restricted area. Until the samples are shipped, custody will be the responsibility of the sampling team leader.

CoC forms document sample collection and shipment to the laboratory. CoC form(s) will be completed for each sampling event. The original copy will be provided to the laboratory with the sample shipping cooler, and a copy will be retained in the field documentation files. The CoC form will identify the contents of each shipment and maintain the custodial integrity of the samples. All CoC forms will be signed and dated by the responsible sampling team personnel, as applicable. The “Relinquished By” field will be signed by the responsible sampling team personnel, with the date, time, and air bill number noted on the CoC form. The laboratory will provide a PDF copy of the CoC forms, with the sample login information included, within 48 hours of sample receipt, along with information related to

the condition of receipt of the samples. The laboratory will also include the original or a copy with the final hardcopy report (the final "hardcopy" can be in a paper or PDF format or both, depending on project-specific requirements).

A self-adhesive custody seal will be placed across the lid and side of each sample to maintain its integrity until the laboratory opens it. The shipping coolers containing the samples will be sealed with a custody seal any time they are not in an individual's possession or view before shipping. All custody seals will be signed and dated by the responsible sampling team personnel.

At a minimum, the CoC form must include the following information:

- Project information such as project number or identification of investigation monitoring program, Project Manager, etc.
- Unique sample ID
- Date and time of sample collection
- Source of sample (including name, location, sample type, and matrix)
- Number of containers
- Designation of MS/MSD (if applicable)
- Preservative used
- Analyses required
- Name of sampler
- Custody transfer signatures, dates, and times of sample transfers from the field to transporters and to the laboratories
- Bill of lading or transporter tracking number (if applicable)

4.4 Laboratory Responsibilities

After the samples reach the laboratory, they shall be checked against information on the CoC form for anomalies. The condition, temperature, and appropriate preservation of samples shall be checked and documented on the CoC form or a sample receipt checklist. Checking an aliquot of each sample container, at the time of receipt, using litmus paper is an acceptable procedure to determine the pH of all sample containers received, except VOCs. The pH check should be conducted in the sample receiving area or in the appropriate laboratory department. Samples for VOC analysis require that the pH check be performed after the vial has been opened for analysis; the pH shall be recorded at the time of analysis in the department log books. Anomalies in the received samples and their resolution shall be documented in laboratory records and summarized in the final analytical report case narrative. All sample information shall then be entered into a tracking system, and unique analytical sample IDs shall be assigned. A copy of this information shall be reviewed by the laboratory for accuracy. Sample holding time tracking begins with the collection of samples and continues until the analysis is complete.

Samples not preserved or analyzed in accordance with the requirements in this QAPP or the project-specific SAP or QAPP addendum may be resampled and analyzed at no additional cost to CH2M HILL. Any subcontracted analyses shall be documented on a CoC form by the laboratory and noted in the case narrative. Internal laboratory CoC procedures shall also be documented and implemented by the laboratory. Sample custody within the laboratory will, at a minimum, include storage of samples in a secure, restricted access area when not in use; samples must be checked out and checked back in by the analysts who use them. Internal custody records must be maintained by the laboratory as part of the documentation file for each sample. Specific instructions concerning the analysis specified for each sample shall be communicated to the analysts. Analytical batches shall be created, and laboratory QC samples shall be introduced into each batch.

While in the laboratory; samples shall be stored in controlled-access, temperature-applicable areas. Refrigerators, coolers, and freezers shall be monitored for temperature 7 days a week. Acceptance criterion for the temperatures of the refrigerators and coolers is 4°C ±2°C. Acceptance criterion for the temperatures of the freezers shall be between -7°C and -20°C. All of the cold-storage areas shall be monitored by using thermometers that have been calibrated with a National Institute of Standards and Technology approved traceable thermometer. As indicated by the calibration results, correction factors shall be applied to each thermometer.

Records that include acceptance criteria shall be maintained. Samples for volatile organics analysis shall be stored separately from other samples, standards, and sample extracts. Samples shall be stored after analysis until disposed of in accordance with applicable local, state, and federal regulations. Disposal records shall be maintained by the laboratory.

The following information shall be documented on the CoC form, the sample receipt form, or the sample login form (or on more than one of these forms, as applicable):

- Date samples received
- CH2M HILL sample ID
- Laboratory sample ID
- Analytical tests requested for the sample batch
- Sample matrix
- Number of samples in the batch
- Container description and location in the laboratory
- Verification of sample preservation

All of the information must be retained and traceable in the laboratory sample tracking system, with summary information provided in the analytical reports.

SOPs describing sample control and custody shall be maintained by the laboratory.

4.5 Sample Packaging and Transport

The following sections provide guidelines for sample packaging and transport that may be superceded, amended, or replaced in the project- or site-specific SAPs or QAPP addenda.

4.5.1 Sample Container Preparation

The following procedures shall be implemented:

- Labels will be checked for completeness and comparability with the COC.
- Container lids will be checked for tightness; if the container is not full, the sampler will note the COC, field notebook, or field sampling form.
- Sample bottles will be double-bagged in heavy-duty plastic. Glass sample containers will be covered with bubble wrap to prevent breakage.

4.5.2 Shipping Cooler Preparation

The following procedures shall be implemented:

- All previous labels and broken custody seals used on the sample shipping cooler will be removed.
- Drain plugs will be sealed with fiberglass or similar tape (outside and inside) to prevent melting ice from leaking.
- A cushioning layer of packing material, such as bubble wrap (approximately 1 inch thick), will be placed at the bottom of the cooler to prevent breakage during shipment.
- The cooler will be lined with a large plastic bag (same type used to contain samples).
- All ice will be double-bagged in zip-lock plastic bags.

4.5.3 Placing Samples in the Cooler

The following procedures shall be implemented:

- The CoC form will be placed in a zip-lock bag and taped inside the top of the cooler if shipment is to be made through commercial carrier.
- Samples will be placed in an upright position in the cooler. Sample containers will never be placed onto their side, except for a soil VOC that is to be frozen.
- Ice will be placed on top of samples and between samples. Ideally, ice will be placed in resealable plastic bags in duplicate to minimize leakage of ice melt into the cooler.
- Void space between samples should be filled with packing material or ice packs (vermiculite is not acceptable packing material unless required by DOT).

4.5.4 Closing the Cooler

The following procedures shall be implemented if the cooler is to be shipped by commercial carrier:

- The cooler lid will be taped with strapping tape, encircling the cooler several times.
- Custody seals should also be affixed to the cooler lid to further ensure the integrity of the samples. Custody seals should be initialed and dated.

4.5.5 Transport

Sample coolers will be transported to the laboratory immediately after sample collection. An overnight courier may be used to transport the samples. Intermediate stops should be avoided, except for emergencies, in which case, the situation should be noted in the field notebooks. The laboratory should be notified that samples are being shipped.

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
Metals (except hexavalent chromium)	SW6010B or C, SW6020A, EPA200.7, EPA200.8, SM3120B, EPA245.1, SW7000 series methods	1-liter P or G	8-oz/P, G, or T	Water: Add HNO_3 to pH<2; soil/sediment: None	28 days for mercury; 180 days for all others
Hexavalent Chromium	SW7199		4-oz/P, G, or T	Soil/sediment: Chill to 4°C (±2°C)	Soil: 30 days to extraction, 7 days to analysis
Hexavalent Chromium	EPA218.6	250-ml P	Not applicable	chill to ≤6°C Laboratory or field filtration within 24 hours. After filtration adjust the pH to 9–9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Hexavalent Chromium	SM3500-Cr B	250-ml P	Not applicable	chill to ≤6°C Laboratory or field filtration within 24 hours. After filtration adjust the pH to 9–9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Purgeable TPH	SW8015B, C or D Preparation methods: SW5035B (soil) SW5030B (water)	Three 40-ml G-TLC	Three 40-ml G-TLC	Water: Add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: Chill to 4°C (±2°C) or: • Frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved within 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
Extractable TPH	SW8015B, C or D	Two 1-liter G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Pesticides	SW8081A or B	Two 1-liter G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis 90 days to extraction if frozen to -10°C (±2°C)
PCB	SW8082 or SW8082A	Two 1-liter G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis 90 days to extraction if frozen to -10°C (±2°C)
VOCs	SW8260B or C Preparation methods: SW5035B (Soil) SW5030B (Water)	Three 40-ml G-TLC	Three 40-ml G-TLC	Water: Add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: Chill to 4°C (±2°C) or: • Frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved with 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol
SVOC	SW8270C or D	Two 1-liter G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Herbicides	SW8151A	Two 1-liter G	8-oz G or T	Chill to 4°C (± 2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
PNA	SW8270SIM	Two 1-liter G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Carbon Dioxide, Methane, Ethane, and Ethane	RSK-175	Three 40-ml G-TLC	Not applicable	Add HCl to pH<2; chill to 4°C (±2°C)	Water: 14 days
Carbon Dioxide	SM5400-CO2	1-liter P or G		≤6°C	14 days
Ammonia	EPA350.1 Revision 2 or SM4500-NH3	1-liter P or G	4-oz P, G, or T	Water: Add H_2SO_4 to pH<2; chill to ≤6°C Soil/sediment: 4°C (±2°C)	Water: 28 days Soil: Not available
Anions	EPA300.0 or SM4500	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C (none required for chloride and fluoride) ortho-Phosphate requires filtering within 15 minutes after sample collection	Bromide, chloride, fluoride, sulfate, and iodide in 28 days Nitrate and ortho-Phosphate in water 48 hours
Metabolic Acids	EPA300.M	500-ml P or G		Chill to ≤6°C	Water: 28 days
Alkalinity (total, bicarbonate, carbonate, hydroxide)	EPA310.2 or SM2320 B	500-ml P or G		Chill to ≤6°C	14 days
TDS	SM2540 C	500-ml P or G		Chill to ≤6°C	7 days
TSS	SM2540 D	500-ml P or G		Chill to ≤6°C	7 days
Turbidity	EPA180.1 Revision 2 or SM2130	500-ml P or G		Chill to ≤6°C	48 hrs
Color	SM2120 E	125-ml P or G		Chill to ≤6°C	48 hours
Specific Conductance	EPA120.1 Revision 1, or SM2510 SW9050	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C Soil/sediment: Chill to 4°C (±2°C)	28 days
Hardness	SM2340 B or C	500-ml P or G		Chill to ≤6°C	6 months
pH	SM4500H+B or SW9040	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C	15 minutes
BOD	SM5210 B	500-ml P or G		Chill to ≤6°C	48 hours

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
TOC/DOC	SM 5310 C	500-ml G or 40-ml VOA	4-oz P, G, or T	Water: For 500-ml: Add H_2SO_4 to pH<2; chill to ≤6°C For 40-ml VOA: Add H_2PO_4 to pH<2; chill to ≤6°C	28 days
TOC	Walkley Black	Not applicable	4-oz P, G, or T	Chill to ≤6°C	28 days
Perchlorate	EPA314.0	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C	28 days
Sulfide	SM4500-S²	500-ml P or G		Add zinc acetate and NaOH to pH>9, chill to ≤6°C	7 days
Acid Volatile Sulfide	E821/R-91-100	Check with Laboratory prior to sample collection			
TKN	EPA351.1/2 or SM4500	500-ml P or G	4-oz P, G, or T	Add H_2SO_4 to pH<2; chill to Chill to ≤6°C	28 days
Ferrous Iron (Fe +2)	SM3500D	500-ml P or G		Chill to ≤6°C	24 hours
Dissolved Silica	EPA200.7 or SM4500-Si or SM3120 B	500-ml P only		Chill to ≤6°C	28 days
18 O and deuterium	Laboratory SOP (continuous flow mass spectrometer – CF-IRMS)	100-ml P or 40-ml VOA		Chill to ≤6°C	6 months
Cyanide	EPA335.4 (R1) or SM4500-CN C/D/E (water) SW9010B, SW9012, or SW9014 (soil)	500-ml P or G	4-oz P, G, or T	Water: Add NaOH to pH>12; chill to ≤6°C Soil/sediment: Chill to 4°C (±2°C)	Water and soil: 14 days
Gross Alpha	SM7110C	500 ml P or G		Add HNO_3 to pH<2	6 months
Gross Beta	E900.0	500-ml P or G		Add HNO_3 to pH<2	6 months
Radium-226	E903.1	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months
Radium-228	E904.0	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months
Strontium	E905.0	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months
Tritium	E906.0	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months
Uranium	R908.0 or 200.8	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
Dioxins and furans	SW8290	Two 1-liter Amber G	8-oz G	Chill to 4°C (±2°C)	Water and Soil: 30 days to extraction; 45 days after extraction to analysis Soils: 365 days to extraction if frozen to -10°C (±2°C)
Dioxins and furans (Drinking water)	EPA1316B	Two 1-liter Amber G		Chill to 4°C (±2°C)	7 Days to extraction 40 days after extraction to analysis
Asbestos	Water: EPA 100.1/100.2-TEM	1-liter sonicated P		Chill to 4°C (±2°C)	Water: 48 hour holding time
	Soil: PLM/BULK (present/absent); CARB435/PLM; TEM		4-oz G	Chill to 4°C (±2°C)	Soil: I year

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		

Notes:

>	=	greater than
<	=	less than
≤	=	less than or equal to
BTEX	=	benzene, toluene, ethylbenzene, and xylene
CF-IRMS	=	continuous-flow isotope ratio mass spectrometry
DOC	=	dissolved organic compounds
G	=	glass
G-TLC	=	glass with teflon-lined cap
H_2PO_4	=	phosphoric acid
H_2SO_4	=	sulfuric acid
HCl	=	hydrochloric acid
HNO_3	=	nitric acid
NaOH	=	sodium hydroxide
NH_4	=	ammonium
NH_4OH	=	ammonium hydroxide
$(NH_4)_2SO_4$	=	ammonium sulfate
oz	=	ounce
P	=	polyethylene
PCB	=	polychlorinated biphenyls
PLM	=	Polarized light microscopy
PNA	=	polynuclear aromatic hydrocarbons
SIM	=	selected ion monitoring
SO_4	=	sulfate
T	=	brass sleeves in the sample barrel (sometimes called California brass)
TDS	=	total dissolved solids
TEM	=	Transmission Electron Microscopy
TKN	=	total kjeldahl nitrogen
TLC	=	teflon lined closure
TOC	=	total organic compounds
TPH	=	total petroleum hydrocarbons
TSS	=	total suspended solids

SECTION 5

Method Quality Objectives and Quality Assurance Program

Programmatic method quality objectives (MQOs) are defined in this section but may differ in individual projects, as specified in the project-specific QAPP addenda. MQOs are the basis for ensuring that the quality of the data collection meets the project-specific DQOs of the plan. They specify the type, quality, and quantity of QA/QC data to be collected and how the data are to be used to make the appropriate decisions for the project. The final output of the data must meet the qualitative and quantitative needs of the project.

5.1 Data Categories

Both screening and definitive data may be generated. Screening data are generated by rapid analytical methods, and calibration and QC requirements are less rigid than those required for definitive data. Quantitation from a screening method is usually imprecise. Definitive data are generated by rigorous analytical methods using standardized calibration and QC and are reported on specified deliverables. The data are analyte-specific, and both identification and quantitation are confirmed.

In general, screening data will be confirmed by definitive data for use in decision making for the PG&E Program. However, screening data may be used for decision making purposes on a project-specific basis, depending upon the DQOs. The project-specific documents will describe the advantages of collecting screening data that might be less precise but will more adequately define the characteristics of the site by increasing the number of samples collected. This approach can reduce overall error in the data collection process.

5.2 Precision, Accuracy, Representativeness, Completeness, and Comparability

Data quality will be evaluated for precision, accuracy, representativeness, completeness, and comparability (PARCC). Both definitive and screening data will be subject to PARCC requirements. PARCC objectives for screening methods may be identical to those for definitive data, or they may be less stringent depending on the project-specific objectives. Sampling frequencies may vary according to the project needs, as defined in the project-specific SAPs or QAPP addenda.

5.2.1 Precision

Precision is a measure of reproducibility of analytical results. It can be defined as the degree of mutual agreement among individual measurements obtained under similar conditions. Total precision is a function of the variability associated with both sampling and analysis. Precision will be evaluated as the relative percent difference (RPD) between field duplicate

sample results or between the MS and MSD results. Field duplicates will comprise 10 percent of the sampling effort. MS/MSD samples will be analyzed at a 5-percent frequency. The MS/MSD samples will be field designated, if so required by project specific requirements. Laboratory-generated precision control limits can be used for data evaluation; however, all precision control limits listed in Appendix A and Tables 5-3 through 5-15 must be met.

5.2.2 Accuracy

Accuracy is the degree of agreement between a measured value and the "true" or expected value. It represents an estimate of total error from a single measurement, including both systematic error, or bias, and random error that may reflect variability due to imprecision. Accuracy is evaluated in terms of percent recovery (%R) determined from results of MS/MSD and laboratory control sample (LCS) analyses. Surrogate recoveries from samples analyzed for organic parameters are also used to assess accuracy. Laboratory-generated accuracy control limits can be used for data evaluation; however, the accuracy control limits listed in Appendix A and Tables 5-3 through 5-15 must be met.

5.2.3 Representativeness

Representativeness is the degree to which sample data accurately reflect the characteristics of a population of samples. It is achieved through a well-designed sampling program and by using standardized sampling strategies and techniques and analytical procedures. Factors that can affect representativeness include site homogeneity, sample homogeneity at a single point, and available information around which the sampling program is designed.

5.2.4 Completeness

Completeness is the number of valid measurements compared with the total number of measurements generated. Completeness will be determined for each method, matrix, and analyte combination. The completeness goals of each project are optimized to meet the DQOs. The goals for the PG&E Program are 95 percent for aqueous samples and 90 percent for soil samples.

5.2.5 Comparability

Comparability is the confidence with which one data set can be compared to another. It is achieved by maintaining standard techniques and procedures for collecting and analyzing samples and reporting the analytical results in standard units. Results of performance evaluation samples and systems audits will provide additional information for assessing comparability of data among subcontracting laboratories.

5.3 Method Detection Limits, Reporting Limits, and Instrument Calibration Requirements

5.3.1 Method Detection Limits

The method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater

than zero. Each participating laboratory will determine the MDL for each method, matrix, and analyte for each instrument that will be used to analyze samples. The MDLs will be initially determined prior to analyzing samples and again at least once every 12 months; a quarterly MDL verification can be substituted for the annual MDL study. The following steps should be followed:

1. Estimate the MDL using one of the following:
   - The concentration value that corresponds to an instrument signal/noise ratio in the range of 2.5 to 5
   - The concentration equivalent of three times the standard deviation of replicate measurement of the analyte in reagent water
   - The region of the standard curve where there is a significant change in sensitivity (i.e., a break in the slope of the standard curve)
2. Prepare (e.g., extract and digest) and analyze seven samples of an MS (ASTM Type II water for aqueous methods; Ottawa sand for soil methods; 1-mm glass beads, or smaller, for metals) containing the analyte of interest at a concentration three to five times the estimated MDL.
3. Determine the variance for each analyte by using Equations 1 and 2:

$$S^2 = \frac{1}{n-1}\left[\sum_{i=1}^{n}\left(x_i - \overline{x}\right)^2\right] \quad (1)$$

where:

S^2 = variance
^{x}I = the nth measurement of the variable x and
$\overline{x}$ = the average value of x

$$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} x_i \quad (2)$$

4. Determine the standard deviation(s) for each analyte by using Equation 3:

$$s = (S^2)^{1/2} \quad (3)$$

5. Determine the MDL for each analyte by using Equation 4:

$$MDL = 3.14(s) \quad (4)$$

   Note: 3.14 is the one-sided t-statistic at the 99-percent confidence level appropriate for determining the MDL using seven samples.

6. If the spike level used in Step 2 is more than 10 times the calculated MDL, repeat the process using a smaller spiking level.

CH2M HILL requires a verification check be performed on the calculated MDLs for each target compound (AFCEE, 2006). The MDL check standard shall be spiked at approximately two times the current reported MDL. The MDL is verified if the check standard produces a

response at least 3 times above the instrument's noise level and greater than the blank associated with the MDL verification study. If the verification response is too low, spike at a successively higher concentration until verification criteria are met, and use the first successful concentration as the reported MDL. The MDL verification check will be sent to CH2M HILL for review and approval.

5.3.2 Reporting Limits

In general, RLs must be greater than two times the calculated MDL. RLs used by the laboratory should not be greater than the reporting limit objectives listed in Appendix A.

When calibrating instruments, a standard at a concentration equal to or less than the RL must be included. In the project-specific SAP or QAPP addendum, reporting of analytical data will be addressed. One of the following options will be selected when establishing reporting requirements for each project:

- Analytes at concentrations greater than the laboratory MDL but less than the RL will be flagged "J" and reported as an estimate. Analytes that are not detected at or above the laboratory MDL will be flagged "U" and reported as not detected at the RL.
- Only analytes at a concentration greater than the project-specific RL will be reported. Analytes detected at less than the RL will be flagged "U" and reported as not detected at the RL.

For consistency, RLs and sample results shall be reported to two significant figures if less than 10 micrograms per liter (µg/L) (parts per billion) and to three significant figures otherwise.

RLs shall be reported on a dry-weight basis for soil samples.

5.3.3 Instrument Calibration

Laboratory instruments shall be calibrated by qualified personnel prior to sample analysis according to the procedures specified for each method. Calibration shall be verified at method-specified intervals throughout the analysis sequence. The frequency and acceptance criteria for calibration are specified for each analytical method in Tables 5-3 through 5-15, with supplemental requirements defined in the following sections for organic methodologies. When multipoint calibration is specified, the concentrations of the calibration standards should bracket those expected in the samples. Samples should be diluted, if necessary, to bring analyte responses within the calibration range. Data that exceed the calibration range cannot be reported by the laboratory. The initial calibration (ICAL) curve shall be verified as accurate with a standard purchased or prepared from an independent second source. ICAL verification involves the analysis of a standard containing all the target analytes, typically in the middle of the calibration range, each time the ICAL is performed. Quantitation based on extrapolation is not desirable.

Calibration requirements

In the initial calibration (for all instruments), a standard at a concentration equal to or less than the RL must be included.

Initial calibration must be re-established if the following conditions exist:

- The last calibration was established more than 1 year prior to the start of a sample's analysis [gas chromatography, gas chromatography-mass spectrometry, inductively coupled plasma, and inductively coupled plasma-mass spectrometry (ICPMS)]
- The last calibration was established more than 2 weeks prior to the start of a sample's analysis for hexavalent chromium by ion chromatography.
- Two consecutive continuing calibration standards fail
- The operating conditions change; for example, any of the following:
  - Major maintenance is performed
  - The fluid or gas "carrier" type changes
  - The instrument requires relocation
  - The analytical column is replaced

5.3.3.1 Initial Calibration Models for the Determination of Organic Compounds

Organic methodologies often provide multiple options for ICAL curve fits and associated acceptance criteria for use. The following sections describe the required laboratory practices that will be employed by the laboratory. The hierarchy that the laboratory will use when selecting the calibration curve fit for use in quantitation of sample results is described in the following section.

Calibration Techniques. The following procedures will be implemented:

- The analyst will verify that correct instrument operating conditions and routine maintenance as specified in the method and laboratory SOP are employed. All maintenance activities will be documented in a laboratory notebook for troubleshooting and scheduling of future routine, periodic maintenance.
- Ensure that the instrument is free of contamination prior to calibration. **Do not** perform any blank subtraction.
- The entire ICAL must be performed and meet method performance criteria prior to sample analyses. The calibration standards must be analyzed in sequential order from the lowest to highest concentration. If **one** calibration standard fails to meet criteria, it may be reanalyzed at the end of the calibration sequence. Justification for removing a calibration point from the selected curve fit includes circumstances such as, improper purge, injection failure, nonspiked level, or other obvious failures. The failure of multiple standards suggests an instrument problem or operator error and corrective action is required.
- Only the lowest or the highest calibration points can be removed from the calibration curve without justification. If the lowest calibration point is removed, the RL for that compound increases to the level of the next lowest calibration point. Approval to elevate RLs greater than the project-specific objectives **must** be approved by the program or project chemist. If the highest calibration point is removed, the linear range is shortened for that compound.

- The lowest calibration point in the calibration curve must be at or below the required RL.
- The other standard concentrations must define the working range of the instrument or the expected range of concentrations found in the samples.
- Either external or internal calibration can be employed for methods not involving mass spectrometry detectors. Internal calibration must be used when a mass spectrometry detector is employed.
- A minimum of five calibration points must be used for the calibration curve for gas chromatography/mass spectrometry and gas chromatography methods.
- Most compounds tend to be linear, and a linear approach should be favored when linearity is suggested by the calibration data. Nonlinear calibration should be considered only when a linear approach cannot be applied. It is not acceptable to use an alternate calibration procedure when a compound fails to perform in the usual manner. When this occurs it is indicative of instrument issues or operator error.
- If a nonlinear calibration curve fit is employed, a minimum of six calibration levels must be used for second-order (quadratic) curves, and a third order polynomial requires a minimum of seven calibration levels.
- When more than five levels of standards are analyzed in anticipation of using second- or third-order calibration curves, all calibration points **must** be used regardless of the calibration option employed. The highest or lowest calibration point may be excluded to narrow the calibration range and meet the requirements for a specific calibration option. Otherwise, unjustified exclusion of calibration data is expressly forbidden.
- Using the average (mean) relative standard deviation (RSD) of all analytes to meet ICAL criteria is **not** acceptable.

Calibration Options. This section describes the acceptable calibration options and the hierarchy that the laboratory should use when selecting a specific option. The choice of calibration option may also be based on previous experience or prior knowledge of detector response.

The following are calibration options:

- **Linear calibration using average calibration or response factors.** Calibration factors for external calibrations or response factors for internal calibrations must have RSDs not exceeding 20 percent or 15 percent, respectively, for quantitation. A minimum response factor of 0.05 for most target analytes or 0.01 for the least responsive target analytes must be achieved to ensure detectability.
- **Linear calibration using a linear regression equation (y=mx+b).** The correlation coefficient must equal 0.995 or better. The line should **not** be forced through the origin. The equation and a plot of the linear regression must be included in the raw data generated by the laboratory and made available in the data package upon request.
- **Nonlinear calibration.** This model may be a second-order or third-order polynomial. The model must be continuous without a break in the function and should **not** be forced through the origin. The coefficient of determination of the nonlinear regression must be

0.99 or better. The equation and a plot of the nonlinear regression must be included in the raw data generated by the laboratory and made available in the data package upon request. This method of calibration **must** be approved by the program or project chemist prior to analysis and is intended for nonlinear responding compounds only.

5.3.3.2 Continuing Calibration

Periodic verification of the ICAL is essential in generating analytical data of known quality. The continuing calibration verification analyses ensure that the instrument has not been adversely affected by the sample matrix or other instrument failures that would increase or decrease the sensitivity or accuracy of the method. The laboratory will perform continuing calibration for all methods in accordance with the specific requirements in the method and laboratory SOP.

Method SW8000B allowed the use of the average of all analytes percent difference or drift (%D) to meet the continuing calibration requirements for the method. Method SW8000B will not be allowed for the PG&E Program QAPP. Using the average (mean) %D to meet continuing calibration criteria is **not** acceptable. All analytes must meet the continuing calibration criteria for %D (see Method SW8000C).

5.4 Elements of Analytical Quality Control

Laboratory QC checks indicate the state of control that prevailed at the time of sample analysis. QC checks that involve field samples, such as matrix and surrogate spikes and field duplicates, also provide an indication of the presence of matrix effects. Field-originated blanks (see Section 3.5) provide a way to monitor potential contamination that field samples are subjected to. The QAPP specifies requirements for method blanks, LCSs, surrogate spikes, and MS/MSD that must be followed by subcontracting laboratories.

A laboratory QC batch is defined as a method blank, LCS, MS/MSD, or a sample duplicate (depending upon the method) and 20 or fewer environmental samples of similar matrix that are extracted or analyzed together. For gas chromatography/mass spectrometry volatile analyses, a method blank, LCS, and MS/MSD must be analyzed in each 12-hour calibration period. The number of environmental samples allowed in the laboratory QC batch is defined by the remaining time in the method-prescribed 12-hour calibration period divided by the analytical run time. Each preparation or analytical batch should be identified in a way that will associate environmental samples with the appropriate laboratory QC samples.

5.4.1 Method Blanks

Method blanks are used to monitor each preparation or analytical batch for interference or contamination from glassware, reagents, and other potential contaminant sources in the laboratory. A method blank is an analyte-free matrix (laboratory reagent water for aqueous samples or Ottawa sand for soil samples) to which all reagents are added in the same amount or proportions as are added to samples. It is processed through the entire sample preparation and analytical procedures along with the samples in the batch. There should be at least one method blank per preparation or analytical batch. If a target analyte is found at a concentration that exceeds the RL, corrective action must be performed to identify and eliminate the contamination source. **All** associated samples must be re-prepared or

reanalyzed, or both, after the contamination source has been eliminated if the compounds detected in the associated blank are also present in the field samples. No analytical data may be corrected for the concentration found in the blank (no blank correction).

5.4.2 Laboratory Control Sample

An LCS consists of an analyte-free matrix (laboratory reagent water for aqueous samples and Ottawa sand or glass beads for soil samples) spiked with known amounts of analytes that come from a source different than that used for calibration standards. A **complete target analyte list** for each method specified in the QAPP will be spiked into the LCS. The spike levels should be less than or equal to the midpoint of the calibration range. If LCS results are outside the specified control limits, corrective action must be taken, including sample re-preparation or reanalysis, or both, if appropriate. Documentation of the re-preparation or reanalysis, or both, must be provided in the analytical report. If more than one LCS is analyzed in a preparation or analytical batch, the results for each of the LCSs analyzed must be reported. Any LCS recoveries that are above or below the QC limits affect the accuracy for the entire batch and require corrective action.

5.4.3 Surrogates

Surrogates are organic analytes that behave similarly as the analytes of interest but are not expected to occur naturally in the samples. They are spiked into the standards, the samples, and QC samples prior to sample preparation. Surrogate recoveries are used as an indicator of accuracy, method performance, and extraction efficiency. If surrogate recoveries are outside the specified control limits, corrective action must be taken, including sample re-preparation or reanalysis, or both, if appropriate. Documentation of the re-preparation or reanalysis, or both, must be provided in the analytical report.

5.4.4 Matrix Spike/Matrix Spike Duplicate

An MS is a sample matrix fortified with known quantities of specific compounds; it is subjected to the same preparation and analytical procedures as the native sample. Target analytes are spiked into the sample. MS recoveries are used to evaluate the effect of the sample matrix on the recovery of the analytes of interest. An MSD is a second fortified sample matrix. The RPD between the results of duplicate MSs measures the precision of sample results. One MS/MSD (MSD where appropriate) per 20 project-specific samples will be analyzed. A complete target analyte list for each method specified in the QAPP will be spiked into the MS/MSD (with the exception of PCBs; see Appendix A -notes). Project-specific samples designated on the CoC form will be spiked. The spike levels will be less than or equal to the midpoint of the calibration range. Exceedances of control limits should be flagged in the analytical report.

5.4.4.1 Matrix Spike for Hexavalent Chromium Analyses

Interference from groundwater is known to reduce the sensitivity of MethodEPA218.6. This can result in an incorrect assessment of the analyte identification or the specific RL if the “Matrix Spike and Dilution Protocol” is not followed. Samples being analyzed by Method EPA218.6 may be required to follow the protocol in the following section.

Matrix Spike and Dilution Protocol. Matrix interference has been encountered that affects the sensitivity for hexavalent chromium by ion chromatography methods. CH2M HILL shall direct the laboratories to perform an additional QA/QC analyses to aid in assessing any effect on method sensitivity for each project due to the sample matrix.

For nondetect sample results, the laboratory will analyze an MS by spiking the samples with 1 µg/L of hexavalent chromium to ensure that identification is accurate and verify that false negatives are detected. For samples with detected results, the laboratory will analyze an MS by spiking the sample with hexavalent chromium at a level not less than 25 percent of the sample concentration. Laboratories will follow the standard protocol of 1 MS and 1 laboratory sample duplicate per 20 samples, unless directed by the project chemist to analyze the MS more frequently.

If the MS is not recovered or the peak is outside of the established retention time window for either detected or nondetect results, the laboratory will make a fivefold dilution of two aliquots of the sample. The first aliquot will be analyzed without the spike; the second aliquot will be spiked with hexavalent chromium at a concentration consistent with the concentrations previously listed and the recovery and peak retention times evaluated. If this MS recovery is not within laboratory QC limits or the peak is not within the laboratory retention time window, the laboratory will dilute two additional aliquots of the sample tenfold, spike one of the aliquots, and analyze the sample/MS. This procedure will be performed at successively greater dilutions of 25:1, 50:1, or 100:1 until the peak identified in the post spike analysis is within the established retention time window for hexavalent chromium and the recovery of the spike is within the laboratory QC limits listed in Appendix A.

The detected result that is reported by the laboratory on the final data package will be chosen from the dilution where both the peak detected in the unspiked and the spiked sample are within the appropriate retention time and the MS is recovered within the QC control limits. The RLs will be raised to the level of the appropriate dilution.

For nondetect results, the dilution selected by the laboratory for reporting will be taken from the smallest dilution that yields an MS recovery within QC control limits and within the appropriate retention time window.

5.4.5 Internal Standards

Internal standards are compounds that have similar properties as the analytes of interest but are not expected to occur naturally in the samples. Some methods require the use of internal standards to compensate for losses during injection or purging or losses due to viscosity. A measured amount of the internal standard is added to the standards, the samples, and QC samples following preparation. When the internal standard results exceed the control limits, corrective action must be taken, including sample reanalysis, if appropriate. Corrective action must be documented in the analytical report.

5.4.6 Laboratory Sample Duplicate

For some methods, a laboratory duplicate is performed instead of a matrix spike duplicate. A laboratory sample duplicate is a sample duplicate selected by the laboratory. It is subjected to the same preparation and analytical procedures as the native sample. The RPD

between the results of the native sample and laboratory sample duplicate measures the precision of sample results. The data collected may also yield information regarding whether the sample matrix is homogenous or heterogeneous.

5.4.7 Interference Check Samples

Interference check samples are used in inductively coupled plasma (ICP) analyses to verify background and interelement correction factors. They consist of two solutions, A and AB. Solution A contains the interfering analytes, and Solution AB contains the analytes of interest and the interfering analytes. Both solutions are analyzed at the beginning and at the end of each analytical sequence. When the interference check sample results exceed the control limits, corrective action must be taken, including sample reanalysis, if appropriate.

5.4.8 Retention Time Windows

Retention time windows for gas and liquid chromatographic analyses must be established by replicate injections of the calibration standard over multiple days as described in SW846 8000B, analytical method, or appropriate laboratory SOP. The absolute retention time of the calibration verification standard at the start of each analytical sequence will be the centerline of the window. For an analyte to be reported as positive, its elution time must be within the retention time window.

5.5 Additional Quality Control Requirements

5.5.1 Holding Time

The holding time requirements specified in this QAPP (see Table 4.1) must be met. For methods requiring both sample preparation and analysis, the preparation holding time will be calculated from the time of sampling to the completion of preparation. The analysis holding time will be calculated from the time of completion of preparation to the time of completion of the analysis, including required dilutions, confirmation analysis, and reanalysis. For methods requiring analysis only, the holding time is calculated from the time of sampling to completion of the analysis, including required dilutions, confirmation analysis, and reanalysis.

5.5.2 Confirmation

Confirmation analysis must be performed as specified for specific organic methods when the result is at or above the RL. Both the primary and confirmation results will be reported. Unless one of the analysis is specifically designated as the confirmation by the method, the more concentrated result will be reported as the sample result and the lesser concentration result as the confirmation. All calibration and QC requirements must be met when confirmation analysis is performed.

5.5.3 Cleanup Procedures to Minimize Matrix Effects

To maintain the lowest possible RLs, appropriate cleanup procedures should be employed when it is indicated by the method to remove or minimize matrix interference. Methods for sample cleanup include, but are not limited to, gel permeation chromatography, silica gel,

alumna, florisil, mercury (sulfur removal), sulfuric acid, and acid/base partitioning. Method blanks, MS/MSDs, and LCSs must be subjected to the same cleanup procedures performed on the samples to monitor the efficiencies of these procedures.

5.5.4 Sample Dilution

Dilution of a sample results in elevated RLs and ultimately affects the usability of the data related to potential actions at the sampling site. It is important to minimize dilutions and maintain the lowest possible RLs. When dilutions are necessary because of high concentrations of target analytes, lesser dilutions should also be reported to fully characterize the sample for each analyte. The level of the lesser dilution should be such that it will provide the lowest possible RLs without having a lasting deleterious effect on the analytical instrumentation.

When a sample exhibits characteristics of matrix interference that are identified through analytical measurement or visual observation, appropriate cleanup procedures specified in Section 5.5.3 must be proven ineffective or inappropriate prior to proceeding with dilution and analysis. Any analyses conducted at a dilution where all analytes will be reported as non-detect above the QAPP RL, must be discussed with the project chemist prior to finalizing the report.

5.5.5 Standard Materials and Other Supplies and Consumables

Standard materials must be of known high purity and traceable to an approved source. Pure standards must not exceed the manufacturer's expiration date or 1 year after receipt if no expiration date is provided. Solutions prepared by the laboratory from the pure standards must be used within the expiration date specified in the laboratory's SOP.

All other supplies and consumables must be inspected prior to use to ensure that the supplies meet the requirements specified in the appropriate SOP. The laboratory's inventory and storage system should ensure their use within the manufacturer's expiration date and storage under proper conditions.

5.5.6 Manual Integration

The laboratory is required to provide all analysts performing methods that rely on interpretation of chromatographic data with training on appropriate software or manual integration practices. The laboratory also will make every effort to minimize the use of manual integration of data. If the need arises to use manual integration to correct a software autointegration error, the manual integration will be clearly identified in the instrument data. Before and after enlargements of the region of the chromatogram where the manual integration was performed will be provided on an appropriate scale that allows an independent reviewer to evaluate the need and quality of the manual integration. The analyst will also document the reason for the manual integration on the chromatogram along with their date and initials. The laboratory manager or designee will approve the manual integration by dating and initialing the chromatogram.

5.5.7 Laboratory Quality Assurance Program

The laboratory will maintain a quality assurance manual or equivalent document. The manual must include all of the requirements provided in the California Environmental Laboratory Accreditation Program (ELAP), and, if applicable, the National Environmental Laboratory Accreditation Program (NELAP). The manual will define the laboratory's internal procedures for QA/QC as follows:

- QA policies, objectives, and requirements
- Organization and personnel
- Document control
- SOPs (analytical methodology and administrative)
- Data generation
- Software verification
- Quality assurance
- Quality control
- Nonconformance/corrective action procedures
- Data review

5.5.7.1 Laboratory Standard Operating Procedures

The laboratory will maintain SOPs for all analytical methods and laboratory operations. The format for SOPs will conform with the following:

- *Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, SW-846, Third Edition, Update III, Section 1* (EPA, 1996)
- "Good Laboratory Practices" in *Principles and Guidance to Regulations for Ensuring Data Integrity in Automated Laboratory Operations* (EPA, 1995)

All SOPs must have a unique identification number that is traceable to previous revisions of the same document. SOP review must be completed annually.

5.5.7.2 Demonstration of Capability

Laboratory QA department personnel will maintain records documenting the ability of each analyst to perform applicable method protocols. Documentation will include annual checks for each method and analyst. In addition, internal, blind performance evaluation samples for each method and matrix demonstrating overall laboratory performance must be submitted annually. The laboratory may receive additional blind performance evaluation samples in conjunction with the PG&E Program.

5.6 Analytical Procedures

The allowed sample preparation methods are presented in Table 5-2. Any changes or alternatives to this list will be included in site-specific SAPs or QAPP addenda. Analytical and preparation methods for SW7000 series are provided in Table 5-2 as alternate methods to SW6020 (with the exception of mercury and soil hexavalent chromium, the SW 7000 series must be approved by the project chemist). These methods will be allowed, provided the RL

objectives are met. After a method is chosen, it must be used throughout the duration of a specific project to maintain data comparability.

This QAPP includes common analytical procedures that may be required for the PG&E Program. Appendix A, Tables A -1 through A -3 contain representative lists of the analytes of concern, the methods to be used, and the RL objectives. Some of the listed analytes may not necessarily be of concern for a particular project; project-specific SAPs or QAPP addenda will list the analytes of concern. The RLs included herein reflect quantifiable levels that are attainable with a specified degree of confidence using the specified methods. The RLs should meet most preliminary cleanup goals or action levels. If changes to the methods or RLs are necessary to meet cleanup goals, the QAPP will be updated or amended by addendum.

General QC requirements are discussed in Section 5.3.3. The calibration and QC requirements specified for each method will be followed and are included in Appendix A and Tables 5-3 through 5-15. Appropriate corrective action will be taken when acceptance criteria are not met. If corrective action is not effective, and data quality is potentially degraded, the occurrence must be documented in a corrective action report and in the data package case narrative. The laboratory manager or a designated person must notify the project chemist.

Analytical services will be provided by laboratories contracted by CH2M HILL or its subcontractors. Analytical laboratories will be accredited, in accordance with the California ELAP, for all parameters where accreditation is available. Subcontract laboratories will be required to follow the SAP and QAPP addenda that are applicable to specific projects or activities and must be approved by the CH2M HILL project chemist.

Field measurements will be performed or supervised directly or indirectly by CH2M HILL field personnel.

5.7 Title 22 Metals

The California Code of Regulations - Title 22, Division 4.5 – Environmental Health Standards for the Management of Hazardous waste has a waste characterization protocol that specifies the following stepped procedure for determining hazardous waste disposal:

1. If the sample is suspected of containing high levels of metals, analyze for the Title 22 metals – total threshold limit concentration (TTLC) (see Appendix A, Table A-3).
2. Compare the TTLC sample results with column G of Appendix A, Table A-3.
3. If the TTLC sample results are greater than the concentrations listed in column G of Appendix A, Table A-3, extract and analyze the samples using the waste extraction test (WET) [only required for analytes that exceed the concentrations listed in column G of Appendix A, Table A-3].
4. If the soluble threshold limit concentration (STLC) sample result, from the waste extraction test extraction, is greater than the concentration listed in column H of Appendix A, Table A-3 for any of the Resource Conservation and Recovery Act metals listed in column E of Appendix A, Table A-3., extract the sample by toxicity

characteristic leaching procedure (TCLP) Method 1311 and analyze for the specific metals that exceeded the STLC threshold.

TABLE 5-1
Maximum Concentrations for Title 22 – Organic Compounds – SW8000 Series
PG&E Program Quality Assurance Project Plan

Constituent	CAS	Method
Mirex	2385-85-5	SW8081
Methyl chloromethyl ether (Chloromethyl methyl ether)	107-30-2	SW8021B
2-Acetylaminofluorene (2-AAF)	53-96-3	SW8270C
Acrylonitrile	107-13-1	SW8260B
4-Aminodiphenyl (4-Aminobiphenyl)	92-67-1	SW8270C
Benzidine and its salts	92-87-5	SW8270C
bischloromethyl ether (BCME)	542-88-1	SW8270C
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	SW8270C
4-Dimethylaminoazobenzene (DAB)	60-11-7	SW8270C
Ethyleneimine (EL)	151-56-4	
ALPHA-NAPHTHYLAMINE (1-NA)	134-32-7	SW8270C
BETA-NAPHTHYLAMINE (2-NA)	91-59-8	SW8270C
4-Nitrobiphenyl (4-NBP)	92-93-3	SW8270C
N-Nitrosodimethylamine (DMN)	62-75-9	SW8270C
beta-Propiolactone (BPL)	57-57-8	SW8260B

Note:

If the sample contains any of the compounds listed in this table at a single or combined concentration equal to or exceeding 0.001 percent by weight, the sample is considered to be toxic under CA Title 22 Section 66261.24 (Characteristic of Toxicity)

TABLE 5-2
Extraction and Digestion Methods
PG&E Program Quality Assurance Project Plan

Analytical Method	Parameter	Preparatory Methods
SW6010B	Trace metals by ICP	SW3005A, SW3010A, SW3015, SW3050B, SW3051
SW6020	Trace metals by ICP-MS	SW3005A, SW3010A, SW3015, SW3050B, SW3051
SW7000 Series[a]	Various elements (unless specified separately) Does Not include Mercury or soil Hexavalent chromium	SW3015, SW3020A, SW3050B, SW3051
EPA200.7 and EPA200.8	Trace metals by ICP/ICP-MS	See analytical method
SW7470A, SW7471A, and EPA245.1	Mercury by cold vapor atomic adsorption	See analytical method
SW7196A, SW7199, and EPA218.6	Hexavalent chromium	See analytical method for water, Use SW3060A for soil preparation prior to SW7199
SW8015B or D	TPH volatile and extractable (water and soil)	Volatiles: SW5030BB, SW5031, SW5035 Extractables: SW3510C, SW3520C, SW3545C, SW3541, SW3545, SW3550B
SW8081A	Organochlorine pesticides (water and soil)	SW3510C, SW3520C, SW3540C, SW3541, SW3545, SW3550B
SW8082	PCBs (water and soil)	SW3510C, SW3520C, SW3540C, SW3541
SW8151A	Chlorinated herbicides (water and soil)	SW3510C, SW3520C, SW3540C, SW3541, SW3550B
SW8260B	Volatile organics (water and soil)	SW3585, SW5021, SW5030B, SW5031, SW5032, SW5035
SW8270C and SW8270C SIM	Semivolatile organics (water and soil)	SW3510C, SW3520C, SW3535, SW3540C, SW3541, SW3545, SW3550B
Laboratory SOP (CF-IRMS)	Stable isotopes	See laboratory SOP
Various[b]	General chemistry	See analytical method

[a]Must be approved by the project chemist.

[b]EPA120.1/SW9050, EPA150.1/SW9040, EPA160.1, EPA160.2, EPA180.1, EPA300.0/SW9056, EPA310.1, EPA350.3, EPA354.1, EPA365.1, EPA370.1, EPA376.1/2, SM3500, EPA335.2, SW9010B, SW9014, and EPA415.2.

Note:

ICP-MS = inductively coupled plasma/mass spectrometry

TABLE 5-3
Surrogate Recovery for Organic Compounds – SW8000 Series
PG&E Program Quality Assurance Project Plan

Compound	Liquid Matrix % Recovery		Solids Matrix % Recovery	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit
SW8015-E[a]				
Benzo (a) pyrene	70	125	60	125
Bromobenzene	50	140	50	150
Hexacosane	60	140	60	140
Octacosane	26	152	25	162
Triacontane	40	140	30	150
Ortho-Terphenyl	57	132	47	142
Fluorobenzene	75	125	65	135
SW8015-P				
Bromofluorobenzene	70	130	64	148
Chlorobenzene[b]	74	138	64	148
Trifluorotoluene	70	130	70	130
SW8021				
Trifluorotoluene	65	125	65	125
SW8082[c]				
Decachlorobiphenyl	29	133	26	125
Tetrachloro-m-xylene	50	120	48	121
SW8260B[d]				
1,2-Dichloroethane-d4	72	119	52	149
4-Bromofluorobenzene	76	119	65	135
Dibromofluoromethane	85	115	65	135
Toluene-d8	81	120	75	125
SW8270C				
1,2-Dichlorobenzene-d4[e, f]	27	100	25	110
2,4,6-Tribromophenol[g]	42	124	36	126
2-Chlorophenol-d4[e, g]	34	98	30	100
2-Fluorobiphenyl[f]	48	120	43	125
2-Fluorophenol[g]	20	120	37	125
Nitrobenzene-d5[f]	41	120	37	125
Phenol-d5[g]	20	120	40	125
Terphenyl-d14[f]	51	135	32	125
SW8270SIM				
1,2-Dichlorobenzene-d4	27	100	25	110
2-Fluorobiphenyl	34	135	34	135
Nitrobenzene-d5	25	135	25	135
Terphenyl-d14	34	167	14	129

TABLE 5-3
Surrogate Recovery for Organic Compounds – SW8000 Series
PG&E Program Quality Assurance Project Plan

	Liquid Matrix % Recovery		Solids Matrix % Recovery	
Compound	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**
SW8081A				
Decachlorobiphenyl	29	135	26	125
Tetrachloro-m-xylene	33	138	36	124
SW8151A				
2,4-dichlorophenylacetic acid	50	130	51	146

[a]Choose two from the list
[b]Required by method
[c]Use tetrachloro-m-xylene as a surrogate if DCBP is used as an IS.
[d]Choose three from the list
[e]Approved alternatives
[f]Base fraction
[g]Acid fraction

TABLE 5-4
Calibration and QC Requirements for Metals – SW6010B and EPA200.7
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
ICAL (a blank and at least one standard)	When modifications are made to the system, or when continuing calibration verification fails.	If more than one standard is used, correlation coefficient must be >0.995.	Not applicable.
Second-Source Calibration Verification	Immediately following each ICAL.	All analytes within ±10% of expected value for SW6010B and within ±5% of expected value for EPA200.7.	Correct problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem and reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence.	All analytes within ±10% of expected value for SW6010B and within ±10% of expected value for EPA200.7.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Interference Check Standard	At the start and end of each analytical sequence or twice during an 8-hour period, whichever is more frequent.	All analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze ICS and all affected samples.

TABLE 5-4
Calibration and QC Requirements for Metals – SW6010B and EPA200.7
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed.	All analytes within limits specified in Appendix A.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified in Appendix A.	Correct the problem, re-prepare and reanalyze the LCS and all samples in the analytical batch.
Postdigestion Spike Addition	When MS/MSD fails.	Recovery within 75 to 125% of expected value.	None.
Dilution Test	Each new sample matrix. Or when the PDS fails	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	Perform postdigestion spike addition.
Linear Range Calibration Check Standard	Once per quarter.	All analytes within +10% of expected value.	Correct problem and reanalyze or reset linear range.

TABLE 5-5
Calibration and QC Requirements for Metals – SW6020 and EPA200.8
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
ICAL (a blank and at least one standard)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails.	Not applicable	Not applicable
Second-source Calibration Verification	Immediately following each ICAL.	All analytes within ±10% of expected value.	Correct problem and repeat ICAL.
Calibration Blank	After every Second-source or Continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem and reanalyze previous 10 samples.

TABLE 5-5
Calibration and QC Requirements for Metals – SW6020 and EPA200.8
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence.	All analytes within ±10% of expected value.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Interference Check Standard	At the start and end of each analytical sequence or twice during an 8-hour period, whichever is more frequent.	All analytes within ±20% of expected value.	Correct the problem, recalibrate and reanalyze ICS and all affected samples.
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed.	All analytes within limits specified in Appendix A.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Postdigestion Spike Addition	When MS/MSD fails.	Recovery within 75 to 125% of expected value.	None.
Dilution Test	Each new sample matrix. Or when the PDS fails	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	Perform postdigestion spike addition.

TABLE 5-6
Calibration and QC Requirements for Metals – SW7000 Series and EPA245.1
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails.	Correlation coefficient of linear regression is ≥0.995.	Correct the problem and repeat the ICAL.
Second-source Calibration Verification	Immediately following each ICAL.	All analytes within ±20% of expected value.	Correct the problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem, then reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence.	All analytes within ±20% of expected value.	Recalibrate and reanalyze all samples since the last accept-able continuing calibration verification.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed.	All analytes within limits specified in accuracy and precision table.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Recovery Test (PDS)	When MS/MSD fails.	Recovery within 85 to 115% of expected value.	Analyze all samples by MSA.
Dilution Test	Each new sample matrix. Or when the PDS fails	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	Perform recovery test.

Note:
MSA = method of standard addition

TABLE 5-7
Calibration and QC Requirements for General Chemistry and Other Parameters[a]
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards); Does Not Apply to Titrimetric Method	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails.	Correlation coefficient of linear regression is ≥0.995.	Correct the problem and repeat the ICAL.
Second-source calibration verification	Immediately following each ICAL.	Analytes within ±15% of expected value (±10% for SW9056/EPA300.0).	Correct the problem and repeat ICAL.
Calibration blank; does not apply to titrimetric method	After every second-source or continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem, then reanalyze previous 10 samples.
Continuing calibration verification	After every 10 samples and at the end of the analysis sequence.	Within ±15% of expected value (±10% for SW9056/EP300.0).	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed.	All analytes within limits specified in Appendix A.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
IPC (EPA314.0 only)	Daily, before sample analysis.	Conductance within 10% of original value (original value within ±10% of MCT).	Prepare fresh IPC solution.
		$PD_{A/H}$ <25%, instrument response within ±20% of expected response.	Redetermined MCT or correct problem and reanalyze IPC.
		Retention time shifts <5%, or overall retention time <80% of original recorded value.	Correct problem, clean or replace column.

TABLE 5-7
Calibration and QC Requirements for General Chemistry and Other Parameters[a]
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
ICAL Verification (ICCS) (EPA314.0 only)	Daily, before sample analysis or when eluent is changed.	Instrument response within ±25% of expected value using a standard at or below the RL.	Correct problem then repeat ICAL.
Pretreated Laboratory Reagent Blank (EPA314.0 only)	Required in any analytical batch which includes samples that have been pretreated to reduce the common anion levels.	Perchlorate must be ≤½ RL.	Correct problem, re-prepare, and analyze method blank and all samples processed with the contaminated blank.
Low-level MDL Check Standard (EPA314.0 only)	Weekly and with ICAL.	Must meet QC acceptance criteria, 50 to 150% of its true concentration.	Reanalyze low-level MDL check standard, if still out of criteria, repeat ICAL.

[a]Unless calibration and QC requirements are specified for an individual method.

Notes:

ICCS = initial calibration check standard

IPC = instrument performance check

MCT = matrix conductivity threshold

TABLE 5-8
Calibration and QC Requirements for Hexavalent Chromium – SW7199 and EPA218.6
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails.	Correlation coefficient of linear regression is ≥0.999.	Correct the problem and repeat the ICAL.
Second-source Calibration Verification	Immediately following each ICAL.	All analytes within ±10% of expected value.	Correct the problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem, then reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence.	All analytes within ±10% of expected value for SW7199 and within ±5% of expected value for EPA218.6.	Recalibrate and reanalyze all samples since the last accept-able continuing calibration verification.
Low-level Calibration verification at the RL of 0.2µg/L	Immediately following each ICAL.	Result within ±20% of expected value.	Correct the problem and repeat ICAL.
Duplicate Sample Injections (SW7199 only)	Every sample.	RPD between injections must be <20%.	Correct the problem, re-prepare, and reanalyze all associated samples.

TABLE 5-8
Calibration and QC Requirements for Hexavalent Chromium – SW7199 and EPA218.6
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS	One per 20 project-specific samples.	All analytes within limits specified in Appendix A.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
pH Buffer Solution Modification	As needed because of sample matrices that cause the analytical column to overload. All QC samples and analyses will use the modified buffered solution when needed.	A modified pH-adjustment buffer that contains 10 times less ammonium sulfate (33 g/L) but the same concentration of ammonium hydroxide as the buffer prescribed in SW7199/ EPA218.6.	None.
MS Dilute and Spike (see Section 5.3.3.1)	As directed in Section 5.3.3.1.	Spike recovery 85 to 115% and peak within RT window.	Dilute two aliquots 1:5, spike one with 1 μg/L of hexavalent chromium and analyze the other unspiked. Continue the procedure using successively greater dilutions of two aliquots until RT and recovery criteria are met.

Note:
RT = retention time

TABLE 5-9
Soil Preparation Method SW3060A for Method SW7199
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
2.5 grams sample to a final volume of 100 ml must be used for each sample	Each sample in the preparation batch.	Follow method preparation for all samples, method blank, and QC samples.	
Method Blank	One per preparation batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
LCS	One per preparation batch.	Spike at concentration specified in method. Recovery range 80 to 120%.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Soluble Matrix Spike	One per preparation batch.	Spike at concentration specified in method. Recovery range 75 to 125%.	None.
Insoluble Matrix Spike	One per preparation batch.	Spike at concentration specified in method. Recovery range 75 to 125%.	None.
Post Digestion Spike	One per preparation batch.	Spike at concentration specified in method. Recovery range 85 to 115%.	None.

TABLE 5-10
Calibration and QC Requirements for Stable Isotopes[a]
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Instrument Standardization	Daily, prior to sample analysis.	Laboratory SOP.	Perform instrument maintenance.
Laboratory Sample Duplicate	Every sample analyzed five times.	Laboratory SOP.	Perform instrument maintenance and reanalyze samples.

[a] ^{18}O and deuterium

TABLE 5-11
Calibration and QC Requirements for TPH, BTEX, Herbicides, and Dissolved Gases – SW8015B, SW8021B, SW8151A, and RSK-175S
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails.	If the %RSD is ≤20%, the average RRF may be used for quantitation; otherwise use calibration curve with coefficient of correlation or determination ≥0.99.	Correct the problem and repeat the ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and after every 10 samples, and at the end of the sequence.	Analytes within ±15% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD, and LCS.	All surrogates in samples, method blank, MS/MSD, and LCS within limits specified in Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 samples.	Full target list spike required within limits specified in Appendix A. Not applicable for RSK-175.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Second Detector or Second Column Confirmation (does not apply to SW8015B or RSK-175)	All samples with results above the RL objectives must be confirmed within the holding time.	Confirmation to be done using a second detector, or second column of dissimilar phase and retention characteristics (or gas chromatography/mass spectrometry if sample concentration is sufficiently high). All calibration and QC acceptance criteria specified for primary analysis must be met in the confirmation analysis.	Failure to perform confirmation will result in potential resampling and analysis at no cost to the project.

Note:
RRF = relative response factor

TABLE 5-12
Calibration and QC Requirements for Pesticides and PCBs – SW8081A and SW8082
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (minimum 5 points) for single-response pesticides; single-point calibration for toxaphene and chlordane; multipoint calibration for Aroclors 1016 and 1260 only, but include midpoint standard for all other Aroclors for pattern recognition; if a specific Aroclor is found in any sample, quantitation for that Aroclor must be done using 5-point calibration	Prior to sample analysis or when calibration verification fails.	To use average RRF for quantitation of any analyte, % RSD must be ≤20%; otherwise use calibration curve with coefficient of correlation or determination ≥0.99.	Correct the problem and repeat the ICAL.
Second-source calibration verification – pesticides and Aroclors 1016 and 1260 (or Aroclors identified in samples)	Once for each multipoint ICAL.	All analytes within ±15% of expected value.	Correct the problem, then recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Continuing calibration verification – pesticides and Aroclors 1016 and 1260 (or Aroclors identified in samples)	At the start of each analytical sequence; after every 12 hours or 10 samples, whichever is more frequent; and at the end of the sequence.	All analytes within ±15% of expected value.	Correct the problem, then recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Endrin/DDT breakdown check (not applicable when analyzing for Aroclors/PCBs only)	At start of each 12-hour period.	Breakdown of either endrin or DDT ≤15%.	Evaluate injector port and take corrective action; recalibrate and reanalyze affected samples if necessary.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD, and LCS.	At least one of the surrogates in samples, method blank, MS/MSD, and LCS within limits specified in Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples.	Full target list spike required within limits specified in corresponding Appendix A.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in corresponding Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

TABLE 5-12
Calibration and QC Requirements for Pesticides and PCBs – SW8081A and SW8082
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Second Column Confirmation	All samples with results above the RL objectives must be confirmed within the holding time.	Confirmation to be done using second column of dissimilar phase and retention characteristics (or gas chromatography/mass spectrometry if sample concentration is sufficiently high). All calibration and QC acceptance criteria specified for primary analysis must be met in the confirmation analysis.	Failure to perform confirmation will result in potential resampling and analysis at no cost to the project.

Note:

DDT = dichloro-diphenyl-trichloroethane

TABLE 5-13
Calibration and QC Requirements for VOCs – SW8260B
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
BFB Tuning	Prior to ICAL and calibration verification (every 12 hours).	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails.	SPCCs average RRF ≥0.30a and %RSD for RRFs for CCCs ≤30% and one of the following options: Option 1 Linear – RSD for each analyte <15%. Use of the mean %RSD for all analytes ≤15% may **not** be used. Option 2 Linear – least squares regression r ≥0.995. Option 3 Nonlinear – coefficient of determination ≥0.99 (6 standards to used for a second order; 7 standards to be used for a third order).	Correct the problem and repeat the ICAL.
Second-source Calibration Verification	Once for each multipoint ICAL.	All analytes within ±25% of expected value.	Correct the problem and repeat ICAL.

TABLE 5-13
Calibration and QC Requirements for VOCs – SW8260B
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter.	SPCCs average RF ≥0.30c and %D for RFs for CCCs ≤20%. All other analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte.	Relative retention time of each analyte within ±0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD and LCS.	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within –50% to +100% of the internal standard responses in the ICAL midpoint standard. Sample EICP area within –50% to +100% of the daily continuing calibration verification.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD and LCS.	All surrogates in samples, method blank and LCS within limits Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples.	Full target list spike required within limits specified in Appendix A.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

[a]SPCC average RRF ≥0.10 for bromoform, chloromethane, and 1,1-dichloroethane.

Notes:
BFB = bromofluorobenzene
CCC = calibration check compounds
EICP = extracted ion current profile SPCC

TABLE 5-14
Calibration and QC Requirements for Semivolatile Organic Compounds – SW8270C
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
DFTPP Tuning	Prior to ICAL and calibration verification (every 12 hours).	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails.	SPCCs average RF ≥0.050 and %RSD for RFs for CCCs ≤30% and one of the following options: Option 1: Linear – RSD for each analyte <15%. Use of the mean %RSD for all analytes ≤15% may **not** be used. Option 2: Linear – least squares regression r ≥0.995. Option 3: Nonlinear – coefficient of Determination ≥0.99 (6 standards to used for a second order; 7 standards to be used for a third order).	Correct the problem and repeat the ICAL.
Second-source Calibration Verification	Once for each multipoint ICAL.	All analytes within ±25% of expected value.	Correct the problem and repeat ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter.	SPCCs average RF ≥0.050 and %D for RFs for CCCs ≤20%. All other analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte.	Relative retention time of each analyte within ±0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD and LCS.	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within -50% to +100% of the internal standard responses in the ICAL midpoint standard.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.

TABLE 5-14
Calibration and QC Requirements for Semivolatile Organic Compounds – SW8270C
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
		Sample EICP area within -50% to +100% of the daily continuing calibration verification.	
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD and LCS.	At least two surrogates per fraction in samples, method blank and LCS within limits specified in Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples.	Full target list spike required within limits specified in Appendix A.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

Note:
DFTPP = decafluorotriphenylphosphene

TABLE 5-15
Calibration and QC Requirements for Polynuclear Aromatic Hydrocarbons – SW8270C SIM
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
DFTPP Tuning	Prior to ICAL and calibration verification (every 12 hours).	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails.	SPCCs average RF ≥0.050 and %RSD for RFs for CCCs ≤30% and one of the following options: Option 1 RSD for each analyte <15%. Option 2 Least squares regression r ≥0.990. Option 3 Nonlinear – Coefficient of Determination ≥0.99 (6 standards to used for a second order; 7 standards to be used for a third order).	Correct the problem and repeat the ICAL.

TABLE 5-15
Calibration and QC Requirements for Polynuclear Aromatic Hydrocarbons – SW8270C SIM
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Second-source Calibration Verification	Once for each multipoint ICAL.	All analytes within ±30% of expected value.	Correct the problem and repeat ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter.	All analytes within ±20% of expected.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte.	Relative retention time of each analyte within ±0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD, and LCS.	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within -50% to +100% of the internal standard responses in the ICAL midpoint standard. Sample EICP area within -50% to +100% of the daily continuing calibration verification.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD and LCS.	At least two surrogates in samples, method blank and LCS within limits specified in Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples.	Full target list spike required within limits specified in Appendix A.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

SECTION 6

Data Reduction, Validation, and Reporting

6.1 Laboratory Data Management

Data reduction will be performed manually or by using appropriate computer software. Quantitation procedures specified for each method must be followed. If data reduction is performed manually, the documentation must include the formulas used. Computer software used for data reduction must have been previously verified by the laboratory for accuracy. Documentation of the software verification must be maintained in the laboratory. All data reduction documentation must allow re-creation of the calculations.

All data will undergo a minimum of three levels of review at the laboratory prior to release. The analyst performing the tests shall initially review 100 percent of the data. After the analyst's review has been completed, 100 percent of the data shall be reviewed independently by a senior analyst or by the section supervisor for accuracy, completeness and compliance with calibration, QC requirements, and holding times. Analyte identification and quantitation must be verified. Calibration and QC results will be compared with the applicable control limits. RLs should be reviewed to make sure they meet the project objectives. Results of multiple dilutions should be reviewed for consistency. Any discrepancies must be resolved and corrected. Laboratory qualifiers will be applied when there are nonconformances that could potentially affect data usability. These qualifiers must be properly defined as part of the deliverables. All issues that are relevant to the quality of the data must be addressed in a case narrative. The laboratory QC manager will review a minimum of 10 percent of data or deliverables generated for the PG&E Program against the project-specific requirements. A final data review will be conducted by the laboratory manager or client services representative to ensure that all required analyses were performed and that all documentation is complete.

The hardcopy and electronic data deliverable (EDD) laboratory reports for all samples and analyses will contain the information necessary to perform data evaluation.

The PG&E Program will request four types of deliverables from the laboratory, depending upon the DQOs of the individual project. The following is a synopsis of when it is appropriate to use each type deliverable:

- **Level 1.** Appropriate for screening-level sampling results. Noncritical project decisions are made using this data.
- **Level 2.** Appropriate for investigative sampling results that will be replaced with confirmatory data or results used for disposal purposes. Less critical project decisions are made using this data.

- **Level 3.** Appropriate for investigative, confirmatory, or closure results. Critical project decisions may be made using this data.
- **Level 4.** Appropriate for investigative, confirmatory, or closure results. Critical decisions may be made using this data and should be used for projects that require a high degree of confidence in the accuracy of the data.

Hardcopy deliverables (and a electronic copy in portable document format [PDF]), in summary format, equivalent to those specified in the latest versions of EPA *Contract Laboratory Program Statements of Work for Organics and Inorganics Analyses* are preferred. The laboratory data report should be organized in a format that facilitates identification and retrieval of data. Alternate reporting formats require approval from the program chemist or project chemist.

A Level 1 report will include, at a minimum, the following information (when applicable):

- Cover letter with the following information:
  - Title of report and laboratory unique report identification (e.g., sample delivery group number)
  - Project name and site location
  - Name and location of laboratory and second-site or subcontracted laboratory
  - Client name and address
  - Statement of authenticity and official signature and title of person authorizing release of the report
- Table of contents
- Summary of samples received that correlates field sample IDs with the laboratory IDs
- Laboratory qualifier flags and definitions
- Field identification number
- Date received
- Date prepared
- Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)
- Preparation and analytical methods
- Result for each analyte (dry-weight basis for soils)
- Percent solids results for soil samples
- Dilution factor (provide both diluted and undiluted results when available)
- Sample-specific RL adjusted for sample size, dilution/concentration

- Sample-specific MDL adjusted for sample size, dilution/concentration (when project objectives require reporting less than the RL)
- Units of measure
- Applicable flags for data associated with QC that are outside of control limits
- CoC forms

A Level 2 report will consist of all the elements included in a Level 1 deliverable plus the following:

- Case narrative that addresses the following:
  - Sample receipt discrepancies (e.g., bubbles in VOA samples or temperature exceedances)
  - Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes, and the corrective action taken for each occurrence
  - Identification and justification for sample dilution
  - Serial dilution recoveries, if applicable (required in hardcopy format only)
  - Postdigestion spike recoveries, if applicable (required in hardcopy format only)
- Surrogate %Rs
- MS/MSD and LCS spike concentrations, native sample results, spiked sample results, %R, and RPDs between the MS and MSD results; associated QC limits must also be provided
- Method blank results
- Analytical batch reference number that cross references samples to QC sample analyses
- Completed sample receipt checklist

A Level 3 report will consist of all the elements included in Level 1 and 2 reports plus the following:

- Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses
- Confirmation results
- Calibration blank results for inorganic analyses (required in hardcopy format only)
- ICP and ICP/MS interference check sample results that include true concentrations, measured concentrations, and the calculated %R of the elements included (required in hardcopy format only)
- Method of standard addition results, if applicable (required in hardcopy format only)

- Internal standard recovery and retention time information, as applicable
- ICAL summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)
- Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)
- Instrument tuning and mass calibration information for gas chromatography/mass spectrometry and ICP/MS analyses
- Any other method-specific QC sample results

A Level 4 report will include all elements for Levels 1 through 3 and all of the associated raw data. It is imperative that the relative scale used for all chromatographic and other instrument data be supplied in a scale that facilitates review from hardcopy. Enlargements of sufficient size and clarity for complex areas of sample chromatograms will be provided. Additional information to be supplied includes the following:

- Sample preparation logs that include the following:
  - Preparation start and end times
  - Beginning and ending temperatures (e.g., water baths and digestion blocks)
- Each algorithm and an example calculation for at least one sample for each matrix analyzed
- Reconstructed total ion chromatograms or selected ion current profiles for each sample (or blank) analyzed and mass spectra(s) for each compound identified including the following:
  - Raw compound spectra
  - Enhanced or background spectra
  - Laboratory generated library spectra (for tentatively identified compounds, provide the reference mass spectra from software spectra library)
- Ion ratio information for dioxin/furan methods

6.2 Hardcopy and Electronic Deliverables

Within the timeframe specified in the laboratory statement of work, contract, or purchase order from sample receipt, the laboratory shall deliver two hardcopies and one PDF of documentation, as specified in this QAPP. In addition, the laboratory shall deliver one electronic copy of the data (i.e., EDD), as specified in the format described in Table 6-1 (or as directed in the project-specific addendum), on CD-ROM or by e-mail (in ASCII format) within the same timeframe (LabSpec-7 format [see Table 6-1]).

All electronic data files shall match the final hardcopy results. CH2M HILL requires receipt of final hardcopy results with electronic files.

All raw data will be maintained in the laboratory and will be available upon request, if not required by the project-specific deliverable. Complete documentation of sample preparation and analysis and associated QC information will be maintained in a manner that allows easy retrieval if additional validation or information is required. Appropriate back-up procedures must be implemented by the laboratory for data that are stored electronically. All data generated using gas chromatography/mass spectrometry must be maintained on COD-ROM or equivalent format and provided to CH2M HILL upon request. All documentation must be retained for a minimum of 5 years after data acquisition.

The primary responsibility for implementing these procedures in the laboratory will reside with the laboratory manager or equivalent. The laboratory manager will approve laboratory reports before submittal.

6.3 Data Validation and Verification

Depending on the project-specific objectives, the analytical results of the data collection effort will be validated by CH2M HILL. In general, there will be different levels of validation employed for the PG&E Program that correspond to the reports described in Section 6.1. In some instances a Level 3 or Level 4 data package may be obtained from the laboratory, but only a Level 1 or Level 2 validation may be conducted. Specific validation levels will be identified in the site-specific SAP or QAPP addendum. Validation of Levels 1 through 4 will always be performed by the project chemist or designee. The levels are summarized as follows:

Level 1 Import the laboratory results into the project database; use automated data validation (AutoDV), as applicable, to the project database. Verify that samples were analyzed by the methods requested, and review the data for outliers and anomalies. Prepare a brief summary validation report.

Level 2 Import the laboratory results into the project database; use AutoDV as applicable, to the project database. Verify that samples were analyzed by the methods requested, review the laboratory case narrative for events in the laboratory that affect the accuracy or precision of the data, review QC indicator data, and perform a cursory review of the data. Prepare a summary validation report.

Level 2B Import the Laboratory results into the project database; use AutoDV, as applicable, to the project database. Verify that samples were analyzed by the methods requested, review the laboratory case narrative for events in the laboratory that affect the accuracy or precision of the data, review QC indicator data, and perform a cursory review of the data. Review specific raw data, as specified in the QAPP addendum, and compare the current data with historical data. Prepare a summary validation report.

Level 3 Import the laboratory results into the project database; use AutoDV, as applicable, to the project database. Validate the analytical data, as described in the following sections, without reviewing any raw data or analyte verification. Prepare a summary validation report.

Level 3B Import the laboratory results into the project database; use AutoDV, as applicable, to the project database. Validate the analytical data as described in the following sections with review of specific raw data, as specified in the QAPP addendum, and compare the current data with historical data. Prepare a summary validation report.

Level 4 Import the laboratory results into the project database; use AutoDV, as applicable, to the project database. Validate analytical data as described in the following sections, including a review of the analytical raw data, and compare the current data with historical data. Prepare a summary validation report.

6.4 Level 3 and 4 Validation Procedures

Personnel involved in the data validation function will be independent of any data generation effort. The project chemist will have responsibility for oversight of the data validation effort. Data validation will be performed when the final data packages are received from the laboratory. Data validation will be performed on an analytical batch basis within each analytical report using the summary results of calibration and laboratory QC and the results from associated field samples. Data packages will be reviewed for all constituents of concern. Raw data will be reviewed when deemed necessary by the project chemist or as specified in QAPP addenda. Data validation procedures will include the following:

- Review of the data package for completeness
- Review of CoC records for discrepancies that might degrade data quality
- Review for compliance with holding time and QC frequency requirements
- Evaluation of all calibration and QC summary results against the project requirements
- Verification of analyte identification and calculations for at least 10 percent of the data
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations
- Initiation of corrective actions, as necessary, based on the data review findings

Data validation will be patterned after the *Contract Laboratory National Functional Guidelines for Inorganic Data Review* (EPA, 2002) and *Contract Laboratory National Functional Guidelines for Organic Data Review* (EPA, 1999), substituting the calibration and QC requirements specified in this QAPP for those specified in the guidelines. The national functional guidelines will primarily be used as a guidance document for the application of data qualification criteria. The level of validation will be defined in the SAP or QAPP addendum.

The flagging criteria presented in Tables 6-2 and 6-3 will be used; the qualifier flags are defined in Table 6-4. Qualifier flags, if required, will be applied to the electronic sample results. A summary table of the data qualifications will be provided in the validation report. If multiple flags are required for a result, the most severe flag will be applied to the electronic result. The hierarchy of flags, from the most severe to the least severe, will be as follows: R, UJ, J, U.

A validation report will be generated for each method and sample delivery group. A copy of the validation report will be retained with the data package in the project chemistry file. The project chemist will be notified of any significant data quality problems.

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
1	VersionCode	Text	15	R	Yes	Code identifying the version of the EDD deliverable.
2	LabName	Text	10	R	Yes	Identification code for the laboratory performing the work. This value is used to distinguish between different facilities.
3	SDG	Text	15	R	No	Sample delivery group designation; always populated for all samples, including QC.
4	FieldID	Text	30	R	No	Client sample ID as appears on CoC forms with optional laboratory-assigned suffixes or prefixes to make it unique. If the sample ID on the CoC form and the prefix or suffix is more than 20 characters, abbreviate the value but make it unique. For laboratory QC samples (e.g., method blanks and laboratory control samples), use a unique laboratory sample ID.
5	NativeID	Text	30	R	No	Client sample ID, **exactly** as on CoC forms. **No prefix or suffix allowed** in client sample IDs. Used to identify the native sample from which other samples are derived (e.g., QAQCType = LR, MS, or SD). For laboratory QC samples (i.e., method blanks and laboratory control samples), use the FieldID value that was assigned. However, for laboratory blank spike duplicate samples, use the FieldID value that was assigned to the associated laboratory blank spike sample.
6	QAQCType	Text	2	R	Yes	The code for the sample type. Any field sample that is not used as laboratory QC and is not otherwise marked on the CoC forms should have the designation of “N” (normal field sample). No suffix allowed (i.e., do not add numbers as suffixes to the QAQCType values as called for in the ERPIMS guidelines). If all analyses for a given sample are diluted, the first dilution should be designated as the normal sample. If more dilutions are required, the next dilution should be designated as the first true dilution with a QAQCType value of “LR” and a LRType value of “DL” (see LRType,).

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
7	LRType	Text	3	C	Yes	This is the code for laboratory replicate sample type. Values are as follows: • Blank (if QAQCType value is not LR) • DL (dilution) • RE (re-analysis) • D (inorganic duplicate) • CF (confirmation) For multiple dilutions or reanalyses of the same sample, append the replicate number after the LRType value (e.g., RE, RE2, and RE3).
8	Matrix	Text	5	R	Yes	Sample matrix code. Valid values are as follows: “AIR”, “WATER”, or “SOIL” unless otherwise provided by the project data manager and marked on CoC forms. The use of other terms (e.g., “liquid” or “solid”) for laboratory QC is not allowed.
9	LabSampleID	Text	12	R	No	Laboratory sample ID assigned by the laboratory. Prefix or suffix is allowed. Dilutions or re-extractions are noted here. For example, “D97-11111RE” is acceptable.
10	AnalysisMethod	Text	20	R	Yes	Analysis method code. This is the ID of the analytical method performed on the sample. For example, “SW8260A.” Generic names such as “EPA” should not be used.
11	ExtractionMethod	Text	20	R	Yes	Preparation method code. A value in this field is required. If the preparation is described in the method, use “METHOD”. If there is no separate preparation required, use “NONE”. Total and dissolved metal analyses are differentiated by the value in this column. Total, TCLP, and SPLP analyses are differentiated by the value in the LeachMethod column (see below).
12	SampleDate	Date		C	No	Date of sample collection. A value is required for all samples sent to the laboratory and samples derived from those samples. Format = mm/dd/yyyy.
13	SampleTime	Time		C	No	Time of sample collection. A value is required for all samples sent to the laboratory and samples derived from those samples. Twenty-four-hour format (hh:mm).
14	ReceiveDate	Date		C	No	Date of sample receipt in the laboratory. A value is required for all samples sent to the laboratory and samples derived from those samples. Format = mm/dd/yyyy.

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
15	ExtractDate	Date		C	No	Date of sample preparation (extraction or digestion). A value is required if the ExtractionMethod field value is other than “NONE”. Format = mm/dd/yyyy
16	ExtractTime	Time		C	No	Time of sample preparation. A value is required if the ExtractionMethod field value is other than “NONE”. Twenty-four-hour format (hh:mm).
17	AnalysisDate	Date		R	No	Date of sample analysis. A value is required for all records. Format = mm/dd/yyyy
18	AnalysisTime	Time		R	No	Time of sample analysis. A value is required for all records. Twenty-four-hour format (hh:mm).
19	PercentSolids	Number		R	No	Percent solids within the sample; should be zero for water samples.
20	LabLotCtlNum	Text	10	C	No	ID for an autonomous group of environmental samples and associated QC samples prepared together. For example, the value can be a digestion or extraction batch ID. If there is no separate extraction or preparation performed, the field is left blank.
21	CAS	Text	20	R	No	CAS registry number of analyte, if available.
22	ParamID	Text	12	R	Yes	Parameter ID code for the parameter listed in the Analyte field.
23	Analyte	Text	60	R	No	Name of analyte, chemical name.
24	Result	Text	10	R	No	Result of the analysis. Surrogate analytes are reported in units of percent. All others are reported in sample concentration units. If undetected, report the adjusted MDL or adjusted RL, depending on the project. (Reported as a text field to preserve significant figures.)
25	ExpectedValue	Number		C	No	Report “100” for surrogates; report “0” for blanks; spike level plus parent result for LCS, and MS/MSD; parent value for laboratory duplicate.
26	Units	Text	10	R	Yes	Units of measure used in the analysis. Report “PERCENT” for surrogate analytes; report concentration units for all others.
27	Dilution	Number		R	No	Total dilution reported in the analysis. Default value is “1”. This value reflects changes to sample preparation amounts as defined by the method (e.g., less sample used for standard VOC analysis).

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
28	MDL	Number		C	No	Minimum detection limit adjusted for preparation and dilution. This value may be the method detection limit or the instrument detection limit, depending on the method and the project requirements. This value is **not** adjusted for percent moisture.
29	RL	Number		C	No	Reporting limit adjusted for preparation and dilution. Value is **not** adjusted for percent moisture. Equivalent to PQL.
30	LabQualifier	Text	6	R	No	Laboratory qualifier for the results, as reported on the hardcopy. Use “=” as first (or only) qualifier value for detected results if there are no other qualifiers for the result.
31	Surrogate	Text	1	R	Yes	If the chemical is a surrogate = Y; if not = N.
32	Comments	Text	240	O	No	Comment field.
33	ParValUncert	Text	16	C	No	Radiological parameter value uncertainty.
34	Recovery	Number		C	No	Percent recovery for MS, SD, LCS, LCSD, and surrogate compounds.
35	LowerControlLimit	Number		C	No	Lower control limit value for spiked compounds, expressed in units of percent. A value in this field is required if there is a value in the Recovery field (Field 34).
36	UpperControlLimit	Number		C	No	Upper control limit value for spiked compounds, expressed in units of percent. A value in this field is required if there is a value in the Recovery field (Field 34).
37	Basis	Text	1	R	Yes	Weight basis for soil (or solid) sample analysis; D = dry-weight basis, W = wet-weight basis, and X = not applicable.
38	ConcQual	Text	1	R	Yes	Concentration qualifier. Use “=” for detects, “J” for estimated value (value between detection limit and reporting limit), “U” for undetected result, and “E” for exceeded result.
39	MDLAdjusted	Number		C	No	Minimum detection limit adjusted for preparation, dilution **and percent moisture**. See the description of the MDL field (Field 28) for an explanation of the contents of this field.
40	RLAdjusted	Number		C	No	Reporting limit adjusted for preparation, dilution **and percent moisture**. Equivalent to PQL

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
41	SampleDescription	Text	30	C	No	Full sample ID as it appears on CoC forms. In some cases, this may be the name of the sampling location instead of the sample. Required for all samples that are either collected in the field and specified on CoC forms, or derived from samples that are collected in the field and specified on COC forms.
42	LeachMethod	Text	20	R	Yes	Analytical method used for leaching the sample; applies to TCLP, SPLP, or other leaching or pre-extraction leaching procedures. Use “NONE” if the sample was not leached.
43	LeachDate	Date		C	No	Date that the leaching method was performed (use the start date for multidate leaching procedures). Value is required if the LeachMethod field value is other then “NONE”. Format = mm/dd/yyyy.
44	LeachTime	Time		C	No	Time that the leaching procedure started. Value is required if the LeachMethod field value is other then “NONE”. Twenty-four-hour format (hh:mm).
45	LeachLot	Text	10	C	No	ID of an autonomous group of environmental samples and associated QC samples **leached** at the same time. Value is required if the LeachMethod field value is other then “NONE”. If the sample was not leached, the field is left blank.
46	AnalysisLot	Text	10	R	No	ID of an autonomous group of environmental samples and associated QC samples **analyzed** together. A value in this field is required (i.e., it should not be blank).
47	CalRefID	Text	10	C	No	ID of a group of environmental and QC samples linked by a common set of calibration records. All results with the same CalRefID value will have had the same initial calibration run.

[a]For a list of valid values see Table 6-1B.

Notes:
The EDD file from the laboratory will be a comma-delimited ASCII file in the format listed above. There will be one EDD file per hardcopy report and the filename of the EDD file will be in the format REPORTID.csv, where REPORTID is the hardcopy report ID of sample delivery group.

C = Conditionally Required
EPRIMS = Environmental Restoration Program Information Management System
R = Required

TABLE 6-1B
Values for Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Name	Valid Values	Meaning
VersionCode	4.20AFCEE3	Format 4.20, AFCEE data values. LabQualifier field contains the laboratory qualifier values defined in the AFCEE QAPP, Version 3.0.
VersionCode	4.20EPACLP	Format 4.20, EPA data values. LabQualifier field contains the standard EPA CLP laboratory qualifiers.
QAQCType	N	Normal, environmental sample
QAQCType	LB	Laboratory method blank
QAQCType	MS	Laboratory matrix spike sample
QAQCType	SD	Laboratory matrix spike duplicate
QAQCType	LR	Laboratory replicate (dilution, re-analysis, duplicate)
QAQCType	BS	Laboratory method blank spike
QAQCType	BD	Laboratory method blank spike duplicate
LRType	DL	First dilution sample
LRType	DL2	Second dilution sample
LRType	DL3	Third dilution sample
LRType	RE	First re-analysis/re-extraction sample
LRType	RE2	Second re-analysis/re-extraction sample
LRType	RE3	Third re-analysis/re-extraction sample
LRType	D	Inorganic duplicate sample
LRType	CF	First confirmation analysis sample
LRType	CF2	Second confirmation analysis sample
LRType	CF3	Third confirmation analysis sample
AnalysisMethod	SW8260A	Volatiles by method 8260A in EPA SW846.
AnalysisMethod	SW8270	Semivolatiles by method 8270 in EPA SW846.
AnalysisMethod	SW6010	ICP metals by method 6010 in EPA SW846.
AnalysisMethod	SW7060	GFAA arsenic by method 7060 in EPA SW846.
ExtractionMethod	FLDFLT	Field filtration for dissolved metals analysis
ExtractionMethod	C3050	CLP-modified SW3050 acid digestion for metals analysis in soil samples.
ExtractionMethod	SW1311	TCLP extraction
ExtractionMethod	DISWAT	Distilled water extraction for analytes in soil samples.
ExtractionMethod	SW3510	Separatory funnel extraction
ExtractionMethod	SW3540	Soxhlet extraction
ExtractionMethod	TOTAL	Digestion of unfiltered waters for total metals analysis

TABLE 6-1B
Values for Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Name	Valid Values	Meaning
ParamID	ACE	Acetone
ParamID	AS	Arsenic
ParamID	BHCGAMMA	gamma-BHC (Lindane)
ParamID	BZ	Benzene
ParamID	CDS	Carbon disulfide
ParamID	PB	Lead
ParamID	PHENOL	Phenol
ParamID	SE	Selenium
ParamID	TCE	Trichloroethene

TABLE 6-2
Flagging Conventions for Organic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	Holding time exceeded for extraction or analysis	J = positive results; UJ = nondetects	Sample
	Holding time exceeded by a factor of two	J = positive results; R = nondetects	
Sample Preservation SW8260B	Sample not preserved	J = positive results; UJ = nondetects	Sample
Sample Integrity SW8260B	Bubbles in VOA vial used for analysis	J = positive hits; UJ = nondetects	Sample
Temperature	>6°C	J = positive results; UJ = nondetects	All samples in same cooler
ICAL	RRF <0.050, <0.010 for poor responders (SW8260B and SW8270C)	J = positive results, R = nondetects	All associated samples in analysis batch
	%RSD >20.0% (SW8260B and SW8270C), or >20% (SW8015B, SW8081A, SW8082, and SW8151A), **AND** calibration curve not used; **OR** calibration curve used, but with coefficient of correlation or determination <0.99	J = positive results, UJ = nondetects	
Calibration Verification (second-source and continuing calibration verification)	RRF <0.050, <0.010 for poor responders (SW8260B and SW8270C)	J = positive results, R = nondetects	All associated samples in analysis batch
	%D >25.0% (SW8260B and SW8270C) or >15% (SW8015B, SW8081A, SW8082, SW8151A	J = positive results, UJ = nondetects	
	%R >UT	J = positive results	All associated samples in analytical batch
	%R <LT	J = positive results, UJ = nondetects	
Laboratory Control Sample	%R >UT	J = positive results	All samples in preparation batch
	%R< LT	J = positive results, UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
Calibration Blank Method Blank	Convert blank concentration to soil units, if applicable; multiply the highest blank concentration by five	U = positive sample results <5x highest blank concentration	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank or calibration blank

TABLE 6-2
Flagging Conventions for Organic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Equipment Blank Field Blank Ambient Blank			All samples, same site, matrix and date (water) or all samples, same site, matrix (soil) associated with equipment blank
Trip Blank			All samples shipped in the same cooler as the trip blank
MS/MSD			
%R	%R >UT	J = positive results	MS analytes in parent sample and field duplicate, if any.
	%R <LT	J = positive results; UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
RPDs	RPD >UT	J = positive results	MS analytes in parent sample and field duplicate, if any.
Surrogates			
SW8260B; SW8015B; SW8015B SW8081 SW8082; SW8151A; SW8310, SW8270CSIM	%R >UT	J = positive results	All analytes in sample
	%R <LT and none <10%	J = positive results; UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
SW8270C	2 or more surrogates in same fraction with %R >UT	J = positive results	All analytes in same fraction in sample
	2 or more surrogates in same fraction with %R <LT but not <10%	J = positive results; UJ = nondetects	
	2 or more surrogates in same fraction with %R <LT and <10%	J = positive results; R = nondetects	
Internal Standards (SW8260B; SW8270C, SW8270CSIM)	Area >UT	J = positive results; UJ = nondetects	Associated analytes in sample
	Area <LT but not <10%	J = positive results;	
	Area <10%	J = positive results; R = nondetects	

TABLE 6-2
Flagging Conventions for Organic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Field Duplicates	Concentration of reported analytes are >5 times the RL in either sample and RPD >UT (30% for water samples; 50% for soil samples)	J = positive results	Field duplicate pair
	One or both sample results <5 times the RL and a difference of ±2 times the RL for water (±4 times for soil).	J = positive; UJ = nondetect	
Confirmation (SW8015B; SW8021B,SW8081A; SW8151A;)	RPD between primary and confirmation results > 25%	J = positive results	Sample

Notes:

All QA/QC criteria are included in Tables 5-3 through 5-15 and Appendix A and will be used for validation criteria.

Organic methods include SW8015B, SW8081A, SW8082, SW8151A, SW8260B, SW8270C, and SW8270C SIM.

Spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of four or more.

For methods requiring confirmation, the qualifications apply to primary analysis results (either of the two columns/detectors may be designated as the primary column/detector).

Where one MS recovery meets acceptance criteria and the other MS of the pair does not, professional judgment may be used to determine if the parent sample should be qualified for matrix effects by comparing the MS recoveries to other QC results within the batch or sample site.

Qualifier may not apply in cases where a surrogate coelutes with a nontarget analyte.

Qualifier may not apply in cases where low surrogate recoveries are due to sample dilution.

< = less than
> = greater than
%R = percent recovery
LT = lower tolerance
UT = upper tolerance

TABLE 6-3
Flagging Conventions – Minimum Data Evaluation Criteria for Inorganic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	Holding time exceeded for extraction, digestion, or analysis	J = positive results; R = nondetects for mercury; UJ = nondetects for all other analytes	Sample
	Holding time for digestion or analysis exceeded by a factor of two	J = positive results; R = nondetects	
Sample Preservation	Sample preservation requirements not met (If sample preservation was not done in the field, but was performed at the laboratory upon sample receipt, no flagging is required)	J = positive results; R = nondetects	Sample
Temperature	>6°C (not applicable to metals except mercury)	J = positive results; UJ = nondetects	Samples in same cooler
ICAL (Multipoint only)	Correlation coefficient ≤0.995	J = positive; UJ = nondetects	All associated samples in analytical batch
Calibration verification (ICAL verification, continuing calibration verification)	%R >UT	J = positive results	All associated samples in analytical batch
	%R <LT	J = positive results, UJ = nondetects	
Interference check sample (SW6010B/SW6020 only)	%R >UT	J = positive results	All associated samples in analytical batch
	%R <LT	J = positive results; UJ = nondetects	
Laboratory Control Sample	%R >UT	J = positive results	All samples in preparation batch
	%R <LT	J = positive results; UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
Calibration Blank (ICB,CCB) Method Blank	Multiply the highest blank concentration by five	U = positive sample results <5x highest blank concentration	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank or calibration blank
Equipment Blank			All samples, same site, matrix and date
MS/MSD	%R >UT	J = positive results	MS analytes in parent sample and field duplicate if applicable
	%R <LT	J = positive results; UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
	RPD >UT	J = positive results	

TABLE 6-3
Flagging Conventions – Minimum Data Evaluation Criteria for Inorganic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
MS Dilute and Spike for hexavalent chromium by Methods SW7199 or EPA218.6 (see Section 5.3.3.1)	Spike recovery 85-115% and peak within recovery time window. If criteria are not met, the laboratory is required to dilute two aliquots 1:5, spike one with 1 μg/L of hexavalent chromium and analyze the other unspiked. Continue the aforementioned procedure using successively greater dilutions of two aliquots until recovery time and recovery criteria are met.	Choose the dilution where the RT/recovery criteria are met. If RT/recovery criteria are met at a 1:1 dilution, data qualification is not required for detected or nondetected results. If RT/recovery criteria met at dilution greater than a 1:1, elevate the RL for nondetected results and qualify the data U at a level equal to the RL multiplied by the dilution factor of the acceptable analysis (apply ValAdj validation reason). If RT/recovery criteria are not met: a) Analysis performed only at a 1:1 dilution: J positive results (apply LabA&P validation reason) UJ or R nondetects determined in conjunction with Project Chemist (apply LabA&P validation reason) b) Analysis performed at subsequent dilutions and criteria are still not met: J flag positive apply LabA&P validation reason) Elevate RL - UJ or R nondetects, determined in conjunction with project chemist (apply LabA&P validation reason)	Sample
Post digestion Spikes/Recovery Test (Metals only) (Step 1 - following MS/MSD, only required if the MS/MSD fails)	Spike results indicate performance of Dilution Test required (i.e. MS/MSD Failed), but Dilution Test not done.	J = positive results, UJ = nondetects	All samples in digestion batch if Dilution test not performed
	%R >UT	J = positive	
	%R <LT	J = positive results, UJ = nondetects	

TABLE 6-3
Flagging Conventions – Minimum Data Evaluation Criteria for Inorganic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Dilution Test (Step 2 - following Post digestion spike, only required if the PDS fails)	If concentration is >25 times the RL and percent difference >UT	J = positive results UJ = nondetects	Analytes in parent sample if analytical spike not performed
MSA (GFAA only) for samples where postdigestion spike (performed as a result of unacceptable serial dilution) fails	r <0.995	J = positive results	Sample
Field Duplicates Laboratory Sample Duplicates	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%	J = positive results	Field duplicate pair
	One or both sample results <5 times the RL and a difference of ±2 times the RL	J = positive results; UJ = nondetects	

Notes:
< = less than
> = greater than

All QA/QC criteria are included in Tables 5-3 through 5-15 and Appendix A and will be used for validation criteria.

Spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of four or more.

CCB = continuing calibration blank
ICB = Initial calibration blank
LabA&P = laboratory accuracy and precision criteria not met
LT = lower tolerance
MSA = method of standard addition
UT = upper tolerance
ValAdj = Value reported by laboratory adjusted because of matrix issues.

TABLE 6-4
Qualifier Flag Definitions
PG&E Program Quality Assurance Project Plan

Flag	Definition
J	Analyte was present but reported value may not be accurate or precise.
R	The result has been rejected.
U	Analyte was analyzed for but not detected at the specified detection limit.
UJ	Analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and might not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

SECTION 7

Performance Evaluations

To assess sample and data collection procedures, performance evaluations will be conducted that include of technical systems audits and performance audits.

7.1 Technical Systems Audits

7.1.1 Laboratory Audits

The laboratories participating in the data collection effort will be prequalified by the project management teams. A surveillance audit program that requires routine technical system audits will be instituted. Laboratory prequalification and the surveillance audits may also be undertaken by regulatory agencies. Laboratory prequalification audits may be performed as onsite audits, desk audits, or a combination of both, depending on the scale and sensitivity of the project.

7.1.1.1 Onsite Laboratory Prequalification Audit

An onsite laboratory prequalification audit in conjunction with a desk audit (see Section 7.1.1.2) is the preferred audit when using a new laboratory. The onsite laboratory audit will start with a pre-audit meeting during which the auditor will discuss with the laboratory staff the purpose of the audit, the schedule and areas to be audited, and the procedures that will be followed. The meeting may include a brief tour of the laboratory. The audit will then be conducted. The auditor will assemble the findings at the conclusion of the audit and discuss the findings with laboratory staff.

Critical items that will be addressed in a technical system audit include, but may not be limited to, the following:

- Calibration procedures and documentation
- Treatment and handling of standards
- Completeness of data forms, notebooks, and other reporting requirements
- Data review and verification procedures
- Data storage, filing, and recordkeeping procedures
- Sample custody procedures
- QC procedures, tolerances, and documentation
- Operating conditions of facilities and equipment
- Documentation of staff training and instrument maintenance activities
- Systems and operations overview

A written audit report will be sent to the laboratory within a specified time. A copy of the audit report will be sent to the project manager, and a copy will be retained in the project files.

The need for follow-up action will be determined based on the laboratory's responses. If an audit identifies an unacceptable condition or unacceptable data, the laboratory will be responsible for developing and initiating corrective action to resolve the situation. The project manager will be notified if the nonconformance impacts the project and requires resources not normally available to the project team. In such cases, the project manager will decide whether resources to pursue corrective action will be made available.

7.1.1.2 Desk Prequalification Audit

In part, a prequalification audit is performed to provide a perspective of the laboratory operations and the internal auditing and data review processes. Noncritical samples, split samples, or performance evaluation samples will be sent to the laboratory as part of the prequalification audit to ascertain the laboratory's ability to produce quality data. Generally, this process starts by sending guidance documents (e.g., QAPP, SAP, and SOW) to the laboratory for review. After a review and confirmation, the laboratory will follow the guidance documents to the best of their ability and to the project chemist's satisfaction. The auditor will request copies of accreditation audits (e.g., ELAP, NELAP, or AFCEE), SOPs, an example data package, and the laboratory's quality assurance manual. After a review of the laboratory's documentation (including instrument output, analytical reports, and other documentation specific to a batch of samples), samples can be sent to the laboratory. The data will be validated by using the Level 4 protocol described in Section 6.3 and reviewing the laboratories QC documentation. The corrective actions described in Section 7.1.1.1 may also apply.

7.1.2 Field Audits

Field audits will be performed annually to verify the performance of field procedures. The audit will evaluate the following:

- Sample containers and preservatives
- Sample collection and identification procedures
- Sample custody, handling, and shipping procedures
- Equipment decontamination procedures
- Calibration of field instruments and performance of field tests
- Documentation of field activities, maintenance of field records, and document control

7.2 Performance Audits

7.2.1 Performance Evaluations

Laboratories are required to participate in a performance evaluation program, in accordance with the California ELAP. Any method or analyte failure in a performance evaluation that affects the certification status of the laboratory with the National Environmental Laboratory Accreditation Program or the state of California must be immediately communicated to the program chemist.

Blind performance evaluation samples will be submitted to the laboratories as deemed necessary by the project chemist or project team.

7.2.2 External Audits

Announced and unannounced audits of the field operations and laboratories may be conducted by CH2M HILL during any stage of the project.

7.2.3 Internal Audits

Annual audits of the laboratory shall be conducted by the laboratory's quality assurance officer. The audits shall verify, at a minimum, that written SOPs are being followed; standards are traceable to certified sources; documentation is complete; data review is being done effectively and is properly documented; and data reporting, including electronic and manual data transfer, is accurate and complete. All audit findings shall be documented in QA reports to management. Necessary corrective actions shall be taken within a reasonable timeframe. The quality assurance office shall verify that such actions are effective and complete and document their implementation in an audit closeout report to management.

SECTION 8

Preventive Maintenance

The primary objective of preventive maintenance is to promote the timely and effective completion of a data collection effort. The maintenance program should be designed to minimize the downtime of crucial sampling and analytical equipment caused by component failures. The maintenance program should establish the following:

- Maintenance responsibilities
- Maintenance schedules
- An adequate inventory of critical spare parts and equipment

8.1 Maintenance Responsibilities

Laboratory instrument maintenance is the responsibility of the participating laboratory. Generally, the laboratory manager or supervisor is responsible for the instruments in their work areas; they will establish maintenance procedures and schedules for each instrument. Laboratories should maintain service agreements with instrument manufacturers or a reputable service company to minimize downtime if there is an instrument malfunction.

Maintenance responsibilities for field equipment are assigned to the field team leader for specific sampling tasks. However, the field team using the equipment is responsible for checking the status of the equipment prior to use and reporting any problems encountered. The field team is also responsible for ensuring that critical spare parts are included as part of the field equipment checklist. Nonoperational field equipment should be removed from service and a replacement obtained. All field instruments will be properly protected against inclement weather conditions during the field investigation.

8.2 Maintenance Schedules

The effectiveness of any maintenance program depends, to a large extent, on adherence to specific maintenance schedules for each piece of equipment. Nonroutine maintenance activities are conducted as needed. Manufacturers' recommendations should provide the primary basis for establishing maintenance schedules. Service contracts may be used to implement maintenance schedules.

Each analytical instrument should be assigned an instrument logbook; all maintenance activities for will be the documented instrument in the logbook. Logbooks should contain the following information:

- Date of service
- Person performing the service
- Type of service performed and the reason for service
- Replacement parts installed, if appropriate
- Date of next scheduled service
- Any other useful information

8.3 Spare Parts

An adequate inventory of spare parts is required to minimize equipment down time. The inventory will include the following:

- Parts and supplies that are subject to frequent failure
- Parts and supplies that have limited useful lifetimes
- Parts and supplies that cannot be obtained in a timely manner should failure occur

Field managers and laboratory managers are responsible for maintaining an adequate inventory of spare parts. In addition to spare parts and supply inventories, an in-house source of backup equipment and instrumentation should be available.

SECTION 9

Data Assessment

9.1 Data Quality Assessment

All laboratory data will be evaluated according to the QA acceptance criteria specified in Tables 5-3 through 5-15 and Appendix A Limitations regarding data usability will be assigned, if appropriate, in accordance with the validation process described in Section 7. Field data will be evaluated according to the appropriate SOP.

9.2 Reconciliation with Project Objectives

The PG&E Program includes projects and sites with varying tasks and objectives. The procedure for data reconciliation will be a function of the project-specific objectives and will be addressed in the project-specific documents.

SECTION 10

Corrective Action

Corrective action may be required as a result of deviations from field or analytical procedures. Deficiencies identified in audits and data quality evaluations may also call for corrective action. All project personnel have the responsibility to identify, report, and solicit approval for corrective actions to resolve conditions that are adverse to data quality.

Tables 5-3 through 5-15 specify the corrective actions to be taken when deviations from calibration and QC acceptance criteria occur. Field and laboratory staff may encounter conditions requiring immediate corrective action that are not addressed in this QAPP, the SAPs, or QAPP addenda. These staff will document conditions and the results of corrective actions in a field logbook or laboratory nonconformance report and communicate their actions as soon as feasible to the appropriate people (field team leader, laboratory supervisor, project chemist, project manager, and if necessary, the PG&E Program quality manager) for immediate input. A mechanism must be in place to allow for supervisory review or client input, or both, for all deviations or deficiencies. A corrective action reporting system that requires immediate documentation of deviations or deficiencies and for supervisory review of the actions taken to correct them will be established. At a minimum, the corrective action report should include the following information:

- The type of deviation or deficiency
- The date of occurrence
- The impact of the deviation or deficiency, such as samples affected
- The corrective action taken
- Documentation that the process has been returned to control

The only time that a corrective action report may be waived is when a deviation or deficiency is immediately corrected and its impact is precluded. An example would be an unacceptable ICAL that is repeated before samples are analyzed.

Each corrective action report must be reviewed and approved by a person of authority, such as the field team leader or laboratory supervisor. The ultimate responsibility for the laboratory corrective action process is the QC manager, who must ensure that proper documentation, approval, and close out of all out-of-control or nonconformance events is performed. A nonconformance report will summarize each nonconformance condition. Corrective action reports that could potentially affect data quality must be brought to the attention of the project chemist. Report disposition will be the responsibility of the project chemist. The project manager may be notified about a particular report at the project chemist's discretion. Copies of corrective action reports must be maintained in the laboratory or field project files.

SECTION 11

Quality Assurance Reports

Where specified in the SAP, work plan, or QAPP addendum, a QA report or data quality evaluation will be submitted by the project chemist to the project manager on a predetermined interval established in the SAP or QAPP addendum. The report will summarize the results of the data validation and the data assessment. The results should be presented in a manner that facilitates decision making. For example, temporal data may be more effectively presented if supplemented by a time plot. Any significant quality problems and recommended solutions should be included in the report. Limitations on data usability identified during data validation should be highlighted. Results of the data assessment should be reconciled with the project objectives.

SECTION 12

Data Management

Electronic data associated with CH2M Hill projects will be used to generate validation reports, risk assessment calculations, modeling results, data summary tables, maps, and other figures. The data management will follow CH2M HILL standard procedures for environmental data collection. Other consultants or contractors may use other electronic data management programs, which will be described in the SAP or QAPP addendum. However, any system used must be capable of storing and managing the information as follows:

- Simple procedures to get rapid access to stored data
- Data entry methods of known accuracy and efficiency
- Well-documented validation procedures for electronic databases
- Sampling data management using unique sample IDs
- A sampling inventory of newly collected data and methods of sample inventory reconciliation
- Sample-specific attributes, including location IDs, sample type and media, and sample date
- Reporting and delivery formats to support data analysis and reduction

12.1 Archiving

Hardcopy and electronic versions will be archived in project files and on electronic archive tapes for the duration of the project, as specified in contractual agreements, or for a minimum of 5 years. All electronic data will be subject to routine back-up until it is archived for long-term retention.

12.2 Data Flow and Transfer

The data flow from the laboratory and field to the project staff and data users will be sufficiently documented to ensure that data are properly tracked, reviewed, and validated.

12.3 Record Keeping

In addition to the data management procedures for analytical data provided in Section 6.1, the laboratory will maintain electronic and hardcopy records sufficient to re-create each analytical event. At a minimum, laboratory will maintain the following records:

- Raw data, including instrument printouts, bench work sheets, and chromatograms, with compound identification and quantitation reports
- Laboratory-specific, written SOPs for each analytical method and QA/QC function implemental during the analysis of project samples

SECTION 13

References

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Appendix A
Reporting Limits, Accuracy, and Precession Limits

Table A-1
Reporting Limits, Accuracy, and Precession Limits for Soil
PG&E Program Quality Assurance Project Plan

					EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	**Constituent**	**CAS**	**Units**	**QAPP RL**	**Residential**	**Commercial**	**Residential**	**Commercial**	**Residential**	**Commercial**	**Most Stringent Screening Level[1]**	**Does RL Exceed Screening Level?**	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**	**% RPD**
SW 9012 or SW 9014	Cyanide	57-12-5	mg/kg	0.25	47	610	1,600	20,000	--	--	0,047	NO	*	*	*	*	30
Walkley-Black	Total organic carbon	TOC	mg/kg	50	--	--	--	--	--	--	--	NO	75	125	75	125	35
SW 9050	Specific conductance	Conductance	µmhos/cm	5	--	--	--	--	--	--	--	NO	75	125	75	125	20
SW 9045	pH	pH	pH units	0.1	--	--	--	--	--	--	--	NO	--	--	--	--	20
SM 2540 B/EPA 160.3	percent moisture	Moist	Percent	--	--	--	--	--	--	--	--	NO	--	--	--	--	20
EPA 300.0	Fluoride	Fluoride	mg/kg	2	--	--	4,700	61,000	--	--	4,700	NO	70	130	70	130	35
EPA 300.0	Chloride	Chloride	mg/kg	2	--	--	--	--	--	--	--	NO	70	130	70	130	35
EPA 300.0	Sulfate	Sulfate	mg/kg	2	--	--	--	--	--	--	--	NO	70	130	70	130	35
EPA 821/R-91-100	Sulfide, acid volatile	18496-25-8	mg/kg	80	--	--	--	--	--	--	--	NO	70	130	70	130	30
SW 7199	Chromium, hexavalent	18540-29-9	mg/kg	0.4	0.29	5.6	230	1,400	17	17	0.29	YES	85	115	85	115	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Aluminum	7429-90-5	mg/kg	10	77,000	990,000	77,000	990,000	--	--	77,000	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Antimony	7440-36-0	mg/kg	2	31	410	31	410	30	380	30	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Arsenic	7440-38-2	mg/kg	0.5	0.39	1.6	0.39	1.6	0.07	0.42	0.07	YES	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Barium	7440-39-3	mg/kg	1	15,000	190,000	15,000	190,000	5,200	63,000	5,200	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Beryllium	7440-41-7	mg/kg	0.5	160	2,000	160	2,000	150	1,700	150	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cadmium	7440-43-9	mg/kg	0.5	70	800	70	810	1.7	7.5	1.7	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Calcium	7440-70-2	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Chromium	7440-47-3	mg/kg	1	--	--	280	1,400	*	*	280	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cobalt	7440-48-4	mg/kg	1	23	300	23	300	660	3,200	23	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Copper	7440-50-8	mg/kg	1	3,100	41,000	3,100	41,000	3,000	38,000	3,000	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Iron	7439-89-6	mg/kg	10	55,000	720,000	55,000	720,000	--	--	55,000	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Lead	7439-92-1	mg/kg	1	400	800	400	800	150	3,500	150	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Magnesium	7439-95-4	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Manganese	7439-96-5	mg/kg	1	--	--	1,800	23,000	--	--	1,800	NO	85	115	75	125	20
SW 7471A/EPA 245.5	Mercury	7439-97-6	mg/kg	0.1	10	43	6.7	28	18	180	6.7	NO	75	125	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Molybdenum	7439-98-7	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Nickel	7440-02-0	mg/kg	1	1,500	20,000	1,600	20,000	1,600	16,000	1,500	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Potassium	7440-09-1	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Selenium	7782-49-2	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Silver	7440-22-4	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Sodium	7440-23-5	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Thallium	7440-28-0	mg/kg	2	0.78	10	5.1	66	5	63	0.78	YES	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Vanadium	7440-62-2	mg/kg	1	--	--	550	7,200	530	6,700	530	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Zinc	7440-66-6	mg/kg	2	23,000	310,000	23,000	310,000	23,000	100,000	23,000	NO	85	115	75	125	20
SW 8015B or C or D	Motor Oil	TPH-motor oil	mg/kg	10	--	--	--	--	--	--	--	NO	60	120	60	120	50
SW 8015B or C or D	TPH-Diesel	TPH-diesel	mg/kg	10	--	--	--	--	--	--	--	NO	51	153	51	153	50
SW 8015B or C or D	TPH-Gasoline	TPH-gasoline	mg/kg	1	--	--	--	--	--	--	--	NO	57	146	57	146	50
SW 8081A or B	4,4'-DDD	72-54-8	ug/kg	4	2,000	7,200	2,000	7,200	2,300	9,000	2,000	NO	50	139	50	139	50
SW 8081A or B	4,4'-DDE	72-55-9	ug/kg	4	1,400	5,100	1,400	5,100	1,600	6,300	1,400	NO	68	126	68	126	50
SW 8081A or B	4,4'-DDT	50-29-3	ug/kg	4	1,700	7,000	1,700	7,000	1,600	6,300	1,600	NO	46	135	46	135	50
SW 8081A or B	Aldrin	309-00-2	ug/kg	4	29	100	29	100	33	130	29	NO	47	120	47	120	50
SW 8081A or B	alpha-HCH	319-84-6	ug/kg	4	77	270	77	270	--	--	77	NO	62	125	62	125	50
SW 8081A or B	alpha-Chlordane	5103-71-9	ug/kg	4	--	--	--	--	430	1,700	430	NO	63	121	63	121	50
SW 8081A or B	beta-HCH	319-85-7	ug/kg	4	270	960	320	1,300	--	--	270	NO	62	127	62	127	50
SW 8081A or B	delta-HCH	319-86-8	ug/kg	4	--	--	--	--	--	--	--	NO	57	130	57	130	50
SW 8081A or B	Dieldrin	60-57-1	ug/kg	4	30	110	30	110	35	130	30	NO	67	125	67	125	50
SW 8081A or B	Endosulfan I	959-98-8	ug/kg	4	--	--	--	--	--	--	--	NO	41	147	41	147	50
SW 8081A or B	Endosulfan II	33213-65-9	ug/kg	4	--	--	--	--	--	--	--	NO	37	141	37	141	50
SW 8081A or B	Endosulfan sulfate	1031-07-8	ug/kg	4	--	--	--	--	--	--	--	NO	62	135	62	135	50
SW 8081A or B	Endrin	72-20-8	ug/kg	4	18,000	180,000	18,000	180,000	21,000	230,000	18,000	NO	61	133	61	133	50
SW 8081A or B	Endrin aldehyde	7421-93-4	ug/kg	4	--	--	--	--	--	--	--	NO	37	147	37	147	50
SW 8081A or B	gamma-HCH (Lindane)	58-89-9	ug/kg	4	520	2,100	520	21,000	500	2,000	500	NO	59	123	59	123	50
SW 8081A or B	gamma-Chlordane	5103-74-2	ug/kg	4	--	--	--	--	430	1,700	430	NO	48	124	48	124	50
SW 8081A or B	Heptachlor	76-44-8	ug/kg	4	110	380	110	380	130	520	110	NO	51	140	51	140	50
SW 8081A or B	Heptachlor epoxide	1024-57-3	ug/kg	4	53	190	53	190	--	--	53	NO	66	130	66	130	50
SW 8081A or B	Methoxychlor	72-43-5	ug/kg	20	310,000	3,100,000	310,000	3,100,000	340,000	3,800,000	310,000	NO	57	143	57	143	50
SW 8081A or B	Toxaphene	8001-35-2	ug/kg	100	440	1,600	440	1,600	460	1,800	440	NO	31	136	31	136	50
SW 8082 or A	Aroclor-1016	12674-11-2	ug/kg	50	3,900	21,000	3,900	21,200	--	--	3,900	NO	41	138	41	138	50
SW 8082 or A	Aroclor-1221	11104-28-2	ug/kg	50	140	540	170	620	--	--	140	NO	45	136	45	136	50
SW 8082 or A	Aroclor-1232	11141-16-5	ug/kg	50	140	540	170	620	--	--	140	NO	45	136	45	136	50
SW 8082 or A	Aroclor-1242	53469-21-9	ug/kg	50	220	740	220	740	--	--	220	NO	43	150	43	150	50
SW 8082 or A	Aroclor-1248	12672-29-6	ug/kg	50	220	740	220	740	--	--	220	NO	44	136	44	136	50
SW 8082 or A	Aroclor-1254	11097-69-1	ug/kg	50	220	740	220	740	--	--	220	NO	41	141	41	141	50
SW 8082 or A	Aroclor-1260	11096-82-5	ug/kg	50	220	740	220	740	--	--	220	NO	61	131	61	131	50
SW 8082 or A	Total PCB	Total PCB	ug/kg	50	220	740	220	740	89	300	89	NO	--	--	--	--	--
SW 8151A	2,4-D	94-75-7	ug/kg	200	690,000	7,700,000	690	7,700	690	550	550	NO	32	121	32	121	50

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PG&E Program Quality Assurance Project Plan

					EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	Constituent	CAS	Units	QAPP RL	Residential	Commercial	Residential	Commercial	Residential	Commercial	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 8151A	2,4-DB	94-82-6	ug/kg	500	490,000	4,900,000	490	4,900	--	--	490	YES	42	145	42	145	50
SW 8151A	2,4,5-T	93-76-5	ug/kg	500	610,000	6,200,000	610	6,200	7,700	6,100	610	NO	43	139	43	139	50
SW 8151A	2,4,5-TP	93-72-1	ug/kg	200	490,000	4,900,000	490	4,900	--	--	490	NO	46	128	46	128	50
SW 8151A	Dalapon	75-99-0	ug/kg	100	1,800,000	18,000,000	1,800	18,000	--	--	1,800	NO	22	125	22	125	50
SW 8151A	Dicamba	1918-00-9	ug/kg	500	1,800,000	18,000,000	1,800	18,000	--	--	1,800	NO	56	120	56	120	50
SW 8151A	Dichloroprop	120-36-5	ug/kg	500	--	--	--	--	--	--	--	NO	72	142	72	142	50
SW 8151A	Dinoseb	88-85-7	ug/kg	100	61,000	620,000	61	620	--	--	61	YES	20	131	20	131	50
SW 8151A	MCPA	94-74-6	ug/kg	1,000	31,000	310,000	31	310	--	--	31	YES	65	120	65	120	50
SW 8151A	MCPP	7085-19-0	ug/kg	1,500	--	--	61	620	--	--	61	YES	60	118	60	118	50
SW 8260B or C	1,1,1,2-Tetrachloroethane	630-20-6	ug/kg	5	1,900	9,300	2,000	9,800	--	--	1,900	NO	74	125	74	125	30
SW 8260B or C	1,1,1-Trichloroethane (TCA)	71-55-6	ug/kg	5	8,700,000	38,000,000	9,000,000	39,000,000	--	--	8,700,000	NO	68	130	68	130	30
SW 8260B or C	1,1,2,2-Tetrachloroethane	79-34-5	ug/kg	5	560	2,800	590	2,900	--	--	560	NO	59	140	59	140	30
SW 8260B or C	1,1,2-Trichloroethane	79-00-5	ug/kg	5	1,100	5,300	1,100	5,500	--	--	1,100	NO	62	127	62	127	30
SW 8260B or C	1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/kg	5	43,000,000	180,000,000	43,000,000	180,000,000	--	--	43,000,000	NO	65	135	65	135	30
SW 8260B or C	1,1-Dichloroethane	75-34-3	ug/kg	5	3,300	17,000	3,400	17,000	--	--	3,300	NO	73	125	73	125	30
SW 8260B or C	1,1-Dichloroethylene	75-35-4	ug/kg	5	240,000	1,100,000	250,000	1,100,000	--	--	240,000	NO	65	136	65	136	30
SW 8260B or C	1,1-Dichloropropene	563-58-6	ug/kg	5	--	--	--	--	--	--	--	NO	70	135	70	135	30
SW 8260B or C	1,2,3-Trichlorobenzene	87-61-6	ug/kg	5	49,000	490,000	--	--	--	--	49,000	NO	62	133	62	133	30
SW 8260B or C	1,2,3-Trichloropropane	96-18-4	ug/kg	5	5	95	91	410	--	--	5	NO	63	130	63	130	30
SW 8260B or C	1,2,4-Trichlorobenzene	120-82-1	ug/kg	5	22,000	99,000	87,000	400,000	--	--	22,000	NO	65	131	65	131	30
SW 8260B or C	1,2,4-Trimethylbenzene	95-63-6	ug/kg	5	62,000	260,000	67,000	280,000	--	--	62,000	NO	65	135	65	135	30
SW 8260B or C	1,2-Dibromo-3-chloropropane	96-12-8	ug/kg	5	5.4	69	5.6	73	--	--	5.4	NO	49	135	49	135	30
SW 8260B or C	1,2-Dibromoethane (EDB)	106-93-4	ug/kg	5	34	170	34	170	--	--	34	NO	70	124	70	124	30
SW 8260B or C	1,2-Dichlorobenzene	95-50-1	ug/kg	5	1,900,000	9,800,000	2,000,000	10,000,000	--	--	1,900,000	NO	74	120	74	120	30
SW 8260B or C	1,2-Dichloroethane (EDC)	107-06-2	ug/kg	5	430	2,200	450	2,200	--	--	430	NO	72	137	72	137	30
SW 8260B or C	1,2-Dichloropropane	78-87-5	ug/kg	5	940	4,700	930	4,700	--	--	930	NO	71	120	71	120	30
SW 8260B or C	1,3,5-Trimethylbenzene	108-67-8	ug/kg	5	780,000	10,000,000	47,000	200,000	--	--	47,000	NO	65	133	65	133	30
SW 8260B or C	1,3-Dichlorobenzene	541-73-1	ug/kg	5	--	--	--	--	--	--	--	NO	72	124	72	124	30
SW 8260B or C	1,3-Dichloropropane	142-28-9	ug/kg	5	1,600,000	20,000,000	1,600,000	20,000,000	--	--	1,600,000	NO	76	123	76	123	30
SW 8260B or C	1,4-Dichlorobenzene	106-46-7	ug/kg	5	2,400	12,000	2,600	13,000	--	--	2,400	NO	72	125	72	125	30
SW 8260B or C	2,2-Dichloropropane	594-20-7	ug/kg	5	--	--	--	--	--	--	--	NO	67	134	67	134	30
SW 8260B or C	2-Butanone (MEK)	78-93-3	ug/kg	50	28,000,000	200,000,000	28,000,000	190,000,000	--	--	28,000,000	NO	40	135	40	135	30
SW 8260B or C	2-Chlorotoluene	95-49-8	ug/kg	5	1,600,000	20,000,000	1,600,000	20,000,000	--	--	1,600,000	NO	69	128	69	128	30
SW 8260B or C	4-Chlorotoluene	106-43-4	ug/kg	5	1,600,000	20,000,000	5,500,000	72,000,000	--	--	1,600,000	NO	73	126	73	126	30
SW 8260B or C	4-Isopropyltoluene	99-87-6	ug/kg	6	--	--	--	--	--	--	--	NO	75	133	75	133	30
SW 8260B or C	4-Methyl-2-pentanone	108-10-1	ug/kg	50	5,300,000	53,000,000	5,300,000	52,000,000	--	--	5,300,000	NO	65	135	65	135	30
SW 8260B or C	Acetone	67-64-1	ug/kg	50	61,000,000	630,000,000	61,000,000	610,000,000	--	--	61,000,000	NO	40	141	40	141	30
SW 8260B or C	Acrolein	107-02-8	ug/kg	100	150	650	160	680	--	--	150	NO	65	135	65	135	30
SW 8260B or C	Acrylonitrile	107-13-1	ug/kg	50	240	1,200	240	1,200	--	--	240	NO	65	135	65	135	30
SW 8260B or C	Benzene	71-43-2	ug/kg	5	1,100	5,400	1,100	5,600	--	--	1,100	NO	73	126	73	126	30
SW 8260B or C	Bromobenzene	108-86-1	ug/kg	5	300,000	1,800,000	94,000	410,000	--	--	94,000	NO	66	121	66	121	30
SW 8260B or C	Bromochloromethane	74-97-5	ug/kg	5	160,000	680,000	--	--	--	--	160,000	NO	71	127	71	127	30
SW 8260B or C	Bromodichloromethane	75-27-4	ug/kg	5	270	1,400	10,000	46,000	--	--	0,270	NO	72	128	72	128	30
SW 8260B or C	Bromoform	75-25-2	ug/kg	6	62,000	220,000	61,000	220,000	--	--	61,000	NO	66	137	66	137	30
SW 8260B or C	Bromomethane	74-83-9	ug/kg	5	7,300	32,000	7,900	35,000	--	--	7,300	NO	45	141	45	141	30
SW 8260B or C	Carbon disulfide	75-15-0	ug/kg	5	820,000	3,700,000	670,000	3,000,000	--	--	670,000	NO	65	135	65	135	30
SW 8260B or C	Carbon tetrachloride	56-23-5	ug/kg	5	610	3,000	250	1,300	--	--	250	NO	67	133	67	133	30
SW 8260B or C	Chlorobenzene	108-90-7	ug/kg	5	290,000	1,400,000	310,000	1,500,000	--	--	290,000	NO	75	123	75	123	30
SW 8260B or C	Chloroethane	75-00-3	ug/kg	5	15,000,000	61,000,000	15,000,000	62,000,000	--	--	15,000,000	NO	41	141	41	141	30
SW 8260B or C	Chloroform	67-66-3	ug/kg	2	290	1,500	300	1,500	--	--	290	NO	72	124	72	124	30
SW 8260B or C	Chloromethane	74-87-3	ug/kg	5	120,000	500,000	1,700	8,400	--	--	1,700	NO	51	129	51	129	30
SW 8260B or C	cis-1,2-Dichloroethene	156-59-2	ug/kg	5	160,000	2,000,000	780,000	10,000,000	--	--	160,000	NO	67	125	67	125	30
SW 8260B or C	cis-1,3-Dichloropropene	10061-01-5	ug/kg	5	--	--	--	--	--	--	--	NO	72	126	72	126	30
SW 8260B or C	Dibromochloromethane	124-48-1	ug/kg	5	680	3,300	5,800	21,000	--	--	0,680	NO	66	130	66	130	30
SW 8260B or C	Dibromomethane	74-95-3	ug/kg	5	25,000	110,000	780,000	10,000,000	--	--	25,000	NO	73	128	73	128	30
SW 8260B or C	Dichlorodifluoromethane	75-71-8	ug/kg	5	94,000	400,000	190,000	780,000	--	--	94,000	NO	34	136	34	136	30
SW 8260B or C	Ethylbenzene	100-41-4	ug/kg	5	5,400	27,000	5,700	29,000	--	--	5,400	NO	74	127	74	127	30
SW 8260B or C	Hexachlorobutadiene	87-68-3	ug/kg	5	6,200	22,000	6,200	22,000	--	--	6,200	NO	53	142	53	142	30
SW 8260B or C	Isopropylbenzene (Cumene)	98-82-8	ug/kg	5	2,100,000	11,000,000	2,200,000	11,000,000	--	--	2,100,000	NO	77	129	77	129	30
SW 8260B or C	Methylene Chloride	75-09-2	ug/kg	5	56,000	960,000	1,100	5,400	--	--	1,100	NO	63	137	63	137	30
SW 8260B or C	Naphthalene	91-20-3	ug/kg	5	3,600	18,000	3,900	20,000	--	--	3,600	NO	51	135	51	135	30
SW 8260B or C	n-Butylbenzene	104-51-8	ug/kg	5	3,900,000	51,000,000	--	--	--	--	3,900,000	NO	65	138	65	138	30
SW 8260B or C	n-Propylbenzene	103-65-1	ug/kg	5	3,400,000	21,000,000	--	--	--	--	3,400,000	NO	63	135	63	135	30
SW 8260B or C	sec-Butylbenzene	135-98-8	ug/kg	5	--	--	--	--	--	--	--	NO	63	132	63	132	30
SW 8260B or C	Styrene	100-42-5	ug/kg	5	6,300,000	36,000,000	6,500,000	38,000,000	--	--	6,300,000	NO	74	128	74	128	30
SW 8260B or C	tert-Butyl Methyl Ether (MTBE)	1634-04-4	ug/kg	20	43,000	220,000	39,000	190,000	--	--	39,000	NO	50	135	50	135	30

Table A-1
Reporting Limits, Accuracy, and Precession Limits for Soil
PG&E Program Quality Assurance Project Plan

					EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	Constituent	CAS	Units	QAPP RL	Residential	Commercial	Residential	Commercial	Residential	Commercial	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 8260B or C	tert-Butylbenzene	98-06-6	ug/kg	5	--	--	--	--	--	--	--	NO	65	132	65	132	30
SW 8260B or C	Tetrachloroethene	127-18-4	ug/kg	5	22,000	110,000	570	2,700	--	--	570	NO	67	139	67	139	30
SW 8260B or C	Toluene	108-88-3	ug/kg	5	5,000,000	45,000,000	5,000,000	46,000,000	--	--	5,000,000	NO	71	127	71	127	30
SW 8260B or C	trans-1,2-Dichloroethene	156-60-5	ug/kg	5	150,000	690,000	110,000	500,000	--	--	110,000	NO	66	134	66	134	30
SW 8260B or C	trans-1,3-Dichloropropene	10061-02-6	ug/kg	5	--	--	--	--	--	--	--	NO	65	127	65	127	30
SW 8260B or C	Trichloroethene	79-01-6	ug/kg	5	910	6,400	2,800	14,000	--	--	0,910	NO	77	124	77	124	30
SW 8260B or C	Trichlorofluoromethane (Freon 11)	75-69-4	ug/kg	5	790,000	3,400,000	800,000	3,400,000	--	--	790,000	NO	49	139	49	139	30
SW 8260B or C	Vinyl Chloride	75-01-4	ug/kg	5	60	1,700	60	1,700	--	--	60	NO	58	126	58	126	30
SW 8260B or C	Xylenes, Total	1330-20-7	ug/kg	15	630,000	2,700,000	600,000	2,600,000	--	--	600,000	NO	65	125	65	125	50
SW 8260B or C	m-Xylene	108-38-3	ug/kg	10	590,000	2,500,000	4,500,000	19,000,000	--	--	590,000	NO	79	126	79	126	30
SW 8260B or C	p-Xylene	106-42-3	ug/kg	10	600,000	2,600,000	4,700,000	20,000,000	--	--	600,000	NO	79	126	79	126	30
SW 8260B or C	o-Xylene	95-47-6	ug/kg	5	690,000	3,000,000	5,300,000	23,000,000	--	--	690,000	NO	77	125	77	125	30
SW 8270C or D	1,2,4-Trichlorobenzene	120-82-1	ug/kg	330	22,000	99,000	87,000	400,000	--	--	22,000	NO	44	125	44	125	30
SW 8270C or D	1,2-Dichlorobenzene	95-50-1	ug/kg	330	1,900,000	9,800,000	2,000,000	10,000,000	--	--	1,900,000	NO	45	125	45	125	30
SW 8270C or D	1,3-Dichlorobenzene	541-73-1	ug/kg	330	--	--	--	--	--	--	--	NO	39	125	39	125	30
SW 8270C or D	1,4-Dichlorobenzene	106-46-7	ug/kg	330	2,400	12,000	2,600	13,000	--	--	2,400	NO	35	125	35	125	30
SW 8270C or D	2,4,5-Trichlorophenol	95-95-4	ug/kg	700	6,100,000	62,000,000	6,100,000	62,000,000	--	--	6,100,000	NO	49	125	49	125	30
SW 8270C or D	2,4,6-Trichlorophenol	88-06-2	ug/kg	330	44,000	160,000	44,000	160,000	--	--	44,000	NO	43	125	43	125	30
SW 8270C or D	2,4-Dichlorophenol	120-83-2	ug/kg	330	180,000	1,800,000	180,000	1,800,000	--	--	180,000	NO	45	125	45	125	30
SW 8270C or D	2,4-Dimethylphenol	105-67-9	ug/kg	330	1,200,000	12,000,000	1,200,000	12,000,000	--	--	1,200,000	NO	32	125	32	125	30
SW 8270C or D	2,4-Dinitrophenol	51-28-5	ug/kg	700	120,000	1,200,000	120,000	1,200,000	--	--	120,000	NO	25	132	25	132	30
SW 8270C or D	2,4-Dinitrotoluene	121-14-2	ug/kg	330	1,600	5,500	120,000	1,200,000	--	--	1,600	NO	48	125	48	125	30
SW 8270C or D	2,6-Dinitrotoluene	606-20-2	ug/kg	330	61,000	620,000	61,000	620,000	--	--	61,000	NO	48	125	48	125	30
SW 8270C or D	2-Chloronaphthalene	91-58-7	ug/kg	330	6,300,000	82,000,000	6,300,000	82,000,000	--	--	6,300,000	NO	45	125	45	125	30
SW 8270C or D	2-Chlorophenol	95-57-8	ug/kg	330	390,000	5,100,000	390,000	5,100,000	--	--	390,000	NO	44	125	44	125	30
SW 8270C or D	2-Methylnaphthalene	91-57-6	ug/kg	330	230,000	2,200,000	310,000	4,100,000	--	--	230,000	NO	47	125	47	125	30
SW 8270C or D	2-Methylphenol (o-Cresol)	95-48-7	ug/kg	330	3,100,000	31,000,000	3,100,000	31,000,000	--	--	3,100,000	NO	40	125	40	125	30
SW 8270C or D	2-Nitroaniline	88-74-4	ug/kg	700	610,000	6,000,000	--	--	--	--	610,000	NO	44	125	44	125	30
SW 8270C or D	2-Nitrophenol	88-75-5	ug/kg	700	--	--	--	--	--	--	--	NO	42	125	42	125	30
SW 8270C or D	3,3'-Dichlorobenzidine	91-94-1	ug/kg	1,300	1,100	3,800	1,100	3,800	--	--	1,100	YES	25	128	25	128	30
SW 8270C or D	3-Nitroaniline	99-09-2	ug/kg	700	--	--	18,000	82,000	--	--	18,000	NO	27	125	27	125	30
SW 8270C or D	4,6-Dinitro-2-methylphenol	534-52-1	ug/kg	1600	4,900	49,000	6,100	62,000	--	--	4,900	NO	29	137	29	137	30
SW 8270C or D	4-Bromophenyl phenyl ether	101-55-3	ug/kg	330	--	--	--	--	--	--	--	NO	46	125	46	125	30
SW 8270C or D	4-Chloro-3-methylphenol	59-50-7	ug/kg	600	6,100,000	62,000,000	--	--	--	--	6,100,000	NO	46	125	46	125	30
SW 8270C or D	4-Chloroaniline	106-47-8	ug/kg	700	2,400	8,600	9,000	32,000	--	--	2,400	NO	10	125	10	125	30
SW 8270C or D	4-Chlorophenyl phenyl ether	7005-72-3	ug/kg	330	--	--	--	--	--	--	--	NO	47	125	47	125	30
SW 8270C or D	4-Methylphenol (p-Cresol)	106-44-5	ug/kg	330	6,100,000	62,000,000	310,000	3,100,000	--	--	310,000	NO	41	125	41	125	30
SW 8270C or D	4-Nitroaniline	100-01-6	ug/kg	700	24,000	86,000	23,000	82,000	--	--	23,000	NO	34	125	34	125	30
SW 8270C or D	4-Nitrophenol	100-02-7	ug/kg	700	--	--	--	--	--	--	--	NO	25	138	25	138	30
SW 8270C or D	Acenaphthene	83-32-9	ug/kg	330	3,400,000	33,000,000	3,400,000	33,000,000	--	--	3,400,000	NO	46	125	46	125	30
SW 8270C or D	Acenaphthylene	208-96-8	ug/kg	330	--	--	--	--	--	--	--	NO	44	125	44	125	30
SW 8270C or D	Anthracene	120-12-7	ug/kg	330	17,000,000	170,000,000	17,000,000	170,000,000	--	--	17,000,000	NO	53	125	53	125	30
SW 8270C or D	Benzo (a) anthracene	56-55-3	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	52	125	52	125	30
SW 8270C or D	Benzo (a) pyrene	50-32-8	ug/kg	330	15	210	15	210	38	130	15	YES	50	125	50	125	30
SW 8270C or D	Benzo (b) fluoranthene	205-99-2	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	45	125	45	125	30
SW 8270C or D	Benzo (g,h,i) perylene	191-24-2	ug/kg	330	--	--	--	--	--	--	--	NO	38	126	38	126	30
SW 8270C or D	Benzo (k) fluoranthene	207-08-9	ug/kg	330	1,500	21,000	1,500	21,000	--	--	1,500	NO	45	125	45	125	30
SW 8270C or D	Benzoic acid	65-85-0	ug/kg	5,000	240,000,000	2,500,000,000	240,000,000	2,500,000,000	--	--	240,000,000	NO	25	125	25	125	30
SW 8270C or D	Benzyl alcohol	100-51-6	ug/kg	330	6,100,000	62,000,000	31,000,000	310,000,000	--	--	6,100,000	NO	25	125	25	125	30
SW 8270C or D	bis (2-chloroethoxy) methane	111-91-1	ug/kg	330	180,000	1,800,000	180,000	1,800,000	--	--	180,000	NO	43	125	43	125	30
SW 8270C or D	bis (2-chloroethyl) ether	111-44-4	ug/kg	330	210	1,000	190	900	--	--	190	YES	38	125	38	125	30
SW 8270C or D	bis (2-chloroisopropyl) ether	108-60-1	ug/kg	330	4,600	22,000	3,500	17,000	--	--	3,500	NO	25	125	25	125	30
SW 8270C or D	bis (2-ethylhexyl) phthalate	117-81-7	ug/kg	330	35,000	120,000	35,000	120,000	--	--	35,000	NO	47	127	47	127	30
SW 8270C or D	Butyl benzylphthalate	85-68-7	ug/kg	1000	260,000	910,000	260,000	910,000	--	--	260,000	NO	49	125	49	125	30
SW 8270C or D	Chrysene	218-01-9	ug/kg	330	15,000	210,000	15,000	210,000	--	--	15,000	NO	53	125	53	125	30
SW 8270C or D	Dibenzo (a,h) anthracene	53-70-3	ug/kg	330	15	210	15	210	--	--	15	YES	41	125	41	125	30
SW 8270C or D	Dibenzofuran	132-64-9	ug/kg	330	78,000	1,000,000	--	--	--	--	78,000	NO	51	125	51	125	30
SW 8270C or D	Diethyl phthalate	84-66-2	ug/kg	330	49,000,000	490,000,000	49,000,000	490,000,000	--	--	49,000,000	NO	50	125	50	125	30
SW 8270C or D	Dimethyl phthalate	131-11-3	ug/kg	330	--	--	--	--	--	--	--	NO	49	125	49	125	30
SW 8270C or D	Di-n-butylphthalate	84-74-2	ug/kg	330	6,100,000	62,000,000	6,100,000	62,000,000	--	--	6,100,000	NO	56	125	56	125	30
SW 8270C or D	Di-n-octylphthalate	117-84-0	ug/kg	1000	--	--	--	--	--	--	--	NO	41	132	41	132	30
SW 8270C or D	Fluoranthene	206-44-0	ug/kg	330	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	54	125	54	125	30
SW 8270C or D	Fluorene	86-73-7	ug/kg	330	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	49	125	49	125	30
SW 8270C or D	Hexachlorobenzene	118-74-1	ug/kg	330	300	1,100	300	1,100	--	--	300	YES	47	125	47	125	30
SW 8270C or D	Hexachlorobutadiene	87-68-3	ug/kg	330	6,200	22,000	6,200	22,000	--	--	6,200	NO	40	125	40	125	30
SW 8270C or D	Hexachloroethane	67-72-1	ug/kg	330	12,000	43,000	35,000	120,000	--	--	12,000	NO	34	125	34	125	30

Table A-1
Reporting Limits, Accuracy, and Precession Limits for Soil
PG&E Program Quality Assurance Project Plan

					EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	**Constituent**	**CAS**	**Units**	**QAPP RL**	**Residential**	**Commercial**	**Residential**	**Commercial**	**Residential**	**Commercial**	**Most Stringent Screening Level[1]**	**Does RL Exceed Screening Level?**	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**	**% RPD**
SW 8270C or D	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	38	125	38	125	30
SW 8270C or D	Isophorone	78-59-1	ug/kg	330	510,000	1,800,000	510,000	1,800,000	--	--	510,000	NO	43	125	43	125	30
SW 8270C or D	Naphthalene	91-20-3	ug/kg	330	3,600	18,000	3,900	20,000	--	--	3,600	NO	40	125	40	125	30
SW 8270C or D	Nitrobenzene	98-95-3	ug/kg	330	4,800	24,000	31,000	280,000	--	--	4,800	NO	41	125	41	125	30
SW 8270C or D	n-Nitrosodi-n-propylamine	621-64-7	ug/kg	330	69	250	69	250	--	--	69	YES	40	125	40	125	30
SW 8270C or D	n-Nitrosodiphenylamine	86-30-6	ug/kg	330	99,000	350,000	99,000	350,000	--	--	99,000	NO	49	125	49	125	30
SW 8270C or D	Pentachlorophenol	87-86-5	ug/kg	700	890	2,700	3,000	9,000	4,400	13,000	0,890	NO	25	125	25	125	30
SW 8270C or D	Phenanthrene	85-01-8	ug/kg	330	--	--	--	--	--	--	--	NO	50	125	50	125	30
SW 8270C or D	Phenol	108-95-2	ug/kg	330	18,000,000	180,000,000	18,000,000	180,000,000	--	--	18,000,000	NO	39	125	39	125	30
SW 8270C or D	Pyrene	129-00-0	ug/kg	330	1,700,000	17,000,000	1,700,000	17,000,000	--	--	1,700,000	NO	46	125	46	125	30
SW 8270SIM	1-methylnaphthalene	90-12-0	ug/kg	5	16,000	53,000	22,000	99,000	--	--	16,000	NO	30	111	30	111	30
SW 8270SIM	2-methylnaphthalene	91-57-6	ug/kg	5	230,000	2,200,000	310,000	4,100,000	--	--	230,000	NO	30	111	30	111	30
SW 8270SIM	Acenaphthene	83-32-9	ug/kg	5	3,400,000	33,000,000	3,400,000	33,000,000	--	--	3,400,000	NO	28	110	28	110	30
SW 8270SIM	Acenaphthylene	208-96-8	ug/kg	5	--	--	--	--	--	--	--	NO	23	126	23	126	30
SW 8270SIM	Anthracene	120-12-7	ug/kg	5	17,000,000	170,000,000	17,000,000	170,000,000	--	--	17,000,000	NO	28	136	28	136	30
SW 8270SIM	Benzo (a) anthracene	56-55-3	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	31	146	31	146	30
SW 8270SIM	Benzo (a) pyrene	50-32-8	ug/kg	5	15	210	15	210	38	130	15	NO	28	128	28	128	30
SW 8270SIM	Benzo (b) fluoranthene	205-99-2	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	30	139	30	139	30
SW 8270SIM	Benzo (g,h,i) perylene	191-24-2	ug/kg	5	--	--	--	--	--	--	--	NO	21	149	21	149	30
SW 8270SIM	Benzo (k) fluoranthene	207-08-9	ug/kg	5	1,500	21,000	1,500	21,000	--	--	1,500	NO	42	129	42	129	30
SW 8270SIM	Chrysene	218-01-9	ug/kg	5	15,000	210,000	15,000	210,000	--	--	15,000	NO	39	134	39	134	30
SW 8270SIM	Dibenzo (a,h) anthracene	53-70-3	ug/kg	5	15	210	15	210	--	--	15	NO	30	138	30	138	30
SW 8270SIM	Fluoranthene	206-44-0	ug/kg	5	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	30	142	30	142	30
SW 8270SIM	Fluorene	86-73-7	ug/kg	5	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	27	116	27	116	30
SW 8270SIM	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	17	164	17	164	30
SW 8270SIM	Naphthalene	91-20-3	ug/kg	5	3,600	18,000	3,900	20,000	--	--	3,600	NO	29	106	29	106	30
SW 8270SIM	Phenanthrene	85-01-8	ug/kg	5	--	--	--	--	--	--	--	NO	32	127	32	127	30
SW 8270SIM	Pyrene	129-00-0	ug/kg	5	1,700,000	17,000,000	1,700,000	17,000,000	--	--	1,700,000	NO	28	130	28	130	30

Notes:

Please keep in mind, Screening Levels are constantly revised by the EPA. The appropriate Screening levels are specific to the project, the location, the agency providing oversight, and the overall Goals of the project.

mg/kg = milligrams per kilogram
ug/kg = micrograms per kilogram
µmhos/cm = micromhos per centimeter

All soil results (with the exception of Waste characterization) must be reported as dry weight
SW 7199 soil analysis must be accompanied by a SW 3060A extraction
PCB - LCS, MS, and MSD only require Aroclor-1016 and Aroclor-1260 spikes

[1] For soil, most stringent of:
EPA Regional Screening Levels - 2008 and May 2012
CHHSL = California Human Health Screening Levels, January 2005
DTSC = California Department of Toxic Substance Control, January 2005

Table A-2

Reporting Limits, Accuracy, and Precession Limits for Groundwate

PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
EPA 300.0M	Acetate	64-19-7	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
SM 2320 B	Alkalinity	Alkalinity	mg/L	5	--	--	--	--	--	NO	85	115	75	125	20
SM 4500-NH3 B, C, D, E, or G	Ammonia (as N)	7664-41-7	mg/L	0.5	--	--	--	--	--	NO	85	115	75	125	20
SM 2320 B	Bicarbonate	Bicarbonate	mg/L	5	--	--	--	--	--	NO	85	115	75	125	20
SM 5210 B	BOD	BOD	mg/L	--	--	--	--	--	--	NO	--	--	--	--	10
EPA 300.0	Bromide	Bromide	mg/L	0.5	--	--	--	--	--	NO	90	110	80	120	20
EPA 300.0M	Butyrate	107-92-6	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
SM 4500-CO_2	Carbon dioxide	124-38-9	mg/L	5	--	--	--	--	--	NO	--	--	--	--	20
SM 2320 B	Carbonate	Carbonate	mg/L	5	--	--	--	--	--	NO	85	115	75	125	20
EPA 300.0/SM 4500-Cl B, C, E, or D	Chloride	Chloride	mg/L	0.5	--	--	--	--	--	NO	90	110	80	120	20
SM 2120 E	Color	Color	Color unit	1	--	--	--	--	--	NO	90	110	90	110	20
SM 4500-CN	Cyanide	57-12-5	mg/L	0.01							85	115	75	125	20
EPA 300.0/SM 4500-F B, C, D, or E	Fluoride	Fluoride	mg/L	0.5	--	2.2	4	--	2.2	NO	90	110	80	120	20
SM 2340 B or C	Hardness	Hardness	mg/L	2	--	--	--	--	--	NO	75	125	75	125	20
SM 2320 B	Hydroxide alkalinity	Hydroxide	mg/L	5	--	--	--	--	--	NO	85	115	75	125	20
EPA 300.0M	Lactate	50-21-5	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
EPA 300.0	Nitrate (as N)	14797-55-8	mg/L	0.5	25	58	10	--	10	NO	90	110	80	120	20
EPA 353.2/SM 4500-NO3 E, F or H	Nitrate/nitrite (as N)	NO3NO2N	mg/L	0.5	--	--	--	--	--	NO	85	115	75	125	20
EPA 300.0/SM 4500-NO2 B, F or E	Nitrite (as N)	14797-65-8	mg/L	0.5	--	3.7	1	--	1	NO	90	110	80	120	20
SM 5310 B, C, or D	Organic carbon	DOC/TOC	mg/L	0.3	--	--	--	--	--	NO	85	115	75	125	10
EPA 300.0/SM 4500-P E or F	Ortho phosphate	Ortho Phosphate	mg/L	0.02	--	--	--	--	--	NO	90	110	80	120	20
EPA 314.0	Perchlorate	Perchlorate	µg/L	4	--	26	--	--	26	NO	85	115	85	115	20
SM 4500-H+ B SW 9040	pH	pH	pH units	0.1	--	--	--	--	--	NO	--	--	--	--	20
EPA 300.0M	Propionate	79-09-4	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
EPA 300.0M	Pyruvate	127-17-3	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
SM 4500-SiO_2 E	Reactive silica	7631-86-9	mg/L	1	--	--	--	--	--	NO	75	125	75	125	20
SM 4500-SiO_2 C	Silica	7631-86-9	mg/L	0.04	--	--	--	--	--	NO	75	125	75	125	20
SILICA_CALC	Soluble silica	7631-86-9	mg/L	0.04	--	--	--	--	--	NO	75	125	75	125	20
EPA 120.1/SW 9050	Specific conductance	Conductance	µmhos/cm	2	--	--	--	--	--	NO	85	115	75	125	20
EPA 300.0/SM 4110 B	Sulfate	Sulfate	mg/L	0.5	--	--	--	--	--	NO	90	110	80	120	20
SM 4500-S^{-2} F, E, D, or G	Sulfide	Sulfide	mg/L	0.05	--	--	--	--	--	NO	75	125	75	125	20
SM 2540 C	Total dissolved solids	TDS	mg/L	10	--	--	--	--	--	NO	75	125	--	--	10
SM 4500-N_{org} B or C	Total kjeldahl nitrogen	7727-37-9	mg/L	--	--	--	--	--	--	NO	75	125	75	125	20
EPA 365.1/EPA 365.3 SM 4500-P E or F	Total phosphorous	Total Phosphorous	mg/L	0.02	--	--	--	--	--	NO	75	125	75	125	20
SM 2540 D	Total suspended solids	TSS	mg/L	4	--	--	--	--	--	NO	75	125	75	125	10
EPA 180.1/SM 2130 B	Turbidity	TURB	NTU	0.1	--	--	--	--	--	NO	--	--	--	--	20
SW 6020A/EPA 200.8	Aluminum	7429-90-5	ug/L	50	16,000	37,000	50*	1,000	50	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Antimony	7440-36-0	ug/L	2	6	15	6	--	6	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Arsenic	7440-38-2	ug/L	0.5 (0.1)	0.045	0.045	10	--	0.045	YES	85	115	75	125	20
SW 6020A/EPA 200.8	Barium	7440-39-3	ug/L	2	2,900	7,300	2,000	1,000	1,000	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Beryllium	7440-41-7	ug/L	0.5	16	73	4	--	4	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Boron	7440-42-8	ug/L	50	?	?	?	?	?	?	85	115	75	125	20
SW 6020A/EPA 200.8	Cadmium	7440-43-9	ug/L	1	--	18	5	--	5	NO	85	115	75	125	20
SW 6010B/EPA 200.7	Calcium	7440-70-2	ug/L	100	--	--	--	--	--	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Chromium	7440-47-3	ug/L	1	--	--	100	50	50	NO	85	115	75	125	20
EPA 218.6	Chromium, Hexavalent	18540-29-9	ug/L	0.2	0.031	110	100	--	0.031	YES	90	110	90	110	20
EPA 218.6 LL	Chromium, Hexavalent, LL	18540-29-9	ug/L	0.06	0.031	110	100	--	0.031	YES	90	110	90	110	20
SM 3500-Cr	Chromium, Hexavalent	18540-29-9	ug/L	10	0.031	110	100	--	0.031	YES	85	115	80	120	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cobalt	7440-48-4	ug/L	5	4.7	11	--	--	4.7	YES	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Copper	7440-50-8	ug/L	1	620	1,500	1,000*	--	620	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Iron	7439-89-6	ug/L	20	11,000	26,000	300*	--	300	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Lead	7439-92-1	ug/L	1	--	--	15	--	15	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Magnesium	7439-95-4	ug/L	100	--	--	--	--	--	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Manganese	7439-96-5	ug/L	0.5	--	880	50*	--	50	NO	85	115	75	125	20
SW 7070A/EPA 245.1/ EPA 6020A?	Mercury	7439-97-6	ug/L	0.2	0.63	0.63	2	--	0.63	NO	75	125	75	125	20
SW 6020A/EPA 200.8	Molybdenum	7439-98-7	ug/L	2	78	180	--	--	78	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Nickel	7440-02-0	ug/L	2	300	730	100*	100	100	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Potassium	7440-09-7	ug/L	100	--	--	--	--	--	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Selenium	7782-49-2	ug/L	10	78	180	50	--	50	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Silver	7440-22-4	ug/L	5	71	180	--	--	71	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Sodium	7440-23-5	ug/L	100	--	--	--	--	--	NO	85	115	75	125	20
EPA 200.7/EPA 200.8	Strontium	7440-24-6	ug/L	50	9,300	22,000	--	--	9,300	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Thallium	7440-28-0	ug/L	1	0.16	2.4	2	--	0.16	YES	85	115	75	125	20
SW 6020A/EPA 200.8	Uranium	7440-61-1	ug/L	5	230	--	30	--	30	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Vanadium	7440-62-2	ug/L	5	--	2.6	--	--	2.6	YES	85	115	75	125	20

Table A-2

Reporting Limits, Accuracy, and Precession Limits for Groundwate

PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Zinc	7440-66-6	ug/L	20	4,700	11,000	5,000*	--	4,700	NO	85	115	75	125	20
SW 8015B or C or D	Motor Oil	TPH-motor oil	mg/L	1	--	--	--	--	--	NO	50	150	50	150	30
SW 8015B or C or D	TPH-Diesel	TPH-diesel	mg/L	0.5	--	--	--	--	--	NO	61	143	61	143	30
SW 8015B or C or D	TPH-Gasoline	TPH-gasoline	mg/L	0.1	--	--	--	--	--	NO	67	136	67	136	30
SW 8081A or B	4,4'-DDD	72-54-8	ug/L	0.1	0.28	0.28	--	--	0.28	NO	50	139	50	139	30
SW 8081A or B	4,4'-DDE	72-55-9	ug/L	0.1	0.2	0.2	--	--	0.2	NO	48	137	48	137	30
SW 8081A or B	4,4'-DDT	50-29-3	ug/L	0.1	0.2	0.2	--	--	0.2	NO	47	138	47	138	30
SW 8081A or B	Aldrin	309-00-2	ug/L	0.1	0.00021	0.004	--	--	0.00021	YES	42	138	42	138	30
SW 8081A or B	alpha-HCH	319-84-6	ug/L	0.1	0.0062	0.011	--	--	0.0062	YES	60	128	60	128	30
SW 8081A or B	alpha-Chlordane	5103-71-9	ug/L	0.1	--	--	2	--	2	NO	63	123	63	123	30
SW 8081A or B	beta-HCH	319-85-7	ug/L	0.1	0.022	0.037	--	--	0.022	YES	66	126	66	126	30
SW 8081A or B	delta-HCH	319-86-8	ug/L	0.1	--	--	--	--	--	NO	46	136	46	136	30
SW 8081A or B	Dieldrin	60-57-1	ug/L	0.1	0.0015	0.0042	--	--	0.0015	YES	62	129	62	129	30
SW 8081A or B	Endosulfan I	959-98-8	ug/L	0.1	--	--	--	--	--	NO	49	120	49	120	30
SW 8081A or B	Endosulfan II	33213-65-9	ug/L	0.1	--	--	--	--	--	NO	42	130	42	130	30
SW 8081A or B	Endosulfan sulfate	1031-07-8	ug/L	0.1	--	--	--	--	--	NO	54	137	54	137	30
SW 8081A or B	Endrin	72-20-8	ug/L	0.1	1.7	11	2	--	1.7	NO	56	134	56	134	30
SW 8081A or B	Endrin aldehyde	7421-93-4	ug/L	0.1	--	--	--	--	--	NO	56	137	56	137	30
SW 8081A or B	gamma-HCH (lindane)	58-89-9	ug/L	0.1	0.036	0.061	0.2	--	0.036	YES	30	146	30	146	30
SW 8081A or B	gamma-Chlordane	5103-74-2	ug/L	0.1	--	--	2	--	2	NO	67	120	67	120	30
SW 8081A or B	Heptachlor	76-44-8	ug/L	0.1	0.0018	0.015	0.4	--	0.0018	YES	51	128	51	128	30
SW 8081A or B	Heptachlor Epoxide	1024-57-3	ug/L	0.1	0.0033	0.0074	0.2	--	0.0033	YES	62	131	62	131	30
SW 8081A or B	Methoxychlor	72-43-5	ug/L	0.5	27	180	40	--	27	NO	56	150	56	150	30
SW 8081A or B	Toxaphene	8001-35-2	ug/L	1	0.013	0.061	3	--	0.013	YES	41	126	41	126	30
SW 8082 or A	Aroclor-1016	12674-11-2	ug/L	0.5	0.96	0.96	0.5	--	0.5	NO	40	144	40	144	30
SW 8082 or A	Aroclor-1221	11104-28-2	ug/L	0.5	0.0043	0.0068	0.5	--	0.0043	YES	41	136	41	136	30
SW 8082 or A	Aroclor-1232	11141-16-5	ug/L	0.5	0.0043	0.0068	0.5	--	0.0043	YES	41	136	41	136	30
SW 8082 or A	Aroclor-1242	53469-21-9	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	39	150	39	150	30
SW 8082 or A	Aroclor-1248	12672-29-6	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	41	136	41	136	30
SW 8082 or A	Aroclor-1254	11097-69-1	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	29	141	29	141	30
SW 8082 or A	Aroclor-1260	11096-82-5	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	45	145	45	145	30
SW 8151A	2,4-D	94-75-7	ug/L	10	130	370	70	--	70	NO	39	120	39	120	30
SW 8151A	2,4-DB	94-82-6	ug/L	20	91	290	--	--	91	NO	44	120	44	120	30
SW 8151A	2,4,5-T	93-76-5	ug/L	20	120	370	--	--	120	NO	44	122	44	122	30
SW 8151A	2,4,5-TP	93-72-1	ug/L	10	84	290	--	--	84	NO	49	126	49	126	30
SW 8151A	Dalapon	75-99-0	ug/L	30	470	1,100	200	--	200	NO	40	120	40	120	30
SW 8151A	Dicamba	1918-00-9	ug/L	30	440	1,100	--	--	440	NO	60	120	60	120	30
SW 8151A	Dichloroprop	120-36-5	ug/L	20	--	--	--	--	--	NO	68	122	68	122	30
SW 8151A	Dinoseb	88-85-7	ug/L	3	11	37	7	--	7	NO	28	115	28	115	30
SW 8151A	MCPA	94-74-6	ug/L	100	5.7	18	--	--	5.7	YES	62	144	62	144	30
SW 8151A	MCPP	7085-19-0	ug/L	100	--	37	--	--	37	YES	60	133	60	133	30
SW 8260B or C	1,1,1,2-Tetrachloroethane	630-20-6	ug/L	0.5	0.5	0.52	--	--	0.5	NO	81	129	81	129	20
SW 8260B or C	1,1,1-Trichloroethane (TCA)	71-55-6	ug/L	1	7,500	9,100	200	200	200	NO	67	132	67	132	20
SW 8260B or C	1,1,2,2-Tetrachloroethane	79-34-5	ug/L	0.5	0.066	0.067	--	1	0.066	YES	63	128	63	128	20
SW 8260B or C	1,1,2-Trichloroethane	79-00-5	ug/L	1	0.24	0.24	5	5	0.24	YES	75	125	75	125	20
SW 8260B or C	1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/L	1	53,000	59,000	--	1,200	1,200	NO	75	125	75	125	20
SW 8260B or C	1,1-Dichloroethane	75-34-3	ug/L	1	2.4	2.4	--	5	2.4	NO	69	133	69	133	20
SW 8260B or C	1,1-Dichloroethene	75-35-4	ug/L	1	260	340	7	6	6	NO	68	130	68	130	20
SW 8260B or C	1,1-Dichloropropene	563-58-6	ug/L	1	--	--	--	--	--	NO	73	132	73	132	20
SW 8260B or C	1,2,3-Trichlorobenzene	87-61-6	ug/L	1	5.2	--	--	--	5.2	NO	67	137	67	137	20
SW 8260B or C	1,2,3-Trichloropropane	96-18-4	ug/L	1	0.00065	0.0096	--	--	0.00065	YES	73	124	73	124	20
SW 8260B or C	1,2,4-Trichlorobenzene	120-82-1	ug/L	1	0.99	8.2	70	5	0.99	YES	66	134	66	134	20
SW 8260B or C	1,2,4-Trimethylbenzene	95-63-6	ug/L	1	15	15	--	--	15	NO	74	132	74	132	20
SW 8260B or C	1,2-Dibromo-3-Chloropropane	96-12-8	ug/L	2	0.00032	0.00032	0.2	--	0.00032	YES	50	132	50	132	20
SW 8260B or C	1,2-Dibromoethane (EDB)	106-93-4	ug/L	1	0.0065	0.0065	0.05	--	0.0065	YES	80	121	80	121	20
SW 8260B or C	1,2-Dichlorobenzene	95-50-1	ug/L	1	280	370	600	600	280	NO	71	122	71	122	20
SW 8260B or C	1,2-Dichloroethane (EDC)	107-06-2	ug/L	0.5	0.15	0.15	5	0.5	0.15	YES	69	132	69	132	20
SW 8260B or C	1,2-Dichloropropane	78-87-5	ug/L	1	0.38	0.39	5	5	0.38	YES	75	125	75	125	20
SW 8260B or C	1,3,5-Trimethylbenzene	108-67-8	ug/L	1	87	12	--	--	12	NO	74	131	74	131	20
SW 8260B or C	1,3-Dichlorobenzene	541-73-1	ug/L	1	--	--	--	--	--	NO	75	124	75	124	20
SW 8260B or C	1,3-Dichloropropane	142-28-9	ug/L	1	290	730	--	--	290	NO	73	126	73	126	20
SW 8260B or C	1,4-Dichlorobenzene	106-46-7	ug/L	0.5	0.42	0.43	75	5	0.42	YES	74	123	74	123	20
SW 8260B or C	2,2-Dichloropropane	594-20-7	ug/L	1	--	--	--	--	--	NO	69	137	69	137	20
SW 8260B or C	2-Butanone (MEK)	78-93-3	ug/L	10	4,900	7,100	--	--	4,900	NO	49	136	49	136	20
SW 8260B or C	2-Chlorotoluene	95-49-8	ug/L	1	180	730	--	--	180	NO	73	126	73	126	20
SW 8260B or C	4-Chlorotoluene	106-43-4	ug/L	1	190	2,600	--	--	190	NO	74	128	74	128	20

Table A-2
Reporting Limits, Accuracy, and Precession Limits for Groundwate
PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 8260B or C	4-Isopropyltoluene	99-87-6	ug/L	1	--	--	--	--	--	NO	73	130	73	130	20
SW 8260B or C	4-Methyl-2-Pentanone	108-10-1	ug/L	10	1,000	2,000	--	--	1,000	NO	58	134	58	134	20
SW 8260B or C	Acetone	67-64-1	ug/L	10	12,000	22,000	--	--	12,000	NO	40	135	40	135	20
SW 8260B or C	Acrolein	107-02-8	ug/L	20	0.041	0.042	--	--	0.041	YES	75	125	75	125	20
SW 8260B or C	Acrylonitrile	107-13-1	ug/L	20	0.045	0.045	--	--	0.045	YES	75	125	75	125	20
SW 8260B or C	Benzene	71-43-2	ug/L	0.4	0.39	0.41	5	1	0.39	YES	81	122	81	122	20
SW 8260B or C	Bromobenzene	108-86-1	ug/L	1	54	20	--	--	20	NO	76	124	76	124	20
SW 8260B or C	Bromochloromethane	74-97-5	ug/L	1	83	--	--	--	83	NO	65	129	65	129	20
SW 8260B or C	Bromodichloromethane	75-27-4	ug/L	0.5	0.12	1.1	100	--	0.12	YES	76	121	76	121	20
SW 8260B or C	Bromoform	75-25-2	ug/L	1	7.9	8.5	100	--	7.9	NO	69	128	69	128	20
SW 8260B or C	Bromomethane	74-83-9	ug/L	3	7	8.7	--	--	7	NO	53	141	53	141	20
SW 8260B or C	Carbon Disulfide	75-15-0	ug/L	1	720	1,000	--	--	720	NO	75	125	75	125	20
SW 8260B or C	Carbon Tetrachloride	56-23-5	ug/L	1	0.39	0.2	5	0.5	0.2	YES	66	138	66	138	20
SW 8260B or C	Chlorobenzene	108-90-7	ug/L	0.5	72	91	100	--	72	NO	81	122	81	122	20
SW 8260B or C	Chloroethane	75-00-3	ug/L	1	21,000	21,000	--	--	21,000	NO	58	133	58	133	20
SW 8260B or C	Chloroform	67-66-3	ug/L	1	0.19	0.19	100	--	0.19	YES	69	128	69	128	20
SW 8260B or C	Chloromethane	74-87-3	ug/L	1	190	1.8	--	--	1.8	NO	56	131	56	131	20
SW 8260B or C	cis-1,2-Dichloroethene	156-59-2	ug/L	1	28	370	70	6	6	NO	72	126	72	126	20
SW 8260B or C	cis-1,3-Dichloropropene	10061-01-5	ug/L	0.5	--	--	--	--	--	NO	69	131	69	131	20
SW 8260B or C	Dibromochloromethane	124-48-1	ug/L	0.5	0.15	0.8	100	--	0.15	YES	66	133	66	133	20
SW 8260B or C	Dibromomethane	74-95-3	ug/L	1	7.9	370	--	--	7.9	NO	76	125	76	125	20
SW 8260B or C	Dichlorodifluoromethane (Freon 12)	75-71-8	ug/L	1	190	390	--	--	190	NO	53	153	53	153	20
SW 8260B or C	Ethylbenzene	100-41-4	ug/L	1	1.3	1.5	700	--	1.3	NO	73	127	73	127	20
SW 8260B or C	Hexachlorobutadiene	87-68-3	ug/L	0.6	0.26	0.86	--	--	0.26	YES	67	131	67	131	20
SW 8260B or C	Isopropylbenzene (Cumene)	98-82-8	ug/L	1	390	680	--	--	390	NO	75	127	75	127	20
SW 8260B or C	Methylene chloride	75-09-2	ug/L	1	9.9	4.8	5	5	4.8	NO	63	137	63	137	20
SW 8260B or C	Naphthalene	91-20-3	ug/L	1	0.14	0.14	--	--	0.14	YES	54	138	54	138	20
SW 8260B or C	n-Butylbenzene	104-51-8	ug/L	1	780	--	--	--	780	NO	69	137	69	137	20
SW 8260B or C	n-Propylbenzene	103-65-1	ug/L	1	530	--	--	--	530	NO	72	129	72	129	20
SW 8260B or C	sec-Butylbenzene	135-98-8	ug/L	1	--	--	--	--	--	NO	72	127	72	127	20
SW 8260B or C	Styrene	100-42-5	ug/L	1	1,100	1,600	100	100	100	NO	65	134	65	134	20
SW 8260B or C	tert-Butyl Methyl Ether (MTBE)	1634-04-4	ug/L	5	12	12	--	13	12	NO	65	123	65	123	20
SW 8260B or C	tert-Butylbenzene	98-06-6	ug/L	1	--	--	--	--	--	NO	70	129	70	129	20
SW 8260B or C	Tetrachloroethene	127-18-4	ug/L	1	9.7	0.11	5	5	0.11	YES	66	128	66	128	20
SW 8260B or C	Toluene	108-88-3	ug/L	1	860	2,300	1,000	150	150	NO	77	122	77	122	20
SW 8260B or C	trans-1,2-Dichloroethene	156-60-5	ug/L	1	86	110	100	10	10	NO	63	137	63	137	20
SW 8260B or C	trans-1,3-Dichloropropene	10061-02-6	ug/L	1	--	--	--	--	--	NO	59	135	59	135	20
SW 8260B or C	Trichloroethene	79-01-6	ug/L	1	0.44	1.7	5	5	0.44	YES	70	127	70	127	20
SW 8260B or C	Trichlorofluoromethane (Freon 11)	75-69-4	ug/L	1	1,100	1,300	--	150	150	NO	57	129	57	129	20
SW 8260B or C	Vinyl Chloride	75-01-4	ug/L	1	0.015	0.016	2	0.5	0.015	YES	50	134	50	134	20
SW 8260B or C	Xylenes, Total	1330-20-7	ug/L	2	190	200	10,000	1,750	190	NO	75	125	75	125	20
SW 8260B or C	m -Xylene	108-38-3	ug/L	2	190	1,400	--	--	190	NO	76	128	76	128	20
SW 8260B or C	o-Xylene	95-47-6	ug/L	1	190	1,400	--	--	190	NO	80	121	80	121	20
SW 8260B or C	p-Xylene	106-42-3	ug/L	1	190	1,500	--	--	190	NO	76	128	76	128	20
SW 8270C or D	1,2,4-Trichlorobenzene	120-82-1	ug/L	10	0.99	8.2	70	--	0.99	YES	37	120	37	120	20
SW 8270C or D	1,2-Dichlorobenzene	95-50-1	ug/L	10	280	370	600	--	280	NO	33	120	33	120	20
SW 8270C or D	1,3-Dichlorobenzene	541-73-1	ug/L	10	--	--	--	--	--	NO	32	120	32	120	20
SW 8270C or D	1,4-Dichlorobenzene	106-46-7	ug/L	10	0.42	0.43	75	--	0.42	YES	32	120	32	120	20
SW 8270C or D	2,4,5-Trichlorophenol	95-95-4	ug/L	50	890	3,700	--	--	890	NO	49	120	49	120	20
SW 8270C or D	2,4,6-Trichlorophenol	88-06-2	ug/L	10	3.5	6.1	--	--	3.5	YES	49	126	49	126	20
SW 8270C or D	2,4-Dichlorophenol	120-83-2	ug/L	10	35	110	--	--	35	NO	48	120	48	120	20
SW 8270C or D	2,4-Dimethylphenol	105-67-9	ug/L	10	270	730	--	--	270	NO	28	120	28	120	20
SW 8270C or D	2,4-Dinitrophenol	51-28-5	ug/L	10	30	73	--	--	30	NO	25	130	25	130	20
SW 8270C or D	2,4-Dinitrotoluene	121-14-2	ug/L	10	0.2	73	--	--	0.2	YES	51	120	51	120	20
SW 8270C or D	2,6-Dinitrotoluene	606-20-2	ug/L	10	15	37	--	--	15	NO	49	120	49	120	20
SW 8270C or D	2-Chloronaphthalene	91-58-7	ug/L	10	550	2,900	--	--	550	NO	49	120	49	120	20
SW 8270C or D	2-Chlorophenol	95-57-8	ug/L	10	71	180	--	--	71	NO	37	120	37	120	20
SW 8270C or D	2-Methylnaphthalene	91-57-6	ug/L	10	27	150	--	--	27	NO	46	120	46	120	20
SW 8270C or D	2-Methylphenol (o-Cresol)	95-48-7	ug/L	10	720	1,800	--	--	720	NO	38	120	38	120	20
SW 8270C or D	2-Nitroaniline	88-74-4	ug/L	50	150	--	--	--	150	NO	48	120	48	120	20
SW 8270C or D	2-Nitrophenol	88-75-5	ug/L	10	--	--	--	--	--	NO	39	123	39	123	20
SW 8270C or D	3,3'-Dichlorobenzidine	91-94-1	ug/L	20	0.11	0.15	--	--	0.11	YES	20	120	20	120	20
SW 8270C or D	3-Nitroaniline	99-09-2	ug/L	50	--	3.2	--	--	3.2	YES	20	126	20	126	20
SW 8270C or D	4,6-Dinitro-2-methylphenol	534-52-1	ug/L	50	1.2	3.7	--	--	1.2	YES	40	130	40	130	20
SW 8270C or D	4-Bromophenyl Phenyl Ether	101-55-3	ug/L	10	--	--	--	--	--	NO	52	120	52	120	20
SW 8270C or D	4-Chloro-3-methylphenol	59-50-7	ug/L	20	1,100	--	--	--	1,100	NO	47	120	47	120	20

Table A-2
Reporting Limits, Accuracy, and Precession Limits for Groundwate
PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 8270C or D	4-Chloroaniline	106-47-8	ug/L	20	0.32	1.2	--	--	0.32	YES	20	120	20	120	20
SW 8270C or D	4-Chlorophenyl phenyl ether	7005-72-3	ug/L	10	--	--	--	--	--	NO	50	120	50	120	20
SW 8270C or D	4-Methylphenol (p-Cresol)	106-44-5	ug/L	50	1,400	180	--	--	180	NO	32	120	32	120	20
SW 8270C or D	4-Nitroaniline	100-01-6	ug/L	50	3.3	3.2	--	--	3.2	YES	36	120	36	120	20
SW 8270C or D	4-Nitrophenol	100-02-7	ug/L	50	--	--	--	--	--	NO	20	120	20	120	20
SW 8270C or D	Acenaphthene	83-32-9	ug/L	10	400	2,200	--	--	400	NO	47	120	47	120	20
SW 8270C or D	Acenaphthylene	208-96-8	ug/L	10	--	--	--	--	--	NO	50	120	50	120	20
SW 8270C or D	Anthracene	120-12-7	ug/L	10	1,300	11,000	--	--	1,300	NO	54	120	54	120	20
SW 8270C or D	Benzo (a) anthracene	56-55-3	ug/L	10	0.029	0.029	--	--	0.029	YES	56	100	56	100	20
SW 8270C or D	Benzo (a) pyrene	50-32-8	ug/L	10	0.0029	0.0029	0.2	--	0.0029	YES	53	120	53	120	20
SW 8270C or D	Benzo (b) fluoranthene	205-99-2	ug/L	10	0.029	0.029	--	--	0.029	YES	45	124	45	124	20
SW 8270C or D	Benzo (g,h,i) perylene	191-24-2	ug/L	10	--	--	--	--	--	NO	38	123	38	123	20
SW 8270C or D	Benzo (k) fluoranthene	207-08-9	ug/L	10	0.29	0.29	--	--	0.29	YES	45	124	45	124	20
SW 8270C or D	Benzoic acid	65-85-0	ug/L	100	58,000	150,000	--	--	58,000	NO	20	120	20	120	20
SW 8270C or D	Benzyl alcohol	100-51-6	ug/L	20	1,500	18,000	--	--	1,500	NO	30	120	30	120	20
SW 8270C or D	bis (2-chloroethoxy) methane	111-91-1	ug/L	10	47	110	--	--	47	NO	46	120	46	120	20
SW 8270C or D	bis (2-chloroethyl) ether	111-44-4	ug/L	10	0.012	0.012	--	--	0.012	YES	37	120	37	120	20
SW 8270C or D	bis (2-chloroisopropyl) ether	108-60-1	ug/L	10	0.31	0.32	--	--	0.31	YES	26	131	26	131	20
SW 8270C or D	bis (2-ethylhexyl) phthalate	117-81-7	ug/L	10	0.071	4.8	6	--	0.071	YES	42	126	42	126	20
SW 8270C or D	Butyl benzylphthalate	85-68-7	ug/L	10	14	35	--	--	14	NO	46	120	46	120	20
SW 8270C or D	Chrysene	218-01-9	ug/L	10	2.9	2.9	--	--	2.9	YES	55	120	55	120	20
SW 8270C or D	Dibenzo (a,h) anthracene	53-70-3	ug/L	10	0.0029	0.0029	--	--	0.0029	YES	42	127	42	127	20
SW 8270C or D	Dibenzofuran	132-64-9	ug/L	10	5.8	--	--	--	5.8	YES	54	120	54	120	20
SW 8270C or D	Diethyl phthalate	84-66-2	ug/L	10	11,000	29,000	--	--	11,000	NO	41	120	41	120	20
SW 8270C or D	Dimethyl phthalate	131-11-3	ug/L	10	--	--	--	--	--	NO	25	127	25	127	20
SW 8270C or D	Di-n-butylphthalate	84-74-2	ug/L	10	670	3,700	--	--	670	NO	54	120	54	120	20
SW 8270C or D	Di-n-octylphthalate	117-84-0	ug/L	10	--	--	--	--	--	NO	37	137	37	137	20
SW 8270C or D	Fluoranthene	206-44-0	ug/L	10	630	1,500	--	--	630	NO	54	120	54	120	20
SW 8270C or D	Fluorene	86-73-7	ug/L	10	220	1,500	--	--	220	NO	50	120	50	120	20
SW 8270C or D	Hexachlorobenzene	118-74-1	ug/L	10	0.042	0.042	1	--	0.042	YES	52	120	52	120	20
SW 8270C or D	Hexachlorobutadiene	87-68-3	ug/L	10	0.26	0.86	--	--	0.26	YES	27	120	27	120	20
SW 8270C or D	Hexachloroethane	67-72-1	ug/L	10	0.79	4.8	--	--	0.79	YES	28	120	28	120	20
SW 8270C or D	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/L	10	0.029	0.029	--	--	0.029	YES	43	125	43	125	20
SW 8270C or D	Isophorone	78-59-1	ug/L	10	67	71	--	--	67	NO	50	120	50	120	20
SW 8270C or D	Naphthalene	91-20-3	ug/L	10	0.14	0.14	--	--	0.14	YES	39	120	39	120	20
SW 8270C or D	Nitrobenzene	98-95-3	ug/L	10	0.12	3.4	--	--	0.12	YES	44	120	44	120	20
SW 8270C or D	n-Nitrosodi-n-propylamine	621-64-7	ug/L	10	0.0093	0.0096	--	--	0.0093	YES	34	128	34	128	20
SW 8270C or D	n-Nitrosodiphenylamine	86-30-6	ug/L	10	10	14	--	--	10	NO	48	120	48	120	20
SW 8270C or D	Pentachlorophenol	87-86-5	ug/L	50	0.17	0.56	1	--	0.17	YES	38	120	38	120	20
SW 8270C or D	Phenanthrene	85-01-8	ug/L	10	--	--	--	--	--	NO	51	120	51	120	20
SW 8270C or D	Phenol	108-95-2	ug/L	10	4,500	11,000	--	--	4,500	NO	20	120	20	120	20
SW 8270C or D	Pyrene	129-00-0	ug/L	10	87	1,100	--	--	87	NO	49	128	49	128	20
SW 8270SIM	1-methylnaphthalene	90-12-0	ug/L	0.2	0.97	2.3	--	--	0.97	NO	35	131	35	131	30
SW 8270SIM	2-methylnaphthalene	91-57-6	ug/L	0.2	27	150	--	--	27	NO	36	121	36	121	30
SW 8270SIM	Acenaphthene	83-32-9	ug/L	0.2	400	2,200	--	--	400	NO	39	125	39	125	30
SW 8270SIM	Acenaphthylene	208-96-8	ug/L	0.2	--	--	--	--	--	NO	43	140	43	140	30
SW 8270SIM	Anthracene	120-12-7	ug/L	0.2	1,300	11,000	--	--	1,300	NO	41	132	41	132	30
SW 8270SIM	Benzo (a) anthracene	56-55-3	ug/L	0.2	0.029	0.029	--	--	0.029	YES	58	141	58	141	30
SW 8270SIM	Benzo (a) pyrene	50-32-8	ug/L	0.2	0.0029	0.0029	0.2	--	0.0029	YES	31	142	31	142	30
SW 8270SIM	Benzo (b) fluoranthene	205-99-2	ug/L	0.2	0.029	0.029	--	--	0.029	YES	42	156	42	156	30
SW 8270SIM	Benzo (g,h,i) perylene	191-24-2	ug/L	0.2	--	--	--	--	--	NO	12	171	12	171	30
SW 8270SIM	Benzo (k) fluoranthene	207-08-9	ug/L	0.2	0.29	0.29	--	--	0.29	NO	49	165	49	165	30
SW 8270SIM	Chrysene	218-01-9	ug/L	0.2	2.9	2.9	--	--	2.9	NO	51	155	51	155	30
SW 8270SIM	Dibenzo (a,h) anthracene	53-70-3	ug/L	0.2	0.0029	0.0029	--	--	0.0029	YES	28	153	28	153	30
SW 8270SIM	Fluoranthene	206-44-0	ug/L	0.2	630	1,500	--	--	630	NO	47	158	47	158	30
SW 8270SIM	Fluorene	86-73-7	ug/L	0.2	220	1,500	--	--	220	NO	40	140	40	140	30
SW 8270SIM	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/L	0.2	0.029	0.029	--	--	0.029	YES	20	167	20	167	30
SW 8270SIM	Naphthalene	91-20-3	ug/L	0.2	0.14	0.14	--	--	0.14	YES	39	125	39	125	30
SW 8270SIM	Phenanthrene	85-01-8	ug/L	0.2	--	--	--	--	--	NO	46	144	46	144	30
SW 8270SIM	Pyrene	129-00-0	ug/L	0.2	87	1,100	--	--	87	NO	39	158	39	158	30
CF-IRMS	D18O	D18O	0/00	--	--	--	--	--	--	NO	--	--	--	--	20
CF-IRMS	DD	DD	0/00	--	--	--	--	--	--	NO	--	--	--	--	20
SM 7110 C	Gross alpha	Gross alpha	pCi/L	3	--	--	15	15	15	NO	--	--	--	--	20
EPA 900.0	Gross beta	Gross beta	pCi/L	4	--	--	--	4	4	NO	--	--	--	--	20
EPA 903.1	Radium-226	013982-63-3	pCi/L	1	--	--	5	--	5	NO	--	--	--	--	20
EPA 904.0	Radium-228	015262-20-1	pCi/L	1	--	--	5	--	5	NO	--	--	--	--	20

Table A-2

Reporting Limits, Accuracy, and Precession Limits for Groundwate

PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
EPA 905.0	Strontium	7440-26-4	pCi/L	2	--	--	--	8	8	NO	--	--	--	--	20
EPA 906.0	Tritium	10028-17-8	pCi/L	1,000	--	--	--	20,000	20,000	NO	--	--	--	--	20
EPA 908.0	Uranium	7440-61-1	pCi/L	1	--	--	--	20	20	NO	--	--	--	--	20
RSK-175	Carbon Dioxide	124-38-9	ug/L	5	--	--	--	--	--	NO	80	120	80	120	20
RSK-175	Ethane	74-84-0	ug/L	5	--	--	--	--	--	NO	80	120	80	120	20
RSK-175	Ethene	74-85-1	ug/L	5	--	--	--	--	--	NO	80	120	80	120	20
RSK-175	Methane	74-82-8	ug/L	5	--	--	--	--	--	NO	80	120	80	120	20

Notes:

Please keep in mind, Screening Levels are constantly revised by the EPA. The appropriate Screening levels are specific to the project, the location, the agency providing oversight, and the overall Goals of the project.

mg/L = milligrams per liter
ug/L = micrograms per liter
µmhos/cm = micromhos per centimeter
pCi/L = picocuries per liter
PCB - LCS, MS, and MSD only require Aroclor-1016 and Aroclor-1260 spikes

[1] For groundwater, most stringent of:
EPA Regional Screening Levels - 2008 and May 2012
Federal Drinking Water Standards, MCLs
*Secondary Federal Drinking Water Standards, MCLs
California Drinking Water Standards, MCLs

Table A-3

Maximum Concentrations for Title 22

PG&E Program Quality Assurance Project Plan

					CA TTCL/STLC						LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	Constituent	CAS	Units	TCLP Regulatory Standards	Title 22 TTLC MCL (mg/kg)	If TTLC Concentration is ≥ this value STLC Analysis Must be performed	Title 22 STLC MCL	Most Stringent Screening Level	RL	Does RL Exceed Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW6010B	Antimony	7440-36-0	mg/kg	--	500	150	15	15	5	NO	80	120	75	125	20
SW6010B	Arsenic	7440-38-2	mg/kg	5	500	50	5	5	5	NO	80	120	75	125	20
SW6010B	Barium	7440-39-3	mg/kg	100	10,000	1,000	100	100	10	NO	80	120	75	125	20
SW6010B	Beryllium	7440-41-7	mg/kg	--	75	7.5	0.75	0.75	1	YES	80	120	75	125	20
SW6010B	Cadmium	7440-43-9	mg/kg	1	100	10	1	1	1	NO	80	120	75	125	20
SW6010B	Chromium	7440-47-3	mg/kg	5	2,500	50	5	5	5	NO	80	120	75	125	20
SW3060A	Chromium, Hexavalent	18540-29-9	mg/kg	--	500	50	5	5	0.4	NO	80	120	75	125	20
SW6010B	Cobalt	7440-48-4	mg/kg	--	8,000	800	80	80	10	NO	80	120	75	125	20
SW6010B	Copper	7440-50-8	mg/kg	--	2,500	250	25	25	5	NO	80	120	75	125	20
SW6010B	Lead	7439-92-1	mg/kg	5	1,000	50	5	5	5	NO	80	120	75	125	20
SW7470A	Mercury	7439-97-6	mg/kg	0.2	20	2	0.2	0.2	0.1	NO	75	125	75	125	20
SW6010B	Molybdenum	7439-98-7	mg/kg	--	3,500	3,500	350	350	10	NO	80	120	75	125	20
SW6010B	Nickel	7440-02-0	mg/kg	--	2,000	200	20	20	5	NO	80	120	75	125	20
SW6010B	Selenium	7782-49-2	mg/kg	1	100	10	1	1	5	YES	80	120	75	125	20
SW6010B	Silver	7440-22-4	mg/kg	5	500	50	5	5	5	NO	80	120	75	125	20
SW6010B	Thallium	7440-28-0	mg/kg	--	700	70	7	7	5	NO	80	120	75	125	20
SW6010B	Vanadium	7440-62-2	mg/kg	--	2,400	240	24	24	5	NO	80	120	75	125	20
SW6010B	Zinc	7440-66-6	mg/kg	--	5,000	2,500	250	250	10	NO	80	120	75	125	20
SW8260B	Benzene	71-43-2	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	Carbon tetrachloride	56-23-5	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	Chlorobenzene	108-90-7	mg/L	100	--	--	--	100	--	YES	--	--	--	--	--
SW8260B	Chloroform	67-66-3	mg/L	6	--	--	--	6	--	YES	--	--	--	--	--
SW8260B	o-Cresol (2-Methylphenol)	95-48-7	mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8260B	m-Cresol	108-39-4	mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8260B	p-Cresol (4-Methylphenol)	106-44-5	mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8260B	Total Cresols		mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8260B	1,4-Dichlorobenzene	106-46-7	mg/L	7.5	--	--	--	7.5	--	YES	--	--	--	--	--
SW8260B	1,2-Dichloroethane (EDC)	107-06-2	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	1,1-Dichloroethylene	75-35-4	mg/L	0.7	--	--	--	0.7	--	YES	--	--	--	--	--
SW8260B	Hexachlorobutadiene	87-68-3	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	Tetrachloroethylene (PCE)	127-18-4	mg/L	0.7	2,040	--	204	0.7	--	YES	--	--	--	--	--
SW8260B	Vinyl chloride	75-01-4	mg/L	0.2	--	--	--	0.2	--	YES	--	--	--	--	--
SW8260B	Trichloroethylene (TCE)	79-01-6	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	2-Butanone (MEK)	78-93-3	mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8270C	2,4-Dinitrotoluene	121-14-2	mg/L	0.13	--	--	--	0.13	--	YES	--	--	--	--	--
SW8270C	Hexachlorobenzene	118-74-1	mg/L	0.13	--	--	--	0.13	--	YES	--	--	--	--	--
SW8270C	Hexachloroethane	67-72-1	mg/L	3	--	--	--	3	--	YES	--	--	--	--	--
SW8270C	Hexachlorobutadiene	87-68-3	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8270C	Nitrobenzene	98-95-3	mg/L	2	--	--	--	2	--	YES	--	--	--	--	--
SW8270C	Pentachlorophenol	87-86-5	mg/L	100	17	--	1.7	1.7	--	YES	--	--	--	--	--
SW8270C	2,4,5-Trichlorophenol	95-95-4	mg/L	400	--	--	--	400	--	YES	--	--	--	--	--
SW8270C	2,4,6-Trichlorophenol	88-06-2	mg/L	2	--	--	--	2	--	YES	--	--	--	--	--
SW8270C	Pyridine	110-86-1	mg/L	5	--	--	--	5	--	YES	--	--	--	--	--
SW8270C	3,3-Dichlorobenzidine		mg/L	0.01	--	--	--	0.01	--	YES	--	--	--	--	--
SW8081A	Endrin	72-20-8	mg/L	0.02	0.2	--	0.02	0.02	--	YES	--	--	--	--	--
SW8081A	Heptachlor (and its epoxide)	76-44-8	mg/L	0.008	4.7	--	0.47	0.008	--	YES	--	--	--	--	--
SW8081A	Methoxychlor	72-43-5	mg/L	10	100	--	10	10	--	YES	--	--	--	--	--
SW8081A	Toxaphene	8001-35-2	mg/L	0.5	5	--	0.5	0.5	--	YES	--	--	--	--	--
SW8081A	Chlordane	57-74-9	mg/L	0.03	2.5	--	0.25	0.03	--	YES	--	--	--	--	--
SW8081A	Lindane	58-89-9	mg/L	0.4	4	--	0.4	0.4	--	YES	--	--	--	--	--
SW8081A	Aldrin	309-00-2	mg/L	--	1.4	--	0.14	0.14	--	YES	--	--	--	--	--

Table A-3

Maximum Concentrations for Title 22

PG&E Program Quality Assurance Project Plan

					CA TTCL/STLC						LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	**Constituent**	**CAS**	**Units**	**TCLP Regulatory Standards**	**Title 22 TTLC MCL (mg/kg)**	**If TTLC Concentration is ≥ this value STLC Analysis Must be performed**	**Title 22 STLC MCL**	**Most Stringent Screening Level**	**RL**	**Does RL Exceed Screening Level?**	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**	**% RPD**
SW8081A	Kepone	143-50-0	mg/L	--	21	--	2.1	2.1	--	YES	--	--	--	--	--
SW8081A	4,4'-DDD	72-54-8	mg/L	--	1	--	0.1	0.1	--	YES	--	--	--	--	--
SW8081A	4,4'-DDE	72-55-9	mg/L	--	1	--	0.1	0.1	--	YES	--	--	--	--	--
SW8081A	4,4'-DDT	50-29-3	mg/L	--	1	--	0.1	0.1	--	YES	--	--	--	--	--
SW8081A	Dieldrin	60-57-1	mg/L	--	8	--	0.8	0.8	--	YES	--	--	--	--	--
SW8081A	Heptachlor	76-44-8	mg/L	--	4.7	--	0.47	0.47	--	YES	--	--	--	--	--
SW8151A	2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	mg/L	10	100	--	10	10	--	YES	--	--	--	--	--
SW8151A	2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex)	93-72-1	mg/L	1	10	--	1	1	--	YES	--	--	--	--	--
SW8082	Polychlorinated biphenyls (PCB)		mg/L	--	50	--	5	5	--	YES	--	--	--	--	--
Dioxins	Dioxin (2,3,7,8-TCDD)	1746-01-6	mg/L	--	0.01	--	0.001	0.001	--	YES	--	--	--	--	--

Notes:

mg/L = milligrams per liter

mg/kg = milligrams per kilogram

TCLP = toxicity characteristic leaching procedure

STLC = soluble threshold limit concentration

TTLC = total threshold limit concentration

Addendum

Addendum to the PG&E Program Quality Assurance Project Plan for the Topock Groundwater Remedy

PG&E Topock Compressor Station Needles, California

Prepared for

Pacific Gas and Electric Company

Revision 1 (September 2014)

CH2MHILL®

155 Grand Avenue
Suite 800
Oakland, CA 94612

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Addendum to the PG&E Program Quality Assurance Project Plan for the Topock Groundwater Remedy

1.0 Introduction

This addendum to the *PG&E Program Quality Assurance Project Plan* (QAPP) Revision 2 (CH2M HILL 2012) has been prepared to address any variations from the QAPP or specifications associated with the Topock Groundwater Remedy (the project) that are not included or defined in the QAPP document. The laboratories will be required to adhere to the QAPP and then use the specific information outlined within this addendum to supersede the QAPP information.

In compliance with the 1996 Corrective Action Consent Agreement (CACA) (California Department of Toxic Substances Control [DTSC] 1996) and the Remedial Design/Remedial Action (RD/RA) Consent Decree (DOI 2013), the sampling and analytical procedures set forth in the QAPP (CH2M HILL 2012), this Addendum, as well as the Sampling and Monitoring Plan (Volume 2 of the Operation and Maintenance Manual) will be followed during remedy operation.

Over the decades-long operation and optimization of the remedy, updates to the aforementioned documents may be necessary for a variety of reasons (e.g., changes driven by field conditions, changes driven by regulations, etc.). As with current practice and required by the QAPP, Standard Operating Procedures (SOPs) will be reviewed on annual basis, at a minimum, and PG&E will inform the agencies of material and substantive changes to the SOPs, as well as the rationale for the changes, prior to implementation.

2.0 Project Organization and Responsibility

2.1 Project Organization

For information on project organization refer to the O&M Manual, Main Text Section L2.

2.2 Certification Requirements

All laboratories participating in analytical services will have a documented Quality System and be certified under the National Environmental Laboratory Accreditation Program (NELAP) or the State of California Environmental Laboratory Accreditation Program (ELAP). Laboratories in California will be required to be certified under the ELAP. Additional accreditation may also be required. The laboratory managers will be responsible for ensuring that all laboratory personnel have been properly trained and are qualified to perform their assigned tasks.

3.0 Sampling Procedures

3.1 Sampling Design

Sampling and monitoring activities are needed for compliance purposes and for effective operation and maintenance of the groundwater remedy. The rationale for the sampling design (sampling locations, frequency, and analytes) is included in the Sampling and Monitoring Plan.

3.2 Field Sampling Procedures

The groundwater remedy will use the project-specific field database, planned sample tables, chain-of-custody (CoC) forms, and other database-generated paperwork (e.g., purge forms, calibration log books). All sample collection and related activities will follow the SOPs provided in Appendix A of the Sampling and Monitoring Plan. Exhibit 3-1 lists the relevant SOPs for the remedy. Over the decades-long operation of the remedy, SOPs may be updated. The Field Lead and Project Chemist will ensure that the sampling is performed in accordance with the updated SOPs.

EXHIBIT 3-1
List of PG&E Program SOPs Applicable to the Topock Groundwater Remedy
Addendum to the PG&E Program Quality Assurance Project Plan for the Topock Groundwater Remedy

SOP	Title	Version	Date
SOP-A1	Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method	Rev 05	7/19/2012
SOP-A2	Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method	Rev 05	10/31/2012
SOP-A3	Purging and Sampling of Active and Inactive Water Supply Wells	Rev 05	10/31/2012
SOP-A4	Depth-Specific Surface Water Sampling	Rev 04	7/31/2012
SOP-A5	Groundwater Sampling from Sonic Drilling Boreholes	Rev 01	7/31/2012
SOP-A6	Sample Field Filtration and Preservation for Metals Analyses	Rev 04	7/31/2012
SOP-A7	Water Level Measurements	Rev 04	5/2/2014
SOP-A8	Field Water Quality Measurements Using a Flow-through Cell	Rev 01	9/23/2010
SOP-A9	Calibration of Field Instruments	Rev 05	3/22/2013
SOP-A10	Decontamination of Water Sampling Equipment	Rev 05	3/22/2013
SOP-A11	Total Depth Measurements	Rev 00	3/31/2005
SOP-A12	Field Water Quality Measurements for Grab Samples	Rev 00	5/2/2014
SOP-A13	Spill Prevention, Containment, and Control Measures for Monitoring Well Development, Purging, and Sampling	Rev 03	9/23/2010
SOP-A14	Pore Water Sampling	Rev 00	9/30/2005
SOP-A16	Access Routes	Rev 02	4/25/2012
SOP-A17	Groundwater and Surface Water Mobile Integrated Sample Tracking	Rev 02	12/5/2008
SOP-A18	Purging and Sampling of Groundwater Wells Minimal Drawdown Method	Rev 01	7/15/2012
SOP-A19	Sampling of Groundwater Monitoring Wells Hydrasleeve No Purge Method	Rev 00	7/15/2012
SOP-A22	Procedures for Calculation of Freshwater Equivalent Heads	Rev 01	4/22/2014
SOP-A23	Sample Handling and Custody	Rev 00	5/22/2014
SOP-L1	Hexavalent Chromium Analysis by Hach Method 1560	Rev 03	4/1/2014
SOP-L2	Ferrous Iron Analysis by Hach Method 8146	Rev 02	4/1/2014
SOP-L3	Total Chromium Analysis by Hach Method 8024	Rev 01	4/1/2014
SOP-L4	Conductivity Analysis by Hach Method 8160	Rev 01	4/1/2014
SOP-L8	Matrix Spike Preparation	Rev 01	6/5/2014
SOP-L9	pH Measurement	Rev 01	4/1/2014
SOP-L10	Hach Model 2100P Turbidimeter Calibration and Analysis Procedures	Rev 01	4/1/2014
SOP-L13	Nitrate Analysis by Hach Method 8171	Rev 00	4/1/204
SOP-L14	Sulfate Analysis by Hach Method 8051	Rev 00	4/1/2014
SOP-L15	Alkalinity Analysis	Rev 00	4/1/204
SOP-L16	Total Organic Carbon Analysis by Hach Method 10129	Rev 00	6/5/2014

EXHIBIT 3-1
List of PG&E Program SOPs Applicable to the Topock Groundwater Remedy
Addendum to the PG&E Program Quality Assurance Project Plan for the Topock Groundwater Remedy

SOP	Title	Version	Date
SOP-L17	Orthophosphate Analysis by Hach Method 8048	Rev 00	6/3/2014
SOP-L18	Manganese Analysis by Hach Method 8149	Rev 00	5/30/2014
SOP-L19	Total Dissolved Solids Analysis	Rev 00	5/29/2014
SOP-B16	Field-Portable X-Ray Fluorescence Soil Sampling	Rev 00	9/5/2008
SOP-C1	Solinst Pressure Transducers	Rev 01	5/2/2014
SOP-C2	Pressure Transducer Upload to Topock Database	Rev 01	5/2/2014
Remedy-SOP-01	Process Water Sampling	Rev 00	6/19/2012
Remedy-SOP-02	Safe Fueling and Fuel Handling Policy	Rev 00	7/5/2013

Notes:
The SOPs listed in this exhibit are provided in Appendix A of the Sampling and Monitoring Plan (Volume 2 of the O&M Manual).
Information from SOP-L5 was incorporated into SOP-L10; SOP-L5 was deleted.
Information from SOP-L11 was incorporated into SOP-L9; SOP-L11 was deleted.
Information from SOP-L12 was incorporated into SOP-L1 and SOP-L2; SOP-L12 was deleted.

3.3 Additional or Revised QC Steps for Hexavalent Chromium

The following quality control (QC) steps will be implemented for all samples related to the groundwater remedy:

1. Additional QC Step – All equipment blanks will be blind (versus being identified to the laboratory as “blank”, or “EB” for equipment blanks), with the exception of additional well-specific equipment blanks for the floodplain wells (see Step 2 in Section 3.4).

2. Additional QC Step – Certified filters will be purchased for groundwater and surface water samples. These filters are packaged with manufactures’ testing data and certification. If uncertified filters must be used, each lot (if lot information is available) will be analyzed for hexavalent chromium (Cr[VI]). If no lot number information is available, one filter per day will be analyzed for Cr(VI).

3. Revised QC Step – The following protocol for Cr(VI) has been established using the ammonium sulfate buffer solution for Cr(VI) sample preservation in the field:

   - Within 2 weeks prior to any field event requiring preservation for Cr(VI), fresh buffer solution will be made and the purity checked by the laboratory; the resulting chromatogram will be emailed to the CH2M HILL project chemist for verification.

   - All Cr(VI) samples will be field-filtered and preserved to a pH range of 9.3 to 9.7 with ammonium sulfate buffer solution.

   - The laboratory will confirm preservation at the time of sample receipt.

   - The Topock groundwater remedy will use EPA Methods E218.6 or SM3500-Cr (use of Methods SW7199 and SW7196 are restricted and must be approved by the project chemist) for Cr(VI) analyses. The use of these methods was approved by DTSC in 2008 (DTSC 2008).

3.4 Additional QC Steps for Hexavalent Chromium in Select Floodplain Well Samples

In addition to the QC steps discussed in Section 3.3, the additional QC steps outlined in this section will be followed during sampling of a) monitoring wells located in or near the floodplain (as defined in Exhibit 3-2) that are currently non-detect (or detected at less than 5 parts per billion) for Cr(VI), and b) future wells located in or

near the floodplain as determined by the CH2M HILL project chemist. As water quality changes, the list of wells in Exhibit 3-2 will be reviewed periodically (initially on an annual basis) and updated as applicable.

EXHIBIT 3-2
Floodplain Wells Recommended for Additional Quality Control Steps
Addendum to the PG&E Program Quality Assurance Project Plan for the Topock Groundwater Remedy

MW-21	MW-33-040	MW-43-075	MW-52S
MW-27-020	MW-34-055	MW-43-090	MW-53D
MW-27-060	MW-34-080	MW-44-070	MW-53M
MW-27-085	MW-36-070	MW-49-135	MW-54-85
MW-28-025	MW-39-040	MW-49-275	MW-54-140
MW-28-090	MW-42-055	MW-49-365	MW-54-195
MW-29	MW-42-065	MW-52D	MW-55-45
MW-32-020	MW-43-025	MW-52M	MW-55-120
MW-32-035			

The additional QC steps for the wells listed in Exhibit 3-2 are as follows:

1. Two Cr(VI) sample containers will be filled for each floodplain well listed in Exhibit 3-2, field filtered, and preserved. The duplicate sample will be placed on hold at the laboratory and will not be analyzed unless needed to investigate an anomalous result.
   - Cr(VI) will be analyzed by method E218.6R.
   - The sample labels will have a designation of “1 of 2” and “2 of 2”.
   - The sample identifier (ID) will be recorded and the existence of two sample containers will be indicated on the CoC form.
2. For each of the wells listed in Exhibit 3-2 that have non-dedicated pumps, an extra equipment blank will be collected after decontaminating the pump and prior to lowering the pump down the well. For example, if sampling has just been completed at MW-42-055 and the next well is MW-42-065, the sampling team will need to decontaminate the portable pump and then collect MW-42-065-XXX-EB before placing the pump in MW-42-065.
   - The well-specific equipment blanks (e.g., MW-42-065-XXX-EB) will be placed on hold and will not be analyzed unless needed to investigate an anomalous result.

The additional QC steps were put into place due to the sensitive nature of the sample locations, where low level detections could have large implications if shown to be correct. These additional QC steps are of little use for wells in the uplands where slight differences of a few ppb are of less concern, especially where the sample concentration is less than the background concentration. At the same time, samples with concentrations greater than 10 – 15 ppb can have sufficient variability within the analytical methods to exceed the possible influence from contamination sources or colloidal suspension concentrations.

Extra containers and EBs prescribed in Steps 1 and 2 above are collected to help determine the source for any possible anomalous results found in the wells listed in Exhibit 3-2. All the wells located near the river (specifically those around the active reducing zone) are susceptible to colloidal suspension of chromium which can cause a high variability between the Cr(T) and Cr(VI) results. The special EBs are collected to eliminate the possibility of cross-contamination between the wells (i.e., to verify that carry-over is not occurring).

Note that the MW-55 and MW-21 wells are not necessarily in the floodplain, but are located in areas “near” the river where the “normal” results are either non-detect or low concentrations. In the event results are “detected”

higher than normal or where the Cr(T) and Cr(VI) concentrations differed more than is considered normal, PG&E works to determine the likely causes and provide the analysis in the report where the results are reported.

3.5 Additional QC Steps for Cr(T) and Cr(VI) — River Samples

In addition to the QC steps discussed in Section 3.3, all river samples (shoreline and in-channel) will require the following additional QC steps:

1. For surface water sampling events; three analyte-specific sample containers will be collected from each sample location for both total chromium (Cr[T]) and Cr(VI). The laboratory will analyze the initial sample aliquot; if that result is an anomalous result (any detected concentration in the river will be considered anomalous), corrective action will be implemented and an additional aliquot of the original sample will be reanalyzed along with an aliquot from each of the additional sample volumes for comparison purposes. In addition, the agencies will be notified immediately if anomalous Cr(T) or Cr(VI) results are detected in river samples which require reanalysis.
    - Cr(VI) will be analyzed by method E218.6R. Cr(T) will be analyzed by SW-6020A.
    - The sample labels will have a designation of “1 of 3”, “2 of 3”, and “3 of 3”.
    - The sample ID will be recorded and the existence of three sample containers will be indicated on the CoC form.
2. Blank samples will be collected daily from two sets of randomly selected dedicated equipment (tubing).
3. In addition, one atmospheric (ambient) blank will be collected at the PG&E Topock site per day of river sampling. The atmospheric blank and the dedicated equipment blanks will be placed on hold at the laboratory, and analyzed only in event of river sample detections.
4. The laboratory is required to ensure that the buffer solution and initial calibration method blank concentrations are less than the method detection limit (MDL) prior to proceeding with sample analysis. In all cases in which corrective actions are applied, the CH2M HILL project chemist will be notified to aid in the corrective action process.
5. In the event corrective action is taken due to an anomalous result, the laboratory will document (in detail) the procedure in the analytical report’s case narrative. The narrative must include, at a minimum, the identity of each “anomalous” detection, the result from each analysis, the basis for what likely caused the detection if the detection is found unrelated to the actual sample (e.g., background contamination), and any future corrective action that will be implemented to resolve the identified problem(s).

3.6 Additional Laboratory QC Steps

To ensure precision and accuracy for the project, analytical laboratories will conduct the following additional QC steps for Cr(T) analyses, Cr(VI) analyses, and all other analyses.

<u>All Cr(T) Analysis</u>

1. The laboratory must use the average of three scans/injections to calculate relative standard deviation (RSD) for the analysis of all metals.
2. All reported detections must have a %RSD of less than or equal to 15% for the triplicate inductively coupled plasma/matrix spike injections.
3. All groundwater and soil samples will be digested using an appropriate method.
4. The laboratory may be asked to investigate situations where the Cr(T) and Cr(VI) results differ by more than 20% relative percent difference (RPD) for samples with concentrations > 4 ppb.

All Cr(VI) Analysis

1. The laboratory will analyze a QC sample (low level check standard) after the initial calibration, at the reporting limit (RL) concentration.
2. The laboratory is required to ensure that the buffer solution, initial calibration blank, and method blank concentrations are less than the MDL prior to proceeding with sample analysis. Sample analysis will only proceed after the buffer solution and method blank concentrations are less than the MDL.
3. Initial calibration must be re-established if any of the following occur:
   - The last calibration was established more than 2 weeks prior to the start of a sample's analysis.
   - Two consecutive continuing calibration standards fail.
   - Any of the following operating conditions change:
     - Major maintenance is performed.
     - The system fluid is changed.
     - The instrument requires relocation.
     - The analytical column is replaced.
4. The laboratory will establish a retention time window and monitor the samples for exceedances.
5. If any calibration blank other than the initial calibration blank (see number 3 above) has a detection greater than the RL, and if there are detections in any sample, the laboratory records will document the concentrations and corrective action will be performed. The corrective action will include sample reanalysis and may also include change of reagents, eluate, and/or standards; and/or optimizing instrumentation. In all cases in which corrective actions are applied, the CH2M HILL project chemist will be notified to aid in the corrective action process.
6. If any calibration blank other than the initial calibration blank (see number 3 above) has a detection greater than the MDL but below the RL, and if there are detections in any sample, the laboratory records will document the concentrations and corrective action will be performed. However, the manner of reporting results will remain unchanged (i.e., results less than the RL will be reported as a non-detected result at 0.2 µg/L). Corrective action may include sample reanalysis; change of reagents, eluate and/or standards; and/or optimizing instrumentation. In all cases in which corrective actions are applied, the CH2M HILL project chemist will be notified to aid in the corrective action process.

All Other Analyses

1. The laboratory will supply sample containers that are pre-cleaned and certified to EPA-specified standards for low level chemical analysis for all PG&E programs.
2. In all cases in which corrective actions are applied, the CH2M HILL project chemist will be notified to aid in the corrective action process.

4.0 Method Quality Objectives and Quality Assurance Program

The data quality goal for the groundwater remedy is to achieve defensible data with the highest quality possible, given the variability of parameters for the groundwater remedy. The final output is a data set designed and validated to meet the qualitative and quantitative needs of the project. See Tables 4-1 through 4-3 for project-specific reporting level requirements and EPA/California screening-level information that may differ from the QAPP.

4.1 Analytical Requirements

This Addendum specifies project-specific analytes and analytical methods that differ from the QAPP. All methods, analytes, or QC parameters specified in this Addendum that may differ from the QAPP supersede the criteria in the QAPP.

4.1.1 Reporting Limits

RLs should be a minimum of two times greater than the calculated MDLs. RLs used by the laboratory should not be greater than the RL objectives listed in Tables 4-1 through 4-3. Note that in Table 4-1, the 0.4 mg/kg RL used for this project is currently the lowest RL achievable using SW7199/3060A and is well below the industrial soil screening level. Screening levels are established by use of statistical analysis and are not based on the analytical capabilities of laboratories or methods.

Only analytes detected at concentrations greater than the project-specific RL will be reported. Analytes detected at less than the RL will be flagged "U" and reported as not detected at the RL.

RLs and sample results shall be reported to two significant figures if less than 10 micrograms per liter (µg/L) (parts per billion) and to three significant figures otherwise.

4.1.2 Calibration

In the initial calibration (for all instruments), a standard at a concentration equal to or less than the RL must be included.

Initial calibration must be re-established if any of the following conditions exist:

- The last calibration was established more than 1 year prior to the start of a sample's analysis (gas chromatography, gas chromatography-mass spectrometry, inductively coupled plasma, and inductively coupled plasma-mass spectrometry)
- The last calibration was established more than 2 weeks prior to the start of a sample's analysis (ion chromatography, and other "wet" chemistry analytical instruments)
- Two consecutive continuing calibration standards fail
- The operating conditions change; for example, any of the following:
  - Major maintenance is performed
  - The fluid or gas "carrier" type changes
  - The instrument requires relocation

4.1.3 Matrix Spike for Hexavalent Chromium Analyses

Interference from Topock groundwater is known to reduce the sensitivity of Method EPA 218.6. This can result in an incorrect assessment of the analyte identification or the specific RL if the Matrix Spike and Dilution Protocol is not followed (see Section 5.4.4.1 of the QAPP). All Topock groundwater and surface water samples analyzed by Method EPA 218.6 will follow the Matrix Spike and Dilution Protocol.

4.1.4 Matrix Spike and Dilution Protocol

Matrix interference has been encountered that affects the sensitivity for hexavalent chromium by ion chromatography methods. CH2M HILL shall direct the laboratories to perform an additional quality assurance/ quality control (QA/QC) analyses to aid in assessing any effect on method sensitivity for each project due to the sample matrix. All Topock groundwater and surface water samples analyzed by Method EPA218.6 will follow the Matrix Spike and Dilution Protocol.

The analytes and analytical requirements are presented in Tables 4-1 through 4-3.

4.2 Data Validation

The validation for this QAPP addendum will follow the Level 3B designation from the QAPP and will be performed by the project chemist and designees.

5.0 Retention of Records

Hardcopy and electronic versions will be archived in project files, on electronic archive tapes, and/or other electronic storage media for the duration of remedy operation plus 10 years, as specified in contractual agreements. All electronic data will be subject to routine back-up until it is archived for long-term retention.

6.0 References

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Tables

TABLE 4-1
Reporting Limits, Accuracy, and Precession Limits for Soil
PG&E Program Quality Assurance Project Plan Addendum

					EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	**Constituent**	**CAS**	**Units**	**QAPP RL[1]**	**Residential**	**Commercial**	**Residential**	**Commercial**	**Residential**	**Commercial**	**Most Stringent Screening Level[2]**	**Does RL Exceed Screening Level?**	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**	**% RPD**
SW 9012 or SW 9014	Cyanide	57-12-5	mg/kg	0.25	47	610	1,600	20,000	--	--	0,047	NO	*	*	*	*	30
Walkley-Black	Total organic carbon	TOC	mg/kg	50	--	--	--	--	--	--	--	NO	75	125	75	125	35
SW 9050	Specific conductance	Conductance	µmhos/cm	5	--	--	--	--	--	--	--	NO	75	125	75	125	20
SW 9045	pH	pH	pH units	0.1	--	--	--	--	--	--	--	NO	--	--	--	--	20
SM 2540 B/EPA 160.3	percent moisture	Moist	Percent	--	--	--	--	--	--	--	--	NO	--	--	--	--	20
EPA 300.0	Fluoride	Fluoride	mg/kg	2	--	--	4,700	61,000	--	--	4,700	NO	70	130	70	130	35
EPA 300.0	Chloride	Chloride	mg/kg	2	--	--	--	--	--	--	--	NO	70	130	70	130	35
EPA 300.0	Sulfate	Sulfate	mg/kg	2	--	--	--	--	--	--	--	NO	70	130	70	130	35
EPA 821/R-91-100	Sulfide, acid volatile	18496-25-8	mg/kg	80	--	--	--	--	--	--	--	NO	70	130	70	130	30
SW 7199	Chromium, hexavalent	18540-29-9	mg/kg	0.4	0.29	5.6	230	1,400	17	17	0.29	YES	85	115	85	115	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Aluminum	7429-90-5	mg/kg	10	77,000	990,000	77,000	990,000	--	--	77,000	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Antimony	7440-36-0	mg/kg	2	31	410	31	410	30	380	30	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Arsenic	7440-38-2	mg/kg	0.5	0.39	1.6	0.39	1.6	0.07	0.42	0.07	YES	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Barium	7440-39-3	mg/kg	1	15,000	190,000	15,000	190,000	5,200	63,000	5,200	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Beryllium	7440-41-7	mg/kg	0.5	160	2,000	160	2,000	150	1,700	150	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cadmium	7440-43-9	mg/kg	0.5	70	800	70	810	1.7	7.5	1.7	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Calcium	7440-70-2	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Chromium	7440-47-3	mg/kg	1	--	--	280	1,400	*	*	280	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cobalt	7440-48-4	mg/kg	1	23	300	23	300	660	3,200	23	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Copper	7440-50-8	mg/kg	1	3,100	41,000	3,100	41,000	3,000	38,000	3,000	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Iron	7439-89-6	mg/kg	10	55,000	720,000	55,000	720,000	--	--	55,000	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Lead	7439-92-1	mg/kg	1	400	800	400	800	150	3,500	150	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Magnesium	7439-95-4	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Manganese	7439-96-5	mg/kg	1	--	--	1,800	23,000	--	--	1,800	NO	85	115	75	125	20
SW 7471A/EPA 245.5	Mercury	7439-97-6	mg/kg	0.1	10	43	6.7	28	18	180	6.7	NO	75	125	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Molybdenum	7439-98-7	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Nickel	7440-02-0	mg/kg	1	1,500	20,000	1,600	20,000	1,600	16,000	1,500	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Potassium	7440-09-1	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Selenium	7782-49-2	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Silver	7440-22-4	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Sodium	7440-23-5	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Thallium	7440-28-0	mg/kg	2	0.78	10	5.1	66	5	63	0.78	YES	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Vanadium	7440-62-2	mg/kg	1	--	--	550	7,200	530	6,700	530	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Zinc	7440-66-6	mg/kg	2	23,000	310,000	23,000	310,000	23,000	100,000	23,000	NO	85	115	75	125	20
SW 8015B or C or D	Motor Oil	TPH-motor oil	mg/kg	10	--	--	--	--	--	--	--	NO	60	120	60	120	50
SW 8015B or C or D	TPH-Diesel	TPH-diesel	mg/kg	10	--	--	--	--	--	--	--	NO	51	153	51	153	50
SW 8015B or C or D	TPH-Gasoline	TPH-gasoline	mg/kg	1	--	--	--	--	--	--	--	NO	57	146	57	146	50
SW 8081A or B	4,4'-DDD	72-54-8	ug/kg	4	2,000	7,200	2,000	7,200	2,300	9,000	2,000	NO	50	139	50	139	50
SW 8081A or B	4,4'-DDE	72-55-9	ug/kg	4	1,400	5,100	1,400	5,100	1,600	6,300	1,400	NO	68	126	68	126	50
SW 8081A or B	4,4'-DDT	50-29-3	ug/kg	4	1,700	7,000	1,700	7,000	1,600	6,300	1,600	NO	46	135	46	135	50
SW 8081A or B	Aldrin	309-00-2	ug/kg	4	29	100	29	100	33	130	29	NO	47	120	47	120	50
SW 8081A or B	alpha-HCH	319-84-6	ug/kg	4	77	270	77	270	--	--	77	NO	62	125	62	125	50
SW 8081A or B	alpha-Chlordane	5103-71-9	ug/kg	4	--	--	--	--	430	1,700	430	NO	63	121	63	121	50
SW 8081A or B	beta-HCH	319-85-7	ug/kg	4	270	960	320	1,300	--	--	270	NO	62	127	62	127	50
SW 8081A or B	delta-HCH	319-86-8	ug/kg	4	--	--	--	--	--	--	--	NO	57	130	57	130	50
SW 8081A or B	Dieldrin	60-57-1	ug/kg	4	30	110	30	110	35	130	30	NO	67	125	67	125	50
SW 8081A or B	Endosulfan I	959-98-8	ug/kg	4	--	--	--	--	--	--	--	NO	41	147	41	147	50
SW 8081A or B	Endosulfan II	33213-65-9	ug/kg	4	--	--	--	--	--	--	--	NO	37	141	37	141	50
SW 8081A or B	Endosulfan sulfate	1031-07-8	ug/kg	4	--	--	--	--	--	--	--	NO	62	135	62	135	50
SW 8081A or B	Endrin	72-20-8	ug/kg	4	18,000	180,000	18,000	180,000	21,000	230,000	18,000	NO	61	133	61	133	50
SW 8081A or B	Endrin aldehyde	7421-93-4	ug/kg	4	--	--	--	--	--	--	--	NO	37	147	37	147	50
SW 8081A or B	gamma-HCH (Lindane)	58-89-9	ug/kg	4	520	2,100	520	21,000	500	2,000	500	NO	59	123	59	123	50
SW 8081A or B	gamma-Chlordane	5103-74-2	ug/kg	4	--	--	--	--	430	1,700	430	NO	48	124	48	124	50
SW 8081A or B	Heptachlor	76-44-8	ug/kg	4	110	380	110	380	130	520	110	NO	51	140	51	140	50
SW 8081A or B	Heptachlor epoxide	1024-57-3	ug/kg	4	53	190	53	190	--	--	53	NO	66	130	66	130	50
SW 8081A or B	Methoxychlor	72-43-5	ug/kg	20	310,000	3,100,000	310,000	3,100,000	340,000	3,800,000	310,000	NO	57	143	57	143	50
SW 8081A or B	Toxaphene	8001-35-2	ug/kg	100	440	1,600	440	1,600	460	1,800	440	NO	31	136	31	136	50
SW 8082 or A	Aroclor-1016	12674-11-2	ug/kg	50	3,900	21,000	3,900	21,200	--	--	3,900	NO	41	138	41	138	50
SW 8082 or A	Aroclor-1221	11104-28-2	ug/kg	50	140	540	170	620	--	--	140	NO	45	136	45	136	50
SW 8082 or A	Aroclor-1232	11141-16-5	ug/kg	50	140	540	170	620	--	--	140	NO	45	136	45	136	50
SW 8082 or A	Aroclor-1242	53469-21-9	ug/kg	50	220	740	220	740	--	--	220	NO	43	150	43	150	50
SW 8082 or A	Aroclor-1248	12672-29-6	ug/kg	50	220	740	220	740	--	--	220	NO	44	136	44	136	50
SW 8082 or A	Aroclor-1254	11097-69-1	ug/kg	50	220	740	220	740	--	--	220	NO	41	141	41	141	50
SW 8082 or A	Aroclor-1260	11096-82-5	ug/kg	50	220	740	220	740	--	--	220	NO	61	131	61	131	50
SW 8082 or A	Total PCB	Total PCB	ug/kg	50	220	740	220	740	89	300	89	NO	--	--	--	--	--
SW 8151A	2,4-D	94-75-7	ug/kg	200	690,000	7,700,000	690	7,700	690	550	550	NO	32	121	32	121	50

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Method	Constituent	CAS	Units	QAPP RL[1]	EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL		Most Stringent Screening Level[2]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 8151A	2,4-DB	94-82-6	ug/kg	500	490,000	4,900,000	490	4,900	--	--	490	YES	42	145	42	145	50
SW 8151A	2,4,5-T	93-76-5	ug/kg	500	610,000	6,200,000	610	6,200	7,700	6,100	610	NO	43	139	43	139	50
SW 8151A	2,4,5-TP	93-72-1	ug/kg	200	490,000	4,900,000	490	4,900	--	--	490	NO	46	128	46	128	50
SW 8151A	Dalapon	75-99-0	ug/kg	100	1,800,000	18,000,000	1,800	18,000	--	--	1,800	NO	22	125	22	125	50
SW 8151A	Dicamba	1918-00-9	ug/kg	500	1,800,000	18,000,000	1,800	18,000	--	--	1,800	NO	56	120	56	120	50
SW 8151A	Dichloroprop	120-36-5	ug/kg	500	--	--	--	--	--	--	--	NO	72	142	72	142	50
SW 8151A	Dinoseb	88-85-7	ug/kg	100	61,000	620,000	61	620	--	--	61	YES	20	131	20	131	50
SW 8151A	MCPA	94-74-6	ug/kg	1,000	31,000	310,000	31	310	--	--	31	YES	65	120	65	120	50
SW 8151A	MCPP	7085-19-0	ug/kg	1,500	--	--	61	620	--	--	61	YES	60	118	60	118	50
SW 8260B or C	1,1,1,2-Tetrachloroethane	630-20-6	ug/kg	5	1,900	9,300	2,000	9,800	--	--	1,900	NO	74	125	74	125	30
SW 8260B or C	1,1,1-Trichloroethane (TCA)	71-55-6	ug/kg	5	8,700,000	38,000,000	9,000,000	39,000,000	--	--	8,700,000	NO	68	130	68	130	30
SW 8260B or C	1,1,2,2-Tetrachloroethane	79-34-5	ug/kg	5	560	2,800	590	2,900	--	--	560	NO	59	140	59	140	30
SW 8260B or C	1,1,2-Trichloroethane	79-00-5	ug/kg	5	1,100	5,300	1,100	5,500	--	--	1,100	NO	62	127	62	127	30
SW 8260B or C	1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/kg	5	43,000,000	180,000,000	43,000,000	180,000,000	--	--	43,000,000	NO	65	135	65	135	30
SW 8260B or C	1,1-Dichloroethane	75-34-3	ug/kg	5	3,300	17,000	3,400	17,000	--	--	3,300	NO	73	125	73	125	30
SW 8260B or C	1,1-Dichloroethylene	75-35-4	ug/kg	5	240,000	1,100,000	250,000	1,100,000	--	--	240,000	NO	65	136	65	136	30
SW 8260B or C	1,1-Dichloropropene	563-58-6	ug/kg	5	--	--	--	--	--	--	--	NO	70	135	70	135	30
SW 8260B or C	1,2,3-Trichlorobenzene	87-61-6	ug/kg	5	49,000	490,000	--	--	--	--	49,000	NO	62	133	62	133	30
SW 8260B or C	1,2,3-Trichloropropane	96-18-4	ug/kg	5	5	95	91	410	--	--	5	NO	63	130	63	130	30
SW 8260B or C	1,2,4-Trichlorobenzene	120-82-1	ug/kg	5	22,000	99,000	87,000	400,000	--	--	22,000	NO	65	131	65	131	30
SW 8260B or C	1,2,4-Trimethylbenzene	95-63-6	ug/kg	5	62,000	260,000	67,000	280,000	--	--	62,000	NO	65	135	65	135	30
SW 8260B or C	1,2-Dibromo-3-chloropropane	96-12-8	ug/kg	5	5.4	69	5.6	73	--	--	5.4	NO	49	135	49	135	30
SW 8260B or C	1,2-Dibromoethane (EDB)	106-93-4	ug/kg	5	34	170	34	170	--	--	34	NO	70	124	70	124	30
SW 8260B or C	1,2-Dichlorobenzene	95-50-1	ug/kg	5	1,900,000	9,800,000	2,000,000	10,000,000	--	--	1,900,000	NO	74	120	74	120	30
SW 8260B or C	1,2-Dichloroethane (EDC)	107-06-2	ug/kg	5	430	2,200	450	2,200	--	--	430	NO	72	137	72	137	30
SW 8260B or C	1,2-Dichloropropane	78-87-5	ug/kg	5	940	4,700	930	4,700	--	--	930	NO	71	120	71	120	30
SW 8260B or C	1,3,5-Trimethylbenzene	108-67-8	ug/kg	5	780,000	10,000,000	47,000	200,000	--	--	47,000	NO	65	133	65	133	30
SW 8260B or C	1,3-Dichlorobenzene	541-73-1	ug/kg	5	--	--	--	--	--	--	--	NO	72	124	72	124	30
SW 8260B or C	1,3-Dichloropropane	142-28-9	ug/kg	5	1,600,000	20,000,000	1,600,000	20,000,000	--	--	1,600,000	NO	76	123	76	123	30
SW 8260B or C	1,4-Dichlorobenzene	106-46-7	ug/kg	5	2,400	12,000	2,600	13,000	--	--	2,400	NO	72	125	72	125	30
SW 8260B or C	2,2-Dichloropropane	594-20-7	ug/kg	5	--	--	--	--	--	--	--	NO	67	134	67	134	30
SW 8260B or C	2-Butanone (MEK)	78-93-3	ug/kg	50	28,000,000	200,000,000	28,000,000	190,000,000	--	--	28,000,000	NO	40	135	40	135	30
SW 8260B or C	2-Chlorotoluene	95-49-8	ug/kg	5	1,600,000	20,000,000	1,600,000	20,000,000	--	--	1,600,000	NO	69	128	69	128	30
SW 8260B or C	4-Chlorotoluene	106-43-4	ug/kg	5	1,600,000	20,000,000	5,500,000	72,000,000	--	--	1,600,000	NO	73	126	73	126	30
SW 8260B or C	4-Isopropyltoluene	99-87-6	ug/kg	6	--	--	--	--	--	--	--	NO	75	133	75	133	30
SW 8260B or C	4-Methyl-2-pentanone	108-10-1	ug/kg	50	5,300,000	53,000,000	5,300,000	52,000,000	--	--	5,300,000	NO	65	135	65	135	30
SW 8260B or C	Acetone	67-64-1	ug/kg	50	61,000,000	630,000,000	61,000,000	610,000,000	--	--	61,000,000	NO	40	141	40	141	30
SW 8260B or C	Acrolein	107-02-8	ug/kg	100	150	650	160	680	--	--	150	NO	65	135	65	135	30
SW 8260B or C	Acrylonitrile	107-13-1	ug/kg	50	240	1,200	240	1,200	--	--	240	NO	65	135	65	135	30
SW 8260B or C	Benzene	71-43-2	ug/kg	5	1,100	5,400	1,100	5,600	--	--	1,100	NO	73	126	73	126	30
SW 8260B or C	Bromobenzene	108-86-1	ug/kg	5	300,000	1,800,000	94,000	410,000	--	--	94,000	NO	66	121	66	121	30
SW 8260B or C	Bromochloromethane	74-97-5	ug/kg	5	160,000	680,000	--	--	--	--	160,000	NO	71	127	71	127	30
SW 8260B or C	Bromodichloromethane	75-27-4	ug/kg	5	270	1,400	10,000	46,000	--	--	0,270	NO	72	128	72	128	30
SW 8260B or C	Bromoform	75-25-2	ug/kg	6	62,000	220,000	61,000	220,000	--	--	61,000	NO	66	137	66	137	30
SW 8260B or C	Bromomethane	74-83-9	ug/kg	5	7,300	32,000	7,900	35,000	--	--	7,300	NO	45	141	45	141	30
SW 8260B or C	Carbon disulfide	75-15-0	ug/kg	5	820,000	3,700,000	670,000	3,000,000	--	--	670,000	NO	65	135	65	135	30
SW 8260B or C	Carbon tetrachloride	56-23-5	ug/kg	5	610	3,000	250	1,300	--	--	250	NO	67	133	67	133	30
SW 8260B or C	Chlorobenzene	108-90-7	ug/kg	5	290,000	1,400,000	310,000	1,500,000	--	--	290,000	NO	75	123	75	123	30
SW 8260B or C	Chloroethane	75-00-3	ug/kg	5	15,000,000	61,000,000	15,000,000	62,000,000	--	--	15,000,000	NO	41	141	41	141	30
SW 8260B or C	Chloroform	67-66-3	ug/kg	2	290	1,500	300	1,500	--	--	290	NO	72	124	72	124	30
SW 8260B or C	Chloromethane	74-87-3	ug/kg	5	120,000	500,000	1,700	8,400	--	--	1,700	NO	51	129	51	129	30
SW 8260B or C	cis-1,2-Dichloroethene	156-59-2	ug/kg	5	160,000	2,000,000	780,000	10,000,000	--	--	160,000	NO	67	125	67	125	30
SW 8260B or C	cis-1,3-Dichloropropene	10061-01-5	ug/kg	5	--	--	--	--	--	--	--	NO	72	126	72	126	30
SW 8260B or C	Dibromochloromethane	124-48-1	ug/kg	5	680	3,300	5,800	21,000	--	--	0,680	NO	66	130	66	130	30
SW 8260B or C	Dibromomethane	74-95-3	ug/kg	5	25,000	110,000	780,000	10,000,000	--	--	25,000	NO	73	128	73	128	30
SW 8260B or C	Dichlorodifluoromethane	75-71-8	ug/kg	5	94,000	400,000	190,000	780,000	--	--	94,000	NO	34	136	34	136	30
SW 8260B or C	Ethylbenzene	100-41-4	ug/kg	5	5,400	27,000	5,700	29,000	--	--	5,400	NO	74	127	74	127	30
SW 8260B or C	Hexachlorobutadiene	87-68-3	ug/kg	5	6,200	22,000	6,200	22,000	--	--	6,200	NO	53	142	53	142	30
SW 8260B or C	Isopropylbenzene (Cumene)	98-82-8	ug/kg	5	2,100,000	11,000,000	2,200,000	11,000,000	--	--	2,100,000	NO	77	129	77	129	30
SW 8260B or C	Methylene Chloride	75-09-2	ug/kg	5	56,000	960,000	1,100	5,400	--	--	1,100	NO	63	137	63	137	30
SW 8260B or C	Naphthalene	91-20-3	ug/kg	5	3,600	18,000	3,900	20,000	--	--	3,600	NO	51	135	51	135	30
SW 8260B or C	n-Butylbenzene	104-51-8	ug/kg	5	3,900,000	51,000,000	--	--	--	--	3,900,000	NO	65	138	65	138	30
SW 8260B or C	n-Propylbenzene	103-65-1	ug/kg	5	3,400,000	21,000,000	--	--	--	--	3,400,000	NO	63	135	63	135	30
SW 8260B or C	sec-Butylbenzene	135-98-8	ug/kg	5	--	--	--	--	--	--	--	NO	63	132	63	132	30
SW 8260B or C	Styrene	100-42-5	ug/kg	5	6,300,000	36,000,000	6,500,000	38,000,000	--	--	6,300,000	NO	74	128	74	128	30
SW 8260B or C	tert-Butyl Methyl Ether (MTBE)	1634-04-4	ug/kg	20	43,000	220,000	39,000	190,000	--	--	39,000	NO	50	135	50	135	30

TABLE 4-1
Reporting Limits, Accuracy, and Precession Limits for Soil
PG&E Program Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL[1]	EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL		Most Stringent Screening Level[2]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 8260B or C	tert-Butylbenzene	98-06-6	ug/kg	5	--	--	--	--	--	--	--	NO	65	132	65	132	30
SW 8260B or C	Tetrachloroethene	127-18-4	ug/kg	5	22,000	110,000	570	2,700	--	--	570	NO	67	139	67	139	30
SW 8260B or C	Toluene	108-88-3	ug/kg	5	5,000,000	45,000,000	5,000,000	46,000,000	--	--	5,000,000	NO	71	127	71	127	30
SW 8260B or C	trans-1,2-Dichloroethene	156-60-5	ug/kg	5	150,000	690,000	110,000	500,000	--	--	110,000	NO	66	134	66	134	30
SW 8260B or C	trans-1,3-Dichloropropene	10061-02-6	ug/kg	5	--	--	--	--	--	--	--	NO	65	127	65	127	30
SW 8260B or C	Trichloroethene	79-01-6	ug/kg	5	910	6,400	2,800	14,000	--	--	0,910	NO	77	124	77	124	30
SW 8260B or C	Trichlorofluoromethane (Freon 11)	75-69-4	ug/kg	5	790,000	3,400,000	800,000	3,400,000	--	--	790,000	NO	49	139	49	139	30
SW 8260B or C	Vinyl Chloride	75-01-4	ug/kg	5	60	1,700	60	1,700	--	--	60	NO	58	126	58	126	30
SW 8260B or C	Xylenes, Total	1330-20-7	ug/kg	15	630,000	2,700,000	600,000	2,600,000	--	--	600,000	NO	65	125	65	125	50
SW 8260B or C	m-Xylene	108-38-3	ug/kg	10	590,000	2,500,000	4,500,000	19,000,000	--	--	590,000	NO	79	126	79	126	30
SW 8260B or C	p-Xylene	106-42-3	ug/kg	10	600,000	2,600,000	4,700,000	20,000,000	--	--	600,000	NO	79	126	79	126	30
SW 8260B or C	o-Xylene	95-47-6	ug/kg	5	690,000	3,000,000	5,300,000	23,000,000	--	--	690,000	NO	77	125	77	125	30
SW 8270C or D	1,2,4-Trichlorobenzene	120-82-1	ug/kg	330	22,000	99,000	87,000	400,000	--	--	22,000	NO	44	125	44	125	30
SW 8270C or D	1,2-Dichlorobenzene	95-50-1	ug/kg	330	1,900,000	9,800,000	2,000,000	10,000,000	--	--	1,900,000	NO	45	125	45	125	30
SW 8270C or D	1,3-Dichlorobenzene	541-73-1	ug/kg	330	--	--	--	--	--	--	--	NO	39	125	39	125	30
SW 8270C or D	1,4-Dichlorobenzene	106-46-7	ug/kg	330	2,400	12,000	2,600	13,000	--	--	2,400	NO	35	125	35	125	30
SW 8270C or D	2,4,5-Trichlorophenol	95-95-4	ug/kg	700	6,100,000	62,000,000	6,100,000	62,000,000	--	--	6,100,000	NO	49	125	49	125	30
SW 8270C or D	2,4,6-Trichlorophenol	88-06-2	ug/kg	330	44,000	160,000	44,000	160,000	--	--	44,000	NO	43	125	43	125	30
SW 8270C or D	2,4-Dichlorophenol	120-83-2	ug/kg	330	180,000	1,800,000	180,000	1,800,000	--	--	180,000	NO	45	125	45	125	30
SW 8270C or D	2,4-Dimethylphenol	105-67-9	ug/kg	330	1,200,000	12,000,000	1,200,000	12,000,000	--	--	1,200,000	NO	32	125	32	125	30
SW 8270C or D	2,4-Dinitrophenol	51-28-5	ug/kg	700	120,000	1,200,000	120,000	1,200,000	--	--	120,000	NO	25	132	25	132	30
SW 8270C or D	2,4-Dinitrotoluene	121-14-2	ug/kg	330	1,600	5,500	120,000	1,200,000	--	--	1,600	NO	48	125	48	125	30
SW 8270C or D	2,6-Dinitrotoluene	606-20-2	ug/kg	330	61,000	620,000	61,000	620,000	--	--	61,000	NO	48	125	48	125	30
SW 8270C or D	2-Chloronaphthalene	91-58-7	ug/kg	330	6,300,000	82,000,000	6,300,000	82,000,000	--	--	6,300,000	NO	45	125	45	125	30
SW 8270C or D	2-Chlorophenol	95-57-8	ug/kg	330	390,000	5,100,000	390,000	5,100,000	--	--	390,000	NO	44	125	44	125	30
SW 8270C or D	2-Methylnaphthalene	91-57-6	ug/kg	330	230,000	2,200,000	310,000	4,100,000	--	--	230,000	NO	47	125	47	125	30
SW 8270C or D	2-Methylphenol (o-Cresol)	95-48-7	ug/kg	330	3,100,000	31,000,000	3,100,000	31,000,000	--	--	3,100,000	NO	40	125	40	125	30
SW 8270C or D	2-Nitroaniline	88-74-4	ug/kg	700	610,000	6,000,000	--	--	--	--	610,000	NO	44	125	44	125	30
SW 8270C or D	2-Nitrophenol	88-75-5	ug/kg	700	--	--	--	--	--	--	--	NO	42	125	42	125	30
SW 8270C or D	3,3'-Dichlorobenzidine	91-94-1	ug/kg	1,300	1,100	3,800	1,100	3,800	--	--	1,100	YES	25	128	25	128	30
SW 8270C or D	3-Nitroaniline	99-09-2	ug/kg	700	--	--	18,000	82,000	--	--	18,000	NO	27	125	27	125	30
SW 8270C or D	4,6-Dinitro-2-methylphenol	534-52-1	ug/kg	1600	4,900	49,000	6,100	62,000	--	--	4,900	NO	29	137	29	137	30
SW 8270C or D	4-Bromophenyl phenyl ether	101-55-3	ug/kg	330	--	--	--	--	--	--	--	NO	46	125	46	125	30
SW 8270C or D	4-Chloro-3-methylphenol	59-50-7	ug/kg	600	6,100,000	62,000,000	--	--	--	--	6,100,000	NO	46	125	46	125	30
SW 8270C or D	4-Chloroaniline	106-47-8	ug/kg	700	2,400	8,600	9,000	32,000	--	--	2,400	NO	10	125	10	125	30
SW 8270C or D	4-Chlorophenyl phenyl ether	7005-72-3	ug/kg	330	--	--	--	--	--	--	--	NO	47	125	47	125	30
SW 8270C or D	4-Methylphenol (p-Cresol)	106-44-5	ug/kg	330	6,100,000	62,000,000	310,000	3,100,000	--	--	310,000	NO	41	125	41	125	30
SW 8270C or D	4-Nitroaniline	100-01-6	ug/kg	700	24,000	86,000	23,000	82,000	--	--	23,000	NO	34	125	34	125	30
SW 8270C or D	4-Nitrophenol	100-02-7	ug/kg	700	--	--	--	--	--	--	--	NO	25	138	25	138	30
SW 8270C or D	Acenaphthene	83-32-9	ug/kg	330	3,400,000	33,000,000	3,400,000	33,000,000	--	--	3,400,000	NO	46	125	46	125	30
SW 8270C or D	Acenaphthylene	208-96-8	ug/kg	330	--	--	--	--	--	--	--	NO	44	125	44	125	30
SW 8270C or D	Anthracene	120-12-7	ug/kg	330	17,000,000	170,000,000	17,000,000	170,000,000	--	--	17,000,000	NO	53	125	53	125	30
SW 8270C or D	Benzo (a) anthracene	56-55-3	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	52	125	52	125	30
SW 8270C or D	Benzo (a) pyrene	50-32-8	ug/kg	330	15	210	15	210	38	130	15	YES	50	125	50	125	30
SW 8270C or D	Benzo (b) fluoranthene	205-99-2	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	45	125	45	125	30
SW 8270C or D	Benzo (g,h,i) perylene	191-24-2	ug/kg	330	--	--	--	--	--	--	--	NO	38	126	38	126	30
SW 8270C or D	Benzo (k) fluoranthene	207-08-9	ug/kg	330	1,500	21,000	1,500	21,000	--	--	1,500	NO	45	125	45	125	30
SW 8270C or D	Benzoic acid	65-85-0	ug/kg	5,000	240,000,000	2,500,000,000	240,000,000	2,500,000,000	--	--	240,000,000	NO	25	125	25	125	30
SW 8270C or D	Benzyl alcohol	100-51-6	ug/kg	330	6,100,000	62,000,000	31,000,000	310,000,000	--	--	6,100,000	NO	25	125	25	125	30
SW 8270C or D	bis (2-chloroethoxy) methane	111-91-1	ug/kg	330	180,000	1,800,000	180,000	1,800,000	--	--	180,000	NO	43	125	43	125	30
SW 8270C or D	bis (2-chloroethyl) ether	111-44-4	ug/kg	330	210	1,000	190	900	--	--	190	YES	38	125	38	125	30
SW 8270C or D	bis (2-chloroisopropyl) ether	108-60-1	ug/kg	330	4,600	22,000	3,500	17,000	--	--	3,500	NO	25	125	25	125	30
SW 8270C or D	bis (2-ethylhexyl) phthalate	117-81-7	ug/kg	330	35,000	120,000	35,000	120,000	--	--	35,000	NO	47	127	47	127	30
SW 8270C or D	Butyl benzylphthalate	85-68-7	ug/kg	1000	260,000	910,000	260,000	910,000	--	--	260,000	NO	49	125	49	125	30
SW 8270C or D	Chrysene	218-01-9	ug/kg	330	15,000	210,000	15,000	210,000	--	--	15,000	NO	53	125	53	125	30
SW 8270C or D	Dibenzo (a,h) anthracene	53-70-3	ug/kg	330	15	210	15	210	--	--	15	YES	41	125	41	125	30
SW 8270C or D	Dibenzofuran	132-64-9	ug/kg	330	78,000	1,000,000	--	--	--	--	78,000	NO	51	125	51	125	30
SW 8270C or D	Diethyl phthalate	84-66-2	ug/kg	330	49,000,000	490,000,000	49,000,000	490,000,000	--	--	49,000,000	NO	50	125	50	125	30
SW 8270C or D	Dimethyl phthalate	131-11-3	ug/kg	330	--	--	--	--	--	--	--	NO	49	125	49	125	30
SW 8270C or D	Di-n-butylphthalate	84-74-2	ug/kg	330	6,100,000	62,000,000	6,100,000	62,000,000	--	--	6,100,000	NO	56	125	56	125	30
SW 8270C or D	Di-n-octylphthalate	117-84-0	ug/kg	1000	--	--	--	--	--	--	--	NO	41	132	41	132	30
SW 8270C or D	Fluoranthene	206-44-0	ug/kg	330	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	54	125	54	125	30
SW 8270C or D	Fluorene	86-73-7	ug/kg	330	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	49	125	49	125	30
SW 8270C or D	Hexachlorobenzene	118-74-1	ug/kg	330	300	1,100	300	1,100	--	--	300	YES	47	125	47	125	30
SW 8270C or D	Hexachlorobutadiene	87-68-3	ug/kg	330	6,200	22,000	6,200	22,000	--	--	6,200	NO	40	125	40	125	30
SW 8270C or D	Hexachloroethane	67-72-1	ug/kg	330	12,000	43,000	35,000	120,000	--	--	12,000	NO	34	125	34	125	30

TABLE 4-1
Reporting Limits, Accuracy, and Precession Limits for Soil
PG&E Program Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL[1]	EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL		Most Stringent Screening Level[2]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 8270C or D	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	38	125	38	125	30
SW 8270C or D	Isophorone	78-59-1	ug/kg	330	510,000	1,800,000	510,000	1,800,000	--	--	510,000	NO	43	125	43	125	30
SW 8270C or D	Naphthalene	91-20-3	ug/kg	330	3,600	18,000	3,900	20,000	--	--	3,600	NO	40	125	40	125	30
SW 8270C or D	Nitrobenzene	98-95-3	ug/kg	330	4,800	24,000	31,000	280,000	--	--	4,800	NO	41	125	41	125	30
SW 8270C or D	n-Nitrosodi-n-propylamine	621-64-7	ug/kg	330	69	250	69	250	--	--	69	YES	40	125	40	125	30
SW 8270C or D	n-Nitrosodiphenylamine	86-30-6	ug/kg	330	99,000	350,000	99,000	350,000	--	--	99,000	NO	49	125	49	125	30
SW 8270C or D	Pentachlorophenol	87-86-5	ug/kg	700	890	2,700	3,000	9,000	4,400	13,000	0,890	NO	25	125	25	125	30
SW 8270C or D	Phenanthrene	85-01-8	ug/kg	330	--	--	--	--	--	--	--	NO	50	125	50	125	30
SW 8270C or D	Phenol	108-95-2	ug/kg	330	18,000,000	180,000,000	18,000,000	180,000,000	--	--	18,000,000	NO	39	125	39	125	30
SW 8270C or D	Pyrene	129-00-0	ug/kg	330	1,700,000	17,000,000	1,700,000	17,000,000	--	--	1,700,000	NO	46	125	46	125	30
SW 8270SIM	1-methylnaphthalene	90-12-0	ug/kg	5	16,000	53,000	22,000	99,000	--	--	16,000	NO	30	111	30	111	30
SW 8270SIM	2-methylnaphthalene	91-57-6	ug/kg	5	230,000	2,200,000	310,000	4,100,000	--	--	230,000	NO	30	111	30	111	30
SW 8270SIM	Acenaphthene	83-32-9	ug/kg	5	3,400,000	33,000,000	3,400,000	33,000,000	--	--	3,400,000	NO	28	110	28	110	30
SW 8270SIM	Acenaphthylene	208-96-8	ug/kg	5	--	--	--	--	--	--	--	NO	23	126	23	126	30
SW 8270SIM	Anthracene	120-12-7	ug/kg	5	17,000,000	170,000,000	17,000,000	170,000,000	--	--	17,000,000	NO	28	136	28	136	30
SW 8270SIM	Benzo (a) anthracene	56-55-3	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	31	146	31	146	30
SW 8270SIM	Benzo (a) pyrene	50-32-8	ug/kg	5	15	210	15	210	38	130	15	NO	28	128	28	128	30
SW 8270SIM	Benzo (b) fluoranthene	205-99-2	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	30	139	30	139	30
SW 8270SIM	Benzo (g,h,i) perylene	191-24-2	ug/kg	5	--	--	--	--	--	--	--	NO	21	149	21	149	30
SW 8270SIM	Benzo (k) fluoranthene	207-08-9	ug/kg	5	1,500	21,000	1,500	21,000	--	--	1,500	NO	42	129	42	129	30
SW 8270SIM	Chrysene	218-01-9	ug/kg	5	15,000	210,000	15,000	210,000	--	--	15,000	NO	39	134	39	134	30
SW 8270SIM	Dibenzo (a,h) anthracene	53-70-3	ug/kg	5	15	210	15	210	--	--	15	NO	30	138	30	138	30
SW 8270SIM	Fluoranthene	206-44-0	ug/kg	5	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	30	142	30	142	30
SW 8270SIM	Fluorene	86-73-7	ug/kg	5	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	27	116	27	116	30
SW 8270SIM	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	17	164	17	164	30
SW 8270SIM	Naphthalene	91-20-3	ug/kg	5	3,600	18,000	3,900	20,000	--	--	3,600	NO	29	106	29	106	30
SW 8270SIM	Phenanthrene	85-01-8	ug/kg	5	--	--	--	--	--	--	--	NO	32	127	32	127	30
SW 8270SIM	Pyrene	129-00-0	ug/kg	5	1,700,000	17,000,000	1,700,000	17,000,000	--	--	1,700,000	NO	28	130	28	130	30

Notes:

Please keep in mind, Screening Levels are constantly revised by the EPA. The appropriate Screening levels are specific to the project, the location, the agency providing oversight, and the overall Goals of the project.

mg/kg = milligrams per kilogram
ug/kg = micrograms per kilogram
µmhos/cm = micromhos per centimeter

All soil results (with the exception of Waste characterization) must be reported as dry weight
SW 7199 soil analysis must be accompanied by a SW 3060A extraction
PCB - LCS, MS, and MSD only require Aroclor-1016 and Aroclor-1260 spikes

[1] Screening levels are established by use of statistical analysis and are not based on the analytical capabilities of labortories or methods. The 0.4 mg/kg RL used for hexavalent chromium for this project is currently the lowest RL achievable using SW7199/3060A and is well below the industrial soil screening level.
[2] For soil, most stringent of:
EPA Regional Screening Levels - 2008 and May 2012
CHHSL = California Human Health Screening Levels, January 2005
DTSC = California Department of Toxic Substance Control, January 2005

TABLE 4-2
Reporting Limits, Accuracy, and Precession Limits for Groundwater
PG&E Program Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	Does RL Exceed Federal MCL Level?	Does RL Exceed California MCL Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
EPA 300.0M	Acetate	64-19-7	mg/L	0.1	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
SM 2320 B	Alkalinity	Alkalinity	mg/L	5	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
SM 4500-NH3 B, C, D, E, or G	Ammonia (as N)	7664-41-7	mg/L	0.5	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
SM 2320 B	Bicarbonate	Bicarbonate	mg/L	5	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
SM 5210 B	BOD	BOD	mg/L	--	--	--	--	--	--	NO	NO	NO	--	--	--	--	10
EPA 300.0	Bromide	Bromide	mg/L	0.5	--	--	--	--	--	NO	NO	NO	90	110	80	120	20
EPA 300.0M	Butyrate	107-92-6	mg/L	0.1	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
SM 4500-CO_2	Carbon dioxide	124-38-9	mg/L	5	--	--	--	--	--	NO	NO	NO	--	--	--	--	20
SM 2320 B	Carbonate	Carbonate	mg/L	5	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
EPA 300.0/SM 4500-Cl B, C, E, or D	Chloride	Chloride	mg/L	0.5	--	--	--	--	--	NO	NO	NO	90	110	80	120	20
SM 2120 E	Color	Color	Color unit	1	--	--	--	--	--	NO	NO	NO	90	110	90	110	20
SM 4500-CN	Cyanide	57-12-5	mg/L	0.01	0.00014		0.2	0.15	0.00014	YES	NO	NO	85	115	75	125	20
EPA 300.0/SM 4500-F B, C, D, or E	Fluoride	Fluoride	mg/L	0.5	--	2.2	4	--	2.2	NO	NO	NO	90	110	80	120	20
SM 2340 B or C	Hardness	Hardness	mg/L	2	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
SM 2320 B	Hydroxide alkalinity	Hydroxide	mg/L	5	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
EPA 300.0M	Lactate	50-21-5	mg/L	0.1	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
EPA 300.0	Nitrate (as N)	14797-55-8	mg/L	0.5	25	58	10	--	10	NO	NO	NO	90	110	80	120	20
EPA 353.2/SM 4500-NO3 E, F or H	Nitrate/nitrite (as N)	NO3NO2N	mg/L	0.5	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
EPA 300.0/SM 4500-NO2 B, F or E	Nitrite (as N)	14797-65-8	mg/L	0.5	--	3.7	1	--	1	NO	NO	NO	90	110	80	120	20
SM 5310 B, C, or D	Organic carbon	DOC/TOC	mg/L	0.3	--	--	--	--	--	NO	NO	NO	85	115	75	125	10
EPA 300.0/SM 4500-P E or F	Ortho phosphate	Ortho Phosphate	mg/L	0.02	--	--	--	--	--	NO	NO	NO	90	110	80	120	20
EPA 314.0	Perchlorate	Perchlorate	µg/L	4	--	26	--	--	26	NO	NO	NO	85	115	85	115	20
SM 4500-H+ B SW 9040	pH	pH	pH units	0.1	--	--	--	--	--	NO	NO	NO	--	--	--	--	20
EPA 300.0M	Propionate	79-09-4	mg/L	0.1	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
EPA 300.0M	Pyruvate	127-17-3	mg/L	0.1	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
SM 4500-SiO_2 E	Reactive silica	7631-86-9	mg/L	1	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
SM 4500-SiO_2 C	Silica	7631-86-9	mg/L	0.04	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
SILICA_CALC	Soluble silica	7631-86-9	mg/L	0.04	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
EPA 120.1/SW 9050	Specific conductance	Conductance	µmhos/cm	2	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
EPA 300.0/SM 4110 B	Sulfate	Sulfate	mg/L	0.5	--	--	--	--	--	NO	NO	NO	90	110	80	120	20
SM 4500-S^{-2} F, E, D, or G	Sulfide	Sulfide	mg/L	0.05	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
SM 2540 C	Total dissolved solids	TDS	mg/L	10	--	--	--	--	--	NO	NO	NO	75	125	--	--	10
SM 4500-N_{org} B or C	Total kjeldahl nitrogen	7727-37-9	mg/L	--	--	--	--	--	--	NO	NO	NO	90	110	75	125	20
EPA 365.1/EPA 365.3 SM 4500-P E or F	Total phosphorous	Total Phosphorous	mg/L	0.02	--	--	--	--	--	NO	NO	NO	75	125	75	125	20
SM 2540 D	Total suspended solids	TSS	mg/L	4	--	--	--	--	--	NO	NO	NO	75	125	75	125	10
EPA 180.1/SM 2130 B	Turbidity	TURB	NTU	0.1	--	--	--	--	--	NO	NO	NO	--	--	--	--	20
SW 6020A/EPA 200.8	Aluminum	7429-90-5	ug/L	50	16,000	37,000	50*	1,000	50	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Antimony	7440-36-0	ug/L	2	6	15	6	--	6	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Arsenic	7440-38-2	ug/L	0.5 (0.1)	0.045	0.045	10	--	0.045	YES	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Barium	7440-39-3	ug/L	2	2,900	7,300	2,000	1,000	1,000	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Beryllium	7440-41-7	ug/L	0.5	16	73	4	--	4	NO	NO	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Boron	7440-42-8	ug/L	50	?	?	?	?	?	?	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Cadmium	7440-43-9	ug/L	1	--	18	5	--	5	NO	NO	NO	85	115	75	125	20
SW 6010B/EPA 200.7	Calcium	7440-70-2	ug/L	100	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Chromium	7440-47-3	ug/L	1	--	--	100	50	50	NO	NO	NO	85	115	75	125	20
EPA 218.6	Chromium, Hexavalent	18540-29-9	ug/L	0.2	0.031	110	100	--	0.031	YES	NO	NO	90	110	90	110	20
EPA 218.6 LL	Chromium, Hexavalent, LL	18540-29-9	ug/L	0.06	0.031	110	100	--	0.031	YES	NO	NO	90	110	90	110	20
SM 3500-Cr	Chromium, Hexavalent	18540-29-9	ug/L	10	0.031	110	100	--	0.031	YES	NO	NO	85	115	80	120	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cobalt	7440-48-4	ug/L	5	4.7	11	--	--	4.7	YES	NO	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Copper	7440-50-8	ug/L	1	620	1,500	1,000*	--	620	NO	NO	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Iron	7439-89-6	ug/L	20	11,000	26,000	300*	--	300	NO	NO	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Lead	7439-92-1	ug/L	1	--	--	15	--	15	NO	NO	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Magnesium	7439-95-4	ug/L	100	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Manganese	7439-96-5	ug/L	0.5	--	880	50*	--	50	NO	NO	NO	85	115	75	125	20
SW 7070A/EPA 245.1/ EPA 6020A	Mercury	7439-97-6	ug/L	0.2	0.63	0.63	2	--	0.63	NO	NO	NO	75	125	75	125	20
SW 6020A/EPA 200.8	Molybdenum	7439-98-7	ug/L	2	78	180	--	--	78	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Nickel	7440-02-0	ug/L	2	300	730	100*	100	100	NO	NO	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Potassium	7440-09-7	ug/L	100	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Selenium	7782-49-2	ug/L	5	78	180	50	--	50	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Silver	7440-22-4	ug/L	5	71	180	--	--	71	NO	NO	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Sodium	7440-23-5	ug/L	100	--	--	--	--	--	NO	NO	NO	85	115	75	125	20
EPA 200.7/EPA 200.8	Strontium	7440-24-6	ug/L	50	9,300	22,000	--	--	9,300	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Thallium	7440-28-0	ug/L	1	0.16	2.4	2	--	0.16	YES	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Uranium	7440-61-1	ug/L	5	230	--	30	--	30	NO	NO	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Vanadium	7440-62-2	ug/L	5	--	2.6	--	--	2.6	YES	NO	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Zinc	7440-66-6	ug/L	20	4,700	11,000	5,000*	--	4,700	NO	NO	NO	85	115	75	125	20
SW 8015B or C or D	Motor Oil	TPH-motor oil	mg/L	1	--	--	--	--	--	NO	NO	NO	50	150	50	150	30
SW 8015B or C or D	TPH-Diesel	TPH-diesel	mg/L	0.5	--	--	--	--	--	NO	NO	NO	61	143	61	143	30
SW 8015B or C or D	TPH-Gasoline	TPH-gasoline	mg/L	0.1	--	--	--	--	--	NO	NO	NO	67	136	67	136	30
SW 8081A or B	4,4'-DDD	72-54-8	ug/L	0.1	0.28	0.28	--	--	0.28	NO	NO	NO	50	139	50	139	30
SW 8081A or B	4,4'-DDE	72-55-9	ug/L	0.1	0.2	0.2	--	--	0.2	NO	NO	NO	48	137	48	137	30
SW 8081A or B	4,4'-DDT	50-29-3	ug/L	0.1	0.2	0.2	--	--	0.2	NO	NO	NO	47	138	47	138	30
SW 8081A or B	Aldrin	309-00-2	ug/L	0.1	0.00021	0.004	--	--	0.00021	YES	NO	NO	42	138	42	138	30
SW 8081A or B	alpha-HCH	319-84-6	ug/L	0.1	0.0062	0.011	--	--	0.0062	YES	NO	NO	60	128	60	128	30
SW 8081A or B	alpha-Chlordane	5103-71-9	ug/L	0.1	--	--	2	--	2	NO	NO	NO	63	123	63	123	30
SW 8081A or B	beta-HCH	319-85-7	ug/L	0.1	0.022	0.037	--	--	0.022	YES	NO	NO	66	126	66	126	30

TABLE 4-2
Reporting Limits, Accuracy, and Precession Limits for Groundwater
PG&E Program Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	Does RL Exceed Federal MCL Level?	Does RL Exceed California MCL Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 8081A or B	delta-HCH	319-86-8	ug/L	0.1	--	--	--	--	--	NO	NO	NO	46	136	46	136	30
SW 8081A or B	Dieldrin	60-57-1	ug/L	0.1	0.0015	0.0042	--	--	0.0015	YES	NO	NO	62	129	62	129	30
SW 8081A or B	Endosulfan I	959-98-8	ug/L	0.1	--	--	--	--	--	NO	NO	NO	49	120	49	120	30
SW 8081A or B	Endosulfan II	33213-65-9	ug/L	0.1	--	--	--	--	--	NO	NO	NO	42	130	42	130	30
SW 8081A or B	Endosulfan sulfate	1031-07-8	ug/L	0.1	--	--	--	--	--	NO	NO	NO	54	137	54	137	30
SW 8081A or B	Endrin	72-20-8	ug/L	0.1	1.7	11	2	--	1.7	NO	NO	NO	56	134	56	134	30
SW 8081A or B	Endrin aldehyde	7421-93-4	ug/L	0.1	--	--	--	--	--	NO	NO	NO	56	137	56	137	30
SW 8081A or B	gamma-HCH (lindane)	58-89-9	ug/L	0.1	0.036	0.061	0.2	--	0.036	YES	NO	NO	30	146	30	146	30
SW 8081A or B	gamma-Chlordane	5103-74-2	ug/L	0.1	--	--	2	--	2	NO	NO	NO	67	120	67	120	30
SW 8081A or B	Heptachlor	76-44-8	ug/L	0.1	0.0018	0.015	0.4	--	0.0018	YES	NO	NO	51	128	51	128	30
SW 8081A or B	Heptachlor Epoxide	1024-57-3	ug/L	0.1	0.0033	0.0074	0.2	--	0.0033	YES	NO	NO	62	131	62	131	30
SW 8081A or B	Methoxychlor	72-43-5	ug/L	0.5	27	180	40	--	27	NO	NO	NO	56	150	56	150	30
SW 8081A or B	Toxaphene	8001-35-2	ug/L	1	0.013	0.061	3	--	0.013	YES	NO	NO	41	126	41	126	30
SW 8082 or A	Aroclor-1016	12674-11-2	ug/L	0.5	0.96	0.96	0.5	--	0.5	NO	NO	NO	40	144	40	144	30
SW 8082 or A	Aroclor-1221	11104-28-2	ug/L	0.5	0.0043	0.0068	0.5	--	0.0043	YES	NO	NO	41	136	41	136	30
SW 8082 or A	Aroclor-1232	11141-16-5	ug/L	0.5	0.0043	0.0068	0.5	--	0.0043	YES	NO	NO	41	136	41	136	30
SW 8082 or A	Aroclor-1242	53469-21-9	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	NO	NO	39	150	39	150	30
SW 8082 or A	Aroclor-1248	12672-29-6	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	NO	NO	41	136	41	136	30
SW 8082 or A	Aroclor-1254	11097-69-1	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	NO	NO	29	141	29	141	30
SW 8082 or A	Aroclor-1260	11096-82-5	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	NO	NO	45	145	45	145	30
SW 8151A	2,4-D	94-75-7	ug/L	10	130	370	70	--	70	NO	NO	NO	39	120	39	120	30
SW 8151A	2,4-DB	94-82-6	ug/L	20	91	290	--	--	91	NO	NO	NO	44	120	44	120	30
SW 8151A	2,4,5-T	93-76-5	ug/L	20	120	370	--	--	120	NO	NO	NO	44	122	44	122	30
SW 8151A	2,4,5-TP	93-72-1	ug/L	10	84	290	--	--	84	NO	NO	NO	49	126	49	126	30
SW 8151A	Dalapon	75-99-0	ug/L	30	470	1,100	200	--	200	NO	NO	NO	40	120	40	120	30
SW 8151A	Dicamba	1918-00-9	ug/L	30	440	1,100	--	--	440	NO	NO	NO	60	120	60	120	30
SW 8151A	Dichloroprop	120-36-5	ug/L	20	--	--	--	--	--	NO	NO	NO	68	122	68	122	30
SW 8151A	Dinoseb	88-85-7	ug/L	3	11	37	7	--	7	NO	NO	NO	28	115	28	115	30
SW 8151A	MCPA	94-74-6	ug/L	100	5.7	18	--	--	5.7	YES	NO	NO	62	144	62	144	30
SW 8151A	MCPP	7085-19-0	ug/L	100	--	37	--	--	37	YES	NO	NO	60	133	60	133	30
SW 8260B or C	1,1,1,2-Tetrachloroethane	630-20-6	ug/L	0.5	0.5	0.52	--	--	0.5	NO	NO	NO	81	129	81	129	20
SW 8260B or C	1,1,1-Trichloroethane (TCA)	71-55-6	ug/L	1	7,500	9,100	200	200	200	NO	NO	NO	67	132	67	132	20
SW 8260B or C	1,1,2,2-Tetrachloroethane	79-34-5	ug/L	0.5	0.066	0.067	--	1	0.066	YES	NO	NO	63	128	63	128	20
SW 8260B or C	1,1,2-Trichloroethane	79-00-5	ug/L	1	0.24	0.24	5	5	0.24	YES	NO	NO	75	125	75	125	20
SW 8260B or C	1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/L	1	53,000	59,000	--	1,200	1,200	NO	NO	NO	75	125	75	125	20
SW 8260B or C	1,1-Dichloroethane	75-34-3	ug/L	1	2.4	2.4	--	5	2.4	NO	NO	NO	69	133	69	133	20
SW 8260B or C	1,1-Dichloroethene	75-35-4	ug/L	1	260	340	7	6	6	NO	NO	NO	68	130	68	130	20
SW 8260B or C	1,1-Dichloropropene	563-58-6	ug/L	1	--	--	--	--	--	NO	NO	NO	73	132	73	132	20
SW 8260B or C	1,2,3-Trichlorobenzene	87-61-6	ug/L	1	5.2	--	--	--	5.2	NO	NO	NO	67	137	67	137	20
SW 8260B or C	1,2,3-Trichloropropane	96-18-4	ug/L	1	0.00065	0.0096	--	--	0.00065	YES	NO	NO	73	124	73	124	20
SW 8260B or C	1,2,4-Trichlorobenzene	120-82-1	ug/L	1	0.99	8.2	70	5	0.99	YES	NO	NO	66	134	66	134	20
SW 8260B or C	1,2,4-Trimethylbenzene	95-63-6	ug/L	1	15	15	--	--	15	NO	NO	NO	74	132	74	132	20
SW 8260B or C	1,2-Dibromo-3-Chloropropane	96-12-8	ug/L	2	0.00032	0.00032	0.2	--	0.00032	YES	YES	NO	50	132	50	132	20
SW 8260B or C	1,2-Dibromoethane (EDB)	106-93-4	ug/L	1	0.0065	0.0065	0.05	--	0.0065	YES	YES	NO	80	121	80	121	20
SW 8260B or C	1,2-Dichlorobenzene	95-50-1	ug/L	1	280	370	600	600	280	NO	NO	NO	71	122	71	122	20
SW 8260B or C	1,2-Dichloroethane (EDC)	107-06-2	ug/L	0.5	0.15	0.15	5	0.5	0.15	YES	NO	NO	69	132	69	132	20
SW 8260B or C	1,2-Dichloropropane	78-87-5	ug/L	1	0.38	0.39	5	5	0.38	YES	NO	NO	75	125	75	125	20
SW 8260B or C	1,3,5-Trimethylbenzene	108-67-8	ug/L	1	87	12	--	--	12	NO	NO	NO	74	131	74	131	20
SW 8260B or C	1,3-Dichlorobenzene	541-73-1	ug/L	1	--	--	--	--	--	NO	NO	NO	75	124	75	124	20
SW 8260B or C	1,3-Dichloropropane	142-28-9	ug/L	1	290	730	--	--	290	NO	NO	NO	73	126	73	126	20
SW 8260B or C	1,4-Dichlorobenzene	106-46-7	ug/L	0.5	0.42	0.43	75	5	0.42	YES	NO	NO	74	123	74	123	20
SW 8260B or C	2,2-Dichloropropane	594-20-7	ug/L	1	--	--	--	--	--	NO	NO	NO	69	137	69	137	20
SW 8260B or C	2-Butanone (MEK)	78-93-3	ug/L	10	4,900	7,100	--	--	4,900	NO	NO	NO	49	136	49	136	20
SW 8260B or C	2-Chlorotoluene	95-49-8	ug/L	1	180	730	--	--	180	NO	NO	NO	73	126	73	126	20
SW 8260B or C	4-Chlorotoluene	106-43-4	ug/L	1	190	2,600	--	--	190	NO	NO	NO	74	128	74	128	20
SW 8260B or C	4-Isopropyltoluene	99-87-6	ug/L	1	--	--	--	--	--	NO	NO	NO	73	130	73	130	20
SW 8260B or C	4-Methyl-2-Pentanone	108-10-1	ug/L	10	1,000	2,000	--	--	1,000	NO	NO	NO	58	134	58	134	20
SW 8260B or C	Acetone	67-64-1	ug/L	10	12,000	22,000	--	--	12,000	NO	NO	NO	40	135	40	135	20
SW 8260B or C	Acrolein	107-02-8	ug/L	20	0.041	0.042	--	--	0.041	YES	NO	NO	75	125	75	125	20
SW 8260B or C	Acrylonitrile	107-13-1	ug/L	20	0.045	0.045	--	--	0.045	YES	NO	NO	75	125	75	125	20
SW 8260B or C	Benzene	71-43-2	ug/L	0.4	0.39	0.41	5	1	0.39	YES	NO	NO	81	122	81	122	20
SW 8260B or C	Bromobenzene	108-86-1	ug/L	1	54	20	--	--	20	NO	NO	NO	76	124	76	124	20
SW 8260B or C	Bromochloromethane	74-97-5	ug/L	1	83	--	--	--	83	NO	NO	NO	65	129	65	129	20
SW 8260B or C	Bromodichloromethane	75-27-4	ug/L	0.5	0.12	1.1	100	--	0.12	YES	NO	NO	76	121	76	121	20
SW 8260B or C	Bromoform	75-25-2	ug/L	1	7.9	8.5	100	--	7.9	NO	NO	NO	69	128	69	128	20
SW 8260B or C	Bromomethane	74-83-9	ug/L	3	7	8.7	--	--	7	NO	NO	NO	53	141	53	141	20
SW 8260B or C	Carbon Disulfide	75-15-0	ug/L	1	720	1,000	--	--	720	NO	NO	NO	75	125	75	125	20
SW 8260B or C	Carbon Tetrachloride	56-23-5	ug/L	0.5	0.39	0.2	5	0.5	0.2	YES	NO	NO	66	138	66	138	20
SW 8260B or C	Chlorobenzene	108-90-7	ug/L	0.5	72	91	100	--	72	NO	NO	NO	81	122	81	122	20
SW 8260B or C	Chloroethane	75-00-3	ug/L	1	21,000	21,000	--	--	21,000	NO	NO	NO	58	133	58	133	20
SW 8260B or C	Chloroform	67-66-3	ug/L	1	0.19	0.19	100	--	0.19	YES	NO	NO	69	128	69	128	20
SW 8260B or C	Chloromethane	74-87-3	ug/L	1	190	1.8	--	--	1.8	NO	NO	NO	56	131	56	131	20
SW 8260B or C	cis-1,2-Dichloroethene	156-59-2	ug/L	1	28	370	70	6	6	NO	NO	NO	72	126	72	126	20
SW 8260B or C	cis-1,3-Dichloropropene	10061-01-5	ug/L	0.5	--	--	--	--	--	NO	NO	NO	69	131	69	131	20
SW 8260B or C	Dibromochloromethane	124-48-1	ug/L	0.5	0.15	0.8	100	--	0.15	YES	NO	NO	66	133	66	133	20
SW 8260B or C	Dibromomethane	74-95-3	ug/L	1	7.9	370	--	--	7.9	NO	NO	NO	76	125	76	125	20
SW 8260B or C	Dichlorodifluoromethane (Freon 12)	75-71-8	ug/L	1	190	390	--	--	190	NO	NO	NO	53	153	53	153	20

TABLE 4-2
Reporting Limits, Accuracy, and Precession Limits for Groundwater
PG&E Program Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	Does RL Exceed Federal MCL Level?	Does RL Exceed California MCL Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 8260B or C	Ethylbenzene	100-41-4	ug/L	1	1.3	1.5	700	--	1.3	NO	NO	NO	73	127	73	127	20
SW 8260B or C	Hexachlorobutadiene	87-68-3	ug/L	0.6	0.26	0.86	--	--	0.26	YES	NO	NO	67	131	67	131	20
SW 8260B or C	Isopropylbenzene (Cumene)	98-82-8	ug/L	1	390	680	--	--	390	NO	NO	NO	75	127	75	127	20
SW 8260B or C	Methylene chloride	75-09-2	ug/L	1	9.9	4.8	5	5	4.8	NO	NO	NO	63	137	63	137	20
SW 8260B or C	Naphthalene	91-20-3	ug/L	1	0.14	0.14	--	--	0.14	YES	NO	NO	54	138	54	138	20
SW 8260B or C	n-Butylbenzene	104-51-8	ug/L	1	780	--	--	--	780	NO	NO	NO	69	137	69	137	20
SW 8260B or C	n-Propylbenzene	103-65-1	ug/L	1	530	--	--	--	530	NO	NO	NO	72	129	72	129	20
SW 8260B or C	sec-Butylbenzene	135-98-8	ug/L	1	--	--	--	--	--	NO	NO	NO	72	127	72	127	20
SW 8260B or C	Styrene	100-42-5	ug/L	1	1,100	1,600	100	100	100	NO	NO	NO	65	134	65	134	20
SW 8260B or C	tert-Butyl Methyl Ether (MTBE)	1634-04-4	ug/L	5	12	12	--	13	12	NO	NO	NO	65	123	65	123	20
SW 8260B or C	tert-Butylbenzene	98-06-6	ug/L	1	--	--	--	--	--	NO	NO	NO	70	129	70	129	20
SW 8260B or C	Tetrachloroethene	127-18-4	ug/L	1	9.7	0.11	5	5	0.11	YES	NO	NO	66	128	66	128	20
SW 8260B or C	Toluene	108-88-3	ug/L	1	860	2,300	1,000	150	150	NO	NO	NO	77	122	77	122	20
SW 8260B or C	trans-1,2-Dichloroethene	156-60-5	ug/L	1	86	110	100	10	10	NO	NO	NO	63	137	63	137	20
SW 8260B or C	trans-1,3-Dichloropropene	10061-02-6	ug/L	1	--	--	--	--	--	NO	NO	NO	59	135	59	135	20
SW 8260B or C	Trichloroethene	79-01-6	ug/L	1	0.44	1.7	5	5	0.44	YES	NO	NO	70	127	70	127	20
SW 8260B or C	Trichlorofluoromethane (Freon 11)	75-69-4	ug/L	1	1,100	1,300	--	150	150	NO	NO	NO	57	129	57	129	20
SW 8260B or C	Vinyl Chloride	75-01-4	ug/L	0.5	0.015	0.016	2	0.5	0.015	YES	NO	NO	50	134	50	134	20
SW 8260B or C	Xylenes, Total	1330-20-7	ug/L	2	190	200	10,000	1,750	190	NO	NO	NO	75	125	75	125	20
SW 8260B or C	m -Xylene	108-38-3	ug/L	2	190	1,400	--	--	190	NO	NO	NO	76	128	76	128	20
SW 8260B or C	o-Xylene	95-47-6	ug/L	1	190	1,400	--	--	190	NO	NO	NO	80	121	80	121	20
SW 8260B or C	p-Xylene	106-42-3	ug/L	1	190	1,500	--	--	190	NO	NO	NO	76	128	76	128	20
SW 8270C or D	1,2,4-Trichlorobenzene	120-82-1	ug/L	10	0.99	8.2	70	--	0.99	YES	NO	NO	37	120	37	120	20
SW 8270C or D	1,2-Dichlorobenzene	95-50-1	ug/L	10	280	370	600	--	280	NO	NO	NO	33	120	33	120	20
SW 8270C or D	1,3-Dichlorobenzene	541-73-1	ug/L	10	--	--	--	--	--	NO	NO	NO	32	120	32	120	20
SW 8270C or D	1,4-Dichlorobenzene	106-46-7	ug/L	10	0.42	0.43	75	--	0.42	YES	NO	NO	32	120	32	120	20
SW 8270C or D	2,4,5-Trichlorophenol	95-95-4	ug/L	50	890	3,700	--	--	890	NO	NO	NO	49	120	49	120	20
SW 8270C or D	2,4,6-Trichlorophenol	88-06-2	ug/L	10	3.5	6.1	--	--	3.5	YES	NO	NO	49	126	49	126	20
SW 8270C or D	2,4-Dichlorophenol	120-83-2	ug/L	10	35	110	--	--	35	NO	NO	NO	48	120	48	120	20
SW 8270C or D	2,4-Dimethylphenol	105-67-9	ug/L	10	270	730	--	--	270	NO	NO	NO	28	120	28	120	20
SW 8270C or D	2,4-Dinitrophenol	51-28-5	ug/L	10	30	73	--	--	30	NO	NO	NO	25	130	25	130	20
SW 8270C or D	2,4-Dinitrotoluene	121-14-2	ug/L	10	0.2	73	--	--	0.2	YES	NO	NO	51	120	51	120	20
SW 8270C or D	2,6-Dinitrotoluene	606-20-2	ug/L	10	15	37	--	--	15	NO	NO	NO	49	120	49	120	20
SW 8270C or D	2-Chloronaphthalene	91-58-7	ug/L	10	550	2,900	--	--	550	NO	NO	NO	49	120	49	120	20
SW 8270C or D	2-Chlorophenol	95-57-8	ug/L	10	71	180	--	--	71	NO	NO	NO	37	120	37	120	20
SW 8270C or D	2-Methylnaphthalene	91-57-6	ug/L	10	27	150	--	--	27	NO	NO	NO	46	120	46	120	20
SW 8270C or D	2-Methylphenol (o-Cresol)	95-48-7	ug/L	10	720	1,800	--	--	720	NO	NO	NO	38	120	38	120	20
SW 8270C or D	2-Nitroaniline	88-74-4	ug/L	50	150	--	--	--	150	NO	NO	NO	48	120	48	120	20
SW 8270C or D	2-Nitrophenol	88-75-5	ug/L	10	--	--	--	--	--	NO	NO	NO	39	123	39	123	20
SW 8270C or D	3,3'-Dichlorobenzidine	91-94-1	ug/L	20	0.11	0.15	--	--	0.11	YES	NO	NO	20	120	20	120	20
SW 8270C or D	3-Nitroaniline	99-09-2	ug/L	50	--	3.2	--	--	3.2	YES	NO	NO	20	126	20	126	20
SW 8270C or D	4,6-Dinitro-2-methylphenol	534-52-1	ug/L	50	1.2	3.7	--	--	1.2	YES	NO	NO	40	130	40	130	20
SW 8270C or D	4-Bromophenyl Phenyl Ether	101-55-3	ug/L	10	--	--	--	--	--	NO	NO	NO	52	120	52	120	20
SW 8270C or D	4-Chloro-3-methylphenol	59-50-7	ug/L	20	1,100	--	--	--	1,100	NO	NO	NO	47	120	47	120	20
SW 8270C or D	4-Chloroaniline	106-47-8	ug/L	20	0.32	1.2	--	--	0.32	YES	NO	NO	20	120	20	120	20
SW 8270C or D	4-Chlorophenyl phenyl ether	7005-72-3	ug/L	10	--	--	--	--	--	NO	NO	NO	50	120	50	120	20
SW 8270C or D	4-Methylphenol (p-Cresol)	106-44-5	ug/L	50	1,400	180	--	--	180	NO	NO	NO	32	120	32	120	20
SW 8270C or D	4-Nitroaniline	100-01-6	ug/L	50	3.3	3.2	--	--	3.2	YES	NO	NO	36	120	36	120	20
SW 8270C or D	4-Nitrophenol	100-02-7	ug/L	50	--	--	--	--	--	NO	NO	NO	20	120	20	120	20
SW 8270C or D	Acenaphthene	83-32-9	ug/L	10	400	2,200	--	--	400	NO	NO	NO	47	120	47	120	20
SW 8270C or D	Acenaphthylene	208-96-8	ug/L	10	--	--	--	--	--	NO	NO	NO	50	120	50	120	20
SW 8270C or D	Anthracene	120-12-7	ug/L	10	1,300	11,000	--	--	1,300	NO	NO	NO	54	120	54	120	20
SW 8270C or D	Benzo (a) anthracene	56-55-3	ug/L	10	0.029	0.029	--	--	0.029	YES	NO	NO	56	100	56	100	20
SW 8270C or D	Benzo (a) pyrene	50-32-8	ug/L	10	0.0029	0.0029	0.2	--	0.0029	YES	YES	NO	53	120	53	120	20
SW 8270C or D	Benzo (b) fluoranthene	205-99-2	ug/L	10	0.029	0.029	--	--	0.029	YES	NO	NO	45	124	45	124	20
SW 8270C or D	Benzo (g,h,i) perylene	191-24-2	ug/L	10	--	--	--	--	--	NO	NO	NO	38	123	38	123	20
SW 8270C or D	Benzo (k) fluoranthene	207-08-9	ug/L	10	0.29	0.29	--	--	0.29	YES	NO	NO	45	124	45	124	20
SW 8270C or D	Benzoic acid	65-85-0	ug/L	100	58,000	150,000	--	--	58,000	NO	NO	NO	20	120	20	120	20
SW 8270C or D	Benzyl alcohol	100-51-6	ug/L	20	1,500	18,000	--	--	1,500	NO	NO	NO	30	120	30	120	20
SW 8270C or D	bis (2-chloroethoxy) methane	111-91-1	ug/L	10	47	110	--	--	47	NO	NO	NO	46	120	46	120	20
SW 8270C or D	bis (2-chloroethyl) ether	111-44-4	ug/L	10	0.012	0.012	--	--	0.012	YES	NO	NO	37	120	37	120	20
SW 8270C or D	bis (2-chloroisopropyl) ether	108-60-1	ug/L	10	0.31	0.32	--	--	0.31	YES	NO	NO	26	131	26	131	20
SW 8270C or D	bis (2-ethylhexyl) phthalate	117-81-7	ug/L	10	0.071	4.8	6	--	0.071	YES	YES	NO	42	126	42	126	20
SW 8270C or D	Butyl benzylphthalate	85-68-7	ug/L	10	14	35	--	--	14	NO	NO	NO	46	120	46	120	20
SW 8270C or D	Chrysene	218-01-9	ug/L	10	2.9	2.9	--	--	2.9	YES	NO	NO	55	120	55	120	20
SW 8270C or D	Dibenzo (a,h) anthracene	53-70-3	ug/L	10	0.0029	0.0029	--	--	0.0029	YES	NO	NO	42	127	42	127	20
SW 8270C or D	Dibenzofuran	132-64-9	ug/L	10	5.8	--	--	--	5.8	YES	NO	NO	54	120	54	120	20
SW 8270C or D	Diethyl phthalate	84-66-2	ug/L	10	11,000	29,000	--	--	11,000	NO	NO	NO	41	120	41	120	20
SW 8270C or D	Dimethyl phthalate	131-11-3	ug/L	10	--	--	--	--	--	NO	NO	NO	25	127	25	127	20
SW 8270C or D	Di-n-butylphthalate	84-74-2	ug/L	10	670	3,700	--	--	670	NO	NO	NO	54	120	54	120	20
SW 8270C or D	Di-n-octylphthalate	117-84-0	ug/L	10	--	--	--	--	--	NO	NO	NO	37	137	37	137	20
SW 8270C or D	Fluoranthene	206-44-0	ug/L	10	630	1,500	--	--	630	NO	NO	NO	54	120	54	120	20
SW 8270C or D	Fluorene	86-73-7	ug/L	10	220	1,500	--	--	220	NO	NO	NO	50	120	50	120	20
SW 8270C or D	Hexachlorobenzene	118-74-1	ug/L	10	0.042	0.042	1	--	0.042	YES	YES	NO	52	120	52	120	20
SW 8270C or D	Hexachlorobutadiene	87-68-3	ug/L	10	0.26	0.86	--	--	0.26	YES	NO	NO	27	120	27	120	20
SW 8270C or D	Hexachloroethane	67-72-1	ug/L	10	0.79	4.8	--	--	0.79	YES	NO	NO	28	120	28	120	20
SW 8270C or D	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/L	10	0.029	0.029	--	--	0.029	YES	NO	NO	43	125	43	125	20

TABLE 4-2
Reporting Limits, Accuracy, and Precession Limits for Groundwater
PG&E Program Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	Does RL Exceed Federal MCL Level?	Does RL Exceed California MCL Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 8270C or D	Isophorone	78-59-1	ug/L	10	67	71	--	--	67	NO	NO	NO	50	120	50	120	20
SW 8270C or D	Naphthalene	91-20-3	ug/L	10	0.14	0.14	--	--	0.14	YES	NO	NO	39	120	39	120	20
SW 8270C or D	Nitrobenzene	98-95-3	ug/L	10	0.12	3.4	--	--	0.12	YES	NO	NO	44	120	44	120	20
SW 8270C or D	n-Nitrosodi-n-propylamine	621-64-7	ug/L	10	0.0093	0.0096	--	--	0.0093	YES	NO	NO	34	128	34	128	20
SW 8270C or D	n-Nitrosodiphenylamine	86-30-6	ug/L	10	10	14	--	--	10	NO	NO	NO	48	120	48	120	20
SW 8270C or D	Pentachlorophenol	87-86-5	ug/L	50	0.17	0.56	1	--	0.17	YES	YES	NO	38	120	38	120	20
SW 8270C or D	Phenanthrene	85-01-8	ug/L	10	--	--	--	--	--	NO	NO	NO	51	120	51	120	20
SW 8270C or D	Phenol	108-95-2	ug/L	10	4,500	11,000	--	--	4,500	NO	NO	NO	20	120	20	120	20
SW 8270C or D	Pyrene	129-00-0	ug/L	10	87	1,100	--	--	87	NO	NO	NO	49	128	49	128	20
SW 8270SIM	1-methylnaphthalene	90-12-0	ug/L	0.2	0.97	2.3	--	--	0.97	NO	NO	NO	35	131	35	131	30
SW 8270SIM	2-methylnaphthalene	91-57-6	ug/L	0.2	27	150	--	--	27	NO	NO	NO	36	121	36	121	30
SW 8270SIM	Acenaphthene	83-32-9	ug/L	0.2	400	2,200	--	--	400	NO	NO	NO	39	125	39	125	30
SW 8270SIM	Acenaphthylene	208-96-8	ug/L	0.2	--	--	--	--	--	NO	NO	NO	43	140	43	140	30
SW 8270SIM	Anthracene	120-12-7	ug/L	0.2	1,300	11,000	--	--	1,300	NO	NO	NO	41	132	41	132	30
SW 8270SIM	Benzo (a) anthracene	56-55-3	ug/L	0.2	0.029	0.029	--	--	0.029	YES	NO	NO	58	141	58	141	30
SW 8270SIM	Benzo (a) pyrene	50-32-8	ug/L	0.2	0.0029	0.0029	0.2	--	0.0029	YES	NO	NO	31	142	31	142	30
SW 8270SIM	Benzo (b) fluoranthene	205-99-2	ug/L	0.2	0.029	0.029	--	--	0.029	YES	NO	NO	42	156	42	156	30
SW 8270SIM	Benzo (g,h,i) perylene	191-24-2	ug/L	0.2	--	--	--	--	--	NO	NO	NO	12	171	12	171	30
SW 8270SIM	Benzo (k) fluoranthene	207-08-9	ug/L	0.2	0.29	0.29	--	--	0.29	NO	NO	NO	49	165	49	165	30
SW 8270SIM	Chrysene	218-01-9	ug/L	0.2	2.9	2.9	--	--	2.9	NO	NO	NO	51	155	51	155	30
SW 8270SIM	Dibenzo (a,h) anthracene	53-70-3	ug/L	0.2	0.0029	0.0029	--	--	0.0029	YES	NO	NO	28	153	28	153	30
SW 8270SIM	Fluoranthene	206-44-0	ug/L	0.2	630	1,500	--	--	630	NO	NO	NO	47	158	47	158	30
SW 8270SIM	Fluorene	86-73-7	ug/L	0.2	220	1,500	--	--	220	NO	NO	NO	40	140	40	140	30
SW 8270SIM	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/L	0.2	0.029	0.029	--	--	0.029	YES	NO	NO	20	167	20	167	30
SW 8270SIM	Naphthalene	91-20-3	ug/L	0.2	0.14	0.14	--	--	0.14	YES	NO	NO	39	125	39	125	30
SW 8270SIM	Phenanthrene	85-01-8	ug/L	0.2	--	--	--	--	--	NO	NO	NO	46	144	46	144	30
SW 8270SIM	Pyrene	129-00-0	ug/L	0.2	87	1,100	--	--	87	NO	NO	NO	39	158	39	158	30
CF-IRMS	D18O	D18O	0/00	--	--	--	--	--	--	NO	NO	NO	--	--	--	--	20
CF-IRMS	DD	DD	0/00	--	--	--	--	--	--	NO	NO	NO	--	--	--	--	20
SM 7110 C	Gross alpha	Gross alpha	pCi/L	3	--	--	15	15	15	NO	NO	NO	--	--	--	--	20
EPA 900.0	Gross beta	Gross beta	pCi/L	4	--	--	--	4	4	NO	NO	NO	--	--	--	--	20
EPA 903.1	Radium-226	013982-63-3	pCi/L	1	--	--	5	--	5	NO	NO	NO	--	--	--	--	20
EPA 904.0	Radium-228	015262-20-1	pCi/L	1	--	--	5	--	5	NO	NO	NO	--	--	--	--	20
EPA 905.0	Strontium	7440-26-4	pCi/L	2	--	--	--	8	8	NO	NO	NO	--	--	--	--	20
EPA 906.0	Tritium	10028-17-8	pCi/L	1,000	--	--	--	20,000	20,000	NO	NO	NO	--	--	--	--	20
EPA 908.0	Uranium	7440-61-1	pCi/L	1	--	--	--	20	20	NO	NO	NO	--	--	--	--	20
RSK-175	Carbon Dioxide	124-38-9	ug/L	5	--	--	--	--	--	NO	NO	NO	80	120	80	120	20
RSK-175	Ethane	74-84-0	ug/L	5	--	--	--	--	--	NO	NO	NO	80	120	80	120	20
RSK-175	Ethene	74-85-1	ug/L	5	--	--	--	--	--	NO	NO	NO	80	120	80	120	20
RSK-175	Methane	74-82-8	ug/L	5	--	--	--	--	--	NO	NO	NO	80	120	80	120	20

Notes:

Please keep in mind, Screening Levels are constantly revised by the EPA. The appropriate Screening levels are specific to the project, the location, the agency providing oversight, and the overall Goals of the project.

mg/L = milligrams per liter
ug/L = micrograms per liter
µmhos/cm = micromhos per centimeter
pCi/L = picocuries per liter
PCB - LCS, MS, and MSD only require Aroclor-1016 and Aroclor-1260 spike

[1] Screening levels are established by use of statistical analysis and are not based on the analytical capabilities of labortories or methods. For groundwater, most stringent of:
EPA Regional Screening Levels - 2008 and May 201
Federal Drinking Water Standards, MCLs
*Secondary Federal Drinking Water Standards, MCLs
California Drinking Water Standards, MCLs

TABLE 4-3

Maximum Concentrations for Title 22

PG&E Program Quality Assurance Project Plan Addendum

					CA TTCL/STLC						LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	**Constituent**	**CAS**	**Units**	**TCLP Regulatory Standards**	**Title 22 TTLC MCL (mg/kg)**	**If TTLC Concentration is ≥ this value STLC Analysis Must be performed**	**Title 22 STLC MCL**	**Most Stringent Screening Level**	**RL**	**Does RL Exceed Screening Level?**	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**	**% RPD**
SW6010B	Antimony	7440-36-0	mg/L	--	500	150	15	15	0.04	NO	85	115	75	125	20
SW6010B	Arsenic	7440-38-2	mg/L	5	500	50	5	5	0.01	NO	85	115	75	125	20
SW6010B	Barium	7440-39-3	mg/L	100	10,000	1,000	100	100	0.04	NO	85	115	75	125	20
SW6010B	Beryllium	7440-41-7	mg/L	--	75	7.5	0.75	0.75	0.01	NO	85	115	75	125	20
SW6010B	Cadmium	7440-43-9	mg/L	1	100	10	1	1	0.02	NO	85	115	75	125	20
SW6010B	Chromium	7440-47-3	mg/L	5	2,500	50	5	5	0.02	NO	85	115	75	125	20
SW3060A	Chromium, Hexavalent	18540-29-9	mg/L	--	500	50	5	5	0.004	NO	90	110	90	110	20
SW6010B	Cobalt	7440-48-4	mg/L	--	8,000	800	80	80	0.1	NO	85	115	75	125	20
SW6010B	Copper	7440-50-8	mg/L	--	2,500	250	25	25	0.02	NO	85	115	75	125	20
SW6010B	Lead	7439-92-1	mg/L	5	1,000	50	5	5	0.02	NO	85	115	75	125	20
SW7470A	Mercury	7439-97-6	mg/L	0.2	20	2	0.2	0.2	0.004	NO	75	125	75	125	20
SW6010B	Molybdenum	7439-98-7	mg/L	--	3,500	3,500	350	350	0.04	NO	85	115	75	125	20
SW6010B	Nickel	7440-02-0	mg/L	--	2,000	200	20	20	0.04	NO	85	115	75	125	20
SW6010B	Selenium	7782-49-2	mg/L	1	100	10	1	1	0.2	NO	85	115	75	125	20
SW6010B	Silver	7440-22-4	mg/L	5	500	50	5	5	0.1	NO	85	115	75	125	20
SW6010B	Thallium	7440-28-0	mg/L	--	700	70	7	7	0.02	NO	85	115	75	125	20
SW6010B	Vanadium	7440-62-2	mg/L	--	2,400	240	24	24	0.1	NO	85	115	75	125	20
SW6010B	Zinc	7440-66-6	mg/L	--	5,000	2,500	250	250	0.4	NO	85	115	75	125	20
SW8081A	4,4'-DDD	72-54-8	mg/L	--	1	--	0.1	0.1	0.002	NO	50	139	50	139	30
SW8081A	4,4'-DDE	72-55-9	mg/L	--	1	--	0.1	0.1	0.002	NO	48	137	48	137	30
SW8081A	4,4'-DDT	50-29-3	mg/L	--	1	--	0.1	0.1	0.002	NO	47	138	47	138	30
SW8081A	Aldrin	309-00-2	mg/L	--	1.4	--	0.14	0.14	0.002	NO	42	138	42	138	30
SW8081A	Chlordane	57-74-9	mg/L	0.03	2.5	--	0.25	0.03	0.002	NO	63	123	63	123	30
SW8081A	Dieldrin	60-57-1	mg/L	--	8	--	0.8	0.8	0.002	NO	62	129	62	129	30
SW8081A	Endrin	72-20-8	mg/L	0.02	0.2	--	0.02	0.02	0.002	NO	56	134	56	134	30
SW8081A	Heptachlor	76-44-8	mg/L	--	4.7	--	0.47	0.47	0.002	NO	51	128	51	128	30
SW8081A	Heptachlor (and its epoxide)	76-44-8	mg/L	0.008	4.7	--	0.47	0.008	0.002	NO	62	131	62	131	30
SW8081A	Kepone	143-50-0	mg/L	--	21	--	2.1	2.1	1	NO					30
SW8081A	Lindane	58-89-9	mg/L	0.4	4	--	0.4	0.4	0.002	NO	30	146	30	146	30
SW8081A	Methoxychlor	72-43-5	mg/L	10	100	--	10	10	0.01	NO	56	150	56	150	30
SW8081A	Toxaphene	8001-35-2	mg/L	0.5	5	--	0.5	0.5	0.02	NO	41	126	41	126	30
SW8082	Polychlorinated biphenyls (PCB)		mg/L	--	50	--	5	5	1	NO	29	141	29	141	30
SW8151A	2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex)	Vanadium	mg/L	1	10	--	1	1	0.2	NO	49	126	49	126	30
SW8151A	2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	mg/L	10	100	--	10	10	0.2	NO	39	120	39	120	30
SW8260B	1,1-Dichloroethylene	75-35-4	mg/L	0.7	--	--	--	0.7	0.02	NO	68	130	68	130	20
SW8260B	1,2-Dichloroethane (EDC)	107-06-2	mg/L	0.5	--	--	--	0.5	0.01	NO	69	132	69	132	20
SW8260B	1,4-Dichlorobenzene	106-46-7	mg/L	7.5	--	--	--	7.5	0.01	NO	74	123	74	123	20
SW8260B	2-Butanone (MEK)	78-93-3	mg/L	200	--	--	--	200	0.2	NO	49	136	49	136	20
SW8260B	Benzene	71-43-2	mg/L	0.5	--	--	--	0.5	0.008	NO	81	122	81	122	20
SW8260B	Carbon tetrachloride	56-23-5	mg/L	0.5	--	--	--	0.5	0.01	NO	66	138	66	138	20
SW8260B	Chlorobenzene	108-90-7	mg/L	100	--	--	--	100	0.01	NO	81	122	81	122	20
SW8260B	Chloroform	67-66-3	mg/L	6	--	--	--	6	0.02	NO	69	128	69	128	20
SW8260B	Hexachlorobutadiene	87-68-3	mg/L	0.5	--	--	--	0.5	0.012	NO	67	131	67	131	20
SW8260B	m-Cresol	108-39-4	mg/L	200	--	--	--	200	1	NO	29	141	29	141	20
SW8260B	o-Cresol (2-Methylphenol)	95-48-7	mg/L	200	--	--	--	200	1	NO	38	120	38	120	20
SW8260B	p-Cresol (4-Methylphenol)	106-44-5	mg/L	200	--	--	--	200	1	NO	32	120	32	120	20
SW8260B	Tetrachloroethylene (PCE)	127-18-4	mg/L	0.7	2,040	--	204	0.7	0.02	NO	66	128	66	128	20
SW8260B	Total Cresols		mg/L	200	--	--	--	200	10	NO					20
SW8260B	Trichloroethylene (TCE)	79-01-6	mg/L	0.5	--	--	--	0.5	0.02	NO	70	127	70	127	20
SW8260B	Vinyl chloride	75-01-4	mg/L	0.2	--	--	--	0.2	0.01	NO	50	134	50	134	20
SW8270C	2,4,5-Trichlorophenol	95-95-4	mg/L	400	--	--	--	400	1	NO	49	120	49	120	20

Appendix D
Construction Health and Safety Plan

Construction Health and Safety Plan

Remedial Action Work Plan
Topock Compressor Station
Needles, California

Prepared for

Pacific Gas and Electric Company

September 2014

Pivox Corporation

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SECTION 1

Introduction

The purpose of the Construction Health and Safety Plan (CHSP) is to provide a basic framework for the safe construction of the Pacific Gas and Electric (PG&E) Topock Compressor Station (TCS) Groundwater Remediation Project (Remedy) located and in the vicinity of PG&E's TCS facility in Needles, California (Site). This CHSP meets the standards set by the United States Occupational Safety and Health Administration (OSHA) (29 CFR 1910 and 1926), and California Occupational Safety and Health Administration (Cal/OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations found at Title 8 of the California Code of Regulations Section 5192 (8 CCR 5192).

This CHSP is packaged with the PG&E Topock 90% Design Construction/Remedial Action Work Plan (C/RAWP). Additional detail on the strategy for constructing the Remedy will be found in the C/RAWP. Remedy technical design information used to develop this CHSP is detailed in the PG&E Topock Final Groundwater Remedy Pre-Final (90%) Basis of Design (Remedy BOD Report).

1.1 CHSP Scope

This CHSP will not be used on its own to direct the health and safety program during Remedy construction; the information and procedures contained herein are to provide high-level project information and serve as the basis for the development of site-specific project health and safety plans (PHSP) by PG&E or their Remedy contractors prior to construction of the Remedy. The Remedy involves a vast array of construction tasks, from well drilling, to installation of high-voltage electrical equipment, to tunneling under active roadways, each with their specific hazards and H&S requirements. Detailed H&S information and requirements for these varied tasks will be provided by the respective PHSP.

This CHSP will be used, in addition to other site orientation information (e.g., cultural resource orientation, protected species orientation) to develop a visitor safety orientation to be reviewed by site visitors upon their initial visit to the Site.

This CHSP will also cover work associated with decommissioning of the IM3 treatment plant. While IM3 decommissioning will be performed after acceptance and startup of the final groundwater remedy, for the purposes of this CHSP, references to final groundwater remedy work includes IM3 decommissioning, and all information included in this CHSP applies.

1.2 Site-Specific Project Health and Safety Plans

Contractors and their subcontractors will be required to prepare and submit a PHSP for approval by PG&E or their designee prior to mobilizing to the site. Contractor PHSP will contain detailed Health and Safety (H&S) procedures, hazard communications, and requirements specific to their work. Contractor and their personnel (including subcontractors) will be required to sign in acknowledgment, understanding and agreement to comply with their PHSP.

PG&E personnel, visitors, and other non-contractor personnel will also be required to review and sign-in to the relevant PHSP when visiting an active work zone governed by a PHSP.

1.3 Stop Work Authority

PG&E recognizes that to achieve the safest possible work environment, all personnel working onsite must be empowered to assume responsibility for their own safety and the safety of others. All personnel will have

the authority to stop work that they feel is unsafe at any time and bring the issue to the attention of their organization, PG&E, or others without repercussion.

1.4 Promoting Safety Culture

A safety culture is built on the compilation of all of our safe behaviors and attitudes. Behavior Based Safety (BBS) Program will be flow-down requirement at the project to facilitate a safety culture. Not really a "program" per se, it is a set of principles to be used in all other programs and procedures. Its purpose is to influence personal attitudes by focusing on observable behaviors, reinforcing exemplary behaviors, and correcting unsafe behaviors which are typically the root causes of accidents.

Leadership will implement behavior observations to identify safe/at-risk behaviors. Until an individual is fully incorporated into safety culture, mentoring arrangements may be implemented for recent hires. Participation, Ownership, Personal Responsibility are key elements to BBS.

SECTION 2

Project Overview

Groundwater activities at the Topock site are being performed in conformance with the requirements of the Resource Conservation and Recovery Act (RCRA) Corrective Action pursuant to a Corrective Action Consent Agreement (CACA) entered into by PG&E and the California Department of Toxic Substances Control (DTSC) in 1996. In addition, PG&E and the United States executed a Remedial Design/Remedial Action Consent Decree (CD), on behalf of the U.S. Department of the Interior (DOI), under the Comprehensive Environmental Response, Compensation, and liability Act (CERCLA) in 2012, which was approved by the U.S. District Court for the Central District of California in November 2013. Section 13a of the CD, and the CD's Scope of Work Sections 2.2.7 and 3 stipulate preparation of this CHSP.

2.1 Site Background and Project Description.

The Compressor Station is located adjacent to the Colorado River in eastern San Bernardino County, California, approximately 12 miles southeast of Needles, California, south of Interstate 40 (1-40), at the north end of the Chemehuevi Mountains. The surrounding project site includes land owned and/or managed by a number of government and private entities including PG&E, the U.S. Bureau of Reclamation (BOR) (managed by the U.S. Bureau of Land Management [BLM]), the U.S. Fish and Wildlife Service (USFWS) (managing the Havasu National Wildlife Refuge [HNWR]), San Bernardino County, BNSF Railroad, Fort Mojave Indian Tribe (FMIT), and the Southern California Metropolitan Water District.

The existing chromium contamination in groundwater is largely attributable to historical wastewater discharge from Compressor Station operations to Bat Cave Wash, designated as Solid Waste Management Unit (SWMU 1/Area of Concern (AOC) 1, and within the East Ravine, designated as AOC 10. Please refer to the Remedy BOD Report for a detailed overview of the remedial concept, objectives, design basis, and design details.

2.2 GW Remedy Construction Project Component Tasks

Key to any activity at the project is working safely, and protecting the environment. Protecting the environment will be understood to encompass preventing release of contaminants into the air, soil and water, as well as preserving the cultural dignity of this site. Remedy construction will be broken into discrete tasks. It is expected that a number of companies will be contracted to implement work required to build one or more of the component tasks described below. Key safety and health concepts for the various tasks listed below are briefly noted under each task.

Key safety and health considerations for the various tasks are also briefly noted below, as a summary of the hazard identification process. Tasks may occur in the typical HAZWOPER zones (Areas of Concern (AOC)) where low levels of chemical contamination may be in the surface soils, or in other work areas of the site where contact with groundwater may occur. Most tasks may be performed without personnel coming in contact with contaminated soils or groundwater and will be evaluated by the HSO for application of HAZWOPER requirements.

Note: asbestos abatement is not considered as a planned feature of the project and is discussed here on a contingency basis.

2.2.1 Mobilization and Site Preparation

- Biological and environmental hazards (e.g., heat stress)

- Loading and unloading of facility equipment, heavy equipment, construction materials.
- Exposure to overhead and buried utilities.
- Heavy equipment operation, including minor earthwork to prepare site staging areas.
- Electrical hookup and distribution

2.2.2 Well Installation

- Biological and environmental hazards (e.g., heat stress)
- Pinch points, between fixed and moving equipment
- Work on uneven ground
- Loud machinery operation
- Slip, trips, falls
- Elevated work and suspended loads
- Struck by parts or equipment
- Work in low-visibility conditions around equipment

2.2.3 Pipeline Installation

- Biological and environmental hazards (e.g., heat stress)
- Airborne dust
- Pinch points, between fixed and moving equipment
- Slip, trips, falls
- Elevated work and suspended loads
- Work in low-visibility conditions around equipment
- Struck by parts or equipment
- Pressurized system hazards; flying debris, whipping hoses, injection hazard
- Excavation/trench hazards; collapse, traffic hazard, hazardous atmosphere
- Work in or near active roadways; struck by traffic
- Electrical hazards
- Work in and around active underground utilities
- Overhead utilities
- Work within the active Compressor Station; multi-employer worksite

2.2.4 Material Import

- Biological and environmental hazards (e.g., heat stress)
- Manual loading and unloading of materials; muscle strain
- Heavy equipment operation; strike personnel or equipment
- Work in or near active roadways; struck by traffic
- Work in low-visibility conditions around equipment

2.2.5 Electrical and Controls Systems Installation

- Biological and environmental hazards (e.g., heat stress)
- Electrical contact; shocks and burns
- Slip, trips, falls
- Elevated work and suspended loads
- Overhead utilities
- Work within the active Compressor Station; multi-employer worksite
- Ergonomics; muscle strain and repetitive motion

2.2.6 Earthwork, Grading, Retaining Wall Construction

- Biological and environmental hazards (e.g., heat stress)
- Airborne dust
- Heavy equipment operation; strike personnel or equipment
- Falls; on ground or on equipment ladders
- Elevated work and suspended loads
- Work in low-visibility conditions around equipment
- Struck by parts or equipment
- Hydraulics pressurized system hazards; whipping hoses, injection hazard
- Excavation/trench hazards; collapse, traffic hazard, hazardous atmosphere
- Work in or near active roadways; struck by traffic
- Work around active underground utilities
- Overhead utilities
- Work within the active Compressor Station; multi-employer worksite

2.2.7 Process Facility Construction and Buildout

- Biological and environmental hazards (e.g., heat stress)
- Airborne dust
- Heavy equipment operation; strike personnel or equipment
- Materials movement hazards; struck by
- Slip, trips, falls
- Elevated work; fall hazard
- Work in low-visibility conditions around equipment
- Pressurized system hazards(pneumatic systems and concrete pumper equipment); whipping hoses,
- Work in or around active natural gas transmission operations
- Work in or near active roadways; struck by traffic

- Work around active underground utilities
- Overhead utilities

2.2.8 Pipeline Bridge/Overhead Crossings

- Biological and environmental hazards (e.g., heat stress)
- Electrical contact; shocks and burns
- Slip, trips, falls
- Elevated work
- Suspended loads
- Overhead utilities
- Unprotected exposure to elements
- Rescue and emergency preparations
- Ergonomics; muscle strain and repetitive motion

SECTION 3

Project Organization and Responsibilities

The following section describes general roles and responsibilities for PG&E and contractor project and H&S leadership. Valuing personal safety, working in a safe manner, and understanding and following established H&S practices and requirements is the responsibility for every person involved with construction of the remedy, whether they represent PG&E, a contractor, a project stakeholder, or a visitor. It is up to the entire project team, starting with project leadership, to establish a culture of safety during implementation of this project.

It is also the responsibility of the project leadership to ensure that all project personnel understand they have stop work authority when confronted with potentially unsafe actions or conditions.

3.1 PG&E H&S Organization

The PG&E organization provided below is preliminary, and will be finalized as the construction project team is established. The roles below may change, or one person may serve more than one role as the Remedy construction project evolves.

3.1.1 PG&E Remediation Program H&S Manager

The PG&E Remediation Program Health & Safety Manager is responsible for managing PG&E's health and safety program for the Environmental Remediation Department. The Program H&S Manager will not have day-to-day involvement with the Project; however, he/she will be responsible for setting Company standards for H&S operations and culture.

The Program Health and Safety Manager may become involved in resolving issues or H&S questions that cannot be resolved within the project team, responding to H&S incidents, or providing high-level H&S inspections during implementation.

3.1.2 Topock Project Manager

The Topock Project Manager (PM) is responsible for the overall direction of the project, relations with external stakeholders, and regulatory compliance issues. The PM is responsible for communication, including status reporting, risk management, escalation of issues that cannot be resolved within the team, and will serve as review and approval authority where the construction project potentially affects long term regulatory compliance of the remedy or acceptance by external stakeholder. In general the PM will serve as the primary point of contact between the Topock GW remedy construction project and other facets of the Topock project.

The Topock PM is responsible for staying apprised of H&S performance during implementation of the project, and maintaining compliance with PG&E's H&S program requirements. The PM may perform site inspections and audits, may assist with incident investigations, and will serve as a liaison with the PG&E Remediation Program H&S Manager.

3.1.3 Topock Site Operations Manager

The Site Operations Manager is the primary point of contact for field activities related to the construction project. The Site Operations Manager holds daily meetings, coordinates site operations, and provides review for contractor submittals in coordination with the Construction Manager. The Site Operations Manager has front-line responsibility for implementing PG&E's H&S program during the full life cycle of Remedy implementation, and works with the Topock Construction Manager to manage PG&E H&S during Remedy construction.

The Site Operations Manager reviews all H&S documentation and performance data and leads PG&E-driven H&S inspections and audits.

3.1.4 Topock Construction Manager

The Construction Manager (CM) will be the primary point of contact for the Owner regarding all construction activities. The CM is responsible for implementation of the Remedy construction project, including the H&S program, contract management, and schedule management. The CM will also serve as the point of contact with the project's independent quality control/quality assurance (QA/QC) organization, and with project contracting/controls personnel for contract change management.

The CM, along with the PG&E Site H&S Supervisor, oversees the implementation of all contractor H&S programs while on-site. Upon consultation with the PG&E Site H&S Supervisor, the CM is responsible for confirming and enforcing contractual H&S obligations, including using contractual enforcement mechanisms if a contractor is found to be non-compliant to contracted project H&S performance requirements.

The CM will lead the regular high-level H&S project meetings described in Section 3.3. The CM may also lead H&S inspections and assist in incident investigations. The CM will report H&S performance information on a regular basis to both the Topock PM and Site Operations Manager.

3.1.5 Topock Site H&S Supervisor

The Topock Site Health and Safety Supervisor (HSS) will be the main point of contact for contractors' health and safety teams. This person may not be a PG&E employee, however, they will serve on the site management team leading the H&S effort. The HSS has direct responsibility for day-to-day implementation of all H&S practices across the Remedy project. The HSS is the primary POC to all contractor H&S personnel, and leads a parallel line of authority with contractor H&S managers, such that H&S performance maintains independence from production-oriented operational performance.

The HSS reviews contractor H&S submittals (including contractor PHSPs) prior to mobilization, performs ongoing reviews of work being performed against H&S requirements documented in this CHSP and the appropriate contractor PHSP, ensures all personnel have received site-specific H&S training, develops and leads site-specific H&S training/orientation sessions, and leads incident investigations, including preparing incident investigation documentation. The PG&E HSS also leads the morning H&S Principals Meetings described in Section 3.3.2.

3.2 Contractor H&S Organization

The contractor organizational structure provided below is preliminary, and will be finalized for each contractor team during the project bid and contracting process. Contractor H&S team size and scale will vary based on the scope of work a given contractor is tasked with, the inherent hazards associated with that scope, and the requirements described in the contractor's approved PHSP.

All personnel assigned HSO responsibilities shall be expected to meet standards of professional level training, relevant experience, and professional certification. The standard for these expectations will be commensurate to the scope of the project, its duration, number of personnel, and potential for aspects of the task to present significant safety hazards. Certified Industrial Hygienist, Certified Safety Professional, Occupational Health and Safety Technologist, Construction Health and Safety Technician are each examples of acceptable certifications.

3.2.1 Contractor PM

The Contractor's PM is responsible for oversight and management of all aspects of their contracted project scope of work, including health and safety, quality assurance, personnel, contract management, schedule management, and change management.

The PM provides safety leadership by establishing the safety standard throughout the project by example and by holding all personnel assigned to this project accountable for their safety responsibilities. The Contractor PM conducts periodic site inspections and participates in incident investigations.

3.2.2 Contractor Corporate HSM

The Contractor Corporate Health and Safety Manager is the senior health and safety professional assigned to the project for the purpose of providing technical assistance to the Contractor PM and on-site health and safety personnel. The HSM is responsible for the following:

- Developing and implementing contractor PHSP in compliance with this CHSP, contract requirements, and applicable PG&E and government standards
- Reviews lower-tier contractor H&S submittals
- Assists Site Health and Safety Officers in developing and reviewing project health and safety procedures, hazard analysis and other supporting documents;
- Reviews analytic data, and other safety managerial professional services
- Conducts periodic inspections and audits of the project site, including subcontractors.

3.2.3 Contractor Site Health & Safety Officer (HSO)

The Contractor's HSO will be the employee(s) designated as the H&S competent persons for their organization's contracted scope of work. Each HSO will be responsible for:

- Implements the provisions of their approved PHSP
- Conducts and documents daily site safety inspections
- Maintains health and safety records on site
- Assists the project manager with incident investigations related to health and safety
- Conducts monitoring tasks on site
- As needed, accompanies employees to clinics or other health care providers to ensure proper care and evaluation of injured or ill employees.

3.2.4 Contractor Site Supervisors

The site supervisors will be responsible for directing the work and schedule at their site, coordinating delivery of equipment and materials, and managing any subcontractors performing work at their site.

Site supervisors have direct responsibility for ensuring that their teams are implementing their H&S program as they work, including completing H&S tailgate meetings, implementing the Job Hazard Analysis process, and planning work such that it can be completed in a responsible and safe manner.

3.2.5 Subcontractors

Subcontractors will work under the direction of their respective site supervisor(s) and will be subject to all health and safety requirements set forth in their respective contractor PHSP. Subcontractors will also be responsible for producing and maintaining their own health and safety plan with plans and procedures specific to their work.

Subcontractor's compliance with this CHSP will be on a flow down basis with the expectation that additional training and PPE appropriate for the craft has been provided. Subcontractors with more than a few employees who will be expected to be onsite for an extended period of time will be expected to provide a site-specific health and safety plans, and job safety analyses. BBS program elements will similarly be implemented.

3.3 Meetings

3.3.1 Plan of the Day

Daily operational meetings will be held each morning to discuss upcoming work, anticipated hazards, external stakeholder monitoring or site visits, and related logistical information. The goal of the Plan of the Day meeting is to ensure that all parties are coordinated in the day's work. An H&S discussion and daily topic will be an agenda item for this meeting; however, this meeting will be focused on logistics and operations rather than H&S discussions.

3.3.2 Morning H&S Principals Meeting

PG&E and contractor health and safety principals will meet each morning to discuss overall health and safety concerns for the day, any ongoing H&S issues, and general H&S performance. Topics covered will include anticipated hazards, safe work policies to address the anticipated hazards, and any health and safety concerns from the previous day's work or lessons learned. This meeting will also discuss upcoming H&S inspections, and will serve as the follow-up milestone after completion of H&S inspections.

3.3.3 Tailgate Meetings

A daily tailgate meeting will be held at each work site each morning prior to commencement of construction activities. The purpose of this meeting will be to communicate objectives for the day's work and any anticipated hazards to the crew members at each Site. Safe work procedures for minimizing these hazards will be discussed and crew members will be invited to contribute their health and safety concerns. Job Hazard Analysis documentation will be reviewed and completed during Tailgate Meetings.

3.3.4 Weekly Project Meetings

Weekly project meetings will be held between principals and the project management staff. These meetings will provide a structure for clear communication between all parts of the project team. Topics will include progress of work, project schedule, health and safety concerns for the coming week, and review of lessons learned.

3.3.5 Inspections

Inspections shall be performed on a regular and spot basis by PG&E H&S leadership, and contractors will be responsible for internal inspections and audits as required by their approved PHSP. Pre-use inspections of equipment, tools, and work areas will be conducted to ensure safe work conditions and that safety related equipment and emergency response materials are in working condition. All site managerial personnel will be expected to participate in individual and team safety walk downs.

Records audits will be conducted to ensure that training and medical qualifications of Contractor and subcontractor personnel are in order. Reports of inspections and audit shall be made to the PM who will assign responsibility and correction date for any contractual or regulatory compliance issues.

This CHSP does not prescribe a formal H&S audit program. Regular H&S audits are an important tool in ensuring that PG&E and contractors are in compliance with project H&S requirements. The PG&E H&S audit program will be developed when the PG&E construction project organization has been finalized, and specific audit requirements will be developed and included in bid and contract documentation as the construction project procurement process gets underway.

SECTION 4

General Rules and Conditions

4.1 General Site Access

Upon initial entry to the site (usually at the site visitor center located at the project construction headquarters), all project personnel, visitors and vendors shall check in and receive an orientation. As appropriate to anticipated tasks and duration on site, they will receive a visitor safety orientation and/or review this CHSP, and sign the certification page acknowledging that they have read, understand, and agree to comply with the provisions. In addition, project personnel and visitors will also be required to review and certify the appropriate contractor PHSP(s) and other relevant safety information prior to entering the support or exclusion zone for a specific active work zone.

All activities outside the site visitor area, except in vehicles while driving between site locations, will require a minimum of OSHA Level D PPE. Specific work zones may require additional PPE and training, as described in Sections 5 through 7.

In general, due to safety considerations at the construction site, visitors will be prohibited from entering designated construction work areas, including, but not limited to exclusion zones, and contamination reduction zones, unless otherwise authorized by PG&E or the onsite Contractor site supervisor or HSO. If a visitor requests entry into an active work zone, the construction team will evaluate the situation and make appropriate adjustments (such as ceasing an activity during the observation) to allow safe entry by the visitor. Visitors will be required to don the necessary PPE prior to entry.

4.2 Topock Compressor Station Access

The Topock Compressor Station requires specific training prior to unaccompanied personnel access within the Station boundary. Remedy construction will be coordinated with the Station supervisors to minimize potential impact on Station operations, and construction personnel access to the Station will be limited to personnel essential to complete planned Remedy construction at the Station. All personnel must complete specific PG&E Compressor Station safety training in order to work within the Station without an escort.

Personnel who have not received this training must be escorted at all times while within the Compressor Station. All personnel must sign in and out at the front office when visiting the Compressor Station.

All visitors who will be entering a work zone will be required, to attend the daily safety meeting for those activities or receive a safety briefing from the Safety Officer prior to entering the work zone.

4.3 General Site Conduct Rules

Personnel employed by or representing PG&E, contractors, or external stakeholders will be responsible for complying with their respective organization's code of conduct. Unacceptable employee conduct and/or violation of a project rule or requirement will be managed as a contractual issue the appropriate organization, and may result in individual denial of access to the work area or project facilities. Examples of unacceptable employee conduct and/or rule violation are as follows:

- Abusing equipment, vehicles, or other property.
- Operating equipment or vehicles without authorization and proper qualification.
- Failure to operate equipment or vehicles in the manner specified by the manufacturer (including proper maintenance and repairs).

- Willful negligence that results in violations of health and safety or project rules or requirements.
- Behaving in a culturally inappropriate or disrespectful manner.
- Behaving in a verbally or physical threatening manner, fighting
- Engaging in horseplay of any kind.
- Sexual harassment, including making inappropriate comments or displaying inappropriate behavior toward an individual's sexual or gender orientation.
- Improperly using, or failure to use, toilet facilities.
- Violating the Site security rules.
- Littering, not using trash receptacles, or otherwise creating unsanitary conditions.
- Smoking, using tobacco, or eating in prohibited areas.
- Possessing, when not authorized, project, or other person's property or services, or theft of the same.
- Altering, damaging, or mutilating public, project, or another person's property.
- Reporting or badging for other employees or other identification misrepresentation.
- Refusing to submit to drug and alcohol screening or testing or other similar inspections.
- Possessing or using alcoholic beverages, controlled substances, or weapons on any project.
- Sleeping on the project.
- Not reporting an accident or health and safety incident, no matter how minor.

4.4 Sanitary Facilities

PG&E will maintain sanitary facilities at the construction headquarters. Topock Compressor Station sanitary facilities cannot be assumed as usable by Remedy construction personnel, whether employed by PG&E or others.

Contractors are required to coordinate site work with the project's general site support organization such that adequate sanitary facilities in the appropriate number and in accordance with OSHA standards are available at all work sites. Because some operations may be remote from the principal site of operations, provisions must be made ensure they are reasonably accessible.

SECTION 5

Work Zone Training Requirements

Information provided below constitutes the general minimum site-wide requirements for all personnel that require unaccompanied access to project work zones. Specific work zones will require additional training relative to the work being performed, e.g., personnel entering a work zone were high voltage electrical hazards are present will require the appropriate electrical safety training prior to entering that work zone. This CHSP cannot responsibly attempt to list out all required training for all work involved during Remedy construction. The PHSP for each scope of work will provide the detailed training requirements involved for that work, and is to be used in conjunction with this CHSP to identify training requirements for project personnel.

This section assumes all personnel have already completed site orientation and Compressor Station safety training (if needed) described in Sections 4.1 and 4.2. Work zones themselves are described in detail in Section 6.

5.1 Initial Training

At a minimum, all personnel entering exclusion zones are to be trained in accordance with the Cal/OSHA HAZWOPER regulation (8 CCR 5192) Workers must have a current 8-hour HAZWOPER refresher training. Documents verifying adequate training will be maintained by the contractor HSO and submitted to the PG&E HSS prior to mobilization.

Prior to entering the exclusion zone, all personnel assigned to work zone are required to read the relevant PHSP and verify by signature that they have read and understand the potential hazards and required protection. The HSO shall maintain a current Health and Safety Plan signature sheet.

Each work zone must have at least one person with first aid/CPR certification and blood borne pathogen training (29 CFR 1910.1030) present during all activity. All personnel entering any the exclusion zone must also have the following minimum site-specific and Cal/OSHA compliant training:

- Heat Stress (Attachment 2)
- Biological Hazards (Attachment 3)
- Hearing Conservation
- Hazard Communication including chemical specific training for contaminants of concern (reference Program)

Additional training (e.g., lockout/tagout, elevated work, confined space entry, arc flash safety) will be required based on the specific scope of work at each exclusion zone, to be described in the relevant PHSP. Note that asbestos abatement is not considered as a planned feature of the project and is discussed here on a contingency basis. Contractor personnel involved with debris removal where asbestos containing materials (ACM) may be present will be trained as described in 8 CCR 1529, and work under the direction of a Certified Asbestos Consultant (CAC).

All personnel assigned work within the restricted work areas are required to attend Safety briefings on a daily basis. Topics of discussion will include chemical, physical, and safety hazards for the activities to be conducted and may be presented by any member of the crew.

Senior crew members are be expected to mentor new hires or personnel learning a new skill.

Lessons Learned and more extensive specialized training (e.g., lockout/tagout procedure to a specific piece of equipment) will be conducted on as needed and as available basis.

5.2 Visitor/Observer Training

Visitors to the site who wish to observe on-site activities from within the exclusion zone are required to have a minimum of 24 hours HAZWOPER initial training. All visitors must be expected to read and comply with all signs and postings.

All personnel will be expected to be in Level D apparel except if in a vehicle, or on the Project Trailers facility.

SECTION 6

Work Zones

The site safety zone layout and procedures should match the prescribed levels of personal protection. The contractor HSO will establish, control, and monitor these areas accordingly. For the purpose of identifying the perimeters of functional safety zones on the site, barriers such as fencing, barricades, traffic cones or warning tape will be used. Work zones may be modified by the HSO based on meteorological data.

Pre-mobilization planning (performed prior to Remedy construction as required by the Project EIR mitigation measures) will include a site review to determine where contaminated soil may be encountered, and to establish procedures for handling encountered soil. This site review, in addition with existing site soil investigation results will be used to delineate work areas as within or outside an AOC, as described in Sections 6.1 and 6.2.

Work zone definitions will also be routinely evaluated during the course of Remedy construction, and a work zones may be reclassified based on site conditions encountered during implementation.

6.1 Work Outside of AOC and No Groundwater Contact

6.1.1 Work Zone

Appropriate personal protection must be worn in this zone (minimum Level D). Because there is no need for a decontamination line, the barricade or barrier to entry will be entirely dependent on the type of hazards in the work zone, and the proximity of personnel not directly performing the task. A “work zone” is not a free access area, or the same as a support zone. If personnel (employee or visitor) appear to be exposed to a work-zone hazard, the activity must stop until a corrective remedy is made.

6.1.2 Observation Zone

Observation zones may be established to manage a safe distance for observers.

6.2 Work within AOC and Where Groundwater Exposure Occurs

Work described in this section and termed as “within AOC” includes any of the locations defined as Solid Waste Management Units or AOCs by the project soil investigation program, areas where contaminated soil was encountered during the pre-mobilization site review, or areas where exposure to impacted groundwater is possible.

6.2.1 Exclusion Zone (EZ)

Appropriate personal protection must be worn in this zone. This zone is normally separated from the non-exclusion zone by a hotline or barrier to prevent personnel from entering the exclusion zone without proper PPE. If there is the possibility of anyone entering the work area from outside, a barrier must be in place.

To minimize risks associated with exposure to groundwater or AOC soil, access to exclusion zones will be limited to personnel that are absolutely necessary to perform the work within the exclusion zone. Visitors entering an exclusion zones, must wear the level of PPE required by the PHSP and approved by the HSO for work there. If respiratory protection is required, training in respiratory protection per 8 CCR 5144 will be required, as well as documentation of fit testing. The HSO will substantiate that visitors or observers entering the exclusion zone have received proper training.

Contamination Reduction Zone (CRZ)

This zone is a transition area between the Exclusion and the Support areas. The contamination reduction areas will be set up to prevent the spread of contaminants from the Exclusion Area. Decontamination will be performed in this area. Decontamination procedures will depend on the type of protective clothing and the nature and magnitude of contamination.

6.2.2 Support Zone (SZ)

The support zone is considered to be free of contaminants and PPE is not required but should be available for emergency use, if necessary. All equipment and materials are stored within this zone. Donning of PPE is done in the support zone before entering the exclusion zone.

6.3 Decontamination

In order to reduce the physical transfer of contaminants or suspected contaminants from the exclusion zone by personnel and/or equipment, decontamination procedures will be instituted. Heavy equipment, waste bins and other reusable materials will be decontaminated prior to leaving the site. The contractor will provide a detailed description of the decontamination process as part of their premobilization submittals. Personal protective equipment worn into the EZ will be decontaminated in accordance with the manufacturer's instructions upon leaving those areas, or placed in bins for disposal.

Direct skin contact with contaminated or suspected contaminated materials shall be avoided. Individuals whose skin comes into contact with contaminated or suspected contaminated materials must immediately remove the contaminated material and wash the skin with soap and water, and if necessary, seek medical attention.

Adequate hand washing facilities will be available in the support zone.

6.4 Multi-employer Zones

More than one contractor may be working in or otherwise passing through another contractor’s work area. To prevent an inadvertent exposure to a hazardous condition, all contractors will be expected to comply with OSHA Directive CPL 2-0.124 for multi-employer worksites. H&S at a multi-employer work area will be managed based on the specific contractual relationships at the specific work area. At a minimum, all H&S requirements provided in this CHSP, Contractor PHSPs, and project specifications will flow down to all personnel on the site, regardless of the specific contractual details.

Each Contractor’s PHSP shall acknowledge methods to comply with this requirement.

SECTION 7

Hazard Control

7.1 Summary and Ranking of Anticipated Hazards

A preliminary evaluation of the common hazards expected during Remedy construction is provided in Table 1. Project hazard risks can be assessed by assigning a relative value (1-4) to match the severity, frequency and probability of each type of expected hazards. The numerical product of these parameters are then multiplied by an integer (1-4) scaled to the number of personnel that may be exposed to such a hazard. The resulting product is intended provide a rough ranking of hazards to ensure focused efforts, and appropriate dedication of resources for controls.

Table 1: Risk Evaluation Matrix

Type of Hazard	Severity score	Frequency score	Probability score	Number of employees	RISK Potential	Description of potential hazards
Physical	1	4	2	4	**32**	Slips/trips/falls and walking and working surfaces
	3	2	2	2	**24**	Falls from heights > 6 ft.
	4	2	1	3	**24**	Heavy equipment - struck by
	4	2	1	2	**16**	Vehicle traffic - project site and related travel
	2	4	1	2	**16**	Excavations - personnel exposure
	2	2	2	2	**16**	Manual lifting - muscle strain
	3	2	2	1	**12**	Drilling activities - pinch points, struck by
	2	2	1	2	**8**	Structural and Equipment Fires - Fueling, materials storage
	4	1	2	1	**8**	Utility strikes
	2	2	1	1	**4**	Pressurized systems; hydraulics, pumps, conveyance piping
	3	1	1	1	**3**	Cranes, boomed equipment, hoisting
Biological and Environ-mental	3	3	3	4	**108**	Heat stresses;,
	1	4	2	4	**32**	Noise from equipment
	2	1	2	2	**8**	snakes
	2	1	1	3	**6**	severe weather
	3	1	1	2	**6**	electrical strikes
	2	1	1	2	**4**	cold

7.2 Job Safety Analysis

Job Safety Analysis (JSA), is also known as Activity Hazard Analysis (AHA)) or Job Hazard Analysis (JHA).

The planning and hazard assessment process continues into the individual job task through the use of JSAs. While some activities will be covered by the hazard analysis sections in this CHSP, as the task planning process and lessons-learned evolve during the course of this project, new JSAs shall be developed to address these changes as necessary.

JSAs describe each step of the activity, the types of exposures, accidents or incidents that can be anticipated, and the control measures that must be implemented before and during the activity. Employee input regarding their knowledge of the activity, hazards and controls will be solicited, and even in the field a JSA may be "dirtied up" by adding newly recognized job steps, hazards and controls. The JSA must be reviewed by every member of the activity, whenever a change is made to it, and as deemed necessary by safety or project management.

7.3 Chemical Hazard Assessment

7.3.1 Chemical Hazards

The chemical of concern for this project is primarily hexavalent chromium (Cr (VI)) in groundwater. Outside of established Areas of Concern (AOC), as shown on Attachment 4), there is no known soil contamination to which site workers and visitors may become exposed to.

Within the site AOCs, lead, dioxins and a number of other materials have been identified in soil. Contractors with work within a specific AOC will be provided with existing soil characterization data during the submittal process, and will develop project specific worker protection and monitoring requirements in the applicable PHSP. The health hazards and Permissible Exposure Limits (PEL) for AOC soil contaminants are shown in Table 2 and provided in this CHSP as an initial guidance to assist contractors in preparing PHSP where required. Where there is no Cal/OSHA PEL for a chemical, the Reference Exposure Level (REL) published by the California Office of Environmental Health Hazard Assessment (CA OEHHA) will be used to calculate the action level.

As an example, soil data provided below is from the PG&E Topock AOC 4 Health and Safety Plan (Table 1, Arcadis, 2010). The action levels for total dust were based on the concentrations of the specific contaminants found in the soil. The Industrial Hygienist took the Cal/OSHA permissible exposure level (PEL) and divided that by the highest concentration level in soil, and thus calculated the level of total dust required to exceed the PEL. Table 2 provides a preliminary evaluation of dust exposure hazards associated with chemicals found in AOC-4 soil, prior to the cleanup that occurred in 2010. These data were used by the industrial hygienist to set guidelines related to minimizing exposure by minimizing the generation of visible dust.

Table 2: AOC Dust Exposure Hazard Evaluation

Chemical Constituent in Site AOC Soil and Exposure Standard	AOC Soil Constituent PEL/REL and Highest Concentration Found in Site Soil		Minimum Total Dust Required to reach PEL/REL for AOC Soil Constituent
Example Calculation	PEL (mg/m^3) X 10^6 mg/kg / Concentration in Soil (mg/kg)	=	Minimum site dust concentration (mg/m^3)
Chromium (VI) (PEL)	0.005 mg/m³ x 10^6 mg/kg / 1,560 mg/kg	=	3.2 mg/m³
PCB (PEL)	0.5 mg/m³ x 10^6 mg/kg / 1.9 mg/kg	=	263,000 mg/m³
Lead (PEL)	0.05 mg/m³ x 10^6 mg/kg / 11,000 mg/kg	=	4.5 mg/m³
Pentachlorophenol (PEL)	0.5 mg/m³ x 10^6 mg/kg / 8.9 mg/kg	=	56,000 mg/m³
Dioxins (REL)	40 pg/m^3 x 10^6 mg/kg / 6085 ng/m^3	=	6.6 mg/m^3
PAHs (REL)	0.001 mg/m³ x 10^6 mg/kg / 12 mg/kg	=	83.3 mg/m³

These same principles will be used to determine appropriate standards for respiratory protection when working within AOCs during the Remedy construction. In most cases, effective dust control will be the primary protection mechanism. However, in some cases, it may also be necessary for affected, site workers to don Level C PPE during earth-disturbing work within an AOC. If so, personnel air monitoring of workers will be conducted. Area air monitoring may also be conducted, as appropriate.

If air monitoring is initiated, it should be noted that not all contaminants would need to be monitored each day. This assessment will be made by the HSO. After a negative exposure assessment is made based on monitoring information, the HSO may elect to reduce or eliminate monitoring for a specific contaminant.

7.3.2 Chemical Hazard Control

Chemical hazard control at the site will be primarily managed by some or all of the following:

- Active dust control. Visible dust emissions shall be anticipated and controlled by the following
    - Required reporting of dust generating activities to PG&E HSS and Site Operations Manager
    - Dust suppression with water
    - Pre-water roads and work areas
    - Reduce vehicle speed
    - Reduce drop height of excavated soils
- Monitor wind conditions to minimize contaminant dispersion
    - Monitoring with real-time particulate monitoring equipment
    - Implement dust control measures to minimize airborne dust
    - Implement Level C respiratory protection when dust monitoring data indicate protection is required
    - Establish a work shutdown wind velocity threshold, and stop work when that threshold has been met
- Hygienic practices including prohibitions against eating/tobacco use in exclusion zone, and mandatory decontamination practices
- Reporting all suspect personnel exposures or contamination spread beyond set boundaries.

7.3.3 Physical Hazards

Hazards typically encountered at construction sites will be present, namely, slippery ground, uneven terrain, and operation of heavy equipment. Fire hazards may also exist around fueling operations or electrical systems. Operating heavy equipment is a severe contact hazard to ground personnel, vehicles and other equipment and facilities

All workers shall be trained and certified (when applicable) to operate the equipment they are using. Equipment will be inspected prior to use and removed from service if found to be not in conformance with any specifications or regulations. Specifics related to the control of these hazards shall be covered in the site specific JHA's and contractor PHSP for activities with exposure to these physical hazards.

7.3.4 Special Hazards

The wide scope of the Topock Remedy construction project can be expected to result in a number of special hazards that will be unique to the various construction methods, locations, and site-specific constraints. This CHSP cannot attempt to list every unique hazard associated with the wide variety of construction work that will occur during Remedy construction. Instead, this CHSP will list general descriptions of unique site hazards that can be expected to be encountered during Remedy construction. The PHSP for specific contracted work will be required to describe special hazards unique to the scoped work, and the goal of the JSA process is for construction team members to carefully consider their work, the hazards associated with

their work, and the means to avoid and/or mitigate those hazards. The following discussion is not meant to serve as a complete discussion of hazards from which to plan work.

7.3.4.1 Work In/Near Steep Topography

The nature of the operations in and near ravines makes it necessary to consider the safety issues associated with personnel and equipment around them. Slope stability is a matter of concern during the excavation. The contractor will utilize previously prepared geotechnical reports (if available) in its technical approach to the excavation of the ravine, and include the technical approach in their PHSP. The technical approach will be approved by the contractor's geotechnical expert and the HSO prior to the start of excavation of the ravine.

The PG&E Slope Safety Standard is to be followed, and is included with this CHSP as Attachment 5.

7.3.4.2 Work in Remote Locations

Many locations in the Remedy construction area are physically remote or relatively inaccessible to other Remedy construction sites (e.g., well HNWR-1, well IRL-4). When working at remote locations, emergency contact service may be compromised. Personnel are to avoid working alone, ensure phone or radio service is adequate before beginning operations, and the PHSP and JSA for this type of work will describe a personnel tracking/contact protocol.

Cellular phone service is known to be poor in specific work locations. All personnel are required to test cellular phone service at a work location prior to beginning work, and implement an alternative communication procedure if cellular phone service is found to be unreliable. Alternative communications procedures will be detailed in the PHSP and JHA for the work, and may include use of 2-way radios, utilization of a 3-person buddy system, or use of satellite phones.

7.3.4.3 Elevated Work

Pipeline installation work includes pipeline installation on aerial bridges that span ravines/washes, and installation pipeline on the existing Kinder Morgan pipeline bridge that spans the Colorado River. The PHSP and/or JSA for this work will need to address suspended/elevated work, fall protection, safe equipment staging and operation, and emergency rescue.

7.3.4.4 Exposure to the Elements

As described throughout this PHSP, exposure to the elements (sun, wind etc.) are severe when not mitigated. Heat-related illness and sunburn are constant hazards throughout the year. The elements may change from day to day or even during a shift. Short-duration heavy rainfall with little warning is typical of the climate in the Topock area. Personnel working in washes and other natural drainage features may be caught in flash floods caused by sudden rainfall. The PHSP and /or JSA for this work will need to address seasonal weather patterns, access/egress to work sites, weather monitoring, evacuation triggers, and work zone evacuation procedures.

7.3.4.5 High Voltage Electrical Power

Remedy construction includes construction of high voltage (12kV) power distribution. Specialized skills are required from personnel directly working near power voltage power. The PHSO and/or JSA for this work will need to address minimum training requirements, specialized PPE, lock-out/tag-out, and work zone access control when working in and around high-voltage electrical equipment.

7.3.4.6 Underground Utilities

Pipeline construction will require extensive crossing of existing underground utilities. Many of these utilities are large high-pressure natural gas transmission lines. Gas transmission pipeline crossings are described and designed in the project plans, however, pipeline installation and other contractors that will have to cross these lines will have to describe associated safety and observation requirements in their PHSP and/or JSA.

Pipeline installation work, specifically at the Topock Compressor Station, can expect to encounter unknown underground utilities. While every attempt will be made to locate and identify underground utilities, contractor specifications and PHSP for this work will need to include excavation observation, advance potholing/visual confirmation of utilities, and low-impact excavation techniques.

In all cases, work near underground utilities will be conducted in coordination with the utility owners(s) and in conformance with USA requirements.

7.3.4.7 Overhead Utilities

Remedy construction will involve work near overhead utilities, including work near suspended high pressure gas transmission pipelines. PHSP and/or JSAs for this work will need to address procedures for personnel and equipment that need to pass beneath overhead gas and electrical power lines, prescribe pre-operation walkdowns, safe clearances for equipment, and overhead power line clearances.

In all cases, work near overhead utilities will be conducted in coordination with the utility owners(s).

7.3.4.8 Work In and Around Vehicular Traffic

Much of the work will take place on or adjacent to public roads. PHSP and JSAs for this work will need to address compliance with traffic control requirements, work zone delineation/visibility, traffic barriers, and access/egress to work zones from public roads.

7.4 Hazard Prevention, Control and Mitigation

7.4.1 Physical Hazards Control

Specifics related to the control of physical hazards shall be covered in the site specific JHA's or any contractor provided PHSP for activities with exposure to these physical hazards. If the prescribed controls are not in place, leaving an employee or visitor exposed to a hazardous condition, the activity must immediately stop.
At a minimum, each contractor's PHSP must address all the concerns and guidelines in this section (7.4).

7.4.1.1 Practice Good Housekeeping

- Keep your work area clean and orderly.
- Do not litter, and maintain and utilize trash containers within easy access to work areas. Trash containers must be able to be tightly sealed for protection in windy conditions or against animal access. Trash containers may not be left full at a work area when not active or outside of work hours.
- Properly store food in appropriate containers away from the work zone. Food may not be left at the work area when not active or outside of work hours.
- Keep work, storage, and access areas clean of tools, equipment, and debris.
- All means of egress shall be kept unblocked, kept clear of debris and slip or trip hazards, kept well lighted, and kept unlocked at times.
- Immediately remove spilled liquids from the floor.
- Clean up or otherwise remove slip/trip/fall hazards immediately.
- Keep aisles and walkways clear of electrical cords.
- Do not overload electrical outlets.
- Electric cords shall not be exposed to potential damage from vehicles.
- Mark or barricade slip/trip/fall hazards that cannot be removed.

- Any time work is performed overhead, barricades shall be erected.
- Barricades shall consist of caution (yellow) or danger (red) barricade colors and appropriately worded tape or signs.
- All barricades shall be removed when not in use.

7.4.1.2 Follow Standard Procedures

The following standard safety behaviors are valuable for work across the site and are expected to be habitually followed as part of a Contractor's organization values:

- Do not eat, drink, chew tobacco or gum, smoke, or engage in any other activity that may increase the possibility of hand-to mouth contact in the EZ or the CRZ. (Exceptions may be permitted by the HSO for other reasons, such as to allow fluid intake during heat stress conditions.
- Employees under a physician's care and/or taking prescribed narcotics must notify the designated site safety supervisor.
- Lift material in a safe manner and avoid strains. Bend your knees, keep your back straight, and push upwards with your legs when lifting. Get help (mechanical help or more people) when lifting heavy or awkward materials.
- Wear the personal protective equipment (PPE) specified in the site HASP.
- Use safety devices provided for your protection (e.g., handrails, guards, pressure relief valves, and seat belts). Do not remove these devices while the equipment is being operated.
- Never approach within 25 feet of the operating area of a piece of equipment without first making eye contact with the operator, signaling your intention, and receiving an acknowledgement from the operator. If you wish to approach the equipment (e.g., to speak with the operator) the operator must first lower all buckets, blades, etc. and idle the engine before you approach.
- When ground personnel support heavy equipment, pay particular attention to pinch points (e.g., the counterweight swing radius and the tracks of an excavator). Keep out from under suspended loads.
- Make sure fall protection or fall arrest systems are in place when working at elevations greater than 6 feet above the surrounding work area.
- Follow the work-rest regimens and other practices required by the heat stress program.
- Where appropriate, lockout procedures shall be used.

7.4.2 Permit Required Procedures

A permit system will be established for:

- Hot work, defined as welding, cutting, grinding, activities that generate heat, sparks, and ignition sources
- Confined space entry, defined as work within a confined space as defined by law).
- Work near pressurized natural gas equipment

The Contractor PHSP for work that may require work described above will require permit documentation, protocols for completing these permits, work zone preparation, personnel and work zone monitoring during permitted work, additional PPE requirements, and additional worker and observer training requirements. Following are general guidelines for workers related to permit-required work.

- Do not enter a permit-required Confined Space without a permit, and follow all requirements of permits as issued.
- Don't rely on postings to warn you of confined space hazards. When in doubt ask for a permit and testing. Manholes, underground vaults, chambers, certain confining trenches, excavations, tanks, silos or other similar spaces may have a confined space hazard.
- Check with your Supervisor prior to starting any Hot Work operation (welding or cutting operations) and, if you are working in an area that requires a Hot Work Permit, follow the permit as issued.
- The combination of hot work and confined spaces is particularly dangerous even if you don't plan to enter the space. No burning, welding, or other source of ignition shall be applied to, or near any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists and authority for the work is obtained from the foreman or superintendent.
- Follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources. Install and remove locks and tags only in accordance with procedure and only when authorized.
- Complete explosive atmosphere testing when working near pressurized gas equipment even if work does not include hot work.

7.4.3 Soil Disturbing Activities

Workers must follow these general guidelines prior to conducting soil disturbing activities. Do not dig or drive objects into the ground without first:

- ensuring that necessary permits have been obtained;
- A competent person has been assigned and has inspected the site;
- Utilities have been located prior to beginning excavation activities;
- Checking that excavations slopes are checked daily for stability. The PG&E Excavation Safety Standard is to be followed, and is included with this CHSP as Attachment 6.
- Do not enter an excavation greater than 4 feet deep unless this work is covered by the appropriate PHSP, JSAs have been reviewed and signed, entrance/egress has been installed, observation is present, the excavation has been shored/sloped properly, and the HSO has authorized access. Maintain safe means access and egress from all excavations.

7.4.3.1 Operations at sites in AOCs and/or Areas with Suspected Soil Contamination

- PPE appropriate to the exposure of contaminated dusts, and/or fluids shall be assigned and worn in addition to PPE assigned for protection from physical hazards
- Worker and air monitoring program is in place, as required
- Dust control measures shall be available at all times during operations
- Delineated zones shall be established, maintained and implemented for purposes of decontamination and prevention of cross-contamination
- Soils that are excavated shall be directly loaded into specified, labeled containers

7.4.4 Safe Use of Tools

Tools, especially hand tools, are used frequently with minimal supervision. It can be all too easy to use tools improperly and create serious safety hazards.

- Use all tools in the manner intended and/or prescribed. The operating instructions for all tools and equipment ARE MANDATORY.
- Modification of use or design must be in accordance with the written instructions or permission of the manufacturer.
- Inspect safety devices before every use, especially guards on cutting devices.
- Do not remove or circumvent guards or other safety devices on tools.
- Inspect other tools and equipment before use and do not use defective equipment. Identify/tag defective equipment per organization protocols such that they cannot be inadvertently brought back into service.
- A competent person must inspect scaffolds and man lifts before each day's use.
- Ladders must be in good service, placed at the proper angle, secured, and extents to the proper length (for access to heights the ladder must be 3 feet above the landing).
- Inspect power tools, looking especially for damaged insulation or missing ground plugs on electrical cords.
- Use ground fault circuit interrupters (GFCI) for cord and plug equipment used outdoors, in damp locations, or when equipment is not plugged directly into permanent wiring.
- Use only extension cords rated for hard service or junior hard service (e.g., SO, JSO, SOW, JSOW).
- Keep electrical cords out of walkways and accumulations of water unless protected and rated for such service.
- Portable generators shall be properly grounded, and shall be allowed to cool prior to refueling.
- All fuel shall be stored in appropriate containers and in appropriate locations.

7.4.5 Safe Construction Equipment Operation

- All heavy equipment operation must be accompanied by a spotter, who is responsible for communicating operating clearances, equipment navigation aid, and hazards to the equipment operator. The operator is required to heed the direction of their spotter and may not operate their machine without their spotter present and visible.
- All equipment is to be operated in accordance with manufacture's written instructions and/or manuals.
- Equipment shall not be modified or operated out of specified limits without written permission from the manufacturer and the health and safety manager for the project.
- Do not operate equipment unless you are properly trained and authorized to do so in a manner consistent with the owner/operators manual.
- DO NOT use a piece of equipment, which has been tagged out of service! Do not remove red tags without authorization from the person placing the tag or the person responsible for the repairs.
- Inspect equipment before using it.
- Heavy equipment inspections shall be documented. Note all discrepancies and tag out equipment that may be dangerous to operate.
- Machinery shall not be serviced, repaired, or adjusted while in operation, nor shall oiling of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work.

- Use vehicle or equipment seat belts any time the vehicle or equipment is in motion.
- Excavating equipment shall not be operated near tops of cuts, banks, or cliffs if employees are working below.
- Do not maneuver equipment into the working area of other equipment without first making eye contact with the operator working in the area and signaling your intentions to maneuver into that area.
- Always acknowledge that you understand that other equipment or ground personnel may enter your working area.
- Do not allow people on foot to approach without lowering hydraulically lifted or suspended components (e.g., buckets, blades, bellies) and reducing engine speed to idle.
- Tractors, bulldozers, scrapers, and carryalls shall not operate where there is a possibility of overturning in dangerous areas such as the edges of deep fills, cut banks, and steep slopes.
- Do not allow supporting ground personnel to work within pinch points of the equipment (e.g., the swing radius of a counterweight and the tracks on an excavator) or under suspended loads.

7.4.6 Environmental Hazards Controls

7.4.6.1 Heat Stress Prevention

Refer to Attachment 2 for a detailed discussion of heat stress, including recommendations on preventing heat stress injuries, identifying heat stress injuries, and responding to heat stress emergencies.

Wearing PPE puts site personnel at considerable risk of heat stress. Heat stress is caused by a number of interacting factors including environmental conditions, clothing, workload and the individual characteristics of the worker. Heat stress monitoring will commence when personnel are wearing PPE that has the potential to add to heat stress (including Tyvek coveralls) or whenever the ambient temperature exceeds 80 degrees F. If a worker's pulse rate exceeds 110 beats per minute following a break, then additional break time will be employed. An adequate amount of shade and drinking water will be available to all workers on site.

7.4.6.2 Noise

The equipment to be used on this site may produce high noise levels. Personnel working near this equipment will wear hearing protection during operation. On-site personnel may have other limited exposures to occupational noise exceeding the action level of 8-hour TWA of 85 dBA. For those cases, hearing protection will be worn whenever regular conversation becomes difficult at a distance of three feet in any work area, which is indicative of noise levels exceeding 85 dBA. The HSO will conduct noise monitoring as necessary and will require wearing earplugs for noise levels that even approach the permissible exposure limit. The control of occupational noise exposures shall comply with Cal/OSHA requirements. Contractor workers will be included in their respective company’s hearing conservation program.

7.4.6.3 Biological Hazards

Biological hazards such as rattlesnakes and spiders may exist on the site. Eachcontractor will address these concerns and means to prevent exposure in their respective HASPs. Supplemental information on Biological Hazards is included in Attachment 4.

7.5 Personal Protective Equipment

Based on an evaluation of the hazards of the site, personal protective equipment will be required for all personnel and visitors entering the controlled portion of the site. Protective equipment for each level of

protection is described in general below. Note that specific tasks, including (but not limited to) work at the Compressor Station, elevated/suspended work, or high-voltage electrical work will require additional PPE.

7.5.1 Site Baseline Level D

All site personnel and visitors will be required to wear the following minimum PPE within all work zones as described in Section 6:

- Safety glasses.
- Boots with toe protection.
- Hard-hat.
- Gloves, must be available if a worker is expected to perform any degree manual work.
- Hearing Protection must be available on a worker's/visitor's person, and donned when in high-noise work zones
- Safety Vest
- A long sleeved sleeved shirt is required for work at the Compressor Station

7.5.2 Modified Level D

- Safety glasses.
- Boots with toe protection.
- Disposable coveralls (as specified by the HSO)
- Disposable booties or rubber boots
- Hard-hat.
- Chemical protective gloves, if warranted by work activity
- Hearing Protection must be available on a worker's/visitor's person, and donned when in high-noise work zones
- Safety Vest
- Face shield and/or goggles (as specified by the HSO)

7.5.3 Level C

- Half or full face air purifying respirator, daily or more frequent cartridge change-out
- Safety glasses.
- Boots with toe protection.
- Disposable coveralls (as specified by the HSO)
- Disposable booties or rubber boots
- Hard-hat.
- Chemical protective gloves
- Hearing Protection
- Safety Vest

Prior to ground-disturbing work in an AOC, an industrial hygienist will evaluate the need for respiratory protection of workers in the work zone. If the analytical data available indicates that it is appropriate, Level

C PPE will be the initial level of protection in the exclusion zone. Level D PPE will be the minimum level of PPE required during soil disturbance outside of an AOC, however, the IH, HSO, or HSS may upgrade PPE requirements based on site observations or new data. This applies to all PG&E, contractor, visitor and observers in the exclusion zone or contaminant reduction work zones. Any upgrades or downgrades to these requirements must be approved by the HSO. The contractor HSO will review the PPE requirements at the start of each shift. Air monitoring data will be utilized to support the assessment, as appropriate.

Exposure Monitoring and Protection

Exposure monitoring may be required and implemented when:

- Handling groundwater with elevated concentrations of hexavalent chromium.
- Handling drill cuttings that were exposed to groundwater with elevated concentrations of hexavalent chromium.
- Work near pressurized gas infrastructure
- Soil disturbing activities within AOCs, unless otherwise directed by the HSO
- Entry into a confined space

8.1 Chemical Monitoring

Preliminary work zone and worker breathing zone monitoring guidelines which may be applicable are provided in Table 3. Contractor PHSP will provide additional direction on chemical monitoring at specific work sites, and Contractor PHSP requirements will take precedence over the guidelines provided in Table 3.

Table 3: Air Monitoring Guidelines and Action Levels

Chemical Hazard	Instrument	Method[1]	Action level	ACTION
Oxygen (O2)	Combustible Gas /O2 meter	Direct read area sample prior to confined space entry.	<19.5%, or >23.5%	• Ventilate until readings can be brought to 21% +/- 1% or do not enter. • Ventilate until readings can be brought to 21% +/- 1% or do not enter.
Combustible Gas /Vapors (CG)	Combustible Gas /O2 meter	Direct reading area sample prior to entering confined space	>10% LEL	Clean, secure source of vapors, ventilate until readings can be brought to +/- 1% LEL or do not enter.
		• Prior to hot work near flammables • Suspect gas leak	Any detection above background drift or fluctuation	Clean, secure source of vapors, ventilate until readings indicate source has been controlled.
Chromium	Personal sampling pumps, MCE filter cassette in breathing zone of worker	NIOSH 7300 when suspected	>50% < 10x PEL or TLV	Apply engineering controls Upgrade PPE as necessary.
			>50X PEL or TLV	Apply engineering controls Upgrade PPE as necessary.
			>1000 PPM or > IDLH	Stop work, determine source of hazard and apply engineering control
Respirable PNOC (Particulates Not Otherwise Classified)	Personal sampling pumps, pre-weighted PVC filter cassette in breathing zone of worker	NIOSH 0600 when suspect or monthly	>50% < 10x PEL or TLV	Apply engineering controls Upgrade PPE as necessary.
			>50X PEL or TLV	Apply engineering controls Upgrade PPE as necessary.
			>1000 PPM or > IDLH	Stop work, determine source of hazard and apply an engineering control
Silica	Per cassette,	NIOSH 7500	>50% < 10x	Apply engineering controls

(respirable fraction)	and cyclone or respirable dust separator.	when suspect or monthly	PEL or TLV	Upgrade PPE as necessary.
			>50X PEL or TLV	Apply engineering controls Upgrade PPE as necessary.
			>1000 PPM or > IDLH	Stop work, determine source of hazard and apply an engineering control

Comments or special instructions:

1. Monitoring methodology determines the analytical method used by the laboratory
2. Breathing zone is the location of the sampling media; it would be attached to the worker's shoulder at approximately the same height of the workers nose and mouth.

8.2 Particulate Monitoring

The most important method for particulate monitoring is using each individual to recognize airborne particulate conditions or "dust" in the air and to take a corrective action to minimize its generation and control its dispersion. Employees will be empowered to call for the water truck to respond to areas where any visible dust is evident.

Real-time dust monitors with data logging capabilities will be used to monitor work areas and perimeters when visible dust is present, when specified by the HSO. Noise Monitoring

Noise monitoring shall be conducted in accordance Section 7.4.6.2.

SECTION 9

Medical Surveillance

9.1 Requirements for Work Zone Entry

All personnel, including subcontractors and visitors, entering the exclusion or contamination reduction zones as defined in Section 6.2, must have completed appropriate medical monitoring requirements required under 8 CCR 5912(f):

- Prior to hazardous waste activities at the Site;
- Annually;
- Upon termination;
- Following exposure or injury; and
- Additionally as needed on a site-specific basis.

The minimum specific examination content and frequency based on probable Site conditions, potential occupational exposures, and required protective equipment, based on consultation with the Occupational Physician.

The HSO will maintain copies of the physician's written authorization statements that all employees conducting hazardous waste Site operations are fit for hazardous waste Site duty and able to wear a respirator. Any restrictions shall be clearly stated. No one shall be permitted to conduct hazardous waste Site operations until a copy of the medical certification is received by the HSO.

Personnel wearing respiratory protection will require a certification from the Occupational Physician that the person is medically qualified to wear respiratory protection.

SECTION 10

Emergency Planning

A map to the hospital will be posted on site, and is provided in this CHSP as Attachment A. Each contractor will have at least one person currently trained and certified in first aid/CPR present at all work zones. The following general procedures will be followed in the case of a medical emergency at the site.

10.1 Personnel Injury

10.1.1 First Aid

The HSO, or supervisor on-site shall ensure necessary first aid or medical attention is obtained. First aid shall be provided by qualified first aid providers or site Fire Department EMTs. If personnel need medical evaluation, ensure that a safety officer or supervisor is assigned to escort the employee. Do not allow injured personnel to drive themselves unless a doctor determines they are fit to do so. If a doctor prescribes medication determine if that medication limits ability to drive. Do not allow employees to drive themselves if the medication impacts on driving safety. Any indications of dizziness, confusion, lack of responsiveness difficulty breathing, or swallowing shall be treated as a medical emergency and emergency response providers contacted.

10.1.2 Heat Stress

Heat stress prevention and emergency response is presented in Attachment 2.

10.1.3 Chemical Inhalation

If warning symptoms such as dizziness, headache, nausea, shortness of breath, burning in the mouth, or other symptoms indicative of the exposure are experienced, the victim will leave or be removed from the controlled area of the site immediately. If the victim is no longer breathing, rescuers will first remove the victim from the contaminated area wearing respiratory protection. Rescue breathing or cardiopulmonary resuscitation (as applicable) will be undertaken immediately, and medical attention will be obtained as soon as possible.

10.1.4 Chemical Ingestion

Medical attention will be sought immediately.

10.1.5 Chemical Eye Contact

If eye contact is made with any of the materials at the site, the eye will be flooded with water for at least 15 minutes. An emergency eyewash will be available in each work zone, either at the CRZ (at AOC work areas) or at the support zone at non-AOC sites. Medical attention will be obtained as soon as possible.

10.1.6 Chemical Skin Contact

Skin exposure will be treated by washing with soap and water. Any contaminated clothing will be removed. First aid will then be applied and medical attention obtained as required.

10.2 Anomalies and Unanticipated Conditions

If contaminated soils, not previously characterized, are suspected of being present (as recognizable by discoloration, odors, or monitoring equipment), then activities shall stop until it is reported to project management and the HSO. Activities may not resume in this area until soil samples are analyzed, regulatory notifications are made and a review of the work plan and PHSP are completed to ensure health protection and environmental compliance.

10.3 Environmental Emergencies

10.3.1 Lightning

Outdoor operations will be suspended when lightning is within a 15 second count of the site (i.e., the time difference between seeing a lightning strike and hearing the sound). High profile equipment operations shall be suspended when lightning is within 30 seconds of the site. High profile operations include crane operations, drilling operations, or electrical wiring tasks. Equipment operators shall stop their equipment and park it safely before heading for shelter. No personnel will be left on the ground in an exposed location.

Preferred shelter is a permanent building. Personnel may also take shelter in trailers or low profile rubber tired equipment (e.g., pickups). Avoid driving pickups or any other equipment except to help evacuate personnel. Work will resume after a 30 minute period without lightning.

10.4 Emergency Response Equipment Required On Site

Contractors will be expected to provide and, maintain the emergency response equipment at their field office, work zones, or vehicles as shown on Table 4:

Table 4: Baseline Emergency Response Equipment Requirements

Emergency Supplies and Equipment	
First Aid Kit	All work zones and field offices
Fire Extinguisher (Type ABC)	All work zones, heavy equipment, and field offices
Mobile Phone	On person
Satellite Phone in limited mobile access locations	On person where required
Traffic Cones	All work zones and field offices
Radios for traffic control or remote access locations	On person where required
Water or other Rehydration Fluid	All work zones, heavy equipment, and field offices
Eyewash	All work zones and field offices
Hand wash and Towels	All work zones and field offices
Sunscreen	All work zones, heavy equipment, and field offices
Insect Repellent	All work zones and field offices
Chemical Spill Kit	All work zones and field offices
Snake Rod (to be used by authorized staff only)	Field office

10.5 Emergency Contacts and Telephone Numbers

10.5.1 Hospital Route

Maps for the Route to Hospital are included as Attachment 1.

10.5.2 Telephone numbers

Note: At this time tentative identification of titles and contact information has been made, but is subject to change. As an interim measure, the color code will identify this section as being subject to future completion.

Emergency telephone numbers will be posted on site.

10.5.2.1 PG&E Contact Info

- Topock Project Manager – Yvonne Meeks (contact info added when finalized)
- Topock Site Operations Manager – Curt Russell (contact info added when finalized)
- Topock Construction Manager – Danielle Starring (contact info added when finalized)
- Topock Project Safety Officer – To be determined
- Topock Compressor Station Operator (760) 326-5535

10.5.2.2 Contractor Contact Info

Note: Contractor H&S personnel organization, roster, and contact info will be detailed in each contractor PHSP.

- Contractor PM - To be determined
- Contractor Site Safety Officer - To be determined

10.5.2.3 General Emergency Contact Info

- General/All emergencies -- dial 911
- Ambulance -- dial 911
- Police Department -- dial 911
- Fire Department -- dial 911
- Hospital: Colorado River Medical Center (See Attachment 1)

  760-326-4531
  1401 Bailey Ave
  Needles, California 92363

SECTION 11

Health and Safety Plan Certification

All project personnel including subcontractors working at the Site are required to sign acknowledging receipt of training, and agreement to comply with project work and safety rules.

ATTACHMENT 1
HOSPITAL ROUTE MAP

CONSTRUCTION HEALTH AND SAFETY PLAN
TOPOCK GROUNDWATER REMEDY

Hospital

Colorado River Medical Center,
1401 Bailey Avenue, Needles , CA
Phone: (760) 326-4531

Directions

- Exit the work area or facility, travel north on National Trails Highway
- Turn West (left if coming from the Topock Compressor Station or IM3 Plant) onto Park Moabi Road
- Enter Highway 40 West at the Park Moabi onramp
- Drive northwest approximately 10 miles on Highway 40 west to Needles.
- Take the "J" Street exit & turn left onto "J Street.
- Go several blocks & turn left onto Bailey Ave.

The Hospital is on the left after the park.

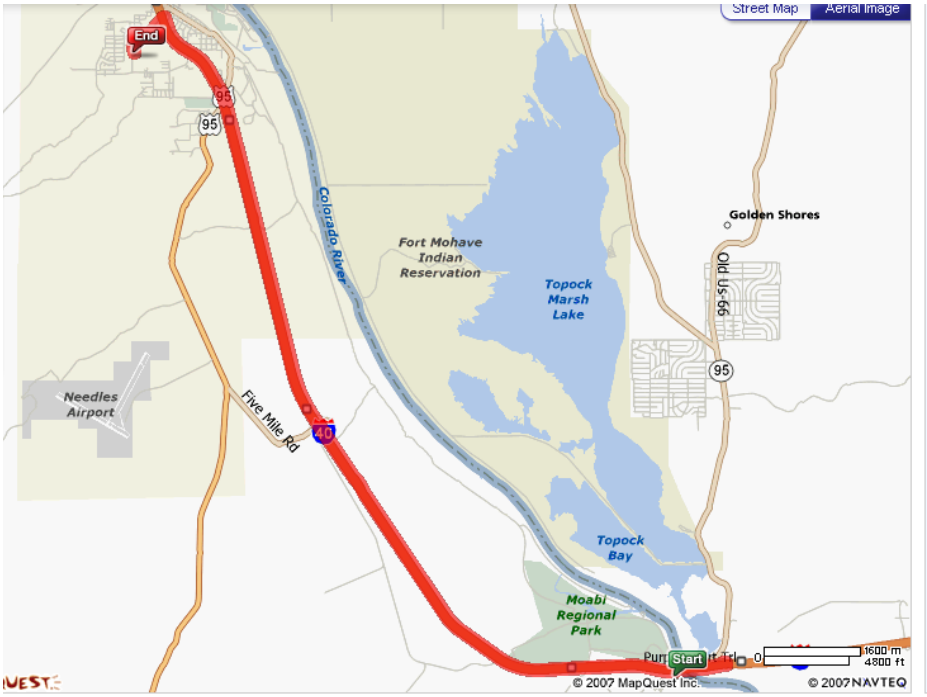


Figure 1: Route Overview from TCS

Figure 2: Closeup of Destination

ATTACHMENT 2

HEAT STRESS PREVENTION AND EMERGENCIES
CONSTRUCTION HEALTH AND SAFETY PLAN
TOPOCK GROUNDWATER REMEDY

Heat Stress: Signs, Symptoms, and Adverse Health Effects.

The incidence and severity of heat stress will vary widely among people, even under identical heat stress conditions. Disabilities often arise from the combined effects of environmental heat loading and metabolic heat production.

Prolonged increases in deep body temperature during the first trimester of pregnancy may endanger the fetus and are associated with temporary infertility for people of both genders.

Profuse and extended sweating produces dehydration and loss of body electrolytes and may lead to heat exhaustion or muscle cramps. A prime objective of heat stress management must always be preventing heat stroke, which is life threatening and is the most serious of the heat-induced disabilities.

The **heat stroke** victim is often manic, disoriented, confused, delirious, or unconscious. The victim's

skin is hot and dry, sweating has ceased, and the body temperature is 40°C (104°F) or higher. Immediate emergency care and hospitalization are essential if signs of heat stroke develop.

Guidelines for Heat Exposure Limits

Always monitor signs and symptoms of heat stressed workers. When WBGT-TLV criteria are exceeded or water vapor impermeable clothing is worn, discontinue any environmentally-induced or activity-induced heat stress for a person when:

- ✓ Sustained heart rate is greater than 160 beats per minute (bpm) for those under 35 years of age; 140 for 35 years and older; or
- ✓ Deep body temperature is greater than 38°C (100.4°F); or
- ✓ There is disorientation or confusion for more than several minutes; or
- ✓ There are complaints of sudden and severe fatigue, nausea, dizziness, light-headedness, or fainting; or
- ✓ There are periods of inexplicable irritability, malaise, or flu-like symptoms; or
- ✓ Sweating stops and the skin becomes hot and dry.

--Good physical fitness and adequate hydration are the first lines of defense against heat strain--

Guidelines for Optimizing Safety and Health For People Working in Hot Conditions

- ✓ Encourage drinking small volumes (approximately 1 cup) of cool or tepid water about every 20 minutes.
- ✓ Provide work settings with good ventilation and shielding from radiant heat sources.
- ✓ Provide accurate verbal and written instructions, frequent training programs, and other information about heat stress and strain.
- ✓ Assure co-worker observation to detect signs and symptoms of heat stress.
- ✓ Pay extra attention to those who take medications that compromise normal cardiovascular, blood pressure, body temperature regulation, renal, or sweat gland functions.
- ✓ Pay extra attention to those who abuse or who are recovering from the abuse of alcohol or other intoxicants.

--NEVER ignore anyone's signs or symptoms of heat stress--

Heat Stress: Response

Recognition of a heat stress condition in its early stages may respond within 10-minutes by simply stopping activities, removing impermeable clothing, resting in shade with rehydration liquids. Position individual in front of a fan. Apply wet towels to skin. Continue observation and pulse monitoring.

If anyone adversely affected does not seem to respond to the treatment, notify a supervisor. Any changes in behavior, dizziness, cessation of sweating, inability to comfortably drink fluids indicate a heat stress condition that is potentially a medical emergency.

Profuse and extended sweating produces dehydration and loss of body electrolytes and may lead to heat exhaustion or muscle cramps. A prime objective of heat stress management must always be preventing heat stroke, which is life threatening and is the most serious of the heat-induced disabilities.

The heat stroke victim is often manic, disoriented, confused, delirious, or unconscious. The victim's skin is hot and dry, sweating has ceased, and the body temperature is 40°C (104°F) or higher. Immediate emergency care and hospitalization are essential if signs of heat stroke develop

ATTACHMENT 3

BIOLOGICAL HAZARD INFORMATION SUPPLEMENT

CONSTRUCTION HEALTH AND SAFETY PLAN

TOPOCK GROUNDWATER REMEDY

Biological Hazards and Controls

Spiders

Spiders are frequently encountered in or near well monuments, inside sheds, or anywhere protected from the elements. Be very careful when working around these areas where spiders may be established. Take proper precautions-wear gloves and pay attention to where you are working.

If a person is bitten by a spider, clean the site well with soap and water. Apply a cool compress over the bite location and keep the affected limb below heart level, if possible. Aspirin or Tylenol may be used to relieve minor symptoms. **DO NOT** cut the wound or apply a tourniquet. If the wound is painful, seek medical attention immediately, or call the Poison Control Center at 1-800-222-1222.

Try to identify the type of spider: note color, size, patterns, and markings. The main spiders of concern in the Mojave area are the Black Widow and Brown Recluse.

Black Widow (*Lactrodectus mactans*)

The black widow spider is easily identified by its shiny black body and red, hour-glass marking on the underside of its abdomen. The venom of the black widow spider is 15 times as toxic as the venom of the Prairie Rattlesnake. But only a minute amount of the toxin is injected with a single bite by the spider, so they are rarely fatal.

The bite itself is often not painful and may go unnoticed, but the poison injected by the Black Widow bite can cause abdominal pain similar to appendicitis as well as pain to muscles or the soles of the feet. Other symptoms include alternating salivation and dry-mouth, paralysis of the diaphragm, profuse sweating and swollen eyelids.

Persons younger than 16 and older than 60, especially those with a heart condition, may require a hospital stay. (Heart and lung failure may result in death.) A physician can give specific antivenin or calcium gluconate to relieve pain. Healthy people recover rapidly in two to five days.

Desert Recluse (*Loxosceles deserta*)

The abdomen of the brown recluse spider is uniformly colored, although the coloration can range from light tan to dark brown, and is covered with numerous fine hairs that provide a velvety appearance. The long, thin, brown legs also are covered with fine hairs, but not spines. Brown recluse spiders are also commonly referred to as "fiddleback" spiders or "violin" spiders because of the violin-shaped marking on the top surface of the cephalothorax (fused head and thorax). However, this feature can be very faint depending on the species of recluse spider, particularly those in the southwestern U.S., or how recently the spider has molted.

Adult brown recluse spiders have a leg span about the size of a quarter. Their body is about 3/8 inches long and about 3/16 inches wide. Males are slightly smaller in body length than females, but males have proportionally longer legs. Both sexes are venomous. The brown recluse spider is not aggressive, and it normally bites only when crushed, handled or disturbed. Some people have been bitten in bed after inadvertently rolling over onto the spider. Others have been bitten after accidentally touching the spider when cleaning storage areas. Some bites occur when people put on seldom used clothing or shoes inhabited by a brown recluse.

The physical reaction to a brown recluse spider bite depends on the amount of venom injected and an individual's sensitivity to it. Some people are unaffected by a bite, whereas others experience immediate or delayed effects as the venom kills the tissue (necrosis) at the site of the bite. Many brown recluse bites cause just a little red mark that heals without event.

Initially, the bite may feel like a pinprick or go unnoticed. Some may not be aware of the bite for 2 to 8 hours. Others feel a stinging sensation followed by intense pain. Infrequently, some victims experience general systemic reactions that may include restlessness, generalized itching, fever, chills, nausea, vomiting, or shock. A small white blister usually initially rises at the bite site surrounded by a swollen area. The affected area enlarges and becomes red, and the tissue is hard to the touch for some time. The lesion from a brown recluse spider bite is a dry, blue-gray or blue-white,

irregular sinking patch with ragged edges and surrounding redness--termed the "red, white, and blue sign." The lesion usually is 1½ inches by 2¾ inches or smaller.

Tarantula (g. *Aphonopelma*)

The tarantula, the largest Mojave desert spider (body, 2 to 3 inches; 4 inch legs), is not poisonous to humans but its bite can be painful. They inhabit burrows, but freely roam. They are reluctant to bite humans and their venom is usually no worse than a bee sting. Tarantulas also release bristles from their abdomen for self-defense. The bristles, while not venomous, can be highly irritating to the skin and mucus membranes. If a person receives tarantula bristles, wash the effective area thoroughly with soap and water. Use an eyewash and seek medical attention if receiving bristles to the eye.

Snakes

Mojave-area snakes typically are found in underbrush, rock ledges, shady spots on hot days, and sunny rock shelves on cool mornings. If you encounter a snake, stay calm and look around; there may be other snakes. If it is apparent the snake is a rattlesnake, or if an identification cannot be made, turn around and walk away on the same path you used to approach the area.

Notify a project biologist whenever a snake has been encountered, regardless of whether the snake could be identified. Do not attempt to pick up or otherwise move a snake that may be in a work area or on an access/travel path. Instead, stop work to allow the snake to leave on its own, and/or notify a project biologist.

If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately and contact the Poison Control Center at 1-800-222-1222. **DO NOT** apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings.

Mojave Rattlesnake (*Crotalus scutulatus*)

The Mojave rattlesnake (Figure 1), also known as the Mojave Green Rattlesnake, is the most dangerous of rattlesnakes in the area. Its venom, about 16 times more powerful than that of the Sidewinder rattlesnake (see below), attacks both the nervous system and the bloodstream. These snakes are not known to be aggressive, but are known to stand their ground rather than to flee from perceived danger.

It looks similar to a diamondback rattlesnake, having diamond shapes along its back. Its color will vary from green-gray to yellowish tones. Adults range from 2-4 feet in length. The creosote bush (see Figure 2), found in the 2,000 to 4,000 foot elevation is the primary, but not the only, habitat of this snake.

They can be identified by their triangular-shaped head and diamond-shaped markings along their body, and of course, rattles. They are brown in color in the lower elevations and darken to a green in the higher regions near the mountains. It seems to prefer desert flats over hilly or canyon habitat. This species is active from April until September. It forages actively in the open and under bushes.

Figure 1 – Mojave Rattlesnake

Figure 2 – Typical Creosote Brush Habitat of the Mohave Rattlesnake

Sidewinder rattlesnake (*Crotalus cerastes*)

The sidewinder rattlesnake is most abundant in desert washes and flats with shrub cover and wind-blown sand, and especially at the bases of bushes partially buried in sand. This snake is active from mid-spring to early fall, but activity may be restricted during the hottest part of the summer. It is an active forager, but it also waits under bushes for prey, partially buried. It may occasionally use mammal burrows or surface cover objects.

Other venomous snakes

Two other snakes, the Speckled Rattlesnake and the Timber Rattle-snake may also be encountered, and excepting color variations and size, are very distinguishable as belonging to the rattlesnake family.

Field Identification – Rattlesnakes

By comparing Figure 1 with Figure 3, it can be seen the most distinguishing features in identifying rattlesnakes are the triangle-shaped head, and a less-pronounced tapering of the tail with whole or remnant rattles. Do not rely on the "buzz" of the rattles for identification, they are sometimes lost, or not deployed!

Figure 3 – A non-venomous gopher snake.

Mammals and Associated Hazards

The only predatory mammal in the area is the mountain lion, although mountain lions are rare in the Topock area. While generally wary of human activities, and seldom prone to attack, they will engage in stalking behavior, particularly for unaccompanied individuals. Attacks are most likely when they have the clear advantage of surprise, or rapid overpowering of their target.

Other mammals such as skunks, rats, bats, coatimundis, coyotes, foxes, raccoons, are present and are often not afraid of humans, particularly if poor food-waste practices draw their attention. Approaching "friendly" animals, juveniles,

or injured animals is particularly dangerous. These animals are sometimes found in open holes and trenches, and are particularly active at night, or cooler times of the day.

Being bitten can potentially result in rabies, and/or infections. Observations of the animal's behavior, and the carcass if safely available, will be important in the physician's evaluation regarding whether to implement prophylactic rabies treatment.

Hanta Virus or Four Corners disease, is a debilitating disease that may be fatal. It is associated with airborne exposure to fecal residue of rodents. Inactive areas where rodent activities are in evidence (pellet-like feces, shredded nesting materials) should be treated as Hanta virus suspect and precautions taken to prevent air-borne dissemination of dust bearing the virus. Use of wet methods for clearing the area will provide dust control to keep surfaces from shedding dust. Do not use dry sweeping, or pressurized air. Best practice is to use a mixture of soap, water and bleach applied by appropriate sized sprayer. "HEPA" filter respiratory protection is recommended during cleaning.

Bees, Stinging Insects, and Scorpions

Bee and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Personnel are to watch for and avoid nests, and keep exposed skin to a minimum. Personnel known to be allergic should also carry sting kit, and inform the SSO and immediate coworkers, who may be called to assist in the event of a sting and allergic response. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

Mosquitoes breed in open still water and will be uncommon unless rain events or unusual factors contribute to their propagation. They carry a number of infectious diseases in their saliva. If identified or suspected, DEET and similar class of mosquito repellents are effective in minimizing bites to exposed skin. Mosquito borne diseases recognized in California include:

- Chikungunya
- Dengue
- Malaria
- Mosquito-Borne Encephalitis/Encephalomyelitis
- Rift Valley Fever
- West Nile virus

The Striped Bark Scorpion is found in areas with a lot of cracks where it will hide. It is an active forager that does not burrow. It is distinctly associated with dead vegetation. During periods of hot weather, scorpions may move into living areas to escape the high temperatures. Scorpion behavior is non-aggressive, unless physically threatened.

Figure 4 - Striped Bark Scorpion

Scorpions have two pincers, 8 legs and an elongated body with a tail composed of segments. The last tail segment contains the stinger (also termed a telson) that transmits a toxin to the recipient of a sting. Scorpions may sting more than once; the stinger, located at the end of the tail segment is usually not lost or left in the person's tissue after a sting.

The sting is very a painful, but has a minor medical significance for healthy humans. Besides being painful a person who has been stung by a scorpion may feel a tingling, burning or numbing sensation at the sting site.

The reaction at the sting site may appear mild. However, infrequently, a person experiencing a serious reaction may develop severe symptoms throughout the body. Severe symptoms include widespread numbness, difficulty swallowing, a thick tongue, blurred vision, roving eye movements, seizures, salivation, and difficulty breathing. These symptoms constitute a medical emergency. Death may occur. Antivenom therapy is available.

1. Wash the sting with soap and water and remove all jewelry because swelling of tissue may impede the circulation if it not allowed to expand (for example, a sting on a finger that has a ring surrounding it).
2. Apply cool compresses, usually 10 minutes on and ten minutes off of the site of the sting.
3. Acetaminophen (Tylenol) 1-2 tablets every 4 hours may be given to relieve pain (usually not to exceed 3g per 24 hours). Avoid aspirin and ibuprofen (Advil, Motrin) because they may contribute to other problems.
4. Antibiotics are not helpful unless the sting area become secondarily infected.
5. Do not cut into the wound or apply suction.

Many scorpion stings can be prevented by taking precautions such as shaking out clothing and shoes to dislodge any scorpions, wearing clothing that covers the body (for example, wearing gloves and tucking in pant legs into boots may limit exposure). Many pesticides that are commercially used outside on homes may make some scorpions sluggish and easier to kill before they can sting. In addition, pesticides may markedly reduce the food source of scorpions.

If a scorpion is seen or felt on the skin, it is better to brush it off quickly instead of slapping at it because the scorpion will likely sting if the slap does not kill it.

Scorpions glow (fluoresce) under UV light (black light), so if a person is doing tasks in areas where scorpions might reside (dark areas like a closet or underneath a porch), people can use a black light to find them before they sting. This technique can be used at night when scorpions are more active and may be found on the floors or walls.

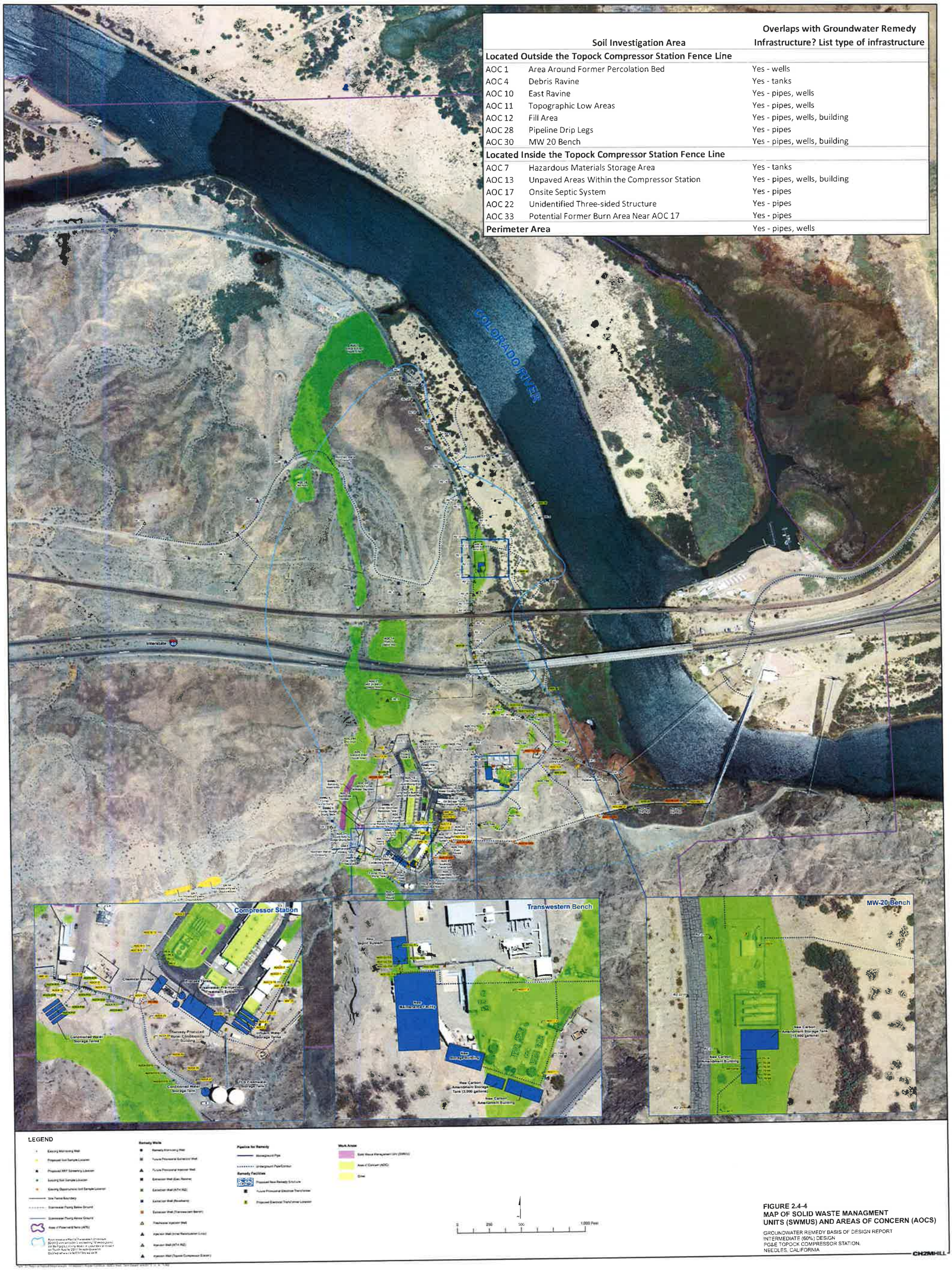
Bloodborne Pathogens

Exposure to bloodborne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and PPE are required per recommendation of Medical Professional. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

All site H&S equipment must include a bloodborne pathogen kit, to be used when rendering first aid, and H&S personnel expected to serve as first responders are to be trained in the use of the bloodborne pathogen kit.

ATTACHMENT 4
MAP OF AOCS

CONSTRUCTION HEALTH AND SAFETY PLAN
TOPOCK GROUNDWATER REMEDY



Soil Investigation Area		Overlaps with Groundwater Remedy Infrastructure? List type of infrastructure
Located Outside the Topock Compressor Station Fence Line		
AOC 1	Area Around Former Percolation Bed	Yes - wells
AOC 4	Debris Ravine	Yes - tanks
AOC 10	East Ravine	Yes - pipes, wells
AOC 11	Topographic Low Areas	Yes - pipes, wells
AOC 12	Fill Area	Yes - pipes, wells, building
AOC 28	Pipeline Drip Legs	Yes - pipes
AOC 30	MW 20 Bench	Yes - pipes, wells, building
Located Inside the Topock Compressor Station Fence Line		
AOC 7	Hazardous Materials Storage Area	Yes - tanks
AOC 13	Unpaved Areas Within the Compressor Station	Yes - pipes, wells, building
AOC 17	Onsite Septic System	Yes - pipes
AOC 22	Unidentified Three-sided Structure	Yes - pipes
AOC 33	Potential Former Burn Area Near AOC 17	Yes - pipes
Perimeter Area		Yes - pipes, wells

Attachment 4
Map of AOCs
Topock Groundwater Remedy Construction H&S Plan

Source: Topock Groundwater Remedy 60% Basis of Design Report, 2013

ATTACHMENT 5
SLOPE SAFETY UTILITY PROCEDURE 2027P-01
CONSTRUCTION HEALTH AND SAFETY PLAN
TOPOCK GROUNDWATER REMEDY

Slope Safety

Summary

This utility procedure identifies hazards associated with working on sloped or angled terrain and describes appropriate work methods to mitigate potential slip and fall hazards.

Level of Use: Information Use

Target Audience

All electric maintenance and construction (EM&C), general construction, electric transmission (ET), and restoration employees.

Safety

- Slope safety is defined as using conventional American National Standards Institute (ANSI)- and Pacific Gas and Electric Company (PG&E)-approved fall protection equipment on sloped surfaces greater than 40°.
- Where a free fall over 2 feet (ft) exists, always use fall arrest equipment. Knot tying is not permitted where loads need support.
- Workers may only use approved fall protection equipment. Many Conformity European (CE) equipment types are not PG&E-approved (for example, non-ANSI-approved rope grabs).
- It is PG&E policy that employees not be exposed to fall hazards. When practical, design or retrofit work areas and processes to eliminate fall hazards before starting work.
- All workers on the job must understand their roles and how those roles relate to the overall work plan, as well as the hazards and hazard controls associated with the job.
- Where feasible, employ approved fall protection systems. Where using a fall protection system is not feasible, implement approved work procedures to protect employees from falls.
- When using a life line, each person must be anchored to a separate, unquestionably strong anchor and life line.
- Only one person may be attached to a life line at a time.
- If the first person ascending or descending a slope reaches stable footing on a slope less than 40°, that person may detach from the life line. The next person may then attach to the same life line to ascend or descend the slope.

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Slope Safety

Before You Start

- Consider all methods of accessing a site to determine if the worksite is accessible without ascending or descending the slope (helicopter long-line-certified employees, alternate route, line-throwing gun, etc.)
- Evaluate and discuss the hazards associated with a sloped or angled jobsite.
- Complete PG&E Course, "Safety at Heights – Authorized Person" (at a minimum).
    - **Authorized person**: A person designated by PG&E who, by reason or training or experience, can work safely at heights and knows how to select and use fall protection equipment properly.
    - **Competent person**: "One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them." (California Code of Regulations, Title 8, Subchapter 4, Article 2)
    - **Qualified person**: "A person designated by the employer who by reason of training, experience or instruction has demonstrated the ability to safely perform all assigned duties and, when required, is properly licensed in accordance with federal, state, or local laws and regulations." (California Code of Regulations, Title 8, Subchapter 4, Article 2)

Table of Contents – Procedures

Subsection	Title	Page
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2	Evaluating the Hazards	3
3	Accessing a Slope	6
4	Tools and Equipment – Harnesses	11
5	Ropes and Life Lines	12

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Slope Safety

Procedures

1 First Aid Emergency Procedures

- Before ascending or descending slopes at the jobsite, establish a site emergency/first aid response plan; document this plan using the jobsite tailboard form and magnetic placard. Ensure the information is complete, communicated, and understood by the entire crew.
- When working alone, perform and document a single-worker tailboard. Always discuss the following information with the person in charge (PIC) – for example, the supervisor:
  - Exact location (global positioning system [GPS] and/or physical location).
  - Time the employee reports back to the PIC after ascending or descending a slope.
  - A follow-up plan in the event the employee is unable to report back at the designated time.

2 Evaluating the Hazards

- When practical, ensure that work areas and processes are designed or retrofitted to eliminate fall hazards.
- Consider all methods of accessing the worksite before working on slopes. Determine if the work can be performed without ascending or descending the slope (helicopter long-line-certified employees, alternate route, line-throwing gun, etc.).

CAUTION

There is no state or federal requirement for working on sloped surfaces less than 40°. However, sloped surfaces less than 40° may pose a hazard. Always consider using fall protection under these circumstances.

2.1 When working on slope surfaces steeper than 40°, adhere to the following guidelines:

- Using fall protection equipment is required, per the Safety Engineering and Health Services (SEHS) *Safety at Heights User Guide*.
- Using a fall arrest system is required when working on a slope ending in a cliff.
- A minimum of two people are required and a fall arrest system must be used when working on a slope where a drop-off greater than 2 ft exists.

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Slope Safety

2.2 IF a hazard cannot be abated through design and any of the following conditions exist:

- The potential vertical fall distance is 2 ft or greater.
- There are sloped roof surfaces steeper than 7:12.
- There are sloped surfaces steeper than 40°.

THEN employ approved fall protection systems, where feasible.

2.3 IF using a fall protection system is not feasible,

THEN implement approved *Safety at Heights User Guide* procedures to protect employees from falls. If necessary, contact a Safety at Heights qualified person (QP) before starting work.

2.4 Before starting work, evaluate and discuss the hazards associated with sloped or angled worksites.

2.5 Always assess the environment. The following is a partial list of work environment and footing conditions to consider:

- What are the general soil conditions (for example, dry and loose or wet and slippery)?
- What are the terrain conditions (for example, general stability, loose rocks, leaves, debris, bush, uneven or moss covered surfaces, steep drop off)?
- What type of vegetation is at the worksite and how might it impact jobsite safety?
- What is the potential for falling/sliding objects (for example, rocks and tools)?
- What are the weather conditions and how might they impact the workers' ability to perform the job safely?
- Is visibility and lighting sufficient to perform the job safely?
- Is the crew properly staffed or are additional resources needed?
- Are approved tools and equipment available at the jobsite to access the slope safely?
- What personal protective equipment (PPE) is needed to perform the job safely? (Be sure to include foot wear for ankle support and traction.)
- Are the workers' hands free of materials and tools while ascending or descending slopes?

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Slope Safety

2.6 Identifying a Slope Hazard

Use a slope indicator to determine the angle of the slope or worksite where employees will be working or must access. (Backcountry slope meter: Code BCASS-10)

- A bubble level or inclinometer may be used to indicate slope angle.
- A protractor may be used (Figure 1), as described in the following Section 2.7, "Identifying Slope Angle Using a Protractor."

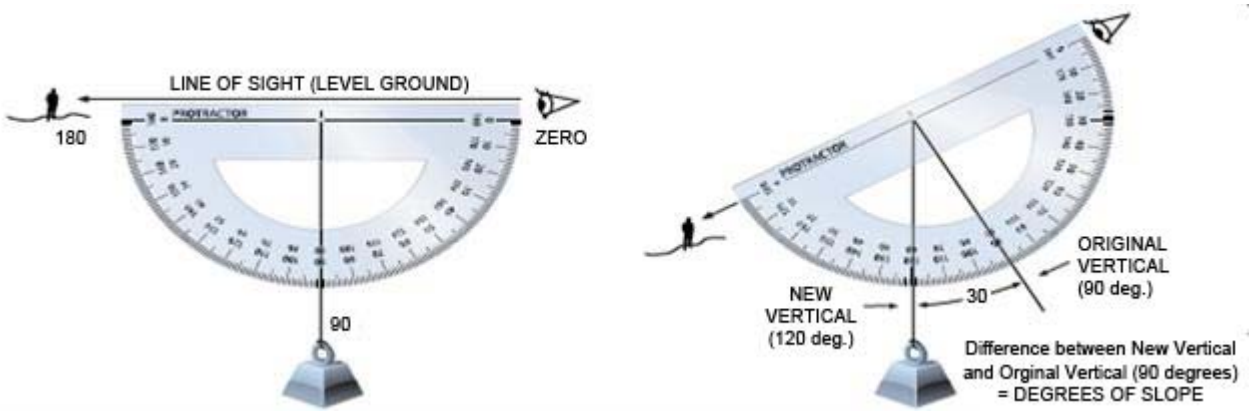

Figure 1. Identifying Slope Angle Using a Protractor

2.7 Identifying Slope Angle Using a Protractor

1. Attach the string to the protractor at the midpoint between the zero and 180° marks (the vertex of the angle).
2. Hang a small weight on the end of the string to make a plumb-bob. The string should hang over the 90° mark when the protractor's flat edge is parallel to level ground.
3. To measure the slope angle from the top of the slope, put your eye by the zero degree mark, and look along the flat edge of the protractor toward the bottom of the hill. If you are at the bottom of the hill, put your eye at the 180° mark and look up toward the top.
4. Check the new angle where the string falls when the plumb-bob is hanging straight down.
5. To ascertain the slope measurement in degrees, subtract 90° from the new vertical angle. In Figure 1 the new angle is 120°, so the slope angle is 30° (120-90=30).
6. To be as accurate as possible, look along the protractors edge to a point the same height above the ground as eye level. (It helps to imagine someone the same height standing at the other end of the slope.)

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Slope Safety

3 Accessing a Slope

3.1 Consider the following partial list of precautions when accessing a slope:

- Access the worksite from above whenever possible. Employees must always be attached to a fall protection system, provided there is a suitable anchor.
- Maintain a sharp visual and mental focus (keep eyes on path) when ascending or descending a slope.
- Wear heavy, Vibram-type boots with good ankle support.
- Use a side step method, if necessary, to maintain stable footing.
- Use a hiking stick or pole for balance.
- Proceed with caution, maintaining a firm footing with each step (take smaller steps).
- Create a step at the worksite for level footing, if needed.

3.2 When using a life line, each person must be anchored to a separate, unquestionably strong anchor. Make sure the anchor is connected at the following points:

- To the frame or other anchor points of a vehicle weighing more than 5,000 pounds (lb.) for fall arrest. Make sure the vehicle ignition is off, the key is removed, and the man-on-line (MOL) tag (notifying others that the vehicle is being used as an anchor) is attached to the steering wheel.
- To a large, firmly planted tree greater than 8 inches in diameter.

3.3 IF there are no suitable anchor points (such as a tree, pole, tower, or truck),

THEN re-evaluate the worksite access. Terrain variables do not allow for a portable engineering solution.

3.4 Accessing a Slope from Above

1. Assess the entire jobsite and slope for potential hazards from the top of the slope.
2. Identify appropriate anchor(s).
3. Ensure that the entire crew participates in a tailboard. Tailboard topics must include the documented emergency plan and all identified, discussed, and mitigated hazards. The entire crew must understand all aspects of the job and emergency plan.
4. Attach a ⅝-inch green life line to the anchor (using a permanently attached steel sling with a minimum ⅝-inch shackle or a 5,000 lb. carabiner).

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Slope Safety

3.4 (continued)

Figure 2. ⅝-Inch Green Life Line

5. IF the steel sling is too short,

   THEN choke an improvised anchor strap (Figure 3) around the anchor, and attach the steel sling eye to the D-ring on the improvised anchor strap with a minimum ⅝-inch shackle or 5,000 lb. carabiner.

Figure 3. Improvised Anchor Strap
(See Table 2 on Page 13 for ordering information.)

6. Put on and adjust an approved full body harness (Figure 4, Page 11).

7. Attach the shock pack end of shock absorbing lanyard (Figure 6, Page 12) to the dorsal (back) D-ring on the harness, and attach the other end to the compatible Buckingham rope grab using approved 5,000 lb. carabiners supplied with shock absorbing lanyard.

8. Attach the approved and compatible Buckingham rope grab (Figure 6) to the life line with the arrow pointing toward the anchor.

9. Begin walking down the slope while holding the rope and moving the rope grab down the rope.

10. When at the worksite, if the slope is over 40°, pull down on the ring of rope grab to lock the rope grab on the life line.

11. Keep equipment on while working on the ground at this location unless the slope can be minimized to less than 40° by digging, relocating to a flatter area, etc.

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3.4 (continued)

CAUTION

Only one person may be attached to any life line at a time.

NOTE

When using a life line, each person must be anchored to a separate, unquestionably strong anchor and life line.

12. IF the first person remains on the first life line,

    THEN the next person repeats Steps 4-10 (starting on Page 6).

13. IF the first person reaches stable ground with less than 40° of slope and disconnects from the life line,

    THEN the next person repeats Steps 6-10 (on Page 7) for each person accessing the slope.

14. Reverse these steps (Section 3.4, "Accessing a Slope from Above," Steps 1-13 starting on Page 6) to ascend the slope after the work is completed.

3.5 Accessing Slope from Below

1. First Person Up

   The first person up performs the following Steps a-j to access a slope from below:

   a. Assess the entire jobsite from the bottom of the slope for potential hazards.

   b. Ensure that the entire crew participates in the tailboard. Tailboard topics must include the documented emergency plan and all identified, discussed, and mitigated hazards. The entire crew must understand all aspects of the job and emergency plan.

   c. Put on and adjust the approved full body harness (Figure 4, Page 11).

   d. Coil the life line up and carry it over your shoulder, or uncoil and attach the life line steel sling to the harness, dragging the life line rope up the hill by the steel sling.

   e. Carry an additional short life line to secure the first person up to a separate anchor, in the event the first person up cannot reach stable ground with less than a 40° slope and additional people will be ascending the hillside.

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3.5 (continued)

CAUTION

Use extreme caution while ascending a hillside. Consider moving up the hill in a switchback pattern, and side step up and along the path to ensure there is a solid foundation for each step. (Consider using a hiking stick/pole for balance.)

f. Use extreme caution while ascending the hillside.

g. When the worksite is reached, identify the appropriate anchor(s).

h. IF the first person up cannot reach stable ground with less than a 40° slope,

THEN the first person up attaches a short ⅝-inch green life line (Figure 2, Page 7) to the appropriate anchor using a permanently attached steel sling with a minimum ⅝-inch shackle or 5,000 lb. carabiner.

i. IF the steel sling is too short,

THEN choke an improvised anchor strap (Figure 3, Page 7) around the anchor, and attach the steel sling eye to the D-ring on the improvised anchor strap with a minimum ⅝-inch shackle or 5,000 lb. carabiner.

(1) Attach the shock pack end of shock absorbing lanyard (Figure 6, Page 12) to the dorsal (back) D-ring on the harness.

(2) Attach the approved and compatible Buckingham rope grab to the other end of the shock absorbing lanyard using approved 5,000 lb. carabiners supplied with shock absorbing lanyard.

(3) Attach the approved and compatible Buckingham rope grab (Figure 6) to the life line with the arrow pointing toward the anchor.

NOTE

When using a life line, each person must be anchored to a separate, unquestionably strong anchor and life line.

CAUTION

Only one person may be attached to any life line at a time

j. Attach the other ⅝-inch green life line to another appropriate anchor (see Step h above).

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3.5 (continued)

2. Next Person Up

The next person up ascends the hillside using the vacant life line (Steps a-g below).

a. Put on and adjust an approved full body harness (Figure 4, Page 11).

b. Attach the shock pack end of shock absorbing lanyard (Figure 6, Page 12) to the dorsal D-ring on the harness, and attach the other end to the Buckingham rope grab.

c. Attach the approved and compatible Buckingham rope grab (Figure 6) to the life line with the arrow pointing toward the anchor.

d. IF the next person up will remain on the life line at the worksite,

THEN that person will take another life line up, and attach the life line to another appropriate anchor for the next person.

e. The next person up begins walking up the slope, while holding the rope and moving the rope grab up the rope.

f. When at the worksite, if the slope is over 40°, pull on the rope grab to lock it on the life line.

g. Keep equipment on while working on the ground at this site unless the slope can be minimized by digging, relocating to a flatter area, etc.

h. Reverse Steps a-g above to descend the slope after the work is completed.

3. Last Person Down

The last person to walk down the slope must disconnect the remaining life lines from the anchors so they can be pulled down the hill.

CAUTION

Use extreme caution while descending a hillside. Consider moving down the hill in a switchback pattern, and side step down and along the path to ensure there is a solid foundation for each step. (Consider using a hiking stick/pole for balance.)

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4 Tools and Equipment – Harnesses

For information regarding other tools and equipment, see the SEHS *Safety Equipment Guide*.

4.1 Full Body Harness

A full body harness is designed with straps that fasten around a person to contain their torso and distribute fall arrest forces over at least their upper thighs, pelvis, chest, and shoulders (with a means for attaching the harness to other components or subsystems).

Workers may use front, side, or back D-rings with a full body harness. While working on steeper slopes, workers must employ a fall arrest system and use a back D-ring as the attachment point.

4.2 Fall Arrest Harness

A fall arrest harness has a single forged D-ring affixed to the shoulder straps and positioned between the shoulder blades. It allows workers to climb and work without interference from the rope. The dorsal attachment ensures that an individual hangs in an upright position after a fall and that the forces of a fall are distributed correctly. The upright position is especially helpful if the fallen worker is unconscious or injured. This design enables workers to be safe and reasonably comfortable while suspended for prolonged periods of time.

4.3 PG&E-Approved Harnesses

When working on slopes, use any of the following harnesses:

- Buckingham Harness.
- DBI Exofit – XP Full Body 4 D-Ring Harness (Figure 4).
- Yates Tower Harness.

Figure 4. DBI Exofit – XP Full Body 4 D-Ring Harness

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5 Ropes and Life Lines

5.1 Rope is defined as any cordage (synthetic or natural) with an external diameter greater than 3/16 inch (4 millimeters [mm]). The length may be twist balanced, as in a “laid” rope, or braided.

5.2 Vertical Life Line (Figure 5 and Table 1 below)

A component, element, or constituent of a life line subsystem consists of a vertically suspended flexible line with a connector at the upper end for fastening the line to an overhead anchor or anchor connector, along which a fall arrester travels.

Figure 5 and Figure 6 are illustrations of the PG&E-approved rope/vertical life line with compatible shock pack and rope grab.

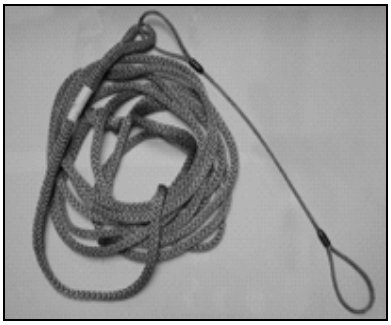

Figure 5. ⅝-Inch Green Life Line

Figure 6. Rope Grab and Buckingham Lanyard for Use with ⅝-Inch Green Life Line

Table 1. Single Braided 12-Strand Rope for Fall Arrest Systems – Requirements and Ordering Codes

Rope Size (inches)	Minimum Breaking Strength (lbs)	Approximate Net Weight per 100 ft (lbs)	Diameter (inches)	M&S Ordering Codes
⅝	15,000	13.1 ±/- .5	0.657 ±/- .015	
Standard Fall Arrest System Ropes				
Specify length of rope				20-9276
Tower Structure Fall Arrest System Ropes				
25 ft length				20-9277
40 ft length				20-9278
Specify length of rope				20-9279
Rope Grab Devices				
MIO ⅝-inch rope grab (non-free following)				20-9280
3 ft Buckingham Energy Absorbing Lanyard, Pt. No. 611113				20-9282
*RTC Rope Grab and Energy Absorbing Lanyard (free following), Mod. No. 23000P3E				20-9281

*Do not use the RTC Rope Grab and Energy Absorbing Lanyard with a Buckingham Bucket Harness.

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Slope Safety

5.2 (continued)

Table 2. Improvised Anchor Strap – Ordering Information (See Figure 3 on Page 7 for illustration.)

Supplier Part #	Description	Manufacturer Part #
DBI1002200	Tie-off adapter, 3 ft long – welding and arc-flash rated (made with Kevlar)	1002200
DBI1002202	Tie-off adapter, 6 ft long – welding and arc-flash rated (made with Kevlar)	1002202
DBI1002207	Tie-off adapter, 12 ft long (for CRE only), welding and arc-flash rated (made with Kevlar)	1002207
DBI1002206	Tie-off adapter, 20 ft long (for CRE only), welding and arc-flash rated (made with Kevlar)	1002206
Tie-off adapters wrap around a structural member to provide an anchorage point for fall restraint/arrest systems. Pass a tie-off adapter through a type D-ring, 1-¾ inch polyester load strap, with a 3-inch wide wear pad and green webbing down the middle of the strap.		

5.3 Horizontal Life Line

The horizontal life line consists of an anchor, anchor connector, life line, and a variety of subsystems. The entire system (from anchor to body support) must be designed, engineered, and approved by a QP and must have a safety factor of at least two.

QP(s) designing or engineering horizontal life line systems **must** conduct appropriate research, maintain adequate safety margins, and receive additional training on designing man-rated systems. Employees may not install or use a horizontal life line for fall arrest unless a QP has properly designed or engineered such life line. Horizontal life line systems are relatively flexible in type, situation, size, and the span they can accommodate.

END of Instructions

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Slope Safety

Definitions

Fall arrest system: Prevents an employee from free falling to the ground. Always wear a full body harness as part of a fall arrest system.

Fall arrester (rope grab): A device which travels along a lifeline and automatically engages a line and lock to prevent an employee from falling.

Fall restraint system: A fall protection method that prevents employees from approaching an edge. With a properly constructed fall restraint system, employees are not in danger of a free fall should they trip or become unconscious. In situations where exposure to a fall hazard cannot be prevented, always use a fall arrest system.

Jobsite: A 360° area within which a worksite is contained.

Worksite: The immediate site where a task is conducted within a jobsite.

Implementation Responsibilities

All electric maintenance and construction (EM&C), general construction, electric transmission (ET), and restoration area superintendents must ensure that the supervisors in their areas conduct tailboards on this procedure.

Governing Document

NA

Compliance Requirement/ Regulatory Commitment

American National Standards Institute (ANSI)

California Code of Regulations, Title 8, “Industrial Relations”

California Occupational Safety and Health Administration (Cal/OSHA)

Reference Documents

PG&E Courses:

- Safety at Heights – Authorized Person
- Safety at Heights – Competent Person
- Safety at Heights – Qualified Person

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Reference Documents, *Continued*

Safety Engineering and Health Services (SEHS) Manuals:

- *Safety at Heights Reference Manual*
- *Safety at Heights User Guide M62-1073*
- *Safety Equipment Guide*

SEHS Safety Tailboard, "Safety in the Field – Slope Safety Awareness"

Utility Standard Practice (USP) 22, "Safety and Health Program"

Appendices

NA

Attachments

NA

Document Recision

NA

Approved By

Charles Gebhardt, Manager

Document Owner

Jerry Meleski, Supervisor

Document Contact

Tim Combs (TJCF)
Senior Work Methods Specialist
(209) 662-4499

Revision Notes

Where?	What Changed?
NA	This is a new document.

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ATTACHMENT 6
EXCAVATION SAFETY UTILITY STANDARD
TD-4621S

CONSTRUCTION HEALTH AND SAFETY PLAN
TOPOCK GROUNDWATER REMEDY

Excavation Safety

SUMMARY

This standard establishes design requirements for working safely in excavations. This standard mandates use of the Pacific Gas and Electric Company (Company or PG&E) *Excavation Safety Manual*.

TARGET AUDIENCE

Personnel who work in or near excavations or perform standby.

SAFETY

Compliance with the Company's *Excavation Safety Manual* ensures safe working conditions.

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Excavation Safety

REQUIREMENTS

1 General

1.1 This standard establishes use of the *Excavation Safety Manual* and any appendices or attachments.

1.2 The *Excavation Safety Manual* provides key information to personnel planning, creating, and/or working near excavations including, but not limited to, the following:

- Pre-construction jobsite preparation or inspection.
- Description of soil types and their characteristics.
- Controlling hazards at the jobsite.
- Monitoring excavation conditions for changes.
- Installation and removal procedures for various types of shoring.
- Designs for sloping and benching excavations.
- Emergency contact numbers and procedures for responding to a cave-in of an excavation.
- Frequently asked questions (FAQs).

1.3 The Company must maintain competent person training records.

2 Adherence to the *Excavation Safety Manual*

2.1 Personnel must adhere to the requirements in the *Excavation Safety Manual* when working in excavations including, but not limited to, the following items:

- Presence of a competent person onsite at all times.
- Analysis of soil classification.
- Identification of jobsite or environmental hazards affecting the stability of the excavation.
- Installation of cave-in protective system (shoring, sloping, benching, shielding, or other approved method).
- Inspection of the excavation and cave-in protective system at the beginning of each shift, and anytime conditions change.
- Securing the jobsite.

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END of Requirements

DEFINITIONS

Competent person: one who is through training and experience, qualified of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to personnel, and who has the authority to take prompt corrective measures to eliminate such conditions.

Excavation: Any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.

IMPLEMENTATION RESPONSIBILITIES

The area directors, superintendents, and supervisors ensure that personnel are trained and comply with the requirements of this standard. In addition, they are responsible for providing sufficient resources to achieve the requirements of this standard and ensuring that the Excavation Safety Manual is available at every jobsite where excavation activities are being performed to comply with the California Division of Occupational Safety and Health (DOSH), better known as Cal/OSHA, regulations.

Personnel assigned tasks related to entering excavations must carry out their designated tasks. For their own safety and that of the general public, personnel must perform only the tasks for which they are trained, knowledgeable, and qualified. When necessary, personnel must notify their supervisor(s) of any additional training, equipment, or resources needed to perform assigned tasks.

GOVERNING DOCUMENT

- NA

COMPLIANCE REQUIREMENT / REGULATORY COMMITMENT

- Occupational Safety and Health Administration (OSHA) 29 CFR 1926 subpart P, Excavations
- 1926.800; Underground Construction
- 1926.956, Underground Lines
- California Code of Regulations (CCR) Title 8, Section 1540, 1541, and 1542 governing Excavation Safety

REFERENCE DOCUMENTS

Developmental References:

- INGAA Document Cs-s-12, “Trenching and Excavation Safety”

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Excavation Safety

- OSHA Technical Manual (OTM) Section, "Excavations: Hazard Recognition in Trenching and Shoring"

Supplemental References:

- NA

APPENDICES

- NA

ATTACHMENTS

- Attachment 1, "Excavation Safety Guide"
- TD-4621M-F01, "Excavation Safety Checklist"

DOCUMENT RECISION

- This document cancels Utility Standard S4415, "Excavation Safety," issued 01/2003.

DOCUMENT APPROVER

Lenny Caldwell
Manager

DOCUMENT OWNER

Curt Liljedahl
Engineer

DOCUMENT CONTACT

Curt Liljedahl
Engineer

REVISION NOTES

Where?	What Changed?
NA	This is a new document.

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Appendix E
Cost Estimate

This section will not be completed in time for the publication of the 90% BOD Report on September 8, 2014. It will be completed on September 15, 2015 and at that time will be sent to all recipients of the 90% BOD Report hardcopies for insertion into their binders.

Appendix F
Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan

Revised Report

Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan, Topock Compressor Station, Needles, California

Prepared for

Pacific Gas & Electric Company

September 2014

CH2MHILL®
155 Grand Avenue
Suite 800
Oakland, CA 94612

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Acronyms and Abbreviations

AOC	area of concern
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
BLM	U.S. Bureau of Land Management
BMP	best management practice
CACA	Corrective Action Consent Agreement
Cal-OSHA	California Occupational Safety and Health Administration
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife (formerly California Department of Fish and Game [CDFG])
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CESA	California Endangered Species Act
CFR	*Code of Federal Regulations*
CHPMP	Cultural and Historic Properties Management Plan
CHSC	California Health and Safety Code
CIMP	Cultural Impact Mitigation Program
CIP	clean-in-place
CMI	corrective measures implementation
CMS/FS	RCRA Corrective Measure Study/CERCLA Feasibility Study
Compressor Station	Topock Compressor Station
Cr	chromium
CRHR	California Register of Historical Resources
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EIR	Environmental Impact Report
ESA	federal Endangered Species Act
Final Remedy	final groundwater remedy
FMIT	Fort Mojave Indian Tribe
ft	foot/feet

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General Permit	NPDES General Permit No. CAS00001
gpm	gallons per minute
HCl	hydrochloric acid
HDPE	high-density polyethylene
HHRA	Human Health Risk Assessment
HMBP	Hazardous Materials Business Plan
HNO_3	nitric acid
HSP	Health and Safety Plan
IM	Interim Measure
IM-3	Interim Measure No. 3
IM-3 system	IM-3 Treatment Plant, extraction, injection, and conveyance system components and infrastructure
MDAQMD	Mojave Desert Air Quality Management District
mg/kg	milligrams per kilogram
ml	milliliter
MLD	most likely descendent
MMRP	Mitigation Monitoring and Reporting Program
MW	monitoring well
NOT	Notice of Termination
NH_4OH	ammonium hydroxide
$(NH_4)_2SO_4$	ammonium sulfate
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OSHA	U.S. Occupational Safety and Health Administration
oz.	ounce
PA	Programmatic Agreement
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PBA	*Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions*
PG&E	Pacific Gas and Electric Company
PLC	programmable logic controller
PPE	personal protective equipment
PRG	preliminary remediation goal
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act

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Regional Water Board	Colorado River Basin Regional Water Quality Control Board
RFI	Resource Conservation and Recovery Act facility investigation
RI	remedial investigation
RO	reverse osmosis
SOB	Statement of Basis
SOP	standard operating procedure
STLC	soluble threshold limit concentration
SVOC	semivolatile organic compound
SWRCB	State Water Resources Control Board
SWPPP	Stormwater Pollution Prevention Plan
SWMU	Solid Waste Management Unit
TC	toxicity characteristic
TCLP	toxicity characteristic leaching procedure
TCP	Traditional Cultural Property
TCS	Topock Compressor Station
TLC	Teflon-lined closure
TPH	total petroleum hydrocarbon
TRC	Technical Review Committee
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WDR	waste discharge requirement
WET	waste extraction test
Work Plan	IM-3 Decommissioning, Removal, and Restoration Work Plan
XRF	X-ray fluorescence

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SECTION 1

Introduction

1.1 Purpose and Scope

Pacific Gas and Electric Company (PG&E) is implementing a final groundwater remedy (Final Remedy) to address chromium in groundwater at Solid Waste Management Unit (SWMU) 1/area of concern (AOC) 1 and 10 located near PG&E's Topock Compressor Station (TCS or the Compressor Station) in San Bernardino County, California. PG&E is required to prepare a work plan for decommissioning and removal of the Interim Measure No. 3 (IM-3) Groundwater Extraction and Treatment System, and the restoration of the areas affected by IM-3 operations, and to submit the work plan as part of PG&E's pre-final/final design submission and Construction/Remedial Action Work Plan.

This IM-3 Decommissioning, Removal, and Restoration Work Plan (Work Plan) was prepared in compliance with the following agreements, decree, plans, and directives, and defines the scope of work and the requirements on which the scope of work is based for the decommissioning, removal, and restoration of the IM-3 Treatment Plant and extraction, injection, and conveyance system components and infrastructure (IM-3 system):

- The 2006 and 2012 Settlement Agreements between PG&E and the Fort Mojave Indian Tribe (FMIT) and the 2012 Settlement Agreement between the California Department of Toxic Substances Control (DTSC) and the FMIT
- The Remedial Design/Remedial Action Consent Decree (CD) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) between PG&E and the United States[1]
- The Programmatic Agreement (PA) among the U.S. Bureau of Land Management (BLM), Arizona State Historic Preservation Officer, California State Historic Preservation Officer, and the Advisory Council on Historic Preservation for the Topock Remediation Project
  - The Cultural and Historic Properties Management Plan (CHPMP), which is a document prepared under the PA
- The Mitigation Monitoring and Reporting Program (MMRP), part of the certified Environmental Impact Report (EIR) for the groundwater remedy (DTSC, 2011b)

PG&E will decommission and remove the IM-3 system in accordance with this Work Plan after receipt of approval for IM-3 decommissioning by DTSC, with concurrence from the U.S. Department of the Interior (DOI). The procedures and criteria for DTSC's determination, with DOI's concurrence, that IM-3 decommissioning can be approved is presented in the Basis of Design Report for the Final Remedy (part of the 90% design documents [CH2M HILL 2014a]) and the Construction/Remedial Action Work Plan (CH2M HILL 2014b) for review. Section 7 of the Basis of Design Report for the Final Remedy presents the transition plan from Interim Measure (IM) to Final Remedy, which specifies that the IM-3 system (extraction, treatment, and injection) will be shut down prior to the startup of the Final Remedy.

During the time period between the shutdown and the decommissioning and removal, the IM-3 system will be in a lay-up condition. A lay-up condition means that the IM-3 system will be left in place in a safe, secure, and preserved state. After the IM-3 system is in a lay-up condition, it is not expected to operate again because it will have met the goals of the IM and associated design parameters. The lay-up period will end, and the decommissioning, removal, and restoration work will begin after agency approval is received. Following the IM-3 system decommission and removal, the land originally affected by IM-3 operations will be restored to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities.

[1] PG&E and the United States executed the CD in 2012, and it approved by the United States District Court for the Central District of California in November 2013.

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This Work Plan includes procedures for IM-3 system lay-up, procedures for decommissioning and removing IM-3 system, waste management procedures, best management practices and mitigation measures compliance, soil confirmation sampling, a general approach for restoring areas originally affected by IM-3 operations, approvals and reporting requirements during the phases of IM-3 system closure, and a proposed schedule for this work.

In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes.[2] The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. As stated in the responses to comments on the 60% design (response to comment [RTC] #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.

1.2 Background and Requirements

1.2.1 Background

The Compressor Station is located in San Bernardino County, approximately 15 miles southeast of Needles, California, as shown on Figure 1-1 (figures are located at the end of each section). Investigative and remedial activities at the Compressor Station have included the following:

- **Conduct multiple phases of the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI)/ Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial investigation (RI) to identify and evaluate the nature and extent of hazardous waste and constituent releases at the Compressor Station.** The RFI/RI for groundwater at the Compressor Station is complete; however, the RFI/RI for soil is ongoing. Two areas associated with the IM have been identified for inclusion in the RFI/RI for soil. The IM-3 Treatment Plant and Monitoring Well (MW)-20 Bench Facility areas are identified as AOC 29 and AOC 30, respectively. In addition, the RCRA Corrective Measure Study/CERCLA Feasibility Study (CMS/FS) for groundwater at SWMU1/AOC1 and AOC10 was completed.
- **Implement an IM to stabilize the groundwater contamination by hydraulic control until the Final Remedy is in operation.** PG&E has implemented an IM at the site since March 2004. Initially, PG&E commenced pumping, transport, and disposal of groundwater from the MW-20 Bench location in March 2004 (IM-2). Batch treatment on the MW-20 Bench was added later in 2004. Because of space and treatment capacity limitations to manage higher groundwater flows at the MW-20 Bench, the IM-3 system includes a groundwater extraction, conveyance, treatment, and injection system. The IM-3 system began treating groundwater in July 2005, and has been in continuous operation since that time. In 2005, IM-2 was turned off, and in 2009, it was decommissioned. Following decommissioning of IM-2, the IM-3 brine storage and loading facilities were relocated and upgraded on the MW-20 Bench.
- **Select a Final Remedy**. In a coordinated effort, DOI and DTSC selected the Final Remedy. The DOI decision is presented in the Record of Decision (DOI, 2011), and the DTSC decision is presented in a decision package that includes the certification of the final EIR, the Final Statement of Basis (SOB), the Statement of Decision, and the Resolution of Approval (DTSC, 2011a). The IM-3 system is not part of the selected Final Remedy; therefore, the IM-3 system will be decommissioned and removed after DOI and DTSC determine that the Final Remedy is operating properly and successfully.

[2] PG&E has provided a proposed draft schedule to the Tribes and once the Tribes have commented on the schedule, PG&E will provide it to DTSC and DOI.

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1.2.2 Requirements for Work Plan

Several documents require PG&E to prepare this Work Plan or impose requirements that apply to the activities within the scope of this plan. This section presents the exact language in each of the documents requiring this Work Plan or applicable to this Work Plan.

Programmatic Agreement (BLM, 2010). Stipulation V of the PA states the following:

A. *All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. All such removal will be planned in consultation with the Signatories, Tribes, and Invited Signatories following the guidelines in Appendix B.*

B. *The removal of such facilities shall be monitored following the monitoring guidelines in Appendix C.*

C. *The removal of such facilities shall take place along existing graded roads to the maximum extent practicable.*

D. *Prior to decommissioning of any remediation facility, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the development of the closure plan to determine how to best restore the areas affected by the Topock Remediation Project, including, but not limited to, the site of the existing treatment plant and related facilities, but excluding the Topock Compressor Station and related facilities, to ensure that environmental restoration of conditions existing prior to the construction of the Project is achieved to the extent practicable.*

E. *PG&E will draft a plan for decommissioning, removal and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes and Invited Signatories.*

General Principle D states that,

> The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to . . . Ensure that PG&E shall, to the extent practicable, restore the areas affected by the Topock Remediation Project within the APE including, but not limited to, the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities to the conditions existing prior to the construction of the PG&E investigation and remediation related appurtenances and facilities.

Stipulation III(B)(3)(c) also states that,

> Whatever the selected alternative, the Federal Agencies will consult with Signatories, Tribes, and Invited Signatories during design, implementation, and monitoring activities to determine how best to restore the areas affected by the Topock Remediation Project. These areas will include, but not be limited to, the site of the existing treatment plant and related facilities but will exclude the Topock Compressor Station and related facilities. The Federal Agencies will ensure that environmental restoration to the conditions existing prior to the construction of the Project is planned and conducted to the extent practicable.

CHPMP (BLM, 2012). Section 6.2.3 states the following:

> *The IM-3 treatment plant is not part of the Selected Remedy for groundwater. The IM-3 treatment plant and other IM infrastructure that are not used for the groundwater remedy are expected to be decommissioned following determination by DOI and DTSC that the groundwater remedy is operating properly and successfully and that IM-3 is no longer needed for the*

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protection of human health and the environment. In conformance with PA Stipulation V(E) and PG&E's Settlement Agreement (PG&E 2006), a plan will be prepared for decommissioning, removal and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes and Invited Signatories [BLM et al. 2010:13].

PG&E will remove all other remediation facilities and appurtenances related to the Topock Remediation Project as soon as practicable following the attainment of cleanup standards and a determination by DOI that the removal of these facilities is protective of human health and the environment (BLM et al. 2010:13).

The CHPMP also refers to Stipulation V of the PA, as previously outlined.

EIR Mitigation Monitoring and Reporting Program (DTSC, 2011b). EIR mitigation measure CUL-1a-8 describes the requirements of the Cultural Impact Mitigation Program (CIMP). Within the CIMP, CUL-1a-8(f) requires the following to be included as an appendix to the CIMP:

A plan for the decommissioning and removal of the IM-3 Facility and proposed restoration of the site (to be an appendix to the CIMP).

Settlement Agreement between PG&E and the FMIT (PG&E, 2006). Article VII, Decommissioning, Restoration and Title Transfer of the IM-3 Site; Future Use of the Topock Compressor Station, states the following:

A. Development and Implementation of a Removal and Restoration Plan

1. Upon decommissioning of the IM-3 treatment plant, PG&E will work in consultation with the Tribe to restore the IM-3 Site to pre-existing conditions to the maximum extent practicable, subject to the continued use of remedial facilities, including but not limited to injection wells and related equipment on the site, as set forth above, consistent with Section VI.B.2. Restoration plans will be developed and implemented in consultation with the Tribe for removal of the IM-3 treatment plant and related facilities and the restoration of disturbed areas.

2. PG&E also will negotiate in good faith with the Tribe and with appropriate federal agencies, including BLM, to identify near-term restoration activities, e.g., around existing wells or access, that might be undertaken to accelerate the return of federal lands to natural conditions, to remove all IM-3 facilities on federal lands and to restore federal lands affected by IM-3 activities. Such removal and restoration activities will be undertaken, subject to any necessary approval of the agencies that own or control the affected properties, as soon as practicable after the facilities or affected properties are no longer needed for IM-3 related facilities, or earlier as may be otherwise mutually agreed upon by the Settlement Parties.

B. Additional Restoration

1. PG&E also will undertake additional restoration efforts requested by the Tribe to address impacts that predate PG&E's ownership, so long as such requests are reasonable and consistent with PG&E's legal obligations (e.g. under the National Historic Preservation Act) and, where regulatory approval is necessary, to the extent approved by relevant State and Federal regulatory agencies.

2. PG&E and the Tribe will negotiate in good faith to identify near-term restoration activities, e.g., around existing wells or access, that might be undertaken to accelerate the return of the IM-3 Site to natural conditions.

Settlement Agreement between PG&E and the FMIT (PG&E, 2012). Article V(B), IM3 Decommissioning, states the following:

B. PG&E shall not advocate with either federal agencies or DTSC for the retention of the IM-3 as a contingency measure for the Groundwater Remedy, or for any other purpose, and will decommission and remove the IM-3 Facilities, not expressly included as part of Alternative E, as soon as reasonably practicable after DTSC has

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approved the decommissioning. PG&E and Tribe shall use their best efforts to get DTSC to establish criteria to allow the removal of the IM-3 Facilities as soon as reasonably practicable once DTSC has certified that the Groundwater Remedy has reached operational status.

Settlement Agreement between DTSC and the FMIT (DTSC, 2012). Article 9(a) , Decommissioning of Interim Measure 3, states the following:

a. DTSC shall comply with "Additional Settlement Terms – Criteria for Decommissioning of IM-3," as is set forth in Exhibit A hereto, which exhibit is incorporated as if set forth in full.

Exhibit A to that Agreement ("Additional Settlement Terms – Criteria for Decommissioning of IM-3") states the following:

1. **Plume Control and IM-3 Decommissioning.** DTSC agrees that when the groundwater remedy is determined by DTSC to have achieved Plume Control as set forth below, then DTSC will approve decommissioning of the Interim Measure 3 wastewater treatment facility (IM-3) as long as that determination is consistent with any required decision to decommission IM-3 (including any related facilities to be decommissioned) by the DOI. DTSC's determination of Plume Control shall be consistent with the ability to achieve the criteria for DTSC's determination that the overall groundwater remedy is operating properly and successfully (OPS), and must be made concurrent with or after DTSC's OPS determination, unless DTSC in its lawful discretion, decides that decommissioning of IM-3 can occur prior to DTSC's OPS determination; and DOI must concur with DTSC's decision to decommission IM-3.
2. **Definition of Plume Control.** Plume Control is defined as a determination, based upon verified monitoring data, that the Cr(VI) plume is generally stable within its baseline footprint and that the remedy is limiting plume migration consistent with the approved remedy design. The baseline footprint shall be defined as the area of groundwater at the time of remedy start-up delineated by concentrations of Cr(VI) in excess of 32 micrograms per liter. In addition, Plume Control means maintaining remedy by-products (such as Mn and As resulting from dosing and groundwater movement) within the limits projected in the approved remedy design.
3. **Definition of OPS as to Remedy.** "Operating properly and successfully" for purposes of the overall groundwater remedy is defined as follows: a) the remedy is operating as designed; b) the information obtained from remedy operation indicates that the remedy is protective of human health and the environment; and c) the remedy is likely to be able to achieve the cleanup levels or performance goals delineated in the DTSC Statement of Basis and the DOI Record of Decision for the groundwater remedy at the PG&E Topock Site.
4. **Consistency with Applicable Laws.** DTSC's approval of decommissioning IM-3 shall be in accordance with any applicable requirements of the Resource Conservation and Recovery Act (RCRA), the Corrective Action Consent Agreement (CACA), the Comprehensive Environmental Response, Cleanup and Liability Act (CERCLA), the National Contingency Plan, and the California Hazardous Waste Control Law (HWCL).
5. **Criteria for Plume Control and IM-3 Decommissioning Approval.** The procedures and criteria set forth below shall apply to DTSC's determination that the remedy is maintaining Plume Control and that IM-3 decommissioning can be approved. The timelines set forth below are estimates based on the conceptual design of the remedy, and the parties understand that the substantive criteria, and not the estimated timelines projected as part of the remedial design, shall govern DTSC's decisions regarding the determination of Plume Control by the remedy and approval of IM-3 decommissioning.
    a. **Plume Control Criteria.** The criteria set forth below shall apply to DTSC's determination that the remedy is maintaining Plume Control. As part of the Remedial Design for the groundwater remedy, PG&E shall include a list of criteria for demonstrated Plume Control ("Plume Control Criteria") for review by project stakeholders and tribes during the remedial design phases, and approval by DTSC as part of the Construction/Remedial Action work plan. The Plume Control Criteria shall be made a part of the 60 and

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90% design packages and finally submitted with the Construction/Remedial Action work plan. Plume Control Criteria that shall be considered include, but are not limited to, the following factors:

i. Delivery and circulation of reagent within the National Trails Highway (NTH) in situ reactive zone (IRZ) treatment zone has successfully established a reducing zone adequate to limit Cr(VI) plume migration;

ii. Successful demonstration of hydraulic movement within the FEIR project area, as defined in FEIR and as shown in FEIR Exhibit 3-2, consistent with the approved remedy design resulting from operation of hydraulic extraction along the river with reinjection in the upland area and fresh water injection in the upland area;

iii. Verified monitoring data will be used to establish that the Cr(VI) plume is generally stable within its baseline footprint, as defined above;

iv. Verified monitoring data demonstrates control of remedy by-products (such as Mn and As resulting from dosing and groundwater movement) within the limits projected in the approved remedy design;

v. Successful Cr(VI) and by-product migration control will be projected using the groundwater flow and transport model used for remedial design only after a demonstration of consistency of model projections of the groundwater flow with transport model and field data.

b. **IM-3 Shutdown and Remedy Startup.** The IM-3 system shall be turned off when the groundwater remedy equipment and facilities are in place, and ready to begin start-up. The remedy equipment and facilities may include: the wells for the IRZ along the NTH, the riverbank wells, the freshwater wells, monitoring wells, the East Ravine/TCS wells, and the pipelines, controls, and electrical and mechanical systems needed to operate these wells. PG&E shall notify DTSC and the Tribe when the IM-3 system is ready to be turned off per the above-stated conditions. Upon DTSC concurrence that the system is ready to be turned off, PG&E shall turn off the IM-3 system, and this date will be the “start-up date.”

c. **Remedy Start-up Steps.** Once IM-3 has been turned off, the groundwater remedy will be started up. Start-up of the remedy may include the following steps: the NTH IRZ wells will begin operation, NTH IRZ carbon substrate injection will begin, the NTH IRZ cut-off line will be established, the freshwater injection system will be brought on line, the operation of the Inner Recirculation Loop of wells will be initiated, and the East Ravine and TCS extraction wells will engage and deliver water to the TCS IRZ wells. *These steps are anticipated to be completed within 12 to 24 months following the start-up date.*

d. **Full Operational Status.** When the remedy start-up steps have been completed, the groundwater remedy will have reached full operational status. At this time, PG&E shall provide DTSC and the Tribe with written notice that the remedy has reached full operational status. The date of this notice will be the “full operational status date.”

e. **Remedy Review for Plume Control.** At the end of each calendar quarter following the full operational status date, PG&E will prepare and submit to DTSC quarterly progress reports on the extent to which the data regarding remedy performance are adequate to make a determination of Plume Control, for the purpose of making a determination that IM-3 may be decommissioned. These reports will at the same time be made available to all stakeholders for evaluation and comment. At the end of the second calendar quarter, and each quarter thereafter as needed, PG&E will provide data and analysis for DTSC review and determination of Plume Control. Based on PG&E’s data and performance evaluation against the approved Plume Control Criteria, DTSC will determine, as soon as practicable, whether conditions have been satisfied to authorize PG&E to decommission IM-3.

f. **Decommissioning and Removal of IM-3.** Not later than thirty (30) days after all of the following have occurred: (a) DTSC determines that the groundwater remedy is achieving Plume Control; (b) DTSC has determined that the groundwater remedy is operating properly and successfully (unless DTSC determines, in its lawful discretion, that decommissioning can occur prior to DTSC’s OPS determination); and (c) DOI

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concurs with the decommissioning of IM-3, DTSC shall issue to PG&E a written approval of the decommissioning of IM-3 directing PG&E to implement the DTSC and DOI-approved IM-3 decommissioning plan. PG&E will then begin decommissioning and removal of the IM-3 facilities as soon as is reasonably practicable after DTSC issues its written approval to proceed.

Additionally, with respect to step (b) above, DOI must concurrently determine the remedy to be functioning properly and performing as designed for DOI to consider the remedy "operational and functional" in accordance with the NCP 300.435(f)(2).

Consent Decree and Appendix C, Scope of Work to Consent Decree (DOI, 2013), Section 2.2.8 states the following:

> *PG&E shall submit an IM-3 Decommission Plan as part of the pre final/final design that describes procedures for the removal and decommissioning of the IM-3 treatment plant and other infrastructure associated with the Interim Measures at Topock that are not incorporated into the groundwater remedy. This Plan will also describe the restoration of the site of the existing treatment plant and related facilities to the conditions existing prior to the construction of the investigation and remediation-related appurtenances and facilities, to the extent practicable and in conformance with the Programmatic Agreement ("PA") and the Settlement Agreement between PG&E and the Fort Mojave Indian Tribe dated November 9, 2006.*

See also Consent Decree Paragraph 12(f) and 13(b). Section 3.3 of the Scope of Work also describes the IM-3 Decommissioning Plan, similar to Section 2.2.8, as part of the Remedial Action Work Plan.

Closure performance standard for a facility operated under Conditional Authorization, as specified in California Health and Safety Code Section 25200.3(g), Revised (California State Board of Equalization, 2012):

> *(1) Upon terminating operation of any treatment process or unit conditionally authorized pursuant to this section, the generator conducting treatment pursuant to this section shall remove or decontaminate all waste residues, containment system components, soils, and structures or equipment contaminated with hazardous waste from the unit. The removal of the unit from service shall be conducted in a manner that does both of the following:*
>
> *(A) Minimizes the need for further maintenance.*
>
> *(B) Eliminates the escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or waste decomposition products to the environment after the treatment process is no longer in operation.*
>
> *(2) Any generator conducting treatment pursuant to this section who permanently ceases operation of a treatment process or unit that is conditionally authorized pursuant to this section shall, upon completion of all activities required under this subdivision, provide written notification, in person or by certified mail, with return receipt requested, to the department and to one of the following:*
>
> *(A) The CUPA, if the generator is under the jurisdiction of a CUPA.*
>
> *(B) If the generator is not under the jurisdiction of a CUPA, the notification shall be submitted to the officer or agency authorized, pursuant to subdivision (f) of Section 25404.3, to implement and enforce the requirements of this chapter listed in paragraph (1) of subdivision (c) of Section 25404.*

1.3 IM-3 System

This Work Plan addresses decommissioning and removal or abandonment in place of the following IM-3 system components:

- Three extraction wells in the MW-20 Bench area of the site (TW-2S, TW-2D, and TW-3D) and one extraction well in the floodplain (PE-1), as well as ancillary well equipment and vaults

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- Underground piping and vaults between the extraction wells and the treatment plant
- Entire treatment plant, including equipment, pipelines, valves, instrumentation, utilities, and infrastructure underneath the sunshade, the sunshade, mobile warehouse units, trailer, treatment plant foundation and secondary containment areas, underground pipelines and utilities within the footprint of the treatment plant fence line, and security fence and gate
- Underground and aboveground pipelines, and instrumentation conduit between treatment plant and injection well field
- Two injection wells in the East Mesa area of the site (IW-2 and IW-3) and power supply structure located at this site
- Support facilities on the MW-20 Bench, including Valve Vault #1, pumps, valves, pipelines, electrical, and instrumentation associated with the extraction wells, parking areas, security fence and gates, security system, lighting, and other ancillary equipment.

Existing MWs and their instrumentation that are currently used to monitor IM-3 performance will be reused as part of the monitoring network associated with the Final Remedy, and therefore will not be decommissioned as part of this Work Plan. Figure 1-2 shows the locations of these monitoring wells. Decommissioning of these existing MWs and their instrumentation will be addressed as part of the decommissioning of the groundwater remedy. The general approach for decommissioning wells has been developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes, and incorporated into the Groundwater Remedy O&M Manual, Volume 1, Section 4 (Well Maintenance and Decommissioning).

No aboveground component of the existing IM-3 system located within the footprint of the existing IM-3 Treatment Plant building, or within the IM-3 Treatment Plant fence line will be reused in its current location as part of the Final Remedy. The brine storage and loading facility (three tanks, the truck lane, and associated pumps and piping) will be reused by the Final Remedy in its existing location at the MW-20 Bench. Decommissioning procedures for the IM-3 system, except for the brine storage and loading facility, are included in this Work Plan. Some of these procedures may not be applicable during implementation of this Work Plan if a particular IM-3 component or portion of IM-3 infrastructure will be reused in a different location as part of the Final Remedy.

Appendix A presents site photographs, and Appendix B presents the Decommissioning Quality Assurance and Quality Control Plan that will be executed to verify the quality of the work and conformance with the requirements of this Work Plan.

Evaluation of existing IM-3 piping/conduits and injection wells use for groundwater remedy

This discussion was added at the request of the Hualapai Tribe in its comment letter on a previous draft of the Work Plan. The Tribe inquired whether left-in-place portions of the IM-3 underground pipelines and conduits could be used for the final groundwater remedy, for example, if there would be less ground disturbance using a combination of IM-3 underground facilities and new above-ground infrastructure. In addition, the Tribe asked about the potential use the existing IM-3 injection wells IW-2 and IW-3 for freshwater injection in the upland.

As discussed in 60% response to comment (RTC) #857, the piping and electrical conduit connecting the IM3 injection and extraction wells are needed to convey water to the IM3 treatment plant or from the treatment plant for re-injection. The extracted groundwater cannot be re-injected without treatment and therefore these IM3 components must be retained until the groundwater remedy is operating properly and successfully, consistent with the 2012 Settlement Agreement between the California Department of Toxic Substances Control and the Fort Mojave Indian Tribe. For this reason, the same components cannot be used for the groundwater remedy.

Further, as directed by DTSC and DOI in the April 4, 2014 direction letter (DTSC and DOI, 2014), PG&E will be removing the IM-3 underground pipelines and conduits to the extent practicable, and not leaving them in place.

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As for the existing IM3 injection wells, PG&E has evaluated and determined that they cannot be used for freshwater injection because their construction is not suitable for use in freshwater injection in the uplands (e.g., well too small, well screen not ideally located).

1.4 Work Plan Organization

This Work Plan is organized as follows:

- Section 1.0 presents the project background, Work Plan requirements, and scope of work.
- Section 2.0 presents IM-3 lay-up requirements and describes lay-up period activities.
- Section 3.0 presents pre-decommissioning activities that will commence after agency approval is received for the decommissioning and removal of the IM-3 system.
- Section 4.0 presents decommissioning procedures for IM-3 system included in this Work Plan that are not already incorporated into the Final Remedy design.
- Section 5.0 presents the waste management plan and identifies IM-3 components and materials that will be reused or recycled from IM-3 decommissioning.
- Section 6.0 presents the best management practices and mitigation measures that apply to the work described in this plan.
- Section 7.0 presents the soil confirmation sampling plan.
- Section 8.0 presents the general approach for restoration of the areas originally affected by IM-3 operations. (In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.)
- Section 9.0 presents permit and authorization requirements for IM-3 system decommissioning and closure, reporting requirements, and an anticipated project schedule.
- Section 10.0 provides a list of references used in this Work Plan.

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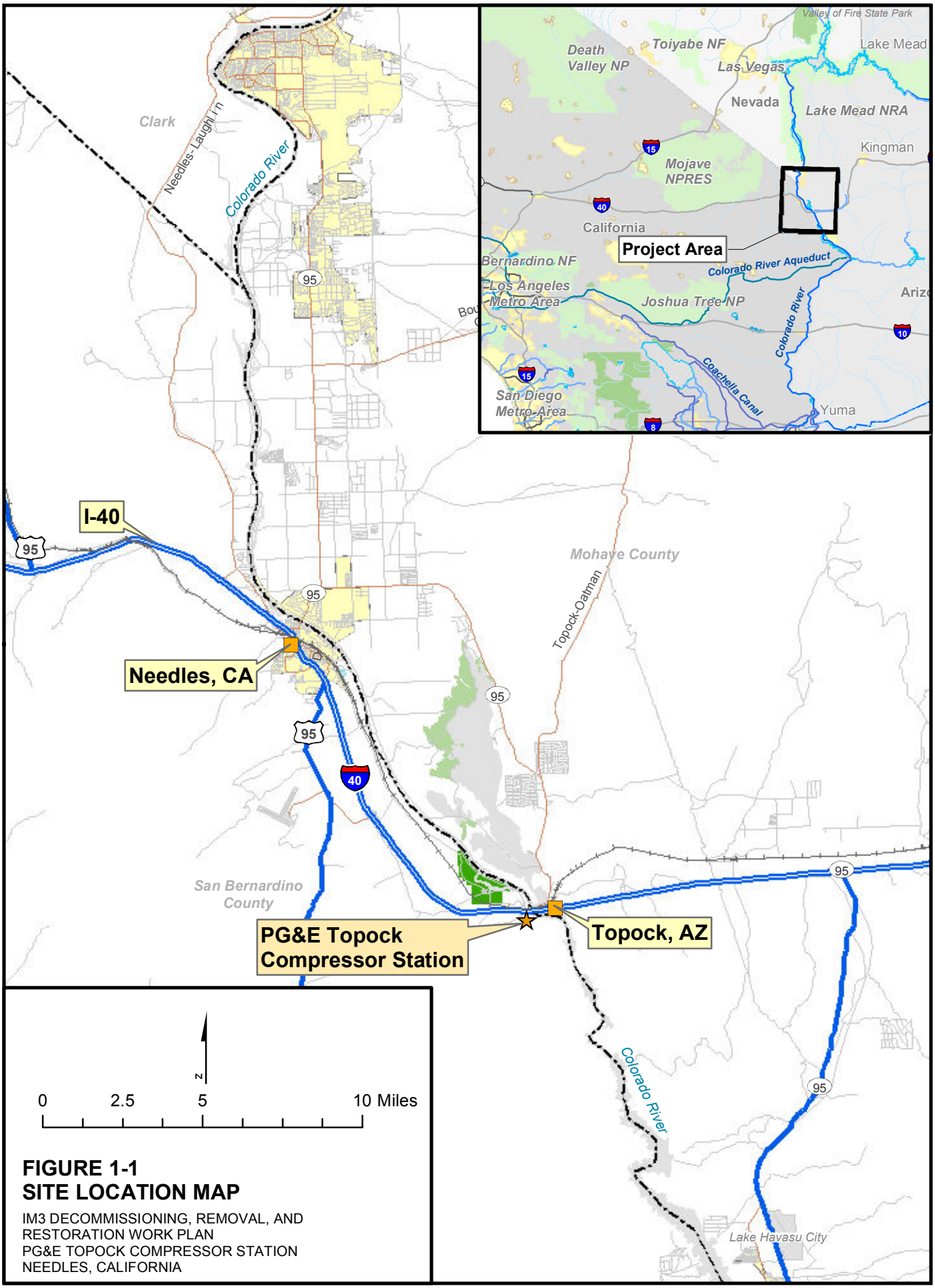
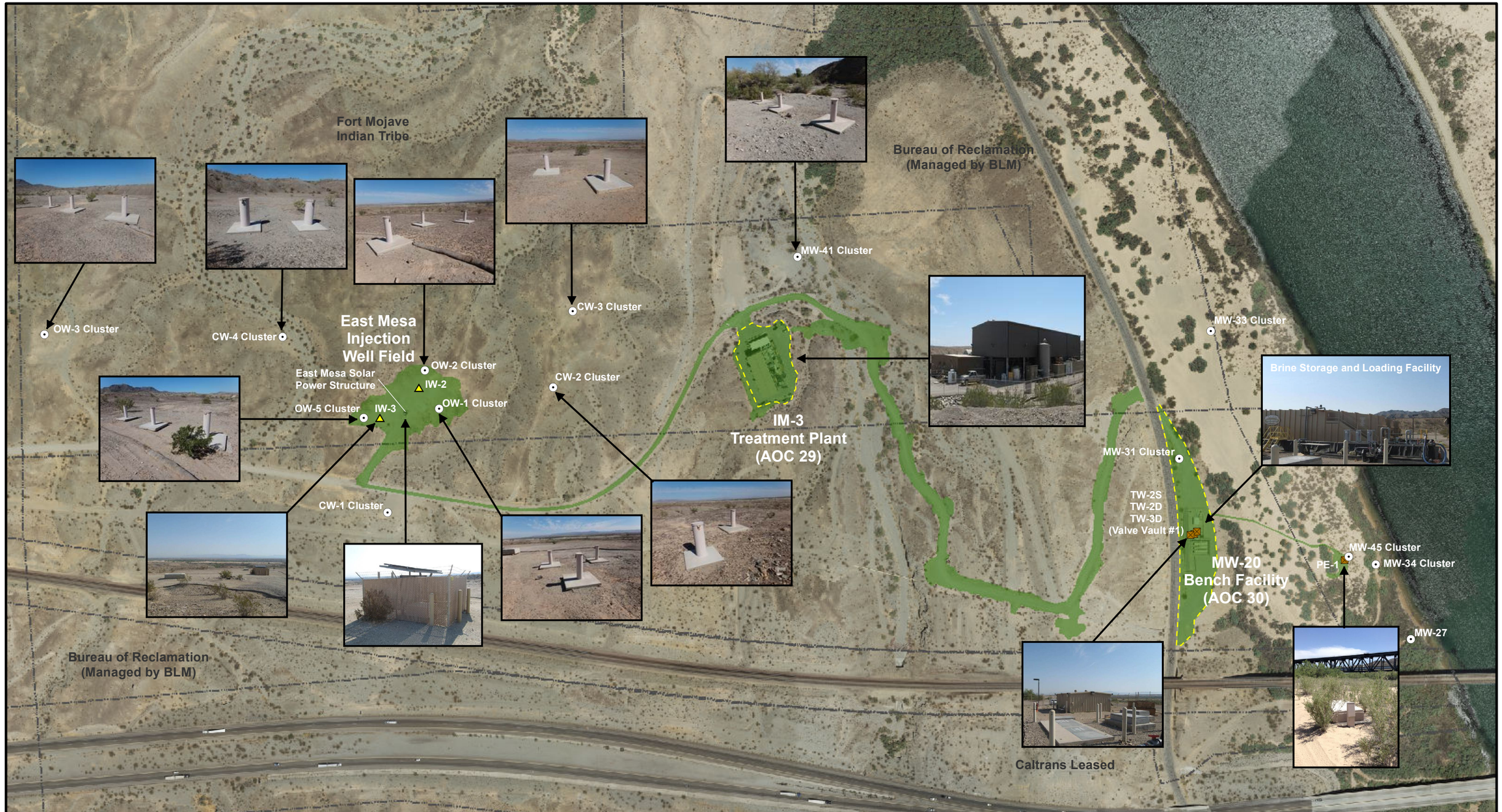


FIGURE 1-1
SITE LOCATION MAP

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Path: D:\Projects\Topock\MapFiles\2012\IM3_Decom\SiteLocation.mxd



LEGEND

- Monitoring Well
- Extraction Well
- Injection Well
- Area of Concern (AOC) Boundary
- Property Boundary
- Primary Work Zone

Notes:

1. All monitoring wells shown are used to monitor IM-3 performance. All monitoring wells have been incorporated in the Final Remedy and will not decommissioned as part of IM-3 decommissioning.
2. MW-13 is located on FMIT property but is not shown on this map because it is not associated with IM-3. This well was installed in 1997 prior to the conceptualization of IM-3.
3. Three tanks, truck lane, and associated pumps and piping (existing Brine Storage and Loading Facility) on MW-20 Bench has been incorporated in the Final Remedy and will not be decommissioned as part of IM-3 decommissioning.

N

0 150 300 600 Feet

FIGURE 1-2
IM-3 SYSTEM LOCATIONS

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

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SECTION 2

IM-3 Lay-up Preparation and Activities during Lay-up Period

2.1 IM-3 Lay-up Preparation

Prior to startup of the Final Remedy, the IM-3 system will be shut down and prepared for lay-up. When the IM-3 system is in a lay-up condition, the system will be left in a safe, secure, and preserved state and will not operate again until agency approval is received for decommissioning and removal of the system. Procedures for shutting down IM-3 are included in the existing IM-3 Treatment and Extraction System Operations and Maintenance Plan (O&M) (CH2M HILL, 2006). Procedures for Lockout/Tagout of pipelines and mechanical and electrical equipment will be in accordance with existing IM-3 Treatment and Extraction System standard operating procedures (SOPs). Wastes generated during IM-3 lay-up will be handled in accordance with the Waste Management Plan under the IM-3 Treatment and Extraction System O&M Plan (CH2M HILL, 2006).

IM-3 lay-up preparation will include the following general activities:

1. Notify DOI and DTSC that the IM-3 system (extraction, conveyance, treatment, and injection) will be shut down and prepared for lay-up.
2. Turn off the extraction well system. Drain the active extraction pipeline. (There is a redundant extraction pipeline that to date (July 2013) has never been used. If this pipeline has never been used at the time of decommissioning, then flushing of this pipeline is not required). Flush the active extraction pipeline(s), and collect the flush water for proper treatment at IM-3 or injection into the IRZ injection wells, or offsite disposal. If the pipeline will not drain completely by gravity, then compressed air may be used to clear the pipeline. Prepare the extraction well system equipment and instrumentation for long-term storage in accordance with manufacturer's requirements.
3. Isolate the IM-3 Treatment Plant from the extraction well system by closing manual isolation valves at the raw water storage tank, T-100, and MW-20 Bench Facility. Disconnect each extraction pipeline from each extraction well head, and blind flange the pipeline segments to physically isolate the wells from the rest of the IM-3 system. Lockout/Tagout extraction well-pump motors and valves associated with extraction wells TW-2S, TW-2D, TW-3D, and PE-1.
4. Treat as much process water within the IM-3 Treatment Plant as possible. Inject treated water. After all treated water has been injected, turn off the injection well system. Drain the injection well pipeline. If the pipeline will not drain completely by gravity, then compressed air may be used to clear the pipeline. Prepare the injection well system equipment for long-term storage in accordance with manufacturer's requirements. Protect the aboveground injection well pipeline and conduit as required.
5. Clear chemical lines and collect chemical waste for treatment or proper disposal. Isolate chemical storage totes or day tanks at feed pumps. Remove and return totes with any unused chemicals to the chemical supplier.
6. Isolate the injection wells from the IM-3 Treatment Plant by closing manual isolation valves at the treated water storage tank, T-700. Disconnect each injection pipeline from each injection well head and blind flange the pipeline segments to physically isolate the wells from the rest of the IM-3 system. Lockout/Tagout valves and electrical equipment associated with injection wells IW-2 and IW-3.
7. Transfer brine in the reverse osmosis (RO) concentrate storage tank, T-701, to brine storage tanks on the MW-20 Bench Facility.
8. Drain any remaining process water in the IM-3 Treatment Plant tanks and treatment pipes by pumping process water to the T-701 tank and then pumping the contents of this tank through the active brine pipeline to the brine storage tanks on the MW-20 Bench Facility. Fill T-701 with enough fresh water to flush the brine

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pipeline(s) and then pump this flush water through the brine pipeline to the brine tanks to flush the brine pipeline(s). (There is a redundant brine pipeline that to date [July 2013] has never been used. If this pipeline has never been used at the time of decommissioning, then flushing of this pipeline is not required). Lockout/Tagout all motors and valves associated with the brine transfer at the IM-3 Treatment Plant after completing this task.

9. Clean treatment tanks/pipes using Vactor truck (see Figure 4-18 at the end of Section 4) or drain treatment tanks/pipes of any residual process water that was not removed in the previous step. Collect process water. Then, clean tanks and pipes by water-blasting all equipment and pipes that handled process water and brine, especially metal parts. Collect cleaning water. Temporary filters may be used to remove particulate matter generated during tank and equipment cleaning. Transfer collected process water and cleaning water to brine storage tanks, or transport to either the TCS evaporation ponds or to a permitted offsite facility(ies).
10. Treat the liquid contents (brine from Step 6 and process/cleaning water from Steps 7 & 8) of the brine storage tanks by either injecting the liquid contents into the in situ system, transporting the liquid contents to the TCS evaporation ponds, or arranging for offsite disposal to a permitted offsite facility(ies).
11. Transport sludge to permitted offsite facility(ies). Return rented phase separators. After the brine storage tanks are drained, rinse the brine storage tanks, brine transfer pumps, and brine pipelines with a clean water flush, and prepare the brine transfer pumps for long-term storage in accordance with manufacturer's recommendations. Lockout/Tagout the pump motors and valves associated with brine transfer.
12. Prepare IM-3 process equipment for lay-up in accordance with manufacturer's requirements. Lockout/Tagout motorized process equipment.
13. Remove in-line pH and conductivity elements from the tanks and pipelines. Disconnect these elements from their electrical and control wires, so they can be stored in a temperature–controlled, secure environment. Properly terminate wires from elements and leave wires in a safe condition. Prepare pH and conductivity elements/instruments for lay-up in accordance with manufacturers' requirements.
14. Preserve the microfilter membranes and the primary and secondary reverse osmosis membranes in storage solution in accordance with manufacturer's recommendations. Store membranes and filters in a temperature–controlled, secure environment.
15. Keep fans running within local microfilter and primary and secondary RO programmable logic controller (PLC) panels, because these units will be stored in place.
16. Remove any unused chemicals not contained in totes from the IM-3 Treatment Plant. This step will include removing flammable liquids from the flammable liquid storage cabinet located at the IM-3 Treatment Plant.
17. Lockout/Tagout air compressor system. Lay up system in accordance with manufacturer's requirements and pressure vessel permit, regulations, and code.
18. Verify emergency shower and eye wash station are in good condition and operable. Continue to maintain water supply and conditioning equipment to support emergency shower and eye wash stations.
19. Remove and properly dispose of the batteries at the solar power structure.
20. Verify fire water tank is at high-level point.
21. Verify potable water tank is at high-level point and that eyewash cooling system is operable.
22. Return generator to the rental company if DTSC approves removal during the lay-up period. Otherwise, return generator during decommissioning period after receipt of DTSC approval. Transfer diesel fuel stored onsite to PG&E for use at the Compressor Station.
23. Backup data saved on the Data Historian. Verify current PLC programs are saved to backup drive. Turn human machine interface and Data Historian off, unplug the uninterruptible power supply, and unplug computers. Lockout/Tagout the PLC panel.

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24. Verify lab equipment is clean and the laboratory is left in a clean and safe condition. Laboratory waste will be managed in accordance with state and federal regulations.
25. Notify DOI and DTSC that IM-3 lay-up is complete.

IM-3 shutdown and lay-up preparation will take up to 3 months. After the IM-3 system is in a lay-up condition, it is not expected to operate again because it will have met the goals of the IM and associated design parameters. The IM-3 system will remain in a lay-up condition until PG&E receives approval for closure and decommissioning of IM-3.

2.2 General Equipment and Site Maintenance

Maintenance during the IM-3 lay-up period will include the equipment and site maintenance described in this subsection.

2.2.1 General Equipment Maintenance

Equipment maintenance is required to keep the equipment in good condition and under active equipment warranties, because most major equipment will likely be recovered for reuse. Motorized equipment at the IM-3 Treatment Plant will require the most maintenance. Table 2-1 shows a general maintenance schedule for motorized equipment and plant safety features (tables are located at the end of each section). A more detailed maintenance schedule for IM-3 equipment during the lay-up period will be developed in accordance with (1) the equipment manufacturer's requirements for maintenance as well as short- and long-term storage, and (2) the existing IM-3 Groundwater Treatment and Extraction System O&M Plan (CH2M HILL, 2006). The more detailed maintenance schedule will be included as an appendix to the existing IM-3 Groundwater Treatment and Extraction System O&M Plan.

Electricity will be required for equipment maintenance during the lay-up period. The IM-3 control system will likely not be required for equipment maintenance.

Other features of the IM-3 system that will require weekly checks include the following:

- Storage tanks that formerly contained hazardous materials.
- Pressurized (compressed air) tank.
- Onsite chemical storage areas. (Excess chemicals will be removed from site during lay-up preparation.)
- Emergency shower and eye wash station and potable water cooling system.
- Fire water tank.
- Aboveground injection well pipeline and instrumentation conduit.

2.2.2 Site Maintenance

Site maintenance will include continued maintenance of the access road to the IM-3 Treatment Plant and injection wells as well as watering the road for dust control pursuant to the EIR mitigation measures. Periodic filling of the potable water tank, and possibly the fire water tank at the IM-3 Treatment Plant, will also be required. Regular pest control will be required. Vehicles used for site and IM-3 system maintenance include utility vehicles, cars, trucks, forklift, and backhoe.

2.2.3 Support Requirements for General Equipment and Site Maintenance

2.2.3.1 Site Security

During the lay-up period, PG&E's security system will continue to provide security monitoring of the IM-3 system facilities. During nighttime hours, existing lighting will continue to be used at the IM-3 Treatment Plant and at the MW-20 Bench Facility for security and safety. Even though the facility will not be routinely staffed at night, minimum lighting during nighttime hours is still required for safety in case PG&E personnel need to enter the facilities during these hours. Minimum lighting or minimum illumination intensities are defined by OSHA. For activities and areas not included under the OSHA standard, the American National Standards Institute has established recommended illumination levels under Recommended Practice RP-07-01.

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2.2.3.2 Communications

Telecommunications and plant communications will continue to be maintained for safety, security, and maintenance requirements.

2.2.3.3 Utilities

Water. Because personnel will be onsite during work days, the potable water system at the IM-3 Treatment Plant will stay in service to provide water to the sinks and toilet in the IM-3 Treatment Plant trailer.

Sewer. Because personnel will be onsite during work days, the sewage holding tank for the IM-3 Treatment Plant trailer will stay in service. The sewage holding tank will need to be serviced; the service frequency will be on an as-needed basis.

Power. Electricity to the IM-3 system is required for maintaining some equipment and to power the IM-3 Treatment Plant security gate and lights. The sole power source during the IM-3 lay-up period will be provided by City of Needles power.

2.3 Regulatory Compliance and Reporting

Required compliance field activities and notifications during the IM-3 lay-up period will include the following:

- Industrial stormwater monitoring in accordance with the IM-3 site–specific Industrial Stormwater Pollution Prevention Plan (SWPPP) (CH2M HILL, 2011)
- Emergency notifications in accordance with the Hazardous Materials Business Plan (HMBP) for IM-3 and the General Communications Framework during O&M of the Groundwater Remedy.

The following letters and reports are required and will need to be submitted during the IM-3 lay-up period:

- PG&E will submit an annual HMBP update to the Certified Unified Program Agency (CUPA) by March 1, pursuant to the requirements of California Health and Safety Code, section 25503, facilities that handle hazardous materials (including hazardous waste) in threshold amounts of 55 gallons, 500 pounds, or 200 cubic feet. If IM-3 has onsite hazardous materials or handles them in the threshold amounts, then PG&E will submit an annual HMBP update to the CUPA by March 1. Additionally, if IM-3 decommissioning makes significant changes to the onsite hazardous materials inventory, then PG&E will submit an HMBP update to the CUPA within 30 days. Hazardous waste tank management procedures during lay-up will be implemented.
- Pursuant to the IM-3 ARARs, PG&E will submit quarterly letters to DOI and the Regional Water Board (due annually on January 15, April 15, July 15, and October 15) stating no operation and no discharge occurred during the previous quarter, until DTSC directs PG&E that it is no longer required to operate IM-3, at which point PG&E's compliance obligations with the IM-3 ARARs are complete.
- Pursuant to the requirements of the California State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS00001 (General Permit), and the IM-3 site-specific Industrial SWPPP, PG&E has been and will continue to conduct monitoring (including visual inspections and stormwater sampling) and submit an annual report (due by July 1). PG&E will submit a Notice of Termination (NOT) to end its coverage when it determines that IM-3 is no longer subject to the General Permit. PG&E will continue to comply with the requirements of the General Permit and the SWPPP until the Regional Water Board approves the NOT.
- Pursuant to the MMRP, PG&E has been submitting and will continue to submit quarterly reports to DTSC to document compliance with the mitigation measures set forth in the certified EIR (DTSC, 2011b).

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TABLE 2-1
General Equipment Maintenance Schedule for IM-3 System During IM-3 Lay-up Period
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Equipment and Plant Safety Features	Maintenance Requirement
Pumps (All types, except for diaphragm)	Every 4 months, manually rotate pump shafts several times. Relubricate bearings once annually.
Valves	Every month, exercise pneumatically and electrically actuated valves to prevent valves from freezing. Periodically exercise manual valves. Pneumatically actuated valves will require the air compressor to be operational. Inspect valves for corrosion or damage to seals.
Mixers	Every 4 months, rotate mixers several times. Relubricate bearings once annually. Power is required to rotate the mixers.
Clarifier Rakes	Every 4 months, rotate rakes several times. Relubricate bearings once annually. Power and control is required to rotate the clarifier rakes.
Blower	Every month, rotate blower motor shaft several times. Relubricate the bearings once annually.
Air Compressor	Perform a weekly safety check of system, because it will be needed for valve operation and other equipment maintenance. Check desiccant every 6 months.
Leak Detection System	Perform a monthly check of system only if untreated water was unable to be cleared from the extraction pipelines when preparing the IM-3 system for lay-up.
Emergency Shower and Eye Wash Station, and Potable Water Cooling System	Perform weekly checks of safety equipment. Be sure water is supplied to system.

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SECTION 3

Pre-decommissioning Activities

3.1 Site-specific Orientation and Project Initiation Meeting

Consistent with current site practice, PG&E will invite agency representatives, interested Tribes, and stakeholders to the site for a project initiation meeting. A project initiation meeting will be conducted after notification to proceed with IM-3 decommissioning and removal activities is obtained from DTSC (with concurrence from DOI) and prior to the start of decommissioning and removal activities. Limited site preparation activities, such as underground utility location, are anticipated to be conducted prior to this meeting. Site preparation activities are summarized in the following section.

During the meeting, PG&E will present an overview of the activities that will be conducted as part of this Work Plan; discuss health and safety requirements, and cultural and biological sensitivities associated with the project; introduce key project team members; identify protective measures for site visitors and monitors; describe applicable site safety and communication protocols; and review plans for project communications with the agencies, interested Tribes, and stakeholders during work. PG&E will invite interested Tribes to participate in cultural sensitivity training for workers.

Required safety training for site workers is included in the Construction Health and Safety Plan (HSP) prepared by PG&E. The HSP also includes details on personal protective equipment (PPE) required for entry into the controlled portion of the site. Safety training and PPE requirements may be different based on the level of risk in the different work areas. PPE may be modified or downgraded as work is completed and hazards are mitigated. The Construction HSP is included as an appendix of the Construction/Remedial Action Work Plan.

Because PG&E anticipates that tribal monitors and agency observers are likely to be onsite to observe much of this work, PG&E will arrange appropriate safe viewing locations for site observers. PG&E will establish a protocol for observers to communicate and check in with PG&E's decommissioning team.

3.2 Site Preparation and Demarcation

The majority of site preparation activities and demarcation of the primary work zone boundaries will occur after the project initiation meeting is held. Figure 3-1 shows the primary work zones, staging areas, access and haul routes, and waste management areas that comprise the project area. The following site preparation and demarcation activities will be conducted prior to the decommissioning and removal of IM-3 system:

- Mobilize required personnel, equipment, and materials to the site for mobilization and site preparation activities.
- Delineate access/haul routes between primary work areas and staging areas.
- Establish initial staging and loading areas. (Because of the large area where decommissioning and removal activities will occur, the active boundaries of these areas will change as the work progresses.)
- Locate and mark underground utilities prior to intrusive soil excavation or other subsurface activities. Protect existing utilities in the work and staging areas as necessary according to the utility owner's specifications.
- Set up temporary facilities and utilities for temporary facilities in a selected staging area for use by the onsite personnel.
- Establish equipment and materials storage areas in designated staging areas.
- Demarcate the first primary work zone boundary. Within the first primary work zone, the exclusion zones and contaminant reduction zones will be demarcated. The support zone will be located and established outside of this primary work zone.

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- Set up temporary hazardous waste storage with secondary containment within the exclusion zone boundary for use during decommissioning and removal activities. Set up temporary non-hazardous waste storage within designated waste management staging areas. Stage and label empty roll-off bins and other empty waste containers in a staging area.
- Set up perimeter air monitoring equipment (see Section 3.2.5).
- Set up health and safety equipment required by the HSP for work in the designated areas, such as locating an emergency eyewash station, fire extinguisher, spill kit, and first aid kit in the decontamination area.

3.2.1 Mobilization and Temporary Facilities

Mobilization activities will include arranging for mobilization of temporary facilities, demolition equipment, and materials (e.g., plastic, sand bags, straw wattles, silt fencing, and empty waste containers) to designated staging areas. Temporary facilities will include an office trailer with electric and phone service, restroom facilities, safety and security lighting, equipment storage area, and parking area. The office trailer will be mobilized approximately 2 weeks prior to setting up electric and phone service. Equipment and materials mobilization will be initiated with site preparation activities that require equipment and materials to complete the activity. Equipment and materials will be mobilized to the site as needed to minimize onsite storage requirements.

Project mobilization will include completion of the following tasks:

1. Given that the CERCLA permit exemption under Section 121(e)(1) applies to this work, determine substantive requirements with which PG&E must comply (see Section 9).
2. Install erosion and sediment controls and other temporary environmental controls. Install appropriate runoff controls to meet the requirements of the SWPPP (see Section 6).
3. Set up temporary facilities, electric, phone, water, restroom facilities, and safety and security lighting for the temporary facilities.
4. Designate parking area and equipment and materials storage area.
5. Set up secondary containment and spill response equipment at established equipment storage area where vehicle/equipment idling or refueling may occur.
6. Verify required health and safety equipment and supplies are in position for use.
7. Deploy heavy equipment, required to carry out the decommissioning and removal activities, to the first primary work zone.
8. Establish water source and set-up temporary water storage. Deploy water trucks for dust control, equipment decontamination, and other activities. Stage fresh water storage tanks in designated staging areas.

3.2.2 Primary Work Zones

A primary work zone is the area where decommissioning and removal activities will take place. There are several primary work zones. Primary work zones include (1) the area around the IM-3 Treatment Plant, (2) the area around the MW-20 Bench Facilities, and (3) the areas around extraction/injection well and pipeline vaults. Figures 3-2 through 3-4 present a close up view of the three types of primary work zones. Primary work zones will be demarcated with fencing or other barriers and signage to prevent unauthorized access. Within each primary work zone that includes the decommissioning and removal of potentially contaminated IM-3 components or infrastructure, one or more contaminant reduction zones will be demarcated with highly visible fencing so that work is conducted in accordance with California Occupational Safety and Health Administration (Cal-OSHA) regulations set forth in Title 8, California Code of Regulations (CCR), Section 5192, and this Work Plan's HSP. Support zones will be located near, but outside, the exclusion zones and contaminant reduction zones. Each zone will provide sufficient area for equipment traffic and decommissioning wastes. Figure 3-2 shows the approximate IM-3 Treatment Plant primary work zone boundary, as well as the boundaries of the exclusion zone, contaminant reduction zone, support zone, and waste management areas within or near the IM-3 Treatment Plant primary work zone. The boundary of the primary work zone and contaminant reduction zone will be delineated and

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demarcated prior to commencing work in that primary work zone. Air monitoring requirements and the requirements of the work may cause the boundaries shown on Figures 3-2 through 3-4 to change.

The IM-3 Treatment Plant primary work zone and the MW-20 Bench Facility primary work zone will also be waste management areas. Each primary work zone will provide sufficient area for decommissioning and removal activities, equipment traffic and truck loading, equipment and personnel contaminant reduction, and management of decommissioning wastes if the zone is also a waste management area. Two of the staging areas, the staging area directly across from the IM-3 Treatment Plant and the staging area located at the old rock quarry will also be waste management areas. Waste management areas are depicted on Figure 3-1. The work to be performed in the exclusion zones, contaminant reduction zones, support zones, and waste management areas is discussed in the following subsections.

3.2.2.1 Exclusion Zones

Exclusion zones will include areas of decommissioning, removal (demolition), and truck loading. Decommissioning and removal activities, decontamination, waste characterization, waste containerization, waste management, and truck loading will occur in the exclusion zones. Silt fences, hay bales, berms, sand bags, and wattles or drainage sumps will be constructed in the exclusion zones to manage and collect runoff as necessary.

Exclusion zones will be accessed through contaminant reduction zones. Personnel requiring access to exclusion zones must have the safety training required by the HSP, be qualified and trained for the PPE as determined by the HSP, and must have reviewed and signed the HSP. The Cal-OSHA Hazardous Waste Operations and Emergency Response standard located at 8 CCR 5192 (Federal OSHA 29 *Code of Federal Regulations* [CFR] 1910.120) in Section (g) (1) (A) states the following:

> *Engineering controls and work practices shall be instituted to reduce and maintain employee exposure to or below the permissible exposure levels (PELs) of substances regulated by 8 CCR 5155, except to the extent that such controls and practices are not feasible. Work practices which may be feasible include removing non-essential employees from potential exposure.*

Therefore, access to exclusion zones will be limited to those essential for the safe completion of project goals, and donning PPE to enter exclusion zones will be the last option after the use of engineering controls and administrative controls are evaluated.

3.2.2.2 Contaminant Reduction Zones

Contaminant reduction zones will be located immediately adjacent to the exclusion zones for purposes of decontaminating personnel, equipment, and vehicles exiting the exclusion zones and entering the support zones. Separate contaminant reduction zones may be established for other areas of the site not accessible through the primary contaminant reduction zones. Workers leaving the exclusion zones will go through decontamination in the contaminant reduction zones consisting of boot washes, PPE removal areas, personal decontamination, and clean clothing area. The equipment and vehicle decontamination areas will be equipped with pressure-washing equipment and a sump to collect decontamination wastewater.

3.2.2.3 Support Zones

Support zones will be located adjacent to or near a primary work zone and will be outside of the exclusion zones and contaminant reduction zones. Equipment and materials staging areas will be within the support zones. Support zones will be used to temporarily store equipment, vehicles, and personnel. Most active equipment staging will take place in the support zones. Support zones may also be used for temporary stockpiling (less than 90 days) of non-hazardous decommissioning wastes and for storing containerized, labeled decommissioning wastes. Break areas, portable toilets, and other support facilities, if needed, will be set up in the support zones. Daily planning and health and safety meetings will be held in the support zones prior to commencing work. Support zones will also serve as the communication and coordination center for emergency situations.

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3.2.2.4 Waste Management Areas

Waste management areas include areas where waste is cleaned, decontaminated, temporarily stockpiled, or staged prior to disposal. Waste management areas will be considered to be exclusion zones, unless waste materials are nonhazardous or characterized, containerized, and labeled (see Section 5).

3.2.3 Staging Areas

Figure 3-1 shows the proposed equipment and material staging areas. Staging areas will be established for location of temporary facilities, lay-down of demolition equipment (including heavy equipment), refueling of vehicles or equipment, concrete crusher, materials, supplies, and demolition tools. Staging of empty containers, containerized, labeled non-hazardous decommissioning wastes, temporary stockpiling of non-hazardous waste for sizing and segregation of waste prior to allow containerization, and staging of recoverable materials for recycle or reuse will occur in staging areas that are also designated as waste management areas. Smaller, temporary equipment and materials staging areas will be set up at each primary work area as necessary.

3.2.3.1 Fuel Storage and Fueling Practices

Offsite fueling or onsite re-fueling at TCS are the primary vehicle or equipment fueling practices by PG&E for mobile equipment. Onsite fueling may be used for fixed decommissioning heavy equipment following the accepted site protocol for onsite fueling. Types of fuel anticipated to be used onsite include the following:

- **Diesel Fuel** – meets California low-sulfur standards and regulations. A bulk diesel fuel tank is in place at the TCS that can be used by PG&E and its contractors conducting decommissioning activities for refueling mobile vehicles and equipment.
- **Gasoline** – meets California's reformulated gasoline program standards and regulations. There will be no bulk storage of gasoline onsite; however, it is anticipated that truck-mounted gasoline storage tanks will be used to transport fuel to the site and refuel equipment onsite.

The project will comply with local, state, and federal regulations related to the bulk storage and management of fuels. Appendix C includes a safe fueling and fuel handling policy for activities during implementation of this Work Plan.

3.2.4 Access and Haul Routes

Access to project area will be via designated access and haul routes. Access and haul route options between primary work areas and staging areas are shown on Figure 3-1. Existing roads should be sufficient for the work covered in this plan; therefore, no new road construction is planned. Appropriate signs will be posted along the access and haul roads to indicate traffic patterns (see Appendix D, Transportation Plan).

3.2.5 Perimeter Air Monitoring

Perimeter air monitoring will be conducted to measure the ongoing effectiveness of the dust control measures, guide modifications to field activities if necessary, and document that adequate measures are being used to prevent the distribution of dust beyond the boundaries of the work zone during the decommissioning and removal of the IM-3 treatment plant. A perimeter air monitoring plan (PAMP) has been developed to accomplish the stated objectives, and is included in Appendix I.

The PAMP has been written in such a manner as to allow field personnel to implement the plan and take the appropriate actions to prevent dust from leaving the work zone during the decommissioning of the IM-3 treatment plant. The PG&E Site Manager and the Project Air Monitoring Officer (AMO) have the primary responsibility for implementing the PAMP. The PG&E Site Manager is responsible for directing and controlling all site activities and is responsible for enforcing on-site compliance with the provisions of the PAMP. The designated Project Air Monitoring Officer (AMO) will implement the PAMP under the direction of the PG&E Site Manager.

3.3 Underground Feature Survey and Utility Isolation

Underground utilities within the project area will be located and marked prior to intrusive site preparation or decommissioning and removal activities that require soil excavation or utility isolation. Underground Service Alert

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or “Dig Alert” will be contacted to identify public utilities that operate within the work areas. Independent utility-locating providers will also be employed to identify underground utilities that are not part of the public utility system. Utility locations will be marked with paint on the ground surface overlying areas that will be disturbed by excavation. Utility clearance operations will be coordinated with facility personnel who will be responsible for utility identification.

Proposed locations of intrusive work will be reviewed with PG&E and IM-3 treatment system personnel knowledgeable in the locations of the existing utilities. These locations will be checked against information from the utility mark-out service. Existing underground utility surveys of the project area and IM-3 Groundwater Extraction and Treatment System record drawings will also be reviewed. In April 2012, an underground utility survey was performed at the project site by Subtronic. Utilities were identified using ground-penetrating radar and marked with paint. Utilities identified include water, sewer, gas, phone, and power lines. The marked utilities were located by Global Positioning System and plotted on utility drawings (see Appendix E). If there is uncertainty about utility locations, excavation will be performed manually or with air knife and vacuum techniques. Those utility services that will require Lockout/Tagout, shut off, or relocation to carry out the work will be identified in cooperation with the utility owner. All Lockout/Tagout will be performed only by qualified personnel.

Portions of the located utilities that service only IM-3 Groundwater Extraction and Treatment System will be decommissioned and removed as a part of this work. The utility will be isolated and disconnected by the utility provider prior to decommissioning and removing portions of a utility. The portions of utilities to be removed and decommissioning procedures for these utilities are described in the following subsections and are shown on Figures 3-5 and 3-6.

3.3.1 Water

The domestic water supply for the IM-3 Treatment Plant trailer sinks and toilet comes from the PG&E Compressor Station. Domestic water is hauled to the site as needed and is transferred into an aboveground tank located inside the IM-3 Treatment Plant sunshade. The domestic water line that feeds the IM-3 Treatment Plant trailer from the tank will be removed when the IM-3 Treatment Plant foundation and underground sewage holding tank is removed. The domestic water tank and pumping system is non-hazardous and can be salvaged or disposed of as non-hazardous waste. Decommissioning procedures for the potable water tank system are listed in Section 4.3.10.1.

3.3.2 Sewer

Sanitary waste is stored in an onsite underground sewage holding tank, which is pumped as necessary. This tank is fed directly from the IM-3 Treatment Plant trailer. The sewage holding tank and line between the trailer and tank will be cleaned prior to isolation. After cleaning, the tank and line will be removed. The sewage holding tank system is non-hazardous and will be disposed of offsite. The location of the former tank will be backfilled and compacted to leave the area in a safe condition. Decommissioning procedures for sewage holding tank system are listed in Section 4.3.7.1.

3.3.3 Natural Gas

No natural gas lines will be removed as a part of this work; however, natural gas lines are located near the boundary of some primary work areas. The location of natural gas lines near the primary work zones will be marked. The lines will be sufficiently protected from the decommissioning and removal activities.

3.3.4 Phone

The phone line to the IM-3 Treatment Plant trailer will be decommissioned from the trailer back to the main vault along National Trails Highway. The actual isolation of the communications feed line to the IM-3 Treatment Plant will be performed by the communication provider. Following isolation completion, the underground conduits that house the communication lines within and outside of the fence line of the IM-3 Treatment Plant will be excavated and removed. The exception is, for the purpose of slope stability and erosion control the short portion of these underground conduits that are on a steep slope, just outside of the IM-3 Treatment Plant fence line to the east

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will be cut and capped at both ends at a location below grade. The location of both capped ends will be identified on an as-built drawing.

3.3.5 Power

The aboveground and underground power lines to the IM-3 Treatment Plant trailer will be removed from the trailer back to the first utility pole located outside of the IM-3 Treatment Plant fence line. The utility pole within the IM-3 Treatment Plant fence line will be removed. The actual isolation of the electrical feed line to the IM-3 Treatment Plant will be performed by the electricity provider. Following isolation completion, the power lines will be removed from the utility pole outside the IM-3 Treatment Plant to the IM-3 Treatment Plant trailer, then the utility power pole within the fence line will be removed. The transformer located within the fence line will also be decommissioned and removed. Similar to the phone line, the underground conduits that is located on a steep slope, just outside of the IM-3 Treatment Plant fence line to the east will be cut and capped at both ends at a location below grade. The location of both capped ends will be identified on an as-built drawing.

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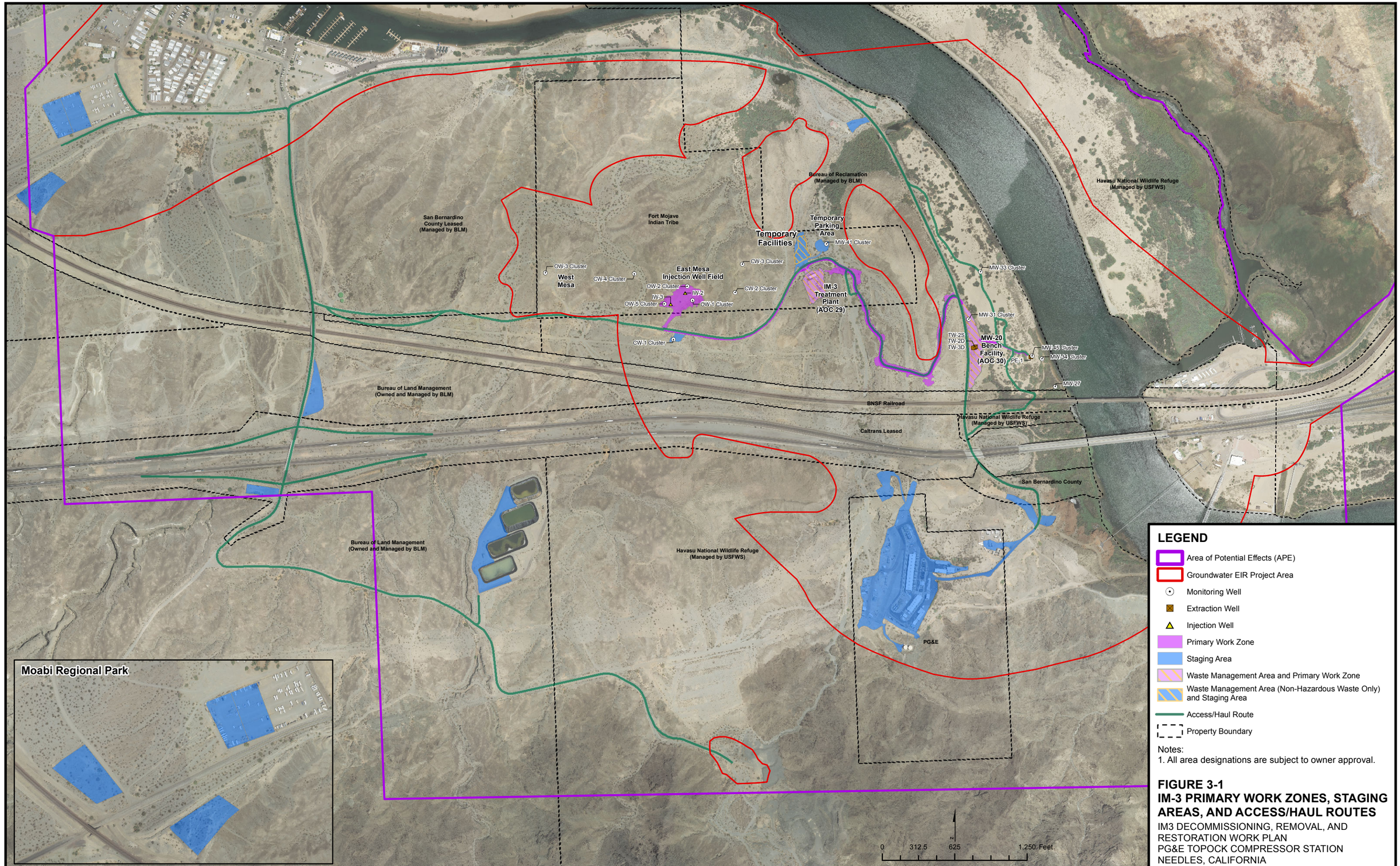
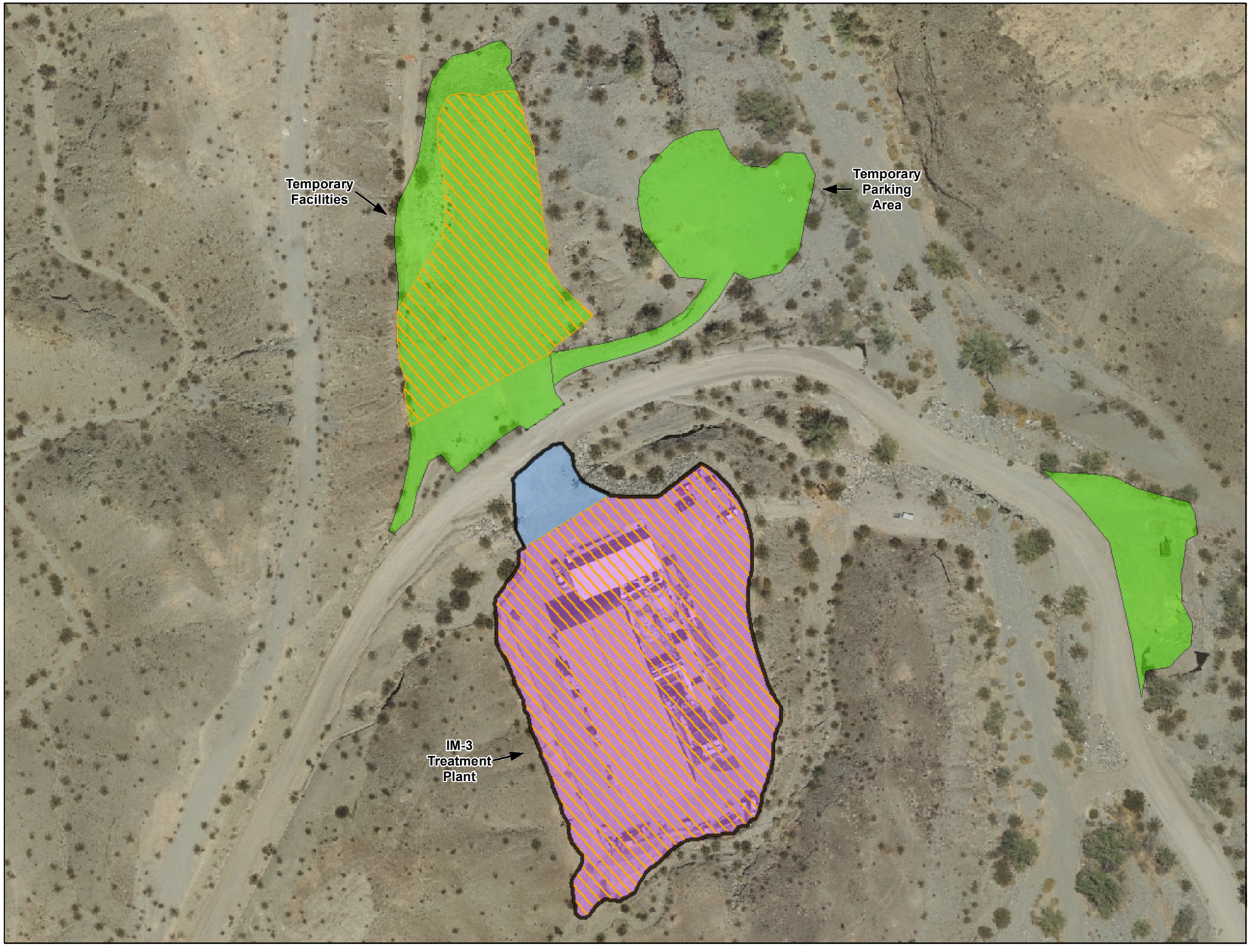
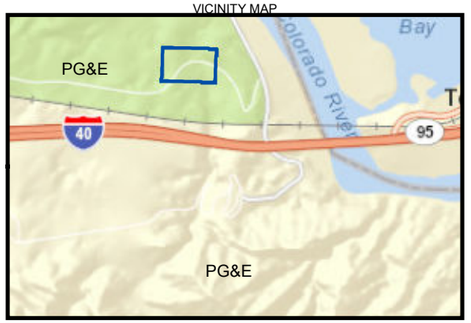


FIGURE 3-1
IM-3 PRIMARY WORK ZONES, STAGING AREAS, AND ACCESS/HAUL ROUTES
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA



VICINITY MAP



LEGEND

- Primary Work Zone Boundary
- Exclusion Zone
- Support Zone
- Contaminant Reduction Zone
- Exclusion Zone and Waste Management Area
- Support Zone and Waste Management Area

Note

1. This primary work zone boundary is approximate and is estimated based on site history and observations. Air monitoring requirements and the requirements of the work may cause the boundary shown on this figure to change.

N

0 25 50 100 150
Feet

FIGURE 3-2
IM-3 TREATMENT PLANT PRIMARY WORK ZONE

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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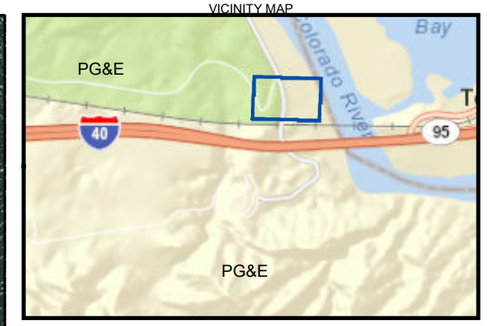
VICINITY MAP



LEGEND

Primary Work Zone Boundary

Note:
The primary work zone boundary is approximate and is estimated based on site history and observations. Air monitoring requirements and the requirements of the work may cause the boundary shown on this figure to change.

N

0 25 50 100 150 200
Feet

FIGURE 3-3
MW-20 BENCH FACILITY
PRIMARY WORK ZONE
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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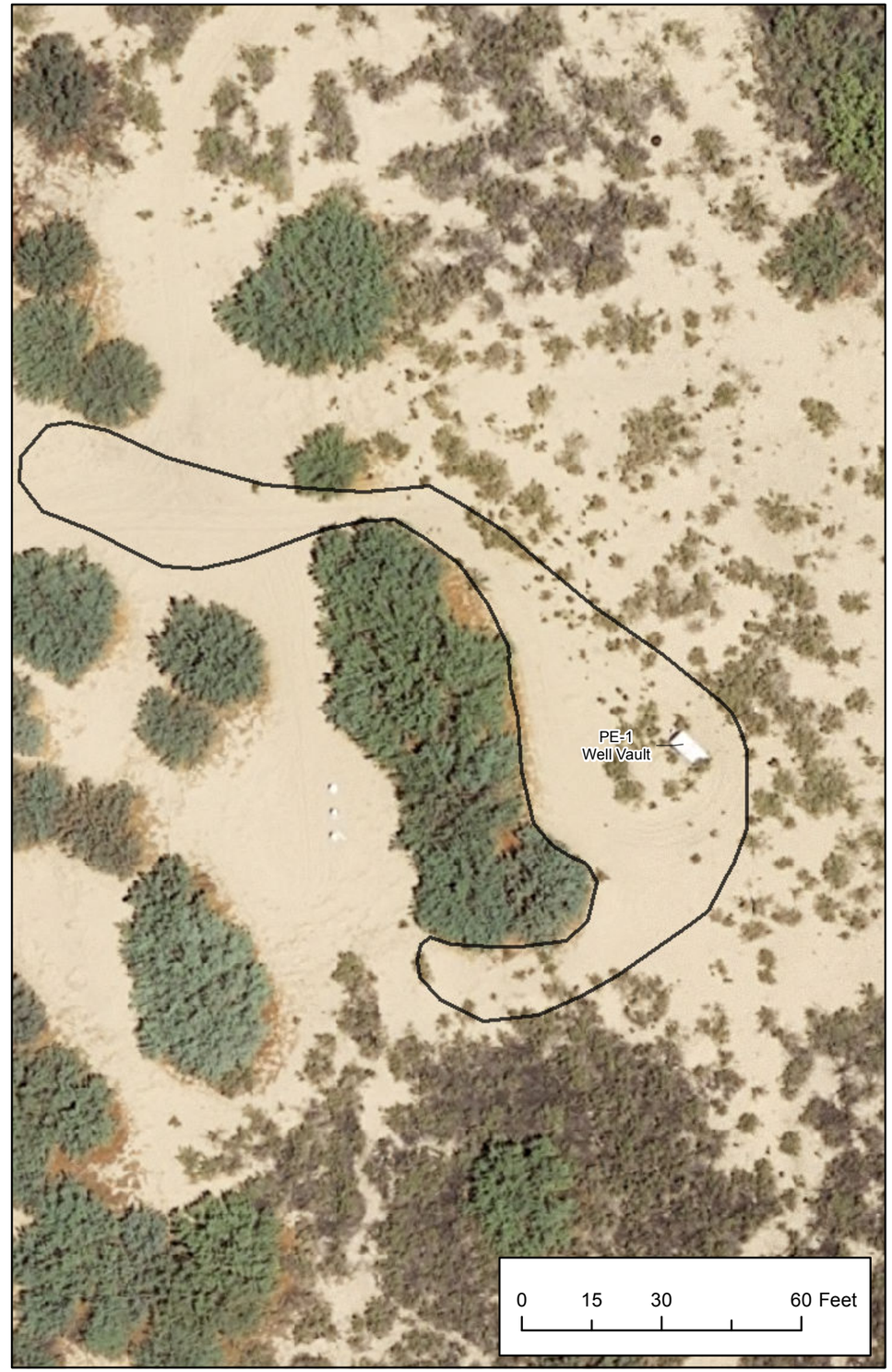

VICINITY MAP

LEGEND

Primary Work Zone Boundary

Notes:

1. Several valve vaults along the conveyance pipeline will be decommissioned and removed. The primary work zone shown on the left is typical for valve vaults.
2. Several well vaults will be decommissioned and removed at extraction wells TW-2S, TW-2D, TW-3D and PE-1, and at injection wells ,IW-2 and IW-3. The primary work zone shown on the right is typical for well vaults.
3. These primary work zone boundaries are approximate and are estimated based on site history and observations. Air monitoring requirements and the requirements of the work may cause the boundaries shown on this figure to change.

N

FIGURE 3-4
WELL AND PIPELINE VAULTS, TYPICAL PRIMARY WORK ZONE
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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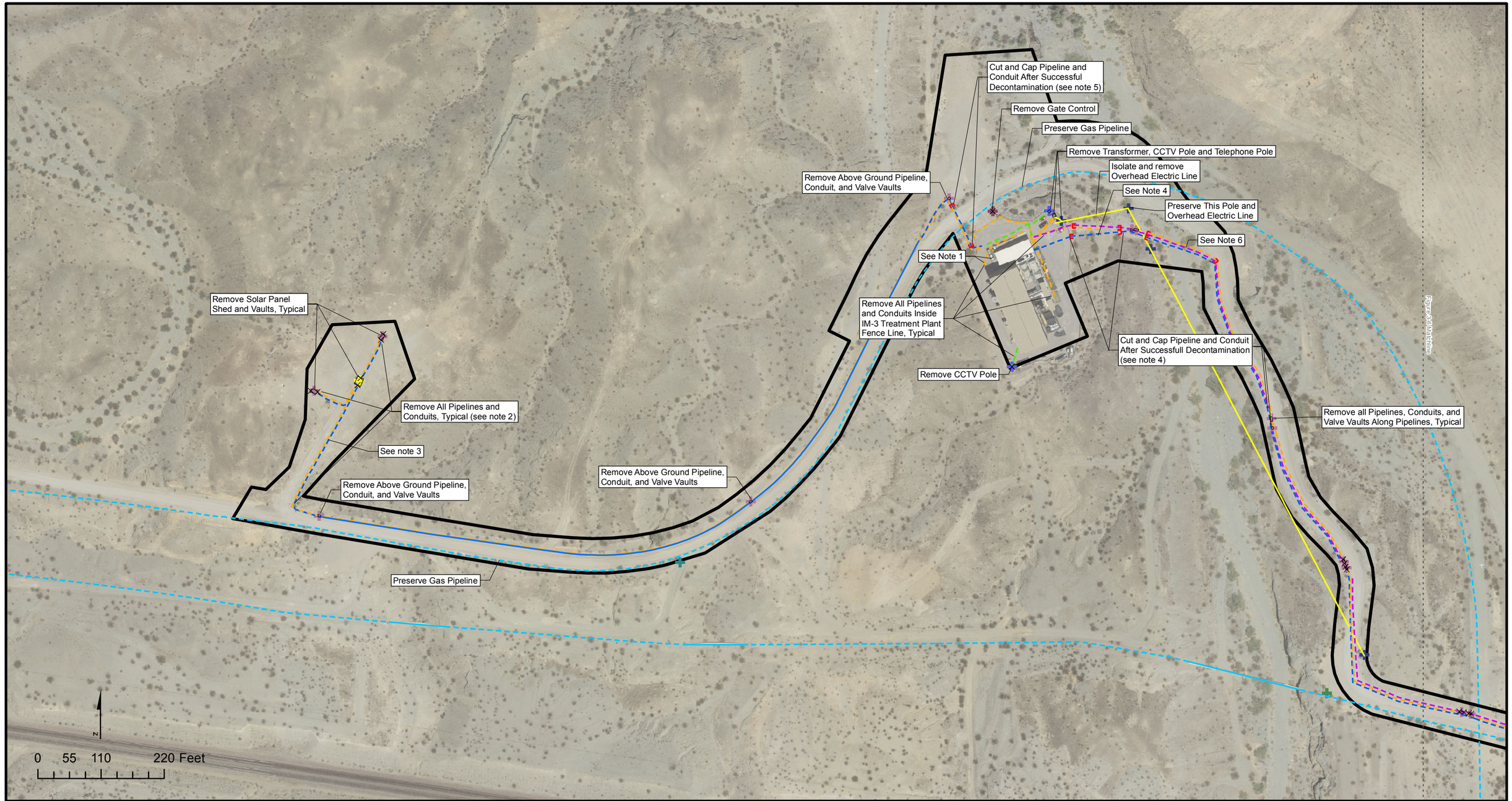

LEGEND

- Survey Corridor
- Cut and Cap Point
- Remove Pipeline,Conduit, Well Vault, or Valve Vault as Indicated

Above Ground Point Features

- CCTV Pole
- Gas Pipe Warning Sign
- Gate
- Gate Control
- Solar Panel/Shed
- Street Sign
- Telephone Pole
- Vault

Line Features (Underground)

- CCTV
- Electric Line
- Gas Pipe
- Telephone Line
- Water Line

Line Features (Aboveground)

- Electric Line
- Gas Pipe
- Overhead Electric
- Water Line

Notes:

1. Approximate locations of potable water and sewer pipelines.
2. Underground pipelines and conduits outside of IM-3 fence line will be removed, unless otherwise noted. Coordination with foreign utilities is required when in/near their right-of-ways.
3. To avoid conflict with remedy pipes and potential damage to existing IM3 infrastructure, these pipe and conduits are to be replaced with aboveground jumper pipes during remedy construction. The jumper pipes are to be removed as part of IM3 decommissioning.
4. All pipes on this slope are to be abandoned in place as shown in order to reduce erosion and improve slope stability.
5. Remove all process piping and conduits and grout shut the casing pipe.
6. There are four water pipelines and multiple conduits in this shared trench under Bat Cave Wash. All pipelinesand conduits in the shared trench are to be abandoned in place as shown to avoid disturbance to sensitive habitat.

FIGURE 3-5
IM-3 UTILITY ISOLATION AND DECOMMISSIONING PLAN

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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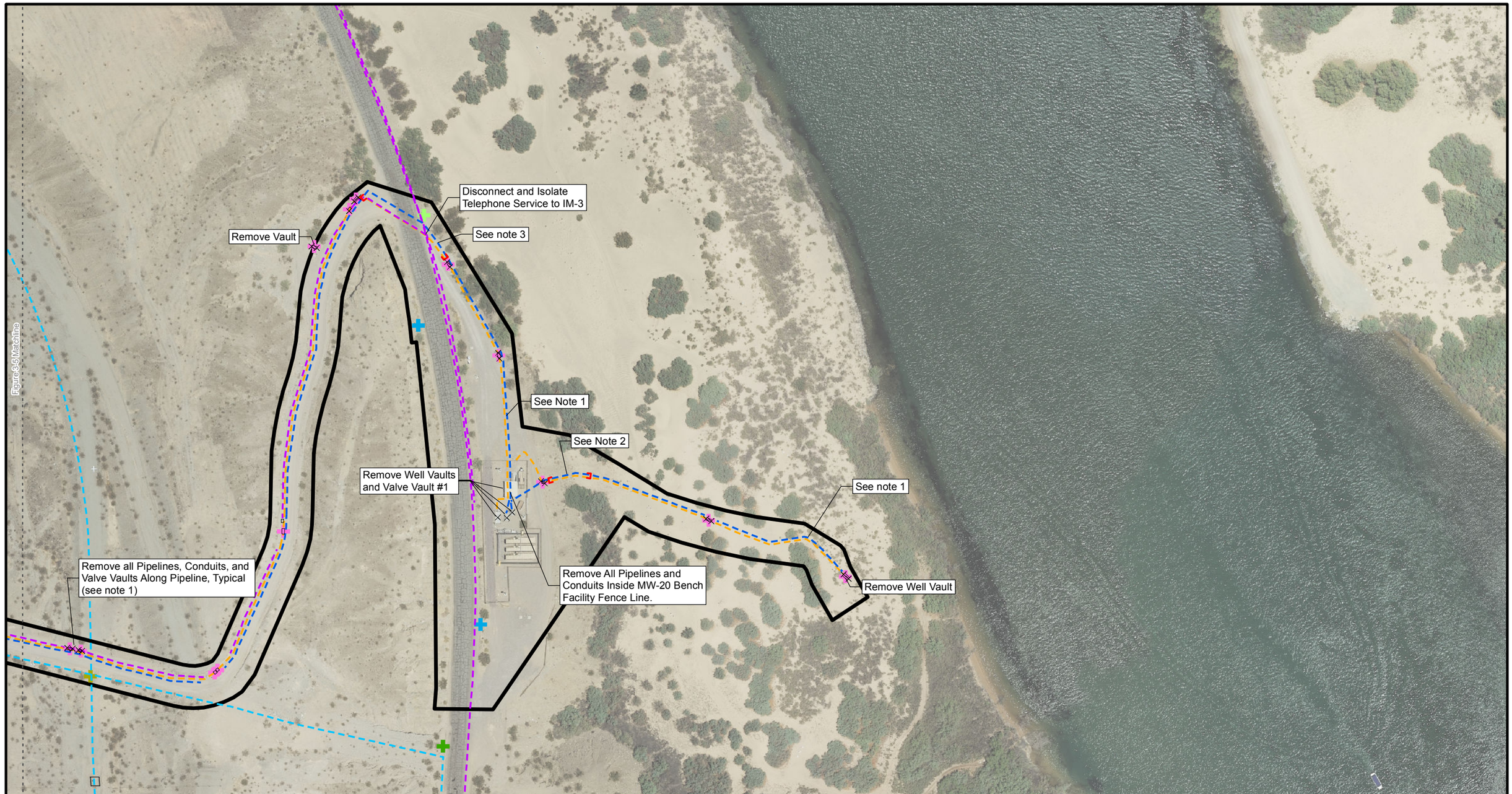

LEGEND

- Survey Corridor
- Cut and Cap Point
- Remove Pipeline,Conduit, Well Vault, or Valve Vault as Indicated

Above Ground Point Features

- Anode
- Gas Pipe Warning Sign
- Gate
- Street Sign
- Telephone Box
- Vault

Line Features (Underground)

- Electric Line
- Gas Pipe
- Telephone Line
- Water Line

N

0 50 100 200 Feet

Notes:

1. Underground pipelines and conduits outside of MW-20 Bench Facility fence line will be removed, unless otherwise noted. Coordinate with foreign utilities when in/near their right-of-ways.
2. All pipes on this slope are to be abandoned in place as shown in order to reduce erosion and improve slope stability.
3. All pipes and conduits in/on the shoulder of NTH are to be abandoned in place to avoid breaking pavement on NTH (Potential O&M issue for county).

FIGURE 3-6
IM-3 UTILITY ISOLATION AND DECOMMISSIONING PLAN 2
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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SECTION 4

Decommissioning Procedures

Decommissioning and removal activities will commence when site preparation, demarcation, and utility isolation activities are complete. For the purpose of this Work Plan, decommissioning is defined as rendering the IM-3 Groundwater Extraction and Treatment System permanently out of service; decontaminating identified system components; removing (demolishing or recovering) identified IM-3 system; characterizing waste; and properly handling, transporting, and disposing of waste streams.

Table 4-1 presents an overview of IM-3 system to be decommissioned and categorizes these components as one of the following waste streams (note: if the component or structure is non-hazardous or is characterized as non-hazardous following successful decontamination, then it can be recovered for reuse or recycle; Section 5.2 presents IM-3 components and structures that have recovery value):

1. Non-hazardous solid waste, which may be recovered or disposed of:
   a. Requiring zero to minimal cleaning (e.g., water rinse).
   b. Requiring extensive cleaning (e.g., pressure washing with surfactant solution).
2. Cleaning liquid and solid waste generated from cleaning components/materials in Category 1.
3. Hazardous solid waste, which will likely not be decontaminated prior to disposal. (Classification of RCRA or Non-RCRA will be determined by analysis prior to disposal.)
4. Components or materials that will be decontaminated and managed as non-hazardous if decontamination is successful, which may be recovered or disposed of.
5. Decontamination liquid or solid waste generated from decontaminating components, or materials in Category 4.

For the purpose of this Work Plan, presumed non-hazardous tank system components, equipment, and materials are defined as items that have only handled non-hazardous waste or non-hazardous materials, or have previously been determined to not exhibit hazardous waste characteristics. Conversely, presumed hazardous tank system components, equipment, and materials are defined as items that have handled hazardous waste or have previously been determined to exhibit hazardous waste characteristics. Figure 4-1 shows the IM-3 treatment process flow diagram and indicates which portions of the treatment system handled hazardous waste and materials. Figure 4-2 presents areas in the IM-3 Treatment Plant that are considered potentially hazardous areas, because the tanks, equipment, and pipelines in these areas have handled hazardous waste. Figure 4-3 presents areas in the MW-20 Bench Facility that are considered potentially hazardous areas, because the equipment and pipelines in these areas have handled hazardous waste. Some of the upstream components of the IM-3 treatment system from the extraction wells to the clarifier, sludge holding tank to the phase separators, and process drains tank have handled hazardous waste and materials.

IM-3 components that are classified as hazardous waste tank systems must meet the closure performance standard for a facility operated under conditional authorization as specified in California Health and Safety Code (CHSC) Section 25200.3(g)(1). Hazardous waste tank systems will also be decommissioned in compliance with 22 CCR Division 4.5, Chapter 32. To decrease the amount of hazardous waste to be transported offsite, most tanks and equipment that contained hazardous waste will be decontaminated to the standards specified in 22 CCR 67383.3(e). By demonstrating that tank system components are no longer hazardous, they can be disposed of as non-hazardous waste or can be recovered if approved by PG&E.

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Various decontamination methods are available for potential use during implementation of this Work Plan and include the following:

- Pressurized water blasting for the removal of light- to heavy-residual product, sludge, scale, and debris from tank, equipment, and a variety of other material surfaces, such as concrete floors and walls.
- Abrasive blasting with various materials accelerated in a pressurized air stream.
- Mechanical removal with equipment such as scabblers. Mechanical removal is typically used for thin veneers of contaminants on relatively small horizontal or vertical affected areas.
- Chemical washing using a combination of an aqueous solution with bleach, acid, surfactant, or other industrial cleaning products, and a clean water rinse.
- Chemical extraction to remove contaminants that may migrate into the pores and microscopic voids of a material.

Non-hazardous IM-3 components will be decommissioned and removed and cleaned if required. Various cleaning methods are available for potential use during the implementation of this Work Plan and include low- and high-pressure water blasting and chemical washing as previously described.

Following decontamination or cleaning, these IM-3 components and material surfaces will be removed from their existing location and containerized and staged for disposal as a waste or for reuse or recycle (see Section 5). Table 4-2 lists common removal (demolition) equipment and methods that may be used during the decommissioning of IM-3 system. This table provides information on typical equipment and methods used for removal and is not meant to be an all-inclusive list or used to dictate means and methods that will be implemented as a part of this work.

Figures 4-4 through 4-23 show photographs of typical removal (demolition) equipment that could be used during the decommissioning and removal of the IM-3 Groundwater Extraction and Treatment System. Note that this is not intended as an exhaustive compilation of potential equipment that could be onsite; equipment could be added to or removed from this list as appropriate at the time of implementation. In addition, photos are for illustration purposes only, and are not intended as exact images of equipment that could be onsite.

The following sections describe decommissioning procedures for the IM-3 system included in this Work Plan. Section 6 describes best management practices and mitigation measures.

4.1 Wells

The four extraction wells, TW-2S, TW-2D, TW-3D, and PE-1, and the two injection wells, IW-2 and IW-3, will be decommissioned as part of the IM-3 system decommissioning. The general approach for decommissioning wells has been developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes, and is included as Standard Operating Procedure (SOP) Well-SOP-01 in Appendix B of the Operation and Maintenance (O&M) Plan (Volume 1 of the O&M Manual (CH2M HILL 2014c). The technical specifications and procedures for decommissioning the above six wells were developed in accordance with this SOP.

Well-head construction includes subsurface concrete vaults equipped with pumps (extraction wells only), instrumentation, valves, and other pipe appurtenances. Appendix A, Photographs 1 and 2 show the extraction well locations and vaults, and Photograph 58 to view the injection well vaults. Underground piping and electrical conduits are connected to the well heads to convey water and provide power and control for equipment, valves, and instrumentation. Appendix A, Photographs 3 and 59 show the typical interior of an extraction well vault and injection well vault, respectively.

4.1.1 Identification of Decommissioning Materials and Placement Requirements

The SOP defines the various materials that can be used during the well decommissioning process. This section identifies the specific materials that will be used during the decommissioning of the IM-3 system wells based on the assumption that the well will be decommissioned in place and that they are located in an area of known or potential soil or groundwater contamination. PG&E anticipates reviewing these plans and assumptions with the

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DTSC, DOI, responsible agency (San Bernardino County), affected land owner, Tribes, and other stakeholders after the well evaluation is complete and before backfilling the wells (see Section 4.1.2).

4.1.1.1 Sealing Material

The wells associated with the IM-3 system are considered Type 2 wells (as identified in the SOP) because they are located in an area of contaminated groundwater (injection wells IW-2 and IW-3 are outside of the groundwater plume, but are in an area planned for active groundwater remediation). Further, wells TW-2S, TW-2D, TW-3D and PE-1 are located on the flood plain of the Colorado River, which represents an area of increased potential for surface water infiltration relative to nearby upland areas. For these reasons, and in accordance with the California Well Standards, sealing material will be used to fill the well casing from total depth to a within 5 feet of ground surface. Neat cement grout has been selected as the preferred sealing material because it has the capacity to infiltrate and seal the annular filter pack behind the well screen.

The neat cement will be composed entirely of Type II/V Portland cement grout with up to 6% bentonite powder. Water used to prepare the cement will be obtained from the freshwater supply associated with the TCS or the groundwater remedy. All manufacturers' specifications for mixture volumes and curing times must be strictly followed (typically, ASTM C150, Standard Specification for Portland cement). Further, the use of any additives will comply with the requirements of ASTM C494 (Standard Specification for Chemical Admixtures for Concrete).

The neat cement will be placed in the well casing in one continuous operation using a tremie pipe with positive displacement pumping (pumped under pressure), beginning at the bottom of well with the end of the tremie pipe submerged two feet or more below the surface of the cement during placement. During this operation, static water is either displaced out of the top of the well by the injected column of material, or is forced into the formation. Water that is displaced out of the top of the well will be contained and managed in accordance with the Waste Management Plan (see Section 5). The cement level in the well will be monitored for settlement during emplacement and approximately 24 hours after and the volume of neat cement will be measured against the anticipated volume of the well (including the annular borehole area) to verify adequate filling. Additional cement will be added as necessary to compensate for grout settlement and bring the level of grout in the well casing approximately 5 feet below the existing ground surface.

4.1.1.2 Filler Material

In accordance with the California Well Standards, filler material will not be used to decommission IM-3 system wells because they are located in an area of contaminated soil and groundwater; however, this assumption will be confirmed with DTSC, DOI, responsible agency (San Bernardino County), affected land owner, Tribes, and other stakeholders before backfilling the wells.

4.1.1.3 Displaced Site Material

Displaced site material will be used to backfill the portion of the excavation above the sealed well casing, including the void created when the existing well vaults are removed. If any soils are displaced during the removal of the well vault, it will be temporarily staged in the work area and replaced into the excavation once the decommissioning process is complete. Additional material needed to backfill the vault excavation will be sourced from an existing, onsite stockpile of displaced site material reserved for this type of use.

4.1.2 Well Decommissioning Procedure

Based on review of the SOP and the assumption that the results of the evaluation conducted within each well prior to decommissioning will indicate that the wells are in good condition, each well will be decommissioned using the procedure for "decommission in place". As identified in the SOP, decommissioning wells in place, when acceptable to the regulatory agencies, is the preferred method as it represents the field procedure which is least intrusive and which creates the least amount of disturbance. In accordance with the SOP, each well will be decommissioned by the following procedure:

1. **Remove all in well infrastructure** to facilitate well evaluation. Prior to decommissioning the wells, submersible pumps in the extraction wells, air-lift tubing in the injection wells, and pipes, valves, and instruments in both the extraction and injection well vaults will be removed. Conduit, electrical panels, and

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other features within a well vault will also be removed. Underground pipelines and conduits exiting a well vault within the MW-20 Bench Facility fence line will be removed. After successful decontamination or cleaning, underground pipelines and conduits exiting PE-1, IW-2, and IW-3 well vaults will be removed.

2. **Well evaluation and consultation with lead agencies, responsible agency (San Bernardino County), affected land owner, and other stakeholders.** Review drilling and well construction records for the given well and compare to information collected during the well evaluation. Conduct an evaluation of each IM-3 system well by measuring total depth and surveying well screen and casing condition with an in-well video camera. Prior to implementation of well decommissioning activities, consult with DTSC, DOI, responsible agency (San Bernardino County), affected land owner, Tribes, and other stakeholders to confirm that the well should be decommissioned in place without modification, and confirm the proper use of backfilling materials (i.e., sealing material versus filler material, if applicable).
3. **Place sealing material.** Once it is confirmed that the well is free of blockages and that well casing and screen condition are acceptable, the sealing material will be placed via tremie pipe as detailed in Section 4.1.1.1. Sealing material placement will begin with the tremie pipe near the bottom of the well and will be placed in one continuous operation. Subsequent lifts of sealing material, if required due to settlement, will be added in the same manner if the material level is below the water table, or the material can be added from the surface if the material level is above the water table. If it is determined that filler material should be used for portions of the well backfill, then the material will be placed in accordance with the methods identified in Section 2.2.2 of the SOP.
4. **Decommissioning the well head.** In addition to the removal of well head infrastructure identified in Step 1, the well head will be decommissioned by removing the existing well vaults and cutting off the well at a depth of approximately 5 feet below ground surface (bgs) (if the well casing is already at a level of 5 feet bgs, or lower, it will be left at the existing depth). The cut-off casing will be encapsulated within a “mushroom cap” composed of neat cement grout that sits above and extends beyond the diameter of the well casing so that fluids drain away from the well. Once the well head cap has cured, the remainder of the excavation will be backfilled using the same material that was displaced during vault removal, as applicable, or with additional displaced site material as identified in Section 4.1.1.3.

4.2 Pipelines and Valve Vaults

IM-3 pipelines run from extraction well PE-1 to the MW-20 Bench Facility, from the MW-20 Bench Facility to and from the IM-3 Treatment Plant, and from the IM-3 Treatment Plant to the injection well field in the East Mesa. Pipelines from the MW-20 Bench Facility to the IM-3 Treatment Plant and on to the injection well field follow the existing access road and a short section of historic Route 66. Underground and aboveground pipelines are present. Pipelines conveying untreated groundwater are constructed of double-walled, high-density polyethylene (HDPE) pipe; treated effluent lines and brine lines are constructed of single-walled HDPE pipe for underground lines and epoxy-lined carbon steel pipe for aboveground lines. Valve vaults are installed along these pipelines, and in some cases, multiple pipelines pass through a single-valve vault. Underground pipelines outside of the IM-3 Treatment Plant and MW-20 Bench Facility will be abandoned in place or removed following cleaning or decontamination. Aboveground pipelines will be removed following cleaning (if necessary). Figures 3-5 and 3-6 show where pipelines are to be cut and capped or removed and the location of vaults that are to be removed. Pipeline and valve vault details and general decommissioning procedures are presented in the following subsections.

4.2.1 Underground Pipelines

Underground pipelines include the following:

- Four double-walled extraction pipelines from the four extraction wells, TW-2S, TW-2D, TW-3D, and PE-1, to Valve Vault No.1 on the MW-20 Bench Facility.
- Two double-walled extraction pipelines from Valve Vault No. 1 on the MW-20 Bench to the IM-3 Treatment Plant (see Appendix A, Photograph 8 to view these pipelines in an open trench). Appendix A, Photograph 9

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shows these pipelines and several conduits in the same shared trench along the road from the MW-20 Bench Facility to the IM-3 Treatment Plant.

- Two brine pipelines from the IM-3 Treatment Plant to the brine storage tanks on the MW-20 Bench Facility (see Appendix A, Photograph 8 to view these pipelines in an open trench). Appendix A, Photograph 9 shows these pipelines and several conduits in the same shared trench along the road from the MW-20 Bench Facility to the IM-3 Treatment Plant.
- Portion of the injection pipeline from the IM-3 Treatment Plant to the point where it bends up above ground at the road across from the IM-3 Treatment Plant.
- One injection pipeline where the portion of the aboveground injection line bends down below grade and splits off into two separate pipelines to the two injection wells, IW-2 and IW-3, at the injection well field in the East Mesa.

The following general steps will be required to decommission the underground pipelines outside of the IM-3 Treatment Plant and MW-20 Bench Facility fence lines:

1. Completely drain pipeline if necessary, collecting the waste stream. If pipeline will not drain completely by gravity, then compressed air may be used to clear the pipeline. The containment vessel for waste stream collection shall be sized to completely contain the maximum amount of waste from a pipeline plus 20 percent freeboard. Refer to Section 6 for best management practices related to spill prevention and response.
2. In accordance with Table 4-1, clean the pipeline if non-hazardous, or decontaminate pipeline if considered potentially hazardous, and collect cleaning or decontamination water. The containment vessel for waste stream collection shall be sized to completely contain the maximum amount of waste from a pipeline plus 20 percent freeboard. Refer to Section 6 for best management practices related to spill prevention and response. (To date, a leak from the interior extraction pipelines to the exterior pipeline has never been detected. If no leaks have been detected at the time of IM-3 decommissioning, then only the interior pipe of the double-contained extraction pipelines will need to be decontaminated. If a leak is detected in the extraction pipelines, then the interior and exterior pipelines will need to be decontaminated.)
3. Dry the pipeline with compressed air after the final freshwater flush.

Remove the valve vaults and the pipelines Underground pipelines within the IM-3 Treatment Plant fence line and within the MW-20 Bench fence line will be excavated and completely removed. The ground within the fence line of these areas will be disturbed for IM-3 Treatment Plant foundation, Valve Vault No. 1, and TW-2S, TW-2D, and TW-3D well vault removal and soil sampling. Invasive procedures are already required in these areas; therefore, pipelines within these areas will be removed when the IM-3 Treatment Plant foundation and vaults are removed, prior to soil sampling.

4.2.2 Aboveground Pipelines

Aboveground pipelines include the following:

- Injection pipeline from the IM-3 Treatment Plant to the entrance to the injection well field in the East Mesa (see Appendix A, Photograph 56 to view the aboveground injection pipeline).

The following general steps will be required to decommission these pipelines:

1. Completely drain pipeline at low points in the line if necessary, collecting the waste stream.
2. Clean pipeline and collect cleaning water in accordance with Table 4-1.
3. Remove pipeline in sections, and contain material for disposal or salvage for recycle.

4.2.3 Valve Vaults

Several valve vaults are installed along the underground and aboveground pipelines. The valve vaults along the extraction and brine pipelines are partially buried, and the valve vaults along the injection pipeline are aboveground. Valve vaults are precast concrete vaults. Pipelines will be decommissioned first or with the valve vaults (see Appendix A, Photographs 10 and 57 to view a valve vault along the extraction and brine pipelines and a

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valve vault along the injection pipeline, respectively). The following general steps will be required to decommission these valve vaults:

1. Verify pipelines, valves, and instrumentation are removed from the valve vault.
2. Completely remove vault (as one unit when possible). Salvage vault for reuse or recycle, or contain waste material for disposal.

4.3 IM-3 Treatment Plant

The IM-3 Treatment Plant includes the trailer, shade structure, concrete plant foundation, equipment pads, secondary containment areas, mobile warehouse units, security gate and fence, gravel base around the plant, and equipment and treatment pipelines underneath the sunshade. Decommissioning and removal of the IM-3 Treatment Plant will not occur until utilities servicing the treatment plant are disconnected and isolated (see Section 3.4 for details on utilities servicing IM-3 facilities). IM-3 Treatment Plant details and general decommissioning procedures for IM-3 Treatment Plant infrastructure and components are presented in the following subsections.

4.3.1 IM-3 Treatment Plant Trailer

The IM-3 Treatment Plant trailer consists of a control room, office, electrical room, bathroom and locker room, and a lab (see Appendix A, Photographs 13 and 14 to view the IM-3 Treatment Plant and IM-3 Treatment Plant Trailer). Prior to decommissioning this trailer, Lockout/Tagout of electrical systems will be completed to verify systems are de-energized. The following subsections describe general decommissioning procedures for each room within the trailer. After room decommissioning is complete, the trailer will either be recovered for reuse or demolished for disposal. If the trailer is kept for reuse onsite in another location or sold for reuse at an offsite location, the trailer will be prepared for over-the-road transport and removed from the site under the appropriate transportation permit for wide loads. If the trailer is demolished, the building materials will either be recovered for recycle or disposed of as a waste. Recoverable materials will be removed prior to demolition of the trailer to the extent possible. Materials that cannot be recycled will be segregated and containerized for transport and disposal. Universal wastes, including light bulbs, ballasts, smoke detectors, exit signs, and batteries, will be removed prior to demolition.

4.3.1.1 Control Room and Office

The control room and office will be decommissioned by removing furniture, appliances, computer, monitors, instrumentation, and other electrical equipment. These materials will be segregated and recovered for recycle or reuse, or will be disposed of as a waste.

4.3.1.2 Electrical Room

The electrical room will be decommissioned by removing the motor control center, PLC, electrical panels, instrumentation, and other electrical equipment and conduits. These materials will be segregated and recovered for recycle or reuse, or will be disposed of as a waste.

4.3.1.3 Bathroom and Locker Room

The bathroom and locker room will be decommissioned by first removing loose items stored in the room. If the trailer is to be demolished, then the light fixtures and plumbing fixtures will be removed and segregated for recycling or disposed of as a waste. If the trailer is to be reused, only the loose items will be removed, leaving the lighting and plumbing fixtures secured for transportation offsite. Lockers will be decontaminated prior to recovery or disposal.

4.3.1.4 Lab

The lab will be decommissioned by first removing loose furniture, appliances, computers, electrical equipment, and lab equipment from the room. Lab sinks and cabinets will then be removed. The lab drain tank outside of the trailer will also be removed (see Appendix A, Photograph 15 to view the lab drain tank). Lab equipment, such as ovens, balances, and fume hoods will be reused or recovered and sold for reuse. Materials removed from the lab

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that cannot be re-tasked will be segregated and recovered for recycle or will be disposed of as a waste. If the trailer is to be reused and retaining the lab sinks and cabinets is desirable, then these features will be preserved.

4.3.2 Facility Shade Structure

The facility shade structure will either be sold for reuse or will be demolished and segregated for recycling. If the structure is sold for reuse, the area around and below the structure will be secured for the disassembly of the structure with the individual components segregated and loaded onto trucks for transport offsite. If the structure is to be demolished, the structure will be demolished from the top of the structure to the ground level using an excavator with shears. The excavator with shears will allow the structure to be safely demolished in pieces. Shears and cutting torches will be used at the ground level to size the pieces to fit in containers for transport and recycle.

4.3.3 Mobile Warehouse Units

Materials will be removed from mobile warehouse units and the floors swept of loose debris. The majority of materials in these units are spare parts for the IM-3 system. Spare parts may be recovered with the equipment they accompany or disposed of as waste. The units may be cleaned with a water rinse. Cleaning water will be collected for disposal as waste. The units will be inspected and either reused at a different onsite location, sold for reuse, or demolished for recycling. If the units are sold for reuse, they will be loaded onto trucks and secured for offsite transport (see Appendix A, Photograph 54).

4.3.4 Flammable Liquid Storage Cabinet

Flammable liquids will be removed from the project site during preparation for IM-3 system lay-up. The empty flammable liquid storage tank can be recovered for reuse, or the cabinet material could be prepared for recycle. (Appendix A, Photograph 49 shows the flammable liquid storage cabinet.)

4.3.5 Security Gate and Fence

The security gate and fence will remain in place during the decommissioning and removal of the IM-3 Treatment Plant and components to provide security and safety until the facility is in a safe and secure condition (Appendix A, Photograph 50 shows a portion of the security fence and gate). The gate will be manually operated during decommissioning then removed and recovered for reuse or recycling. Aboveground electrical conduits and controls will be removed and segregated for recycling or disposal as waste. Wires will be pulled from the underground electrical conduit from the trailer to the gate. For the purpose of slope stability and erosion control, the underground conduits that is located on a steep slope, just outside of the IM-3 Treatment Plant fence line to the east will be cut and capped at both ends at a location below grade. Locations of the capped lines will be surveyed and shown on as-built drawings.

The security fencing will be removed by first removing the fencing from the individual posts. The posts will then be removed by pulling them from the ground using equipment. The fencing and posts will be segregated and staged for offsite reuse or recycling. The remaining holes will be backfilled to leave the area in a safe condition.

4.3.6 Gravel Base around IM-3 Treatment Plant and Pipe Culvert

After IM-3 Treatment Plant components, structure, and security gate and fence are removed from the IM-3 Treatment Plant primary work zone, any gravel that is visibly stained will be removed and disposed of. Remaining gravel inside of the IM-3 Treatment Plant primary work zone will then be temporarily stockpiled to allow access to soil for soil confirmation sampling (see Section 7 for soil confirmation sampling procedures). After results from soil sampling are received, the stockpiled gravel may be used within the IM-3 Treatment Plant boundary to maintain the area and keep it safe during the time period between completion of IM-3 Treatment Plant decommissioning and removal and implementation of the Site-Specific IM-3 Restoration Plan. The forthcoming Site-Specific IM-3 Restoration Plan will address final disposition of the remaining gravel in this area.

When removing stained gravel from the site, the pipe culvert at the entrance to the IM-3 Treatment Plant should also be removed. The pipe culvert will be recovered for reuse or material cut to size and recycled. The pipe culvert on the road at Bat Cave Wash will be preserved.

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4.3.7 Treatment Equipment and Piping

Aboveground treatment equipment, treatment pipelines, electrical, instrumentation underneath the facility shade structure and within the footprint of the IM-3 Treatment Plant will be decommissioned and removed. Prior to decommissioning these IM-3 components, the shade structure will be removed and the treatment plant isolated from the extraction and injection wells and pipelines by decommissioning the pipelines entering and leaving these areas first. The following subsections detail general decommissioning procedures for tanks systems, other major equipment, and treatment pipelines.

4.3.7.1 Tank Systems

The IM-3 Treatment Plant includes several process tanks, potable water tank, fire water storage tank, and sewage holding tank. Pipes, pumps, valves, instrumentation, other miscellaneous equipment, and appurtenances attached to a particular tank are considered to be a part of the tank system. The following general steps will be required to decommission each tank system.

1. Completely drain tank in place if necessary, collecting the waste stream.
2. Clean or decontaminate tank in place if necessary, in accordance with Table 4-1, collecting the waste stream.
3. After the tank system is characterized, remove ancillary equipment installed in the tank such as mixers, air headers, and submersible pumps. Disconnect and remove associated piping, valves, and instruments from tank that were not decommissioned as a part of another piece of treatment equipment. Recover components and materials for reuse or recycle, or prepare them for offsite disposal as waste.
4. Remove the tank with a crane, and direct load onto a truck for offsite transport or for transport to a designated waste management area.
5. Remove the tank support system, such as saddle, tank legs, base plates, and anchors.

Entry into these tanks requires a confined space permit. The following subsections present unique features to each tank system and decommissioning sequencing recommendations.

Raw Water Storage Tank. Table 4-3 describes the raw water storage tank. To allow for easy removal of the raw water storage tank, the treated water storage tank should be decommissioned and removed prior to decommissioning this tank.

Chromium Reduction Reactor Tank. Table 4-4 describes the chromium reduction reactor tank. This tank includes a removable mixer. To allow for easy removal of the chromium reduction reactor tank, the raw water storage tank and the pipe reactor should be decommissioned and removed prior to decommissioning this tank.

Iron Oxidation Tanks. Three identical iron oxidation tanks are onsite; table 4-5 describes these. The oxidation tanks include a removable mixer and a polyvinyl chloride or fiberglass air header. To allow for easy removal of the iron oxidation tanks, the raw water storage tank should be decommissioned and removed prior to decommissioning these tanks.

Sludge Holding Tank. Table 4-6 describes the sludge holding tank that includes a removable mixer and decanter piping.

Pretreated Water Tank. Table 4-7 describes the pretreated water tank. To allow for easy removal of the pretreated water tank, the microfilter package system and microfilter clean-in-place system should be decommissioned and removed prior to decommissioning this tank.

Microfilter Waste Tank and Clean-in-Place System. Table 4-8 describes the microfilter waste tank, which is part of the microfilter clean-in-place (CIP) system. The CIP system includes two pumps, a bag filter, several pipes, valves, a microfilter CIP plastic tote, and chemical addition connections.

Primary Reverse-osmosis Feed Tank. Table 4-9 describes the primary reverse-osmosis feed tank.

Secondary Reverse-osmosis Feed Tank. Table 4-10 describes the secondary RO feed tank.

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Reverse-osmosis Permeate Tank. Table 4-11 describes the RO permeate tank. To allow for easy removal of the RO permeate tank, the mobile warehouse units should be decommissioned and removed prior to decommissioning this tank.

Reverse-osmosis Concentrate Storage Tank. Table 4-12 describes the RO concentrate storage tank. To allow for easy removal of the RO concentrate storage tank, the mobile warehouse units should be decommissioned and removed prior to decommissioning this tank.

Treated Water Storage Tank. Table 4-13 describes the treated water storage tank. Removal of this tank will allow for other tank systems to be easily removed.

Process Drains Tank. Table 4-14 describes the process drains tank. A removable, vertical-submersible pump is located in this tank. This tank system should be decommissioned and removed last, because it collects wastewater from floor drains within the IM-3 Treatment Plant footprint. Water within the phase separator secondary containment area collected in the area sump can also be pumped to this tank.

Domestic Water Tank and Distribution System. Table 4-15 describes the domestic water tank.

Fire Water Storage Tank. Table 4-15 describes the fire water storage tank. This tank is located outside of the facility shade structure. It could be used for fire protection during the decommissioning and removal of IM-3 system at the IM-3 Treatment Plant location.

Sewage Holding Tank. Table 4-17 describes the sewage holding tank that is located underground adjacent to the west side of the IM-3 Treatment Plant trailer. It will be decommissioned when the IM-3 utilities are disconnected and isolated and IM-3 Treatment Plant is decommissioned and removed.

4.3.7.2 Package Systems

The IM-3 treatment system includes five package systems. The decommissioning of each package system requires a different procedure. The following sections describe these procedures, unique features of the package system, and decommissioning sequencing recommendations.

Clarifier. Table 4-18 describes the clarifier. The clarifier and associated sludge pipelines, sludge conveyance pumps, valves, and instrumentation are considered a hazardous waste tank system. The following general steps will be required to decommission the clarifier:

1. Completely drain the clarifier if necessary, collecting waste stream.
2. Remove rake drives and motors on top of clarifier. Disconnect associated piping, valves, and instruments from the tank that were not decommissioned as a part of another piece of treatment equipment. Decontaminate these components in accordance with Table 4-1 (same decontamination procedures for the clarifier tank is required for these components).
3. Decontaminate the clarifier in place in accordance with Table 4-1.
4. Disassemble and remove flocculator mix tank assembly (small mix tank with small rake inside) from the sludge holding tank portion of the clarifier with a crane, and direct load onto a truck for offsite transport or for transport to a designated waste management area.
5. Disassemble and remove the lamella tank assembly (inclined plate portion of clarifier) from the sludge holding tank portion of the clarifier with a crane, and direct load onto a truck for offsite transport or for transport to a designated waste management area.
6. Remove the sludge holding tank with crane, and direct load onto a truck for offsite transport or for transport to a designated waste management area.
7. Remove the remaining clarifier support system components.

If decontamination is successful, then the clarifier should be recovered for recycling as scrap steel metal, rather than recovering it for reuse as a clarifier, because it may be near the end of its useful life at the time of decommissioning.

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Microfilter. Table 4-19 describes the microfiltration package system (microfilter). The following general steps will be required to decommission the microfilter:

1. Completely drain the microfilter tanks if necessary, collecting waste stream.
2. If not already removed, remove and dispose the microfilter modules.
3. Clean the microfilter system in accordance with Table 4-1.
4. The microfilter system has a recovery value for reuse. If the system is reused, disassemble skids as required for transport offsite or to an onsite staging area for temporary storage. Package off-skid components as required for offsite transport or to an onsite staging area for temporary storage.
5. Clean the microfilter in place in accordance with Table 4-1.
6. Remove the remaining microfilter support system components.

Primary and Secondary Reverse-osmosis System. Table 4-20 describes the primary and secondary RO systems. The following general steps will be required to decommission the primary and secondary RO systems:

1. Completely drain the reverse osmosis feed tanks and associated pipelines if necessary, collecting waste stream.
2. If not already removed, remove and dispose the reverse osmosis membranes.
3. Clean the RO systems in accordance with Table 4-1.
4. The RO system has a recovery value for reuse. If the system is reused, disassemble the skids as required for offsite transport or to an onsite staging area for temporary storage. Package the off-skid components as required for offsite transport or to an onsite staging area for temporary storage.
5. Clean the RO vessels and equipment in place in accordance with Table 4-1.
6. Remove the remaining RO support system components.

Air Compressor and Dryer. Table 4-21 describes the air compressor and dryer. The following general steps will be required to decommission the air compressor and dryer:

1. Relieve pressure from the compressed air tank by releasing it into the atmosphere.
2. The compressed air system has a recovery value for reuse. If the system is reused, disassemble the skids as required for offsite transport or to an onsite staging area for temporary storage. Package the off-skid components as required for offsite transport or to an onsite staging area for temporary storage.
3. Remove the remaining support system components.

Blower. Table 4-22 describes the blower. The following general steps will be required to decommission the blower:

1. Relieve the pressure from the air tank by releasing it into the atmosphere.
2. The blower has a recovery value for reuse. If the system is reused, disassemble the skids as required for offsite transport or to an onsite staging area for temporary storage. Package the off-skid components as required for offsite transport or to an onsite staging area for temporary storage.
3. Remove the remaining support system components.

4.3.7.3 Phase Separators

The phase separators are rented units and will be removed from the site during the IM-3 lay-up period. Only the phase separators secondary containment area should be demolished and removed.

4.3.7.4 Chemical Storage and Feed Systems

The following five chemical storage and feed systems are at the IM-3 Treatment Plant:

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2. Sodium hydroxide storage and feed system
3. Hydrochloric acid storage and feed system
4. Polymer makeup storage and feed system
5. Anti-scalant storage and feed system

Appendix A, Photographs 42 through 48, present the onsite chemical systems. The ferrous chloride, sodium hydroxide, and hydrochloric acid systems will be managed as hazardous waste systems. The polymer and anti-scalant used onsite do not exhibit hazardous waste properties; therefore, these systems can be managed as non-hazardous waste. During decommissioning, when handling equipment or pipelines that contain or contained these chemicals, appropriate PPE will be worn as required by the particular chemical's material safety data sheet and as required by the site HSP. The following general procedures apply when decommissioning these feed systems:

1. Empty the chemical totes or tanks if necessary, collecting waste stream.
2. Disconnect the feed pumps from totes or tanks if still connected in field.
3. Handle the chemical storage and feed equipment and chemical pipelines in accordance with Table 4-1. Most chemical pumps and piping do not have a high-reuse value; therefore, it is recommended that these components be disposed of. The polymer makeup system could have reuse value at the time of decommissioning, depending on the condition.
4. Remove the remaining chemical support system components.

Some chemical pipes are heat traced. The heat trace electrical panel is located near the chemical storage area. Decommission the heat trace wires and panel according to Section 4.3.7.9 or similar to other electrical components decommissioned at the site.

4.3.7.5 Pumps, Mixers, Valves, and Miscellaneous Equipment

Installed pumps, valves (both automated and manual), and miscellaneous in-line mechanical equipment are a part of a tank or package system previously described. Handle pumps, valves, and miscellaneous mechanical equipment in accordance with Table 4-1 and Figure 4-2.

4.3.7.6 Pipe Reactor and Treatment Pipe

The serpentine pipe reactor and chemical mix loop are located between the raw water storage tank and the chromium reduction reactor tank. The pipe reactor is nominally 12 inches in diameter and consists of three serpentine loops. This pipe may require a crane for disassembly and removal (see Appendix A, Photo 17). The chemical mix loops are nominally 6 inches in diameter and located within the raw water feed pipe to the pipe reactor. Treatment pipelines are considered a part of a tank or package system in which the pipelines are connected. Tank systems and package systems are previously described. Fittings and appurtenances in the treatment pipe being decommissioned should be handled in accordance with the tank or package system in which they are connected, Table 4-1, and Figure 4-2.

4.3.7.7 General Pipe

Other pipelines in the IM-3 Treatment Plant will be handled according to the area classification in which they originate. Figure 4-2 shows the boundaries of the area classification. Decommission, remove, and handle pipelines in accordance with Table 4-1 and Figure 4-2.

4.3.7.8 Safety Shower, Eye wash, and Chiller System

Two safety eye washes and showers and a chiller system for cold water supply to the eye washes and showers are onsite. The chiller system is located at the domestic water tank equipment pad. The following general procedures apply when decommissioning the safety equipment:

1. Drain the chiller system if required, collecting waste stream.
2. The safety shower and eye wash units and chiller system have recovery value for reuse. If the units and chiller system are reused, disassemble the units and skid as required for offsite transport or to an onsite staging area

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for temporary storage. Package off-skid components as required for offsite transport or to an onsite staging area for temporary storage.

3. Remove the remaining support system components.

4.3.7.9 Plant Instrumentation and Control System, Including Security and Communications Equipment

Several field instruments are installed in treatment pipes and tanks within the IM-3 Treatment Plant. Field instruments include pH, conductivity, flow, pressure, level, and vibration instruments. The IM-3 control system includes the main control panel LCP-100, two WonderWare human-machine interface operator consoles running on personal computers, motor control center, power panels, and a leak detection panel system located in the control room of the IM-3 Treatment Plant trailer as well as local equipment hand switches and panels in the plant. The field instruments and control system components should be decommissioned and handled in accordance with Table 4-1 and Figure 4-2. Most control components will not likely have reuse value at the time of decommissioning, but the materials that compose the components can be recovered for recycle.

The security and communications system is provided and is monitored by PG&E Security. The decommissioning of this system will be coordinated with PG&E Security.

4.3.8 Concrete Foundation, Equipment Pads, and Secondary Containment Areas

The concrete treatment plant foundation, equipment pads located on top of the foundation, containment area around the phase separator, and containment areas around the chemical storage area will be decommissioned and removed after the facility shade structure and equipment and materials underneath the shade structure are decommissioned. These concrete areas will be decommissioned by first sampling the concrete in representative areas to determine if the concrete is contaminated. If only surface contamination is present, then the surface will be removed by scarification equipment and disposed of as a waste and the nonhazardous concrete will be broken using an excavator with a hydraulic breaker. The rebar and grating will be separated from the concrete. The nonhazardous concrete, rebar, and grating material will be recovered for recycle. Section 5.2.2 further describes concrete recycling. Soil confirmation sampling will occur after all subsurface features at the IM-3 Treatment Plant have been excavated and removed. Section 7 describes soil confirmation sampling procedures, and Figure 7-1 shows the proposed sample locations. After soil confirmation test results are received and it is determined that the soil is uncontaminated, then the holes created by removing the plant foundation and secondary containment areas will be backfilled with displaced material or foreign fill and compacted to leave the area in a safe condition. Excess displaced material from the Final Remedy and displaced material from IM-3 Decommissioning activities may be used for backfill after the materials are tested and proven to be suitable for this use. Displaced material is defined as material removed from the earth as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The handling and disposition of displaced material will be in accordance with *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (see Appendix F).

4.4 MW-20 Bench Facility

Figure 3-3 shows the MW-20 Bench Facility primary work zone. The MW-20 Bench Facility includes components of the extraction and conveyance portion of the IM-3 system as well as the brine storage and loading facility. Figure 4-3 shows the boundaries of the area classification within the MW-20 Bench fence line. Section 4.1 describes decommissioning procedures for the extraction wells and well vaults located at the MW-20 Bench Facility.

The MW-20 Bench fence and gates have been incorporated into the Final Remedy and are planned to be reused in the same location. The fence and gates should be preserved while conducting work in this area. If this plan changes in the future, the fence and gates will need to be removed. The fence and gates will likely have recovery value for reuse.

4.4.1 Valve Vault No. 1

Extraction well pipelines pass through the partially buried building referred to as Valve Vault No. 1. This building should be decommissioned and removed as a part of the IM-3 decommissioning (Appendix A, Photographs 4

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through 7, show the well vaults and Valve Vault No. 1). Underground pipelines that pass through this vault will be removed within the vault. Electrical and instrumentation inside this building will also be removed. Untreated water (i.e., extraction) pipelines inside of the MW-20 Bench Facility fence line will be removed. With one exception, pipelines outside of the MW-20 fence line will be removed. The exception is the pipe and conduit that are on the steep slope just east of the MW-20 Bench area; for the purpose of slope stability and erosion control, they will be cut and capped at both ends at a location below grade. Locations of the capped lines will be surveyed and shown on as-built drawings.

4.4.2 Brine Storage and Loading

The MW-20 Bench Facility contains three brine storage tanks that store RO concentrate (i.e., brine or high-salinity treated water for offsite disposal). A secondary containment area made from a liner, gravel, and k-rails surrounds the brine storage tanks. A small pump station located off the brine storage tank area is connected to the tanks to allow for transferring brine into the brine storage tanks, into tanker trucks for offsite disposal. A lined, gravel truck lane runs through the MW-20 Bench Facility to the west side of the brine tank area. The brine storage and loading component of the MW-20 Bench Facility (three tanks, truck lane, and associated pumps and piping) has been incorporated into the Final Remedy and is planned to be reused in the same location. If this plan changes in the future, the brine storage and loading component will be decommissioned in accordance with the following general procedures:

1. Drain the brine tanks and brine pipelines if necessary, collecting waste stream.
2. Decommission and remove the brine pump station and aboveground brine pipelines. Handle equipment and pipelines in accordance with Table 4-1.
3. Remove the k-rails to allow for removal of brine storage tanks.
4. Return the brine storage tanks to the rental company.
5. Demolish and remove the secondary containment area.
6. Remove the underground brine lines within the fence line of the MW-20 Bench Facility.
7. Remove the gravel and liner from the truck lane.

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TABLE 4-1
Expected Wastes Generated from the Decommissioningof IM-3 Components and Infrastructure
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

	Presumed Waste Category						Test Waste? (Y/N)
	Non-hazardous Waste			Hazardous Solid Waste (Likely Will Not Be Decontaminated Prior to Disposal) *Classification of RCRA or Non RCRA will be determined by analysis prior to disposal.*	Components and Materials that will be Decontaminated and Managed as Non-Hazardous if Decontamination is Successful (Option to Recover Component or Structure)	Decontamination Liquid and Solid Wastes Generated? (Y/N)	*Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
Expected Wastes **[Note: If the component or structure is non-hazardous or is characterized non-hazardous following successful decontamination, then it can be recovered for reuse or recycle.]**	Non-hazardous Solid Waste No to Minimal Cleaning Required (Option to Recover Component or Structure in this Category)	Non-hazardous Solid Waste Extensive Cleaning Required (Option to Recover Component or Structure in this Category)	Cleaning Liquid and Solid Wastes Generated? (Y/N)				
Utilities							
Potable water pipelines	X		N			N	N
Sewage pipelines		X	Y			N	Y
Phone lines	X		N			N	N
Power lines	X		N			N	N
Transformer (Purchased from City of Needles)	X		N			N	N
Wells and Well Vaults							
Valves, Instruments, and Appurtenances in Extraction Wells			N		X	Y	Y
TW-2S Extraction Pump, P-100			N		X	Y	Y
TW-2D Extraction Pump, P-101			N		X	Y	Y
TW-3D Extraction Pump, P-102			N		X	Y	Y
PE-1 Extraction Pump, P-103			N		X	Y	Y
Extraction Well Vaults			N		X	Y	Y
Valves, Instruments, and Appurtenances in Extraction Wells		X	Y			N	Y
Injection Well Vaults	X		N			N	N
Pipelines and Valve Vaults							
Underground Pipelines and Vaults							
Extraction pipelines			N		X	Y	Y
Brine pipelines		X	Y			N	Y
Injection pipelines	X		Y			N	Y
Extraction Pipeline Vaults			N		X	Y	Y
Above Ground Pipelines and Vaults							
Injection pipelines	X		Y			N	Y
Injection Pipeline Vaults	X		N			N	N
IM-3 Treatment Plant							
IM-3 Treatment Plant Trailer	X		Y			N	Y
Facility Shade Structure	X		N			N	N
Concrete Foundation, Equipment Pads, and Secondary Containment Areas							
In Hazardous Area - Refer to Figure 4-2					X	Y	Y
Outside of Hazardous Area - Refer to Figure 4-2	X		N			N	N
Mobile Warehouse Units	X		N			N	N
Flammable Liquid Storage Cabinet	X		N			N	N
Security Gate and Fence	X		N			N	N
Treatmentand Plant Support Equipment and Piping							
Tank Systems							
Raw Water Storage Tank, T-100			N		X	Y	Y
Chromium Reduction Reactor Tank, T-300			N		X	Y	Y
Iron Oxidation Tank, T-301A			N		X	Y	Y
Iron Oxidation Tank, T-301B			N		X	Y	Y
Iron Oxidation Tank, T-301C			N		X	Y	Y
Sludge Holding Tank, T-402			N		X	Y	Y
Pretreated Water Tank, T-500		X	Y			N	Y
Microfilter Waste Tank, T-503, and Clean-in-Place System			N		X	Y	Y
Primary RO Feed Tank, T-600		X	Y			N	Y

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TABLE 4-1
Expected Wastes Generated from the Decommissioningof IM-3 Components and Infrastructure
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

	Presumed Waste Category						Test Waste? (Y/N)
	Non-hazardous Waste			Hazardous Solid Waste (Likely Will Not Be Decontaminated Prior to Disposal) *Classification of RCRA or Non RCRA will be determined by analysis prior to disposal.*	Components and Materials that will be Decontaminated and Managed as Non-Hazardous if Decontamination is Successful (Option to Recover Component or Structure)	Decontamination Liquid and Solid Wastes Generated? (Y/N)	*Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
Expected Wastes **[Note: If the component or structure is non-hazardous or is characterized non-hazardous following successful decontamination, then it can be recovered for reuse or recycle.]**	**Non-hazardous Solid Waste No to Minimal Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Non-hazardous Solid Waste Extensive Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Cleaning Liquid and Solid Wastes Generated? (Y/N)**				
Secondary RO Feed Tank, T-2601		X	Y			N	Y
RO Clean-in-Place System, T-601					X	Y	Y
RO Permeate Tank, T-603	X		Y			N	Y
RO Concentrate Tank, T-701		X	Y			N	Y
Treated Water Tank, T-700	X		Y			N	Y
Process Drain Tank, T-900			N		X	Y	Y
Potable Water Tank & Distribution System	X		N			N	N
Fire Water Storage Tank	X		N			N	N
Sewage Holding Tank		X	Y			N	Y
Package Systems							
Clarifier, CL-400			N		X	Y	Y
Microfiltration System		X	Y			N	Y
Primary and Secondary RO System		X	Y			N	Y
Air Compressor and Dryer System, CMP-1000	X		N			N	N
Blower, B-300	X		N			N	N
Chemical Storage & Feed Systems							
Ferrous Chloride							
Ferrous chloride pump, P-800			N		X	Y	Y
Ferrous chlroide tote(s)			N		X	Y	Y
Sodium Hydroxide							
Sodium hydroxide pump - Iron Ox, P-802A			N		X	Y	Y
Sodium hydroxide pump - Iron Ox, P-802B			N		X	Y	Y
Sodium hydroxide pump - Iron Ox, P-802C			N		X	Y	Y
Sodium hydroxide pump - RO Permeate, P-802D			N		X	Y	Y
Sodium hydroxide tote(s)			N		X	Y	Y
Hydrochloric Acid							
Hydrochloric acid pump, P-801			N		X	Y	Y
Hydrocholoric acid tote(s)			N		X	Y	Y
Polymer							
Polymer makedown system, M-804 (to include day tanks)		X	Y			N	Y
Pump to clarifier		X	Y			N	Y
Pump to dewatering system		X	Y			N	Y
Anti-scalant							
Primary RO Anti-Scalant Feed Pump		X	Y			N	Y
Secondary RO Anti-Scalant Feed Pump		X	Y			N	Y
Anti-scalant Day Tanks		X	Y			N	Y
Pumps, Mixers, Valves, and Miscellaneous Mechanical Equipment*							
Pumps*							
Raw Water Feed Pump, P-200			N	X		N	N
Chemical Mixing Pump, P-201			N	X		N	N
Clarifier Feed Pump, P-400			N		X	N	N
Sludge Withdrawal Pump, P-401			N		X	N	N
Phase Separator Feed Pump, P-403			N		X	N	N
Sludge Recycle Pump, P-404			N		X	N	N

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TABLE 4-1
Expected Wastes Generated from the Decommissioningof IM-3 Components and Infrastructure
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

	Presumed Waste Category						Test Waste? (Y/N)
	Non-hazardous Waste			Hazardous Solid Waste (Likely Will Not Be Decontaminated Prior to Disposal) *Classification of RCRA or Non RCRA will be determined by analysis prior to disposal.*	Components and Materials that will be Decontaminated and Managed as Non-Hazardous if Decontamination is Successful (Option to Recover Component or Structure)	Decontamination Liquid and Solid Wastes Generated? (Y/N)	*Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
Expected Wastes **[Note: If the component or structure is non-hazardous or is characterized non-hazardous following successful decontamination, then it can be recovered for reuse or recycle.]**	**Non-hazardous Solid Waste No to Minimal Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Non-hazardous Solid Waste Extensive Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Cleaning Liquid and Solid Wastes Generated? (Y/N)**				
Phase Separator Sump Pump, P-405			N		X	N	N
Pre-treated Water Transfer Pump, P-500		X	Y			N	Y
MF CIP Waste Storage Tank Transfer Pump, P-503			N		X	N	N
RO Booster Pumps, P-601A and P-601B		X	Y			N	Y
Permeate Pumps, P-605A and P-605B	X		Y			N	Y
RO Filtered Water Transfer Pump, P-620		X	Y			N	Y
Secondary RO Booster Pump, P-2701		X	Y			N	Y
Treated Water Pump, P-700	X		Y			N	Y
RO Concentrate Transfer Pump, P-701		X	Y			N	Y
Process Drain Pump, P-900			N		X	N	N
Seal Water Pump, P-1100	X		N			N	N
Potable Water Pump, P-1300	X		N			N	N
Mixers							
Chromium Reduction Tank Mixer, M-300			N		X	Y	Y
Iron Oxidation Tank 301A Mixer, M-301A			N		X	Y	Y
Iron Oxidation Tank 301B Mixer, M-301B			N		X	Y	Y
Iron Oxidation Tank 301C Mixer, M-301C			N		X	Y	Y
Clarifier Flash Mixer, M-400A			N		X	Y	Y
Clarifier Flocculator, M-400B			N		X	Y	Y
Clarifier Sludge Rake, M-400C			N		X	Y	Y
Automated and Manual Valves							
In Hazardous Area - Refer to Figure 4-2			N	X		N	N
Outside of Hazardous Area - Refer to Figure 4-2	X		N			N	N
Miscellaneous Equipment							
PS-RW-111-01 (In-line strainer)			N	X		N	N
PS-WS-111-01 (Strainer)			N	X		N	N
Air Diffuser Rings in Iron Oxidation Tanks			N	X		N	N
Treatment Pipe							
Pipe Reactor			N	X		N	N
Ferrous chloride, sodium hydroxide, and hydrochloric acid feed pipelines			N	X		N	N
All Other Pipes in Hazardous Area - Refer to Figure 4-2			N	X		N	N
All Other Pipes Outside of Hazardous Area - Refer to Figure 4-2	X		Y			N	Y
Safety Shower, Eye wash, and Chiller	X		N			N	N
Plant Instrumentation and Control (I&C) System*							
I&C Components (pH, temperature, flow, pressure, conductivity, level, vibration meters and switches, etc)							
In Hazardous Area - Refer to Figure 4-2			N	X		N	N
Outside of Hazardous Area - Refer to Figure 4-2	X		N			N	N
Control System							
LCP-100 (Main control panel)	X		N			N	N
ICP-100 (Injection well control panel)	X		N			N	N
Wonderware Software (SCADA and touch screen)	X		N			N	N
Computer (Dell workstation, software, printer)	X		N			N	N
Automation Software (PLC software)	X		N			N	N
Motor Control Center (Plus enclosed breakers)	X		N			N	N

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TABLE 4-1
Expected Wastes Generated from the Decommissioningof IM-3 Components and Infrastructure
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

	Presumed Waste Category						Test Waste? (Y/N)
	Non-hazardous Waste			Hazardous Solid Waste (Likely Will Not Be Decontaminated Prior to Disposal) *Classification of RCRA or Non RCRA will be determined by analysis prior to disposal.*	Components and Materials that will be Decontaminated and Managed as Non-Hazardous if Decontamination is Successful (Option to Recover Component or Structure)	Decontamination Liquid and Solid Wastes Generated? (Y/N)	*Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
Expected Wastes **[Note: If the component or structure is non-hazardous or is characterized non-hazardous following successful decontamination, then it can be recovered for reuse or recycle.]**	**Non-hazardous Solid Waste No to Minimal Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Non-hazardous Solid Waste Extensive Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Cleaning Liquid and Solid Wastes Generated? (Y/N)**				
Leak Detection Panel - 003 (Leak detection control panel)	X		N			N	N
Security and Communications Equipment	X		N			N	N
MW-20 Bench Facilities (Note: Extraction well vaults are categorized under the "Wells" section presented at the top of the table).							
Valve Vault #1			N		X	Y	Y
Brine Storage and Loading (Only if removed from Final Remedy)							
Brine Pumping System		X	Y			N	Y
Gravel Road	X		N			N	N
K-Rail and Secondary Containment Gravel and Liner	X		N			N	N
Solar panels (preference is to recycle these panels, otherwise handle as a waste as categorized)			N	X		N	N
Solar batteries (to be managed according to the lead acid battery rules and to be recycled)	-	-	-	-	-	-	-
Incidental Trash	X		N			N	N
Universal Waste (to be managed according to the universal waste rules)	-	-	-	-	-	-	-

Notes:
* If there is a recent replacement of the equipment, then the equipment should be considered for decontamination and recovery.
** Pump body and pump motor can be managed in a different manner.

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TABLE 4-2
Typical Demolition Equipment and Methods of Demolition
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Category of Work	Sub-Category	Typical Methods of Demolition/Equipment
Structures	Above grade - structural concrete and steel frame	For concrete removal, excavator with pulverizer; metal removal, excavator with shear or bucket and thumb; and crane, welding torch, Portaband saws, excavator breaker
Light Steel Frame		Excavator with bucket and thumb, front-end crawler loader, reachfork, scissor lifts, and boom lifts
Heavy Concrete (i.e., Building Foundations or Equipment Pads)		Excavator with breaker, concrete saw, compressor with hammer,
Equipment	Large or heavy equipment and elevated items, such as a canopy	Crane with rigging crew Personnel lifts for access
General Equipment	Tanks, skid-mounted package systems	Large forklift, crane, rigging crew, and scissor and boom lifts, backhoe, dump truck
Recycle Demolition Materials	Structural steel, pipe, and miscellaneous materials	Excavator with shear, welding torch
Concrete		Excavator with a pulverizer, compressor with hammer, concrete saw, dump truck, portable crushers to make road base
Overhead Structures		Crane with rigging crew and personnel lift, and excavator with shear
Dust Control		Water trucks, pull behind water buffalo, fresh water storage tanks
Decontamination		Water trucks, Vactor trucks, hoses, pumps
Material Management		Mechanical hand cutting tools (may include a torch), roll off bin trucks, 18 wheel flatbed trucks (to haul tanks offsite)
Waste management		Trucks to transport liquid waste and solid waste
Earthwork	Removal of Underground Pipe, Backfill and revegetation	Excavator, GradeAll, Loader, 18 wheeler, compactor

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TABLE 4-3
Raw Water Storage Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-100
Photo Number	16 (Appendix A)
Size/Orientation	12–foot (ft) diameter by 32-ft length/horizontal
Approximate Capacity	28,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide hydraulic separation between groundwater extraction pumps and the treatment system

TABLE 4-4
Chromium Reduction Reactor Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-300
Photo Number	18 (Appendix A)
Size/Orientation	6-ft diameter by 10.5-ft height/vertical with conical bottom
Approximate Capacity	2,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide additional residence time for hexavalent chromium to convert to trivalent chromium

TABLE 4-5
Iron Oxidation Tanks Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-301A, T-301B, and T-301C
Photo Number	19 (Appendix A)
Size/Orientation	9-ft diameter by 16-ft height/vertical
Approximate Capacity	7,500 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To oxidize soluble Fe(II) to insoluble Fe (III) by air addition and pH adjustment

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TABLE 4-6
Sludge Holding Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-402
Photo Number	24 (Appendix A)
Size/Orientation	9-ft diameter by 12-ft height/vertical with conical bottom
Approximate Capacity	5,500 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To accumulate sludge prior to dewatering

TABLE 4-7
Pretreated Water Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-500
Photo Number	25 (Appendix A)
Approximate Capacity	10-ft diameter by 16-ft height/vertical
Capacity	9,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide hydraulic separation between the chromium reduction process and the microfilter

TABLE 4-8
Microfilter Waste Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-503
Photo Number	27 (Appendix A)
Approximate Capacity	6-ft diameter by 15-ft height/vertical
Capacity	3,200 gallons
Material of Construction	Fiberglass (Hetron 922 with C-Veil Liner)
Original Purpose of Tank	To store microfilter clean-in-place waste and allow for some equalization prior to reintroducing waste stream back to the front of the process for treatment

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TABLE 4-9
Primary Reverse-osmosis Feed Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-600
Photo Number	28 (Appendix A)
Size/Orientation	10-ft diameter by 16-ft height/vertical
Approximate Capacity	9,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To store microfilter effluent for further dissolved solids removal by the primary RO system and for blending RO permeate to obtain a targeted effluent total dissolved solids concentration

TABLE 4-10
Secondary Reverse-osmosis Feed Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-2601
Photo Number	30 (Appendix A)
Size/Orientation	4-ft diameter by 6–ft, 8-inch height/vertical
Approximate Capacity	600 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To store primary RO permeate for further dissolved solids removal by the secondary RO system

TABLE 4-11
Reverse-osmosis Permeate Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-603
Photo Number	32 (Appendix A)
Size/Orientation	8-ft diameter by 8-ft height/vertical
Approximate Capacity	3,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To store permeate from the primary and secondary RO systems for utility water use prior to conveying water to the treated water storage tank

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TABLE 4-12
Reverse-osmosis Concentrate (Brine) Storage Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-701
Photo Number	33 (Appendix A)
Size/Orientation	10-ft diameter by 14-ft height/vertical
Approximate Capacity	8,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To store RO concentrate prior to pumping it to the brine storage tanks located on the MW-20 Bench

TABLE 4-13
Treated Water Storage Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-700
Photo Number	36 (Appendix A)
Size/Orientation	12-ft diameter by 32-ft length/horizontal
Approximate Capacity	28,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide hydraulic separation between the treatment system and the injection wells

TABLE 4-14
Process Drains Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-900
Photo Number	38 (Appendix A)
Size/Orientation	8-ft diameter by 12-ft length/horizontal
Approximate Capacity	5,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To collect small incidental flows from floor drains and various process equipment for return to the raw water storage tank for reprocessing

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TABLE 4-15
Domestic Water Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-1300
Photo Number	39 (Appendix A)
Size/Orientation	Approximately 7.5-ft diameter by 6-ft height/vertical
Approximate Capacity	2,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide domestic water to the IM-3 Treatment Plant trailer

TABLE 4-16
Fire Water Storage Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-1200
Photo Number	40 (Appendix A)
Size/Orientation	10-ft diameter by 17.5-ft height/vertical
Approximate Capacity	11,750 gallons
Material of Construction	A-36 steel (American Water Works Association D100, 1996 Tank), painted
Original Purpose of Tank	To provide a water source for firefighting measures in the event of a fire

TABLE 4-17
Sewage Holding Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	No tag
Photo Number	35 (Appendix A)
Size/Orientation	No data available
Approximate Capacity	No data available
Material of Construction	Fiberglass
Original Purpose of Tank	To store sewage from IM-3 Treatment Plant trailer

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TABLE 4-18
Clarifier Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	CL-400
Photo Number	22 (Appendix A)
Size/Type	Approximately 19-ft wide by 26-ft height/inclined plate, lamella type
Material of Construction	Steel, painted
Original Purpose of Tank	To provide liquid/solid separation from the process stream, removing the majority of chromium hydroxide and iron hydroxide precipitates formed in the upstream reaction

TABLE 4-19
Microfiltration Package System Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	Microfiltration Package System, individual 500 series equipment tags for package system components
Photo Number	26 (Appendix A)
Size/Type	Pall Aria AP3 Microfiltration System
Materials of Construction	Stainless steel, acrylic, polypropylene, and ethylene-propylene-diene monomer
Original Purpose of Tank	To remove remaining solids larger than a nominal diameter of 0.1 micron from the clarified water

TABLE 4-20
Primary and Secondary Reverse-osmosis System Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	Primary and Secondary RO Package System
Photo Numbers	29 and 31, (Appendix A)
Size/Type	Crown Solutions/Veolia Water – primary RO is 60 gpm with 75% recovery, followed by a secondary RO that is 15 gpm with 50% recovery
Materials of Construction	Superduplex, stainless steel, plastic
Original Purpose of System	To reduce the naturally-occurring total dissolved solids in the treated water to match the total dissolved solids of the water in the injection field

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TABLE 4-21
Air Compressor and Dryer Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	CMP-1000 and T-1301 (compressed air tank)
Photo Number	41 (Appendix A)
Size/Type	32 inches by 32 inches by 61 inches, operating pressure 60 psi gauge/Gardner Denver Model DGH60
Materials of Construction	Steel, painted
Original Purpose	To provide compressed air to pneumatic instruments and valves

TABLE 4-22
Blower System Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	B-300
Photo Number	21 (Appendix A)
Size/Type	Rotary Lobe Gardner Denver Model GAEMCPA, catalog no. 5MP, 2850 RPM Max, Sutorbilt
Materials of Construction	Steel, painted
Original Purpose of Blower	To provide process air to iron oxidation tanks

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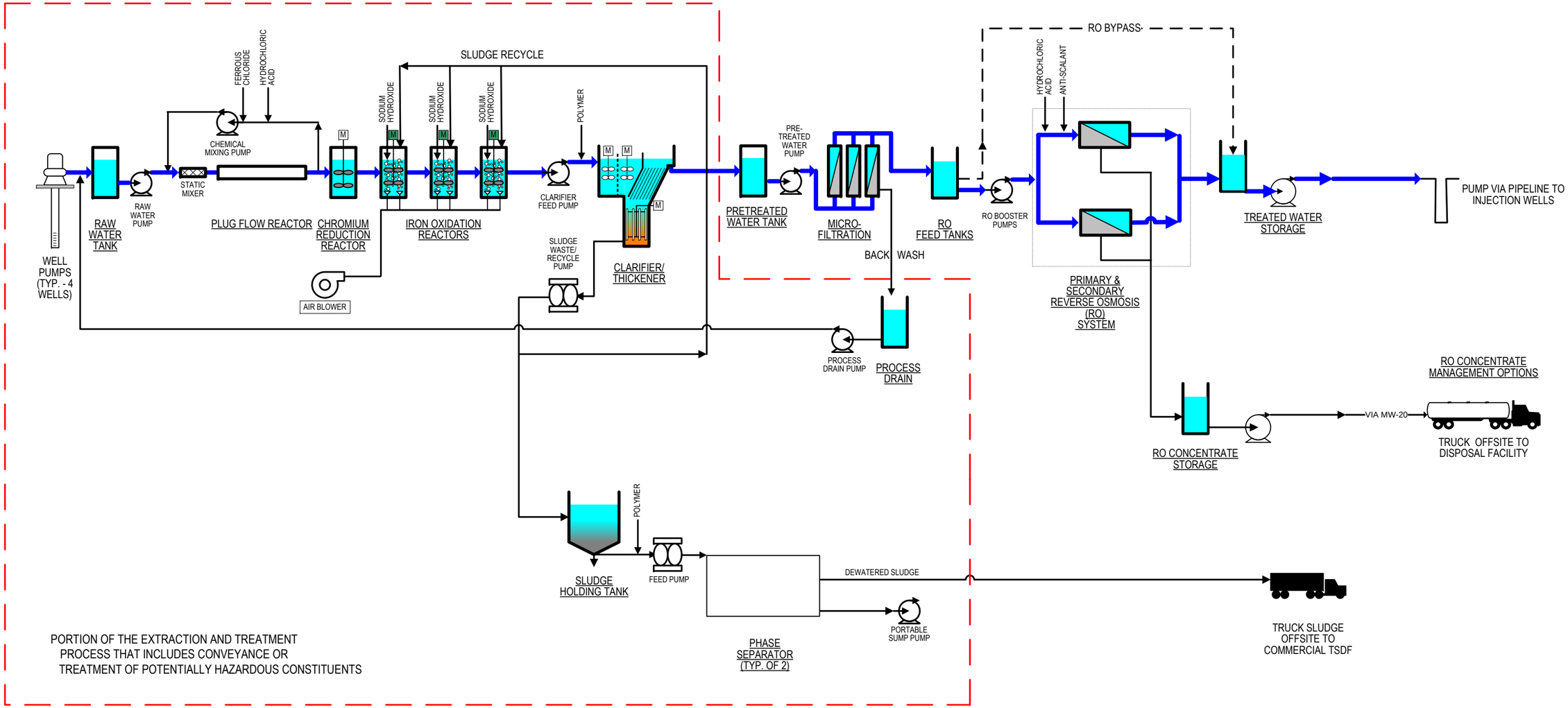

FIGURE 4-1
GROUNDWATER EXTRACTION AND TREATMENT SYSTEM PROCESS FLOW DIAGRAM
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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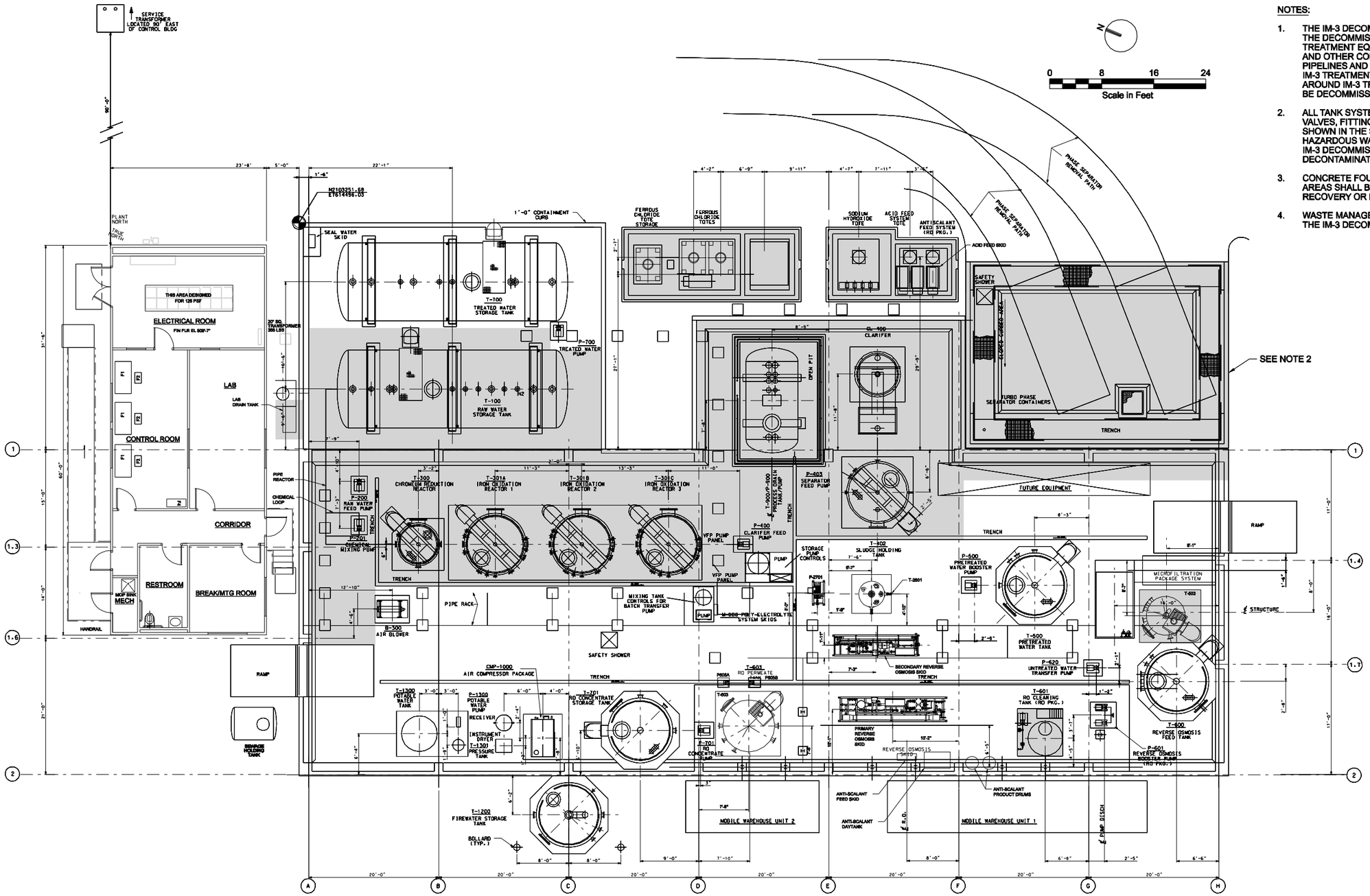

NOTES:

1. THE IM-3 DECOMMISSIONING WORK PLAN INCLUDES THE DECOMMISSIONING AND REMOVAL OF ALL INFRASTRUCTURE, TREATMENT EQUIPMENT, TREATMENT PIPELINES, AND OTHER COMPONENTS SHOWN ON THIS PLAN. UNDERGROUND PIPELINES AND CONDUITS, ABOVE GROUND ELECTRICAL, IM-3 TREATMENT PLANT FOUNDATION, SECURITY GATE, AND FENCE LINE AROUND IM-3 TREATMENT PLANT NOT SHOWN ON THIS PLAN SHALL ALSO BE DECOMMISSIONED AND REMOVED.
2. ALL TANK SYSTEMS, TREATMENT EQUIPMENT, TREATMENT PIPELINES, VALVES, FITTINGS, APPURTENANCES AND INFRASTRUCTURE MATERIALS SHOWN IN THE SHADED AREAS SHOULD BE MANAGED AS POTENTIALLY HAZARDOUS WASTE UNTIL PROVEN NON-HAZARDOUS. TABLE 4-1 OF THE IM-3 DECOMMISSIONING WORK PLAN INDICATES WHETHER OR NOT DECONTAMINATION IS REQUIRED.
3. CONCRETE FOUNDATION AND CONCRETE SECONDARY CONTAINMENT AREAS SHALL BE SAMPLED AND CHARACTERIZED PRIOR TO RECOVERY OR DISPOSAL.
4. WASTE MANAGEMENT PROCEDURES ARE INCLUDED IN SECTION 5 OF THE IM-3 DECOMMISSIONING WORK PLAN.

FIGURE 4-2
IM-3 TREATMENT PLANT DECOMMISSIONING PLAN

IM-3 Decomissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station
Needles, California

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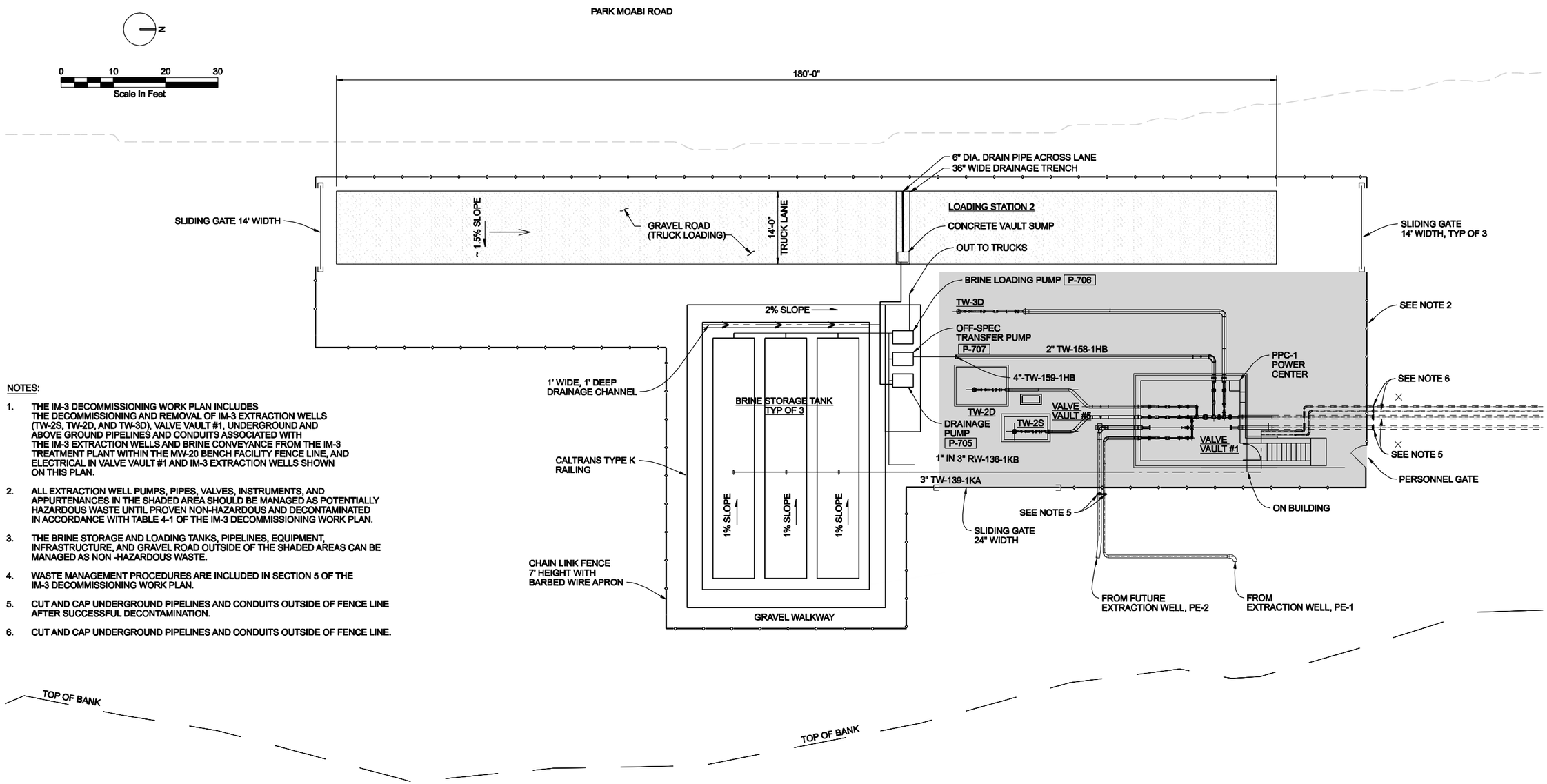
im-3 tpdp.dgn



NOTES:

1. THE IM-3 DECOMMISSIONING WORK PLAN INCLUDES THE DECOMMISSIONING AND REMOVAL OF IM-3 EXTRACTION WELLS (TW-2S, TW-2D, AND TW-3D), VALVE VAULT #1, UNDERGROUND AND ABOVE GROUND PIPELINES AND CONDUITS ASSOCIATED WITH THE IM-3 EXTRACTION WELLS AND BRINE CONVEYANCE FROM THE IM-3 TREATMENT PLANT WITHIN THE MW-20 BENCH FACILITY FENCE LINE, AND ELECTRICAL IN VALVE VAULT #1 AND IM-3 EXTRACTION WELLS SHOWN ON THIS PLAN.
2. ALL EXTRACTION WELL PUMPS, PIPES, VALVES, INSTRUMENTS, AND APPURTENANCES IN THE SHADED AREA SHOULD BE MANAGED AS POTENTIALLY HAZARDOUS WASTE UNTIL PROVEN NON-HAZARDOUS AND DECONTAMINATED IN ACCORDANCE WITH TABLE 4-1 OF THE IM-3 DECOMMISSIONING WORK PLAN.
3. THE BRINE STORAGE AND LOADING TANKS, PIPELINES, EQUIPMENT, INFRASTRUCTURE, AND GRAVEL ROAD OUTSIDE OF THE SHADED AREAS CAN BE MANAGED AS NON -HAZARDOUS WASTE.
4. WASTE MANAGEMENT PROCEDURES ARE INCLUDED IN SECTION 5 OF THE IM-3 DECOMMISSIONING WORK PLAN.
5. CUT AND CAP UNDERGROUND PIPELINES AND CONDUITS OUTSIDE OF FENCE LINE AFTER SUCCESSFUL DECONTAMINATION.
6. CUT AND CAP UNDERGROUND PIPELINES AND CONDUITS OUTSIDE OF FENCE LINE.

FIGURE 4-3
MW-20 BENCH FACILITY
DECOMMISSIONING PLAN

IM-3 Decomissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station
Needles, California

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im3 bfdp.dgn

FIGURE 4-4
Typical water truck (left) and typical excavator with thumb attachment (right)

FIGURE 4-5
18 Wheeler with flatbed trailer showing tank removal.

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FIGURE 4-6
Truck with typical pull behind water buffalo (front), typical crane (right).

FIGURE 4-7
Typical concrete crusher.

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FIGURE 4-8
Typical crane removing a typical tank.

FIGURE 4-9
Typical roll off bins for temporary material storage/management (right).

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FIGURE 4-10
Typical front end loader/backhoe.

FIGURE 4-11
Example of worker using typical welding torch (left). Example of worker using typical portaband saw (right).

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FIGURE 4-12
Example of worker with typical concrete saw (left). Example of Worker using typical compressor with Hammer (right).

FIGURE 4-13
Typical excavator with bucket (left), typical dump truck (right)

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FIGURE 4-14
Typical dump truck with second trailer.

FIGURE 4-15
Typical front end crawler loader.

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FIGURE 4-16
Typical Reachfork.

FIGURE 4-17
Typical excavator with pulverizer attachment.

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FIGURE 4-18
Typical vactor truck.

FIGURE 4-19
Typical compactor.

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FIGURE 4-20
Typical personnel lifts (left), scissor lift (right).

FIGURE 4-21
Typical excavator using shear attachment.

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FIGURE 4-22
Typical water storage tanks (for dust control).

FIGURE 4-23
Typical compact excavator with breaker attachment.

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SECTION 5

Waste Management Plan and Recoverable Materials

5.1 Waste Management Plan

This Waste Management Plan is intended to provide procedures for the proper collection, characterization, storage, transportation, and disposal of waste generated during the decommissioning, removal, and restoration of the site. Wastes from IM-3 decommissioning and removal work will be managed and disposed of in a manner consistent with applicable local, state, and federal laws and regulations at the time of management and disposal.

5.1.1 Expected Waste Streams

Expected waste streams and potentially recoverable components and materials are identified in Section 4 and presented in Table 4-1. As discussed in Section 4, each waste stream or recoverable component or material will fall into one of the following four categories:

1) Non-hazardous solid waste, which may be recovered or disposed of:
   a) Requiring zero to minimal cleaning (e.g., water rinse).
   b) Requiring extensive cleaning (e.g., pressure washing with surfactant solution).
2) Cleaning liquid and solid waste generated from cleaning components/materials in Category 1.
3) Hazardous solid waste, which will likely not be decontaminated prior to disposal. (Classification of RCRA or Non-RCRA will be determined by analysis prior to disposal.)
4) Components or materials that will be decontaminated and managed as non-hazardous if decontamination is successful, which may be recovered or disposed of.
5) Decontamination liquid or solid waste generated from decontaminating components, or materials in Category 4.
6) Universal Waste: Universal wastes are a category of hazardous wastes that are subject to less-stringent regulatory requirements. California's universal waste regulations apply to batteries, lamps, thermostats, aerosol cans, cathode ray tube (CRT) materials, universal waste electronic devices (such as computers, computer peripherals, telephones, answering machines, radios, calculators, and appliances), and a number of mercury-containing products. Some of the newly added mercury-containing products are listed as hazardous wastes in California when discarded, regardless of their mercury concentration. In California, automotive-type lead-acid batteries are not regulated as universal wastes but are instead subject to the requirements of 22 CCR 66266.80 and 22 CCR 66266.81. All other types of batteries (including small sealed lead-acid storage batteries) may be managed as universal waste. Aerosol cans that are empty are not subject to the universal waste requirements, but must be managed in accordance with the requirements for empty containers.

The amount of waste material that will be generated during the treatment plant decommissioning is estimated to be up to 5,000 cubic yards of solid waste and up to 2 million gallons of liquid waste, primarily water. With the removal of piping and conduits outside of the IM-3 treatment and MW-20 Bench, the additional amount of waste is estimated to be up to 650 cubic yards.

Appendix F, Soil Management Plan presents characterization and handling procedures for excavated soils.

5.1.2 Waste Characterization

Wastes generated from IM-3 decommissioning will need to be characterized prior to disposal. If the decommissioned IM-3 component or material from the IM-3 infrastructure is determined to be salvageable or recoverable, then the component or material can be managed as a recoverable material. Recoverable materials must be non-hazardous. PG&E will determine which IM-3 components or materials will be recovered for recycling or reuse prior to implementing this Work Plan. Section 5.2 describes recoverable materials. If the IM-3 component

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or material is classified as non-hazardous per Table 4-1, then it will be managed as a non-hazardous waste. Liquid and solid wastes generated from cleaning non-hazardous components and materials from the IM-3 infrastructure will be collected in separate containers from decontamination wastes and characterized in accordance with the procedures defined in this section. If the IM-3 component or material is classified as hazardous and will not be decontaminated prior to disposal per Table 4-1, then it will be managed as a hazardous waste and characterized as a RCRA or Non-RCRA hazardous waste in accordance with the procedures outlined below. If decontamination of the IM-3 component or material is required, then the waste material will be characterized as outlined below.

5.1.2.1 Hazardous Solid Waste

Representative samples of selected solid wastes which PG&E will presume to be hazardous will be tested using the toxicity characteristic leaching procedure (TCLP) and the results compared to the RCRA toxicity characteristic (TC) limits for metals, as specified in 22 CCR 66261.24(a)(1). If TC levels are exceeded, the waste will be classified as RCRA hazardous; otherwise, it will be classified as non-RCRA hazardous without additional analysis. This process will be limited to wastes deemed most likely to be RCRA hazardous, based on an evaluation of the process chemistry.

5.1.2.2 Concrete

Representative samples of concrete from the plant foundations, floor slabs, vaults, and containment areas will be collected by chipping or coring. Samples will be collected from locations most likely to have contacted hazardous waste or hazardous materials, such as the inside containment structures for process chemicals and other containment areas exposed to treatment system sludge. Samples will be analyzed individually and the results evaluated as follows:

1. If the total constituent concentration exceeds the total threshold limit concentration in 22 CCR 66261.24(a)(2), the concrete will be classified as a non-RCRA hazardous waste. Additional evaluation of the soluble threshold limit concentrations (STLC), as described in step 3 below, will not be performed.
2. If the total constituent concentration exceeds the numeric value of the RCRA TC level by 20 times or more, the TCLP will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the concrete will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3, will not be performed.
3. If the concrete has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by 10 times or more, the waste extraction test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the concrete will be classified as a non-RCRA hazardous waste. If the STLC is not exceeded, the concrete will be classified as non-hazardous.

5.1.2.3 Decontaminated IM-3 Components

Decontaminated IM-3 components will be visually inspected for conformance with the following criteria, as specified in 22 CCR 67383.3(e):

1. Piping and appurtenances will be free of product, sludge, rinseate, and debris to the extent that no material can be poured or drained from them when held in any orientation (e.g., tilted, inverted).
2. The tank, upon inspection, will be visually free of product, sludge, scale (thin, flaky residual of tank contents), rinseate and debris (except that residual staining caused by soil and waste consisting of light shadows, slight streaks, or minor discolorations), and soil and waste in cracks, crevices, and pits may be present.

In applying these criteria, rust-colored iron staining due to the use of ferrous chloride in the IM-3 treatment process will not be interpreted as indicating the presence of hazardous waste.

If the decontaminated component satisfies these criteria, it will be classified as non-hazardous.

5.1.2.4 Cleaning and Decontamination Liquid, and Solid Wastes

Wastes generated from cleaning non-hazardous IM-3 components and materials or decontaminated original hazardous IM-3 components or materials will be sampled and analyzed for metals and pH. Cleaning wastes and

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decontamination wastes will be collected in separate containers. Cleaning wastes will be managed as non-hazardous wastes, and decontamination wastes will be managed as potentially hazardous waste until proven non-hazardous after analysis.

Liquids will be classified as hazardous waste if they exhibit a pH of 2.0 or below, or 12.5 or above. Solids will be classified as hazardous waste if an equal weight mixture of the solid and water exhibits a pH in this range.

Samples will be evaluated for the presence of metals with hazardous waste TC levels specified in 22 CCR 66261.24 using the approach below.

Liquid wastes containing less than 0.5 percent filterable solids will be analyzed for total metals and the results compared with the RCRA TC limits in 22 CCR 66261.24(a)(1) and the STLCs in 22 CCR 66261.24(a)(2). If any constituent exceeds the RCRA TC limit, the waste will be classified as RCRA hazardous. If no constituents exceed the RCRA TC limit, but one or more constituent exceed the STLC, the waste will be classified as non-RCRA hazardous. If neither limit is exceeded, the waste will be classified as non-hazardous.

Liquid wastes containing 0.5 percent or more filterable solids will be analyzed using the TCLP and the results will be compared with the RCRA TC limits. If a TC limit is exceeded, the waste will be classified as RCRA hazardous. If no TC limits are exceeded, the waste will be analyzed using the California WET and the results compared with the STLCs. If one or more STLCs is exceeded, the waste will be classified as non-RCRA hazardous. If neither limit is exceeded, the waste will be classified as non-hazardous.

Solid wastes will be analyzed for total metals, expressed in milligrams per kilogram (mg/kg), and the results will be evaluated as follows:

1. If the total constituent concentration exceeds the total threshold limit concentration in 22 CCR 66261.24(a)(2), material will be classified as a non-RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.
2. If the total constituent concentration exceeds the numeric value of the RCRA TC level by 20 times or more, the TCLP will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the material will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3, will not be performed.
3. If the material has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by 10 times or more, the WET will be performed. If the constituent concentration in the WET exceeds the STLC, the material will be classified as a non-RCRA hazardous waste. If the STLC is not exceeded, the waste will be classified as non-hazardous.

If the material has not been classified as a hazardous waste in steps 1, 2, or 3, it will be classified as non-hazardous waste.

5.1.3 Onsite Management

Waste materials will be managed onsite in demarcated waste management areas. Section 3.2.2 identifies the waste management areas for this work. Within the waste management areas, hazardous wastes will be segregated from non-hazardous wastes. Additionally, incompatible hazardous wastes (e.g., flammable and corrosives wastes) will be segregated. Wastes of the same matrix, contamination, and source may be aggregated to facilitate accumulation and disposal.

Lined roll-off boxes, drums, or other suitable containers will be used to contain solid wastes. Liquid wastes will be contained in drums, totes, or portable tanks. Hazardous waste will be accumulated in U.S. Department of Transportation (DOT) specification containers, which will be kept closed except when adding or removing waste. Cleaning and decontamination wastewater will be contained in portable tanks within secondary containment near the point of origin while the water is characterized for offsite disposal.

Hazardous waste container storage areas will be equipped with secondary containment that is capable of containing 10% of the aggregate volume of liquids, or the volume of the single largest container holding liquids,

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plus the precipitation from a 24-hour, 25-year storm. The base of the storage areas will be sloped so that spilled liquids drain away from the containers, unless the containers are elevated. Run-on into the storage areas will be prevented. Spilled or leaked waste and accumulated precipitation will be removed from the storage area in a timely manner and disposed of as hazardous or non-hazardous based on test results.

Incidental trash, such as wooden pallets, food, and beverage containers will be contained in dumpsters located in support zones or staging areas near temporary facilities. Universal waste, such as batteries, electronic devices, cathode ray tubes, lamps, aerosol cans, and mercury-containing equipment, will be stored in containers or packages that will remain closed; are structurally sound; adequate to prevent breakage; compatible with contents of batteries, lamps, or thermostats; and lack evidence of leakage, spillage, or damage that could cause leakage under reasonable foreseeable conditions.

Temporary stockpiling may be required to facilitate container loading, because waste materials will likely need to be cut to size first to fit into the appropriate container. Temporary stockpiling may also be used to segregate materials and may be required to facilitate container loading by a second piece of equipment, if the removal equipment cannot efficiently or safely load containers directly. The types of wastes that may be managed in temporary stockpiles include metal from the canopy, concrete from vaults, plant foundation, secondary containment areas, pieces of equipment, metal and plastic pipelines, valves, and fittings. Temporary stock-piling may also be required if wastes are pending analyses. Temporary stockpiling will be done on a bermed-lined pad if the underlying material is clean. Temporary stockpiles will be in waste management areas within exclusion zones.

Hazardous wastes will be removed from the site within 90 days from the date of generation. The date of generation is the day that a waste is first placed in a container, tank, or stockpile. Accumulation start date for containers and tanks will be documented on the hazardous waste label. A log or other record will be used to document the accumulation start date for stockpiles and tanks. Labeling of waste containers and tanks will be in accordance with 22 CCR Division 4.5, Chapter 12 and 49 CFR 172, 173, and 178. Universal waste will be labeled as universal waste plus the type of universal waste (i.e., Universal Waste – Batteries); it will be accumulated onsite up to 1 year, and not more than 5000 kilograms will be accumulated at one time. Universal waste will be sent to a permitted recycling facility, and shipping papers will be retained for a minimum of 3 years. Waste accumulation and equipment storage areas will be inspected weekly for labeling, malfunctions, deterioration, discharges, and leaks that could result in a release. Hazardous waste tanks will be inspected daily. Deficiencies observed or noted during inspection will be corrected, and corrective measures will be documented and maintained onsite.

Once all hazardous waste has been removed from the site the hazardous waste storage areas will be decontaminated to remove any waste residue and the structures will be managed as described elsewhere in this decommissioning plan.

5.1.4 Waste Transportation and Disposal

Prior to offsite transportation the hazardous waste labels on all non-bulk containers will be verified to be accurate and complete, and all non-bulk containers will be labeled with the appropriate DOT hazard class label.

After the wastes are containerized and labeled, wastes ready for offsite disposal will be loaded onto trucks for transport to appropriate disposal facilities. PG&E will designate a transportation coordinator to be onsite during loading and transportation activities. This individual will be responsible for coordinating and overseeing these activities.

As truck loading is completed, the containers and trucks will be inspected and brushed as necessary to remove loose materials. Trucks or roll-offs that enter exclusion zones will pass through contaminant reduction zones to exit the site. Each load will be inspected to verify that it is secure and that the truck has been properly cleaned or decontaminated as required. Prior to loading hazardous waste, the driver's license of each driver will be checked to verify that it is the proper class and has the appropriate endorsements for the vehicle being driven. Appropriate DOT placards for the waste being transported will be provided to the driver, if necessary. Appropriate documentation, including waste manifests, will be completed and checked. In addition, a truck log will be maintained with loading and transportation information. The vehicle will proceed to the appropriate disposal

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facility in accordance with local, state, and federal transportation requirements. Appendix D presents further information about the transportation of wastes.

Based on the estimated volume of solid and liquid waste that will be generated from the IM-3 decommissioning, approximately 400 tanker trucks for liquid waste (assuming 5,000 gallons per truck) and roughly 280 trucks for solid waste (assuming 20 cubic yards per truck) are expected to be required to transport waste to disposal facilities.

5.1.5 Disposal Facilities

Disposal facilities receiving Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) waste (waste that contains CERCLA hazardous substances, pollutants, or contaminants) must be in compliance with 42 U.S.C § 9621 (d) (3) and 40 C.F.R. § 300.440. PG&E may ship waste material associated with the implementation of the Final Remedy from the Site to an offsite facility only if it demonstrates to DOI's satisfaction, prior to the first shipment, and annually thereafter, that USEPA has determined that the proposed receiving facility is operating in compliance with 42 U.S.C § 9621 (d) (3) and 40 C.F.R. § 300.440. If waste material is shipped to an out-of-state disposal facility, then PG&E will provide written notice of the disposal of waste to the appropriate state environmental official in each receiving facility's state and the DOI Project Manager prior to the first shipment of the waste material in accordance with the requirements of the Consent Decree. Wastes designated as RCRA or Non-RCRA hazardous wastes will be transported and disposed of in a pre-approved facility with the appropriate permits for the type of waste being accepted. Waste profiles will be established, and acceptance of the waste stream will be established prior to sending any waste material offsite. Receiving facilities for wastes designated as non-hazardous wastes will also be pre-approved. Facilities for the RCRA hazardous wastes, Non-RCRA hazardous and non-hazardous wastes will be identified just prior to implementing this Work Plan.

PG&E proposes use of the following potential disposal facilities for the project as well as others, subject to the communication and approval processes under the Consent Decree outlined above:

PSC Rancho Cordova – TSDF
11855 White Rock Road
Rancho Cordova, CA 95742

Chemical Waste Management – Kettleman Hills Facility – Landfill
35251 Old Skyline Road
Kettleman City, CA 93239

US Ecology Inc. - Landfill
Highway 95 (12 miles South of Beatty, NV)
Beatty, NV 89003

Clean Harbors Button Willow – Landfill
2500 West Lokern Road
Button Willow, CA 93206

5.1.6 Recordkeeping

Copies of all records related to waste management, including waste characterization test results, documentation of waste classification decisions, hazardous and non-hazardous waste manifests, and waste tracking logs, will be retained for at least three years.

5.2 Recoverable Materials

Several of the expected waste streams are potentially recoverable or salvageable for reuse or recycle during the decommissioning and removal of IM-3 system. The following subsections identify expected waste streams that have reuse or recycle value and describe recoverable material handling and staging at the project site.

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5.2.1 Reuse and Recycling Evaluation

Efforts will be made to recover IM-3 system materials for reuse or recycle to the extent feasible in accordance with PG&E's Programmatic Sustainable Remediation Guidance. Based on the IM-3 components and materials from IM-3 infrastructure to be decommissioned and removed, the following expected non-hazardous waste streams have been identified as providing reuse or recycling value:

- IM-3 Treatment Plant trailer
- Security fence and gate
- Mobile warehouse units
- Facility shade structure
- Precast concrete vaults
- Most equipment and tank systems
- Scrap steel and iron
- Non-ferrous copper and stainless steel
- Plastic
- Concrete
- Computers, monitors, telephones, radios, and other small electronic equipment

Scrap steel and iron will be generated during the removal of buildings, equipment, tanks, and piping. Copper will be generated during the removal of electrical utilities and lighting. Stainless steel will be generated during the removal of instruments, small diameter piping, fittings, and appurtenances. Plastic will be generated from the removal of pipes, valves, and appurtenances. Concrete will be generated from the removal of the IM-3 Treatment Plant foundation and secondary containment structures, and precast concrete vaults. Fiberglass will be generated from the removal of most tank systems and pumps.

5.2.2 Recoverable Materials Staging

Recoverable materials will be staged within the designated waste management areas for the project.

5.2.2.1 Salvageable IM-3 Infrastructure, Equipment, and Tank Systems

Salvageable IM-3 infrastructure, equipment, and tank systems may be sold for reuse or salvaged for future reuse by PG&E. If IM-3 infrastructure or components are selected to be reused by the Final Remedy, then the infrastructure or components will be reused in a different location than its existing location. IM-3 infrastructure, equipment, and tank systems will likely be directly loaded onto trucks at the point of removal for delivery to their offsite destination. If temporary onsite storage is required, then the storage area will be isolated from subsequent decommissioning and removal activities.

IM-3 infrastructure likely to be recovered includes the IM-3 treatment trailer, security fence and gate, mobile warehouse units, facility shade structure, and precast concrete vaults. Equipment and tank systems likely to be recovered include package systems, such as the microfilter and reverse osmosis package systems and tank systems downstream of the clarifier.

5.2.2.2 Scrap Steel and Iron

Scrap steel and iron will result from removal of structural beams, columns, decking, siding, piping, and other components. Scrap steel and iron will likely be accumulated and contained in dumpsters or roll off bins located in support zones or staging areas outside of exclusion zones, because it is non-hazardous and recyclable. In these areas, secondary processing will be completed to meet the requirements of the scrap buyer, such as cutting the material to size. The material will be cut to size with shears or torches in a controlled environment to allow for safe loading and offsite transportation. Temporary stockpiling of scrap steel and iron may be required for material segregation and sizing. The material will be segregated, sold for recycling, and transported offsite. When possible, materials will be directly loaded onto trucks at the point of removal for offsite delivery.

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5.2.2.3 Scrap Non-ferrous Metals

Copper and stainless steel are the primary non-ferrous metals that will be recovered from IM-3 decommissioning. Because of the high value of copper and other non-ferrous materials, these materials should be stored in a secure area and delivered as each load is accumulated. Secure material storage areas will be established within a designated staging area. Similar to scrap steel and iron materials, the non-ferrous materials will be cut to size using shears or torches in a controlled environment to allow for safe loading and offsite transportation. Materials will be segregated, sold for recycling, and transported offsite.

5.2.2.4 Plastic

The plastics associated with treatment piping and conveyance piping will be decontaminated as indicated on Table 4-1. If the plastic material is categorized as non-hazardous or decontaminated and proven non-hazardous, then it may be recycled. Plastic will be cut to size, stored in dumpsters or roll off bins, and segregated for either recycling or disposal depending on the volume, condition, and type.

5.2.2.5 Concrete

Representative samples of the IM-3 Treatment Plant foundation and secondary containment areas will be collected prior to demolition to determine waste characterization. Contaminated concrete will be scarified off, characterized, handled, and properly disposed of. Non-hazardous concrete will be broken up using a hydraulic breaker attached to an excavator or using a drop hammer. The rebar within the concrete will be removed and segregated for recycling as scrap steel. The concrete will either be broken into sizable pieces for transportation to an offsite recycler or disposal facility, or will be sized for transport to an onsite crusher that will pulverize the concrete into a material that may be used onsite as road base.

TABLE 5-1
Recoverable Materials
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station Needles, California

Recoverable Materials	Recycle Options Typical in the Industry
Useable Equipment	Sell directly, wholesale to third party, or otherwise used by PG&E
Useable Structural Steel and Piping	Sell directly, wholesale to third party, or otherwise used by PG&E
Scrap Steel, Re-bar, and Iron	Deliver and sell to third party
Non-ferrous Metals (copper, aluminum, titanium) and Stainless Steel	Deliver and sell to third party
Plastic	Deliver and sell to a third party
Concrete – Unprocessed	Deliver to outside crushing plant for processing and sell to third party

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SECTION 6

Best Management Practices and Mitigation Measures/ARARs Compliance

The PG&E remediation project team is committed to executing this project with zero safety incidents. Project protocols have been and will continue to be implemented and enforced to make certain project team members, site visitors, including Tribal Monitors, regulatory agencies, and interested stakeholders, are safe.

Contractors performing field work will be responsible for preparing and complying with the standards and procedures in the project-specific HSP. As required by the EIR mitigation measure HAZ-2c, the project-specific HSP was prepared and included in an appendix to the Construction/Remedial Action Work Plan

PG&E is committed to implementing the design and remedial action in a manner that is respectful of the sacredness and sensitivity of the resources at and near the project area. Therefore, PG&E and its contractors will fully comply with the mitigation measures set forth to minimize impacts on the sensitive resources as well as protocols and provisions that are in the CIMP and the CHPMP (BLM, 2012).

The EIR MMRP (DTSC, 2011b) includes 111 mitigation measures and sub-measures that address nine resource areas, including aesthetic, biological, air quality, cultural, geology and soils, hazardous materials, hydrology and water quality, noise, and water supply. Table 6-1 summarize the actions to be taken in compliance with the EIR mitigation measures for the decommissioning, removal, and restoration of the IM-3 Groundwater Extraction and Treatment System. For IM-3 decommissioning, removal and restoration, of the 111 mitigation measures and submeasures, 84 are classified as “actionable,” and 27 are classified as “no action.”

In addition, a summary of actions taken or that will be taken to comply with applicable stipulations in the PA (BLM, 2010) related to IM-3 decommissioning and removal activities is presented in Table 6-2, and a summary of actions taken or that will be taken to comply with applicable requirements in the CHPMP (BLM, 2012) is presented in Table 6-3. Table 6-4 presents actions taken or that will be taken to comply with ARARs.

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TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Aesthetics	AES-1	Impacts on Views from Topock Maze Locus B, a Scenic Vista (Key View 5) - The proposed project shall be designed and implemented to adhere to the design criteria presented below.			
Aesthetics	AES-1a	a) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases consistent with CUL-1a-5. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation.	Map of mature plant species, the Aesthetic and Visual Resources Protection and Revegetation Plan, and the Cultural Impact Minimization Program (CIMP)	Action	IM-3 decommissioning and removal activities will comply with the following: a) Methods and specifications for avoidance, protection, natural revegetation, and transplanting and planting of replacement species included in the Aesthetic and Visual Resources Protection and Revegetation Plan (appendix to the Construction/ Remedial Action Work Plan). b) Protocols to reduce visual intrusions included in the CIMP (CUL-1a-8i).
Aesthetics	AES-1b	b) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed and shall be implemented consistent with CUL-1a-5. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.	Future Site-Specific IM-3 Restoration Plan and the CIMP	Action	IM-3 decommissioning and removal activities will comply with the following: a) Methods and specifications for avoidance, protection, natural revegetation, and transplanting and planting of replacement species included in the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (appendix to the Construction/Remedial Action Work Plan). The Site-Specific IM-3 Restoration Plan will reference this revegetation plan. b) Protocols to reduce visual intrusions included in the CIMP (CUL-1a-8i).
Aesthetics	AES-1c	c) Plant material shall be consistent with surrounding native vegetation.	Future Site-Specific IM-3 Restoration Plan	Action	IM-3 decommissioning and removal activities will comply with the following: a) Methods and specifications for avoidance, protection, natural revegetation, and transplanting and planting of replacement species included in the Aesthetic and Visual Resources Protection and Revegetation Plan and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (appendices to the Construction/Remedial Action Work Plan). The Site-Specific IM-3 Restoration Plan will reference these plans. b) Protocols to reduce visual intrusions included in the CIMP (CUL-1a-8i).
Aesthetics	AES-1d	d) The color of the wells, pipelines, reagent storage tanks, control structures, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.	N/A	No Action	IM-3 decommissioning does not include construction of new structures, wells, pipelines, reagent storage tanks, control structures, or utilities.
Aesthetics	AES-1e	e) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.	Future Site-Specific IM-3 Restoration Plan	Action	IM-3 decommissioning and removal activities will comply with the following: a) Methods and specifications for avoidance, protection, natural revegetation, and transplanting and planting of replacement species are included in the Aesthetic and Visual Resources Protection and Revegetation Plan and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (appendices to the Construction/Remedial Action Work Plan). The IM-3 Restoration Plan will reference these revegetation plans. b) Protocols to reduce visual intrusions included in the CIMP (CUL-1a-8i).
Aesthetics	AES-2	Impacts on Views from Colorado River, a Scenic Resources Corridor (Key View 11) - The proposed project shall be designed and implemented to adhere to the design criteria presented below:			
Aesthetics	AES-2a	a) A minimum setback requirement of 20 feet from the water (ordinary high water mark or OHWM) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the river bank.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.

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TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Aesthetics	AES-2b	b) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation consistent with CUL-1a-5.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Aesthetics	AES-2c	c) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Aesthetics	AES-2d	d) Plant material shall be consistent with surrounding native vegetation.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Aesthetics	AES-2e	e) The color of the wells, pipelines, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.	N/A	No Action	IM-3 decommissioning does not include construction of new structures, wells, pipelines, reagent storage tanks, control structures, or utilities.
Aesthetics	AES-2f	f) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Aesthetics	AES-3	Impacts on Visual Quality and Character along the Colorado River (Key View 11) - Mitigation Measure AES-1 shall be implemented. Implementation of Mitigation Measures AES-1 would reduce the overall change to the visual character of the view corridor along the Colorado River. Although the proposed project would still be visible, incorporating a facilities design that is aesthetically sensitive and preserving the vegetation would blend the proposed project into their visual setting within the floodplain and would reduce the overall contrast of the proposed project.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Air Quality	AIR-1	Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors - PG&E shall implement the fugitive dust control measures below for any construction and/or demolition activities:			
Air Quality	AIR-1a	a) Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient;	This Work Plan	Action	This measure is addressed in Section 3 and Appendix D, Transportation Plan.
Air Quality	AIR-1b	b) Cover loaded haul vehicles while operating on publicly maintained paved surfaces;	This Work Plan	Action	This measure is addressed in Section 3 and Appendix D, Transportation Plan.
Air Quality	AIR-1c	c) Stabilize (using soil binders or establish vegetative cover) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions;	This Work Plan	Action	This measure is addressed in Section 3 and Appendix D, Transportation Plan.
Air Quality	AIR-1d	d) Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours; and	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Air Quality	AIR-1e	e) Curtail nonessential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.

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Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Biological Resources	BIO-1	Potential Fill of Wetlands and Other Waters of the United States and Disturbance or Removal of Riparian Habitat - Areas of sensitive habitat in the project area have been identified during project surveys. These areas include floodplain and riparian areas, wetlands, and waters of the United States. Habitats designated by CDFW as sensitive, including desert washes and desert riparian, are also included. To the extent feasible, elements of the project shall be designed to avoid direct effects on these sensitive areas. During the design process and before ground disturbing activities within such areas (not including East Ravine), a qualified biologist shall coordinate with PG&E to ensure that the footprints of construction zones, drill pads, staging areas, and access routes are designed to avoid disturbance of sensitive habitats to the extent feasible. DTSC shall be responsible for enforcing compliance with design and all preconstruction measures.	This Work Plan and CWA 404/CDFW avoidance and minimization measures	Action	Figures 3-1 through 3-3 of this Work Plan show the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint was selected to avoid disturbance of sensitive habitats to the extent feasible. The CWA 404/CDFW avoidance and minimization measures (included in an appendix to the Construction/Remedial Action Work Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities.
Biological Resources	BIO-1	If during the design process it is shown that complete avoidance of habitats under USACE jurisdiction is not feasible, the Section 404 permitting process shall be completed, or the substantive equivalent per CERCLA Section 121(e)(1). In either event, the acreage of affected jurisdictional habitat shall be replaced and/or rehabilitated to ensure "no-net-loss." Before any ground-disturbing project activities begin in areas that contain potentially jurisdictional wetlands, the wetland delineation findings shall be documented in a detailed report and submitted to USACE for verification as part of the formal Section 404 wetland delineation process and to DTSC. For all jurisdictional areas that cannot be avoided as described above, authorization for fill of wetlands and alteration of waters of the United States shall be secured from USACE through the Section 404 permitting process before project implementation. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods agreeable to USACE and consistent with applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. Alternately, if USACE declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the substantive equivalent of the Section 404 permitting process shall be complied with by ensuring that the acreage of jurisdictional wetland affected is be replaced on a "no-net-loss" basis in accordance with the substantive provisions of USACE regulations. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods consistent with USACE methods, and consistent with the purpose and intent of applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. In any event, a report shall be submitted to DTSC to document compliance with these mandates.	This Work Plan and CWA 404 avoidance and minimization measures	Action	Decommissioning and restoration in the floodplain and other habitats subject to the jurisdiction of the USACE and California Department of Fish and Wildlife (CDFW) will be accomplished according to the substantive requirements of the Clean Water Act (CWA), Section 404 (included an appendix to the Construction/Remedial Action Work Plan). Section 8 of this Work Plan includes restoration guidelines (steps to be followed during restoration), elements of the restoration of habitat and revegetation and demobilization, and a draft annotated outline of a future, more detailed Site-Specific IM-3 Restoration Plan. In response to the Tribes' comments on the 60% design (CH2M HILL 2014) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA, and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. As stated in the responses to comments on the 60% design (response to comment [RTC] #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.

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TABLE 6-1
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Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Biological Resources	BIO-1	If during the design process it is shown that complete avoidance of habitats under CDFW jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, a Section 1602 streambed alteration agreement shall be obtained from CDFW and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a no-net-loss basis in accordance with CDFW regulations and, if applicable, as specified in the streambed alteration agreement, if needed. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to CDFW and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to CDFW, BLM, and USFWS that is agreeable to these agencies, or, alternately, through the implementation of a habitat restoration plan consistent with the substantive policies of CDFW, BLM, and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan. Alternately, if CDFW declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, and during the design process it is shown that complete avoidance of habitats under CDFW jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, the substantive mandates of a streambed alteration agreement shall be implemented, and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a "no-net-loss" basis in accordance with CDFW regulations and, if applicable. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to CDFW and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan developed consistent with the substantive policies of CDFW, BLM and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.	This Work Plan, Future Site-Specific IM-3 Restoration Plan, the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats, and CDFW avoidance and minimization measures	Action	Restoration in the floodplain and other habitats subject to the jurisdiction of the CDFW will be accomplished according to the CDFW avoidance and minimization measures and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (included as appendices to the Construction/Remedial Action Work Plan). Section 8 of this Work Plan includes restoration guidelines (steps to be followed during restoration), elements of the restoration of habitat and revegetation and demobilization, and a draft annotated outline of a future, more detailed Site-Specific IM-3 Restoration Plan. In response to the Tribes' comments on the 60% design (CH2M HILL 2014) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA, and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. As stated in the responses to comments on the 60% design (RTC #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. The Future Plan will reference the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats, which includes information on salvage, relocation and transplantation methods, and replacement planting for plant species in sensitive habitat areas that are within areas under the jurisdiction of CDFW pursuant to Section 1600 of the State of California Fish and Game Code.

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TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Biological Resources	BIO-2a	a) Disturbance of Special-Status Birds and Loss of Habitat. To the extent feasible, the project implementation plans shall be designed to minimize removal of habitat for special-status birds. During the design process and before ground disturbing activities (except within the East Ravine as described in the Revised Addendum and unless otherwise required as noted below), a qualified biologist shall coordinate with PG&E to ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on habitat and nesting habitat for other special-status species, to the extent feasible. DTSC will ensure compliance with all preconstruction and construction phase avoidance measures identified during this process and included in any design plans. Vegetation removal and other activities shall be timed to avoid the nesting season for special-status bird species that may be present. The nesting cycle for most birds in this region spans March 15 through September 30. Preconstruction Measures: Preconstruction breeding season surveys shall be conducted during the general nesting period, which encompasses the period from March 15 through September 30, if the final design of the project (including East Ravine investigation Sites I, K and L) could result in disturbance or loss of active nests of special-status bird species. If vegetation removal or other disturbance related to project implementation is required during the nesting season, focused surveys for active nests of special-status birds shall be conducted before such activities begin. A qualified biologist shall conduct preconstruction surveys to identify active nests that could be affected. The appropriate area to be surveyed and the timing of the survey may vary depending on the activity and species that could be affected. For the Yuma clapper rail, the preconstruction surveys shall specifically identify habitat within 300 feet of construction areas, in accordance with substantive policies of USFWS including those set out in USFWS protocols. Construction Measures: Before the initiation of project elements that could result in disturbance of active nests or nesting pairs of other special-status birds, a qualified biologist shall be consulted to identify appropriate measures to minimize adverse impacts during the construction phase of the project. If deemed appropriate for the final project design because of the potential for impacts, minimization measures will include focusing construction activities that must be conducted during the nesting season to less- sensitive periods in the nesting cycle, implementing buffers around active nests of special-status birds to the extent practical and feasible to limit visual and noise disturbance, conducting worker awareness training, and conducting biological monitoring (including noise monitoring to determine if construction noise at the edge of suitable nesting habitat is elevated above 60 dBA Leq or ambient levels). An avoidance and minimization plan for special status bird species, as defined in Table 4.3-3 of the EIR and those species protected under the federal Migratory Bird Treaty Act, including the Yuma clapper rail, shall be developed and implemented in consultation with USFWS, and agreed upon by DTSC. Avoidance and impact minimization measures, such as prohibiting construction near or in sensitive bird habitat, limiting construction during breeding seasons, and requiring an on-site biological monitor, shall be included in the design plan and implemented to the extent necessary to avoid significant impacts on sensitive bird species.	This Work Plan, the Programmatic Biological Assessment (PBA), and the Bird Impact Avoidance and Minimization Plan (BIAMP)	Action	This measure, the conservation measures in the PBA, and the avoidance and minimization measures included in the Bird Impact Avoidance and Minimization Plan (included in an appendix to the Construction/Remedial Action Work Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities. Figures 3-1 through 3-3 of this Work Plan show the primary work zones, staging areas, waste management areas, and access and haul routes. The project footprint was selected to avoid disturbance of sensitive habitats and habitat for special-status birds to the extent feasible.

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Biological Resources	BIO-2b	b) Disturbance of Desert Tortoise and Loss of Habitat. Preconstruction Measures: In areas where impacts to potential desert tortoise habitat are unavoidable, measures outlined in the Programmatic Biological Agreement (PBA; CH2M HILL, 2007) and in the USFWS letter concurring with the PBA, shall be implemented, as described below. To the extent feasible, project construction shall be designed to minimize removal of habitat for the desert tortoise. Before any ground-disturbing project activities begin, and except within the East Ravine for which potential effects to the tortoise have been considered per the PBA), a USFWS-authorized desert tortoise biologist shall identify potential desert tortoise habitat in areas that could be affected by the final project design. Through coordination with the authorized biologist, PG&E shall ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on potential desert tortoise habitat to the extent feasible. These measures include the presence of a USFWS-authorized desert tortoise biologist onsite or designated agent in accordance with the PBA who will examine work areas and vehicles for the presence of desert tortoises, and who will conduct preconstruction desert tortoise surveys in areas where unavoidable impacts to tortoise habitat would occur. If feasible, the preconstruction desert tortoise surveys would coincide with one of the two peak periods of desert tortoise activity (i.e., if feasible, the surveys should be conducted in either the period from April through May, or from September through October). The preconstruction surveys shall be in full accordance with the substantive requirements of USFWS protocols. Construction Measures: Before the initiation of project elements that could result in disturbance of desert tortoises or desert tortoise habitat, a USFWS-authorized desert tortoise biologist shall be consulted to identify appropriate measures to minimize adverse impacts. Minimization measures are likely to include micro-siting structures, pipelines, and access roads in previously disturbed areas or in areas with sparse scrub vegetation, conducting worker awareness	This Work Plan and the PBA	No Action	This measure and conservation measures in the PBA (included in an appendix to the Construction/Remedial Action Work Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities. Figures 3-1 through 3-3 of the Work Plan show the primary work zones, staging areas, waste management areas, and access and haul routes. The project footprint was selected to avoid disturbance of sensitive habitats and desert tortoise habitat to the extent feasible.
Biological Resources	BIO-2c	c) Disturbance of Special-Status Species and Loss of Habitat Caused by Decommissioning. To avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities, an avoidance and minimization plan shall be developed and implemented through consultation with CDFW, BLM, and USFWS. These measures shall be based on surveys conducted prior to decommissioning, and during the breeding season (as previously defined in this EIR for each species or suite of species). Restoration of any disturbed areas shall include measures to achieve no net loss of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to CDFW, BLM, and USFWS that is agreeable to these agencies. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.	Future Site-Specific IM-3 Restoration Plan, future IM-3 Decommissioning Avoidance and Minimization Plan, the PBA, the BIAMP, the CIMP, and CWA 404/CDFW avoidance and minimization measures and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats.	Action	This measure, conservation measures in the PBA, the BIMP, CWA 404/CDFW avoidance and minimization measures, and CIMP protocols for restoring the environment to its preconstruction condition upon decommissioning (CUL-1a-8e) and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats will be implemented during IM-3 decommissioning, removal, and restoration activities. The CIMP protocols will also be referenced in the Site-Specific IM-3 Restoration Plan. An Avoidance and Minimization Plan will be developed in consultation with CDFW, BLM, and USFWS, prior to IM-3 decommissioning.
Biological Resources	BIO-3a	a) Potential Impacts to Aquatic Habitat Related to Turbidity, Erosion, Sedimentation, and Overall Water Quality during Construction of the Intake Structure. Hydrology & Water Quality Mitigation Measure HYDRO-1 shall be implemented in order to reduce water quality impacts related to erosion and pollutant runoff through implementation of BMPs. In addition, installing the cofferdam and dewatering a portion of the proposed intake structure site during fish screen construction may result in fish stranding. PG&E and its contractor shall coordinate with a qualified fisheries biologist to develop and implement a fish rescue plan. The fish rescue effort would be implemented during the dewatering of the area behind the cofferdam and would involve capturing those fish and returning them to suitable habitat within the river. The fish rescue plan shall identify and describe the following items: collection permits needed, fish capture zones, staffing, staging areas, fish collection and transport methods, species prioritization, resource agency contacts, fish handling protocols, fish relocation zones, site layout and progression of dewatering and fish rescue, and records and data. To ensure compliance, a fisheries biologist shall be present on-site during initial pumping (dewatering) activities and to oversee the fish rescue operation.	N/A	No Action	IM-3 decommissioning will not involve construction of an intake structure.

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Biological Resources	BIO-3b	b) Potential Loss or Degradation of Aquatic Habitat. To restore, replace, or rehabilitate habitat impacted by the intake structure, PG&E shall implement the measures described below. Unless as provided below, PG&E shall confer with CDFW regarding potential disturbance to fish habitat and shall obtain a streambed alteration agreement, pursuant to Section 1602 of the California Fish and Game Code, for construction work associated with intake structure construction; PG&E shall also confer with CDFW pursuant to the California Endangered Species Act (CESA) regarding potential impacts related to the loss of habitat or other operational impacts on state-listed fish species, respectively. PG&E shall comply with all requirements of the streambed alteration agreement and any CESA permits to protect fish or fish habitat or to restore, replace, or rehabilitate any important habitat on a "no-net-loss" basis. Alternatively, if CDFW declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the project proponent shall consult with CDFW regarding potential disturbance to fish habitat and shall meet the substantive policies of a streambed alteration agreement and of the CESA for construction work associated with intake structure construction and operations. PG&E shall comply with all substantive requirements of the streambed alteration agreement and CESA to protect fish and fish habitat or to restore, replace, or rehabilitate any important habitat on a "no-net-loss" basis and to operate the facility in accordance with CESA to ensure no net loss of habitat function.	N/A	No Action	IM-3 decommissioning will not involve construction of an intake structure.
Biological Resources	BIO-3b	Additionally, PG&E shall consult with USACE regarding the need to obtain permits under section 404 of the CWA and section 10 of the Rivers and Harbors Act. In conjunction with these permitting activities, the USACE must initiate consultation with USFWS under Section 7 of the federal ESA regarding potential impacts of the proposed project on federally listed fish species due to the loss of habitat on federally listed fish species. PG&E shall implement any additional measures developed through the ESA Section 7 processes, or its equivalent, to ensure "no-net loss" of habitat function. Alternatively, if USACE and/or USFWS decline to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, PG&E shall confer with USFWS regarding potential disturbance to federally listed fish species and federally listed fish species habitat and shall meet the substantive mandates under Section 7 of the federal ESA regarding potential impacts to fish or to habitat of federally listed fish species. PG&E shall implement any additional measures developed through that processes, including compliance with the substantive requirements of all of what would be permit conditions if not exempt pursuant to CERCLA, and to ensure "no-net-loss" of habitat function. Because the type and extent of habitat potentially affected is unknown, PG&E shall have an instream habitat typing survey conducted in the area potentially affected by the intake construction. Further, cooperation with USFWS and other fisheries biologists shall determine suitable and acceptable location(s) for the intake structure(s) to avoid the spawning habitat of special-status fish species. PG&E shall avoid habitat modifications, especially to habitat that is preferred by native fishes for spawning or rearing including side channels, cobble or gravel bars, and shallow backwaters. If these habitat types cannot be avoided, any disturbed habitat will be restored or replaced to achieve "no-net-loss" of habitat types and values as described above.	N/A	No Action	IM-3 decommissioning will not involve construction of an intake structure.
Biological Resources	BIO-3c	c) Potential Fish Entrainment and Impingement during Operation of the Intake Structure. Both screened and unscreened diversions can entrain larval life stages of fish. For example, adverse effects to early life stages of fish could occur if diversions coincide with planktonic larval life stages that occur during summer months, a period of high entrainment vulnerability. Prior to operation of the intake structure, PG&E shall consult with USFWS and CDFW to determine the most vulnerable time of the year for entrainment or impingement of razorback sucker and bonytail chub eggs or larvae. PG&E shall install a state-of-the-art positive-barrier fish screen that would minimize fish entrainment and impingement at the intake structure. The fish screen shall be designed in accordance with CDFW and the National Marine Fisheries Service criteria, with specific consideration given to minimizing harm to fish eggs and other early life stages. To be sure that the fish screen operates as intended and reduce the risk of impacts, long-term monitoring of the operations and maintenance of the positive-barrier screen shall be conducted. Monitoring at the onset of diversions through the intake shall include approach velocity measurements immediately after the positive-barrier screen operations begin, with fine-tuning of velocity control baffles or other modifications as necessary, to achieve uniform velocities in conformance with the screen criteria established by regulatory agencies.	N/A	No Action	IM-3 decommissioning will not involve construction of an intake structure.

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Cultural Resources	CUL-1a	a) During Design, Construction, O&M, and Decommissioning Implement Measures to Avoid, Minimize, or Mitigate Impacts on Cultural Resources. Establishment of a cultural impact mitigation program and a Corrective Measures Implementation Workplan (CMI Workplan), with specific activities stipulated for each phase of the project, will reduce the potential for impacts on historical resources within the project area, and will help preserve the values of and access to the Topock Cultural Area for local Tribal users. As detailed below, measures will be implemented to avoid known resources, re-use existing disturbed areas to the extent feasible, allow for Tribal input to the final design and maintain access for Tribal users during design, construction, operation, and decommissioning activities, as appropriate. During construction, a Worker Education Program and regular archaeological and Tribal monitoring will be implemented, and measures intended to reduce the potential for incursion by outside parties will be strengthened. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation (dated December 31, 2010).	This Work Plan and Worker Education Program	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities. Sensitivity training will be provided by PG&E to workers prior to commencing the IM-3 decommissioning, removal, and restoration activities, and will be reinforced throughout the duration of the project.
Cultural Resources	CUL-1a-1	During development of the final design and the construction, operation, and decommissioning phases of the project, PG&E shall carry out and require all subcontractors to carry out all investigative, testing, and remediation activities, including all supporting operations and maintenance activities, in ways that avoid, minimize, and mitigate significant adverse effects to historically significant cultural and historic resources, consistent with the CEQA Guidelines, and including the Topock Cultural Area, to the maximum extent feasible as determined by DTSC.	This Work Plan	Action	Sensitivity training will be provided by PG&E to workers prior to commencing the IM-3 decommissioning, removal, and restoration activities, and will be reinforced throughout the duration of the project.
Cultural Resources	CUL-1a-2	As part of the CMI Workplan, PG&E shall develop a written access plan to preserve Tribal members' access to, and use of, the project area for religious, spiritual, or other cultural purposes. This plan will allow access to the extent PG&E has the authority to facilitate such access, and be consistent with existing laws, regulations, and agreements governing property within the project area. The access plan may place restrictions on access into certain areas, such as the Compressor Station and the existing evaporation ponds, subject to DTSC review with regard to health and safety concerns and to ensure noninterference with approved remediation activities. This access plan may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the related stipulation (General Principle I.C) contained in the Programmatic Agreement (Appendix PA). PG&E shall demonstrate a good faith effort to coordinate with Interested Tribes by including communication logs as part of the CMI Workplan. "Interested Tribes" means, for purposes of this EIR and the mitigation measures contained herein, the six tribes that have substantially participated in the various administrative processes surrounding remediation of the site with DTSC, PG&E, and DOI, including throughout development of the final remedy. Interested tribes include the Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Fort Yuma-Quechan Indian Tribe, and Hualapai Indian Tribe.	This Work Plan and Access Plan	Action	Provisions in the Access Plan (included as appendix to the Construction/Remedial Action Work Plan) will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-3	PG&E shall enhance existing measures to prevent and reduce incursions from recreational and/or other outside users from affecting unique archeological and historically significant resources, including resources within the Topock Cultural Area, by:			
Cultural Resources	CUL-1a-3a	a. Retaining a Qualified Cultural Resource Consultant to implement the Mitigation Monitoring and Reporting Program (MMRP) and conducting yearly inspections (or less frequently upon approval by DTSC) of identified historical resources, including inspections of the Topock Cultural Area, to determine if substantial adverse changes have occurred relative to the condition of the historical resources during the past year or prior to the implementation of the proposed project. PG&E shall offer to retain a Tribal monitor at historic rates of compensation or Tribal representatives designated by the Tribal Council or chairperson, if so requested, to accompany the Qualified Cultural Resources Consultant during the inspections. The Qualified Cultural Resource Consultant shall be a person who is acceptable to DTSC and who is also a qualified archaeologist with a graduate degree in archaeology, anthropology or closely related field, plus at least 3 years of full-time professional experience in general North American archaeological research and fieldwork, with expertise/experience in the Southwest preferred.	N/A	No Action	This measure is under implementation. No additional action will be required during IM-3 decommissioning, removal, and restoration activities to comply with this measure.

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Cultural Resources	CUL-1a-3b	b. Developing a site security plan as part of the CMI Workplan. The site security plan shall include, but not be limited to, instructions for PG&E personnel to inspect the project site routinely during construction and report any human-caused disturbance to project facilities and the surrounding environment to DTSC and the appropriate landowner, such as BLM, USFWS, or FMIT, as appropriate, depending on the ownership of the property involved in the incursion. Notification shall be within a specified period, as established in the site security plan for the event, and shall also be summarized as part of the periodic implementation status report, as approved by DTSC for remedy implementation. This measure does not impose any obligation on PG&E to perform law-enforcement duties on federal or private lands, but is intended to provide increased observation of potential intrusions into the project area during construction and operation of the final remedy that may impact significant cultural resources. PG&E staff, or assigned agents, should be instructed to report any outside disturbance to the environment personally observed over the course of the working day. Information shall be reported within a specific period, as established in the site security plan, to DTSC and the appropriate landowners, such as BLM, USFWS, or FMIT, depending on the ownership of the property intruded upon. The site security plan may also include the use of PG&E security cameras at major ingress/egress gates into the project site. Finally, if requested by the FMIT the plan may include the use of private security personnel to patrol the FMIT-owned parcel within the project area to prevent outside incursions.	This Work Plan and Site Security Plan	Action	Provisions in the Site Security Plan (included as appendix of the Construction/Remedial Action Work Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-3c	c. Coordinating with BLM and San Bernardino County to facilitate an outreach effort to the staff at Moabi Regional Park, requesting that they communicate to visitors the parts of the project area that are off limits to off-road vehicle usage because of health and safety concerns, public lands management plans, or landowner requests. PG&E shall make a good faith effort to involve the surrounding Tribes in this outreach effort, providing Interested Tribes with the opportunity to comment on outreach materials or provide a Tribal cultural resources specialist the opportunity to participate in the outreach activities. As part of this outreach effort, PG&E shall work with Park Moabi and offer to design, develop, and fund the installation of an informational kiosk within Park Moabi that informs visitors of the work being done at the project site. PG&E shall involve the Tribes to the maximum extent feasible, as determined by DTSC, in the design and development of the informational kiosk.	N/A	No Action	This measure is under implementation. No additional action will be required during IM-3 decommissioning, removal, and restoration activities to comply with this measure.
Cultural Resources	CUL-1a-3d	d. Posting signage to indicate those parts of the project area that are off limits to off-road vehicle usage due to possible health and safety concerns and to reduce potential damage to environmental resources. If agreed to by land owners and/or local, state, or federal management entities within the project area, PG&E shall work with the relevant land owner or land management entity to develop, design, and fund the installation of easily visible and clear signage. This may include coordination with BLM to install signage noting the designation of the area as an Area of Critical Environmental Concern owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.	This Work Plan	Action	Exclusion zones with posted signage will be delineated and demarcated at the zones prior to commencing work.
Cultural Resources	CUL-1a-4	PG&E shall work with representative members of the Interested Tribes to convene and retain a multidisciplinary panel of independent scientific and engineering experts as part of a Technical Review Committee (TRC). The TRC shall be made up of not more than five multidisciplinary experts who will be on call to review project-related documents, participate in project-related meetings, and advise interested Tribal members on technical matters relating to the final design and remedy. The TRC shall include only persons with technical expertise, including but not limited to geology, hydrology, water quality, engineering, paleontology, toxicology, chemistry, biology, or botany. Before July 1, 2011, PG&E shall post an open grant or Request for Qualifications (RFQ) and retain members of the TRC at rates comparable to those paid historically to Tribal experts by PG&E for the remediation project. TRC members shall be selected by majority vote of one representative from each participating Interested Tribe. PG&E shall provide Interested Tribes at least 30-days' notice of the meeting to select TRC members and to review TRC candidate qualifications. For the purposes of contracting, the grant may be awarded to one Tribal government to manage or, alternatively, PG&E may reimburse the Tribe or TRC members directly. The entirety of the monies shall be used to fund the scientific and engineering team exclusively, and shall not be used to fund other Tribal government expenses or used to support legal counsel. A stipulation of the open grant shall be that the scientific and engineering team shall provide all deliverables and results to all involved Tribes, despite a possible contract agreement with only one Tribe or with PG&E. Upon conclusion of the construction phase of the project, the necessity and dollar value of the TRC shall be assessed by PG&E and, with the approval of DTSC, shall either be extended, reduced, or terminated under the operations and maintenance phase. An annual activity report shall be sent to DTSC for review and to ensure PG&E is in compliance.	N/A	No Action	This measure is under implementation. No additional action will be required during IM-3 decommissioning, removal, and restoration.

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Cultural Resources	CUL-1a-5	Should any indigenous plants of traditional cultural significance and listed in Appendix PLA of the EIR for the Topock remediation project (AECOM, 2011) be identified within the project area, PG&E shall avoid, protect, and encourage the natural regeneration of the identified plants when developing the remediation design, final restoration plan, and IM-3 decommission plan. In the event that impacts on the identified plants cannot be avoided and such plants will be displaced, PG&E shall retain a qualified botanist who shall prepare a plant transplantation/monitoring plan which can be included as part of the Cultural Impact Mitigation Program (CIMP) referenced in CUL-1a-8 either by (1) transplanting such indigenous plants to an on-site location, or (2) providing a 2:1 ratio replacement to another location decided upon between PG&E and members of the Interested Tribes. Plans to transplant or replace such plants shall be approved by DTSC. In coordination with the qualified botanist, PG&E shall monitor all replanted and replacement plants for at least 5 years, and shall ensure at least a 75 percent survivorship during that time. This mitigation measure is not meant to replace or subsume any actions required by state or federal entities with regard to the protection of species listed as rare, threatened, or endangered.	This Work Plan, Future Site-Specific IM-3 Restoration Plan, Mitigation and Monitoring Plan for Culturally Significant Plants, and the CIMP	Action	Section 8 addresses this mitigation measure. Section 8 of this Work Plan includes restoration guidelines (steps to be followed during restoration), elements of the restoration of habitat and revegetation and demobilization, and a draft annotated outline of a future, more detailed Site-Specific IM-3 Restoration Plan. In response to the Tribes' comments on the 60% design (CH2M HILL 2014) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA, and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. As stated in the responses to comments on the 60% design (RTC #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. In addition, CIMP protocols to restore the environment to its preconstruction condition upon decommissioning (CUL-1a-8e) and the Mitigation and Monitoring Plan for Culturally Significant Plants will be implemented and referenced in the Site-Specific IM-3 Restoration Plan.
Cultural Resources	CUL-1a-6	All additional phone calls and alarms associated with remediation activities or facilities shall not be routed through PG&E's existing alarm system utilized at the compressor station. The notification system for remediation-related alerts and/or phone calls shall not introduce additional noise to the project area, to the maximum extent feasible, provided there is ongoing compliance with applicable safety regulations or standards of the Federal Energy Regulatory Commission, Occupational Safety and Health Administration, and other agencies. (See Mitigation Measure NOISE-3 for additional mitigation related to the Topock Cultural Area).	N/A	No Action	No alarms will be associated with IM-3 Decommissioning work. Additional phone calls will not be routed through PG&E's existing alarm system used at the Compressor Station.
Cultural Resources	CUL-1a-7	Nighttime construction-related activities shall be limited to work that cannot be disrupted or suspended until the following day, such as, but not limited to, well drilling and development or decommissioning activities. Lighting considerations, including the potential use of solar power for some lighting, shall be included as part of the remedial design plan to be developed with involvement of Interested Tribes and the U.S. Department of the Interior. To minimize construction and operations-related lighting impacts, the lighting in the remedial design plan shall include, at a minimum: (1) shrouding/shielding for portable lights needed during construction and operational activities; (2) installation of portable lights at the lowest allowable height and in the smallest number feasible to maintain adequate night lighting for safety; (3) shielding and orientation of lights such that off-site visibility of light sources, glare, and light from construction activities is minimized to the extent feasible. No additional permanent poles shall be installed for lighting. This mitigation measure is not meant to replace or subsume any actions required by the County or state or federal entities with regard to lighting required for minimum security and safety purposes.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration. Protocols for nighttime lighting are included in an appendix to the Construction/Remedial Action Work Plan.
Cultural Resources	CUL-1a-8	Prior to commencement of construction, PG&E shall submit as part of the final Remedial Design, a CIMP developed in coordination with Interested Tribes for DTSC's review and approval. The CIMP may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the Programmatic Agreement (Appendix PA). The CIMP shall include, at a minimum and to DTSC's satisfaction, the following:	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Cultural Resources	CUL-1a-8a	a. Protocols for continued communication. Consistent with past practice and the communication processes previously entered into by PG&E with Interested Tribes, the company shall continue to communicate with Interested Tribes during the design, construction, operation, and decommissioning of the project. Prior to implementation of construction, PG&E shall communicate with Interested Tribes that place cultural significance on the Topock Cultural Area. Outreach efforts between the Tribes and PG&E shall be communicated by PG&E to DTSC quarterly during the design and construction phase for review and input, and annually during project operations.	EIR mitigation measures compliance reports (quarterly during design /construction, annual during project operation); and CIMP	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8b	b. Protocols for the appropriate treatment of archaeological materials that may be disturbed or discovered during implementation of the final remedy, including protocols for the repatriation of significant items of cultural patrimony that may be recovered during the project, and protocols for the curation of cultural materials recovered during the project. Treatment of archaeological sites may include data recovery or capping. If data recovery is proposed, a Research Design following California Office of Historic Preservation guidelines or federal guidelines, as applicable, shall be prepared and reviewed and approved by DTSC.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8c	c. Protocols for the review of cultural resource-related documents throughout the design, construction, and operational phases.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8d	d. Protocols for the review of project design documents before the beginning of construction, including reviews of project design documents throughout the design process (e.g., Preliminary [approximately 30% completed], Intermediate [approximately 60% completed] and Pre-final design).	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8e	e. Protocols for the appropriate methods to be used to restore the environment to its preconstruction condition upon decommissioning of individual groundwater remedy facilities.	N/A	No Action	Because IM-3 is not part of the Final Remedy, this measure does not apply to the IM-3 decommissioning, removal, and restoration work.
Cultural Resources	CUL-1a-8f	f. A plan for the decommissioning and removal of the IM-3 Facility and proposed restoration of the site (to be an appendix to the CIMP).	This Work Plan (appendix to the CIMP)	Action	This Work Plan fulfills this mitigation measure and will be included in Appendix B of the CIMP.
Cultural Resources	CUL-1a-8g	g. Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site.	CIMP and the Soil Management Plan (Appendix F of this Work Plan)	Action	Appendix F (Soil Management Plan) fulfills this measure.
Cultural Resources	CUL-1a-8h	h. Protocols for the appropriate methods, consistent with Mitigation Measure NOISE-3, to reduce auditory impacts.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8i	i. Protocols for the appropriate methods, consistent with Mitigation Measures AES-1 and AES-2, to reduce visual intrusions.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8j	j. Protocols for Tribal notification in advance of project-related activities that the Interested Tribes may feel have the potential to cause adverse impacts to sensitive cultural resources.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8k	k. Protocols to be followed by project personnel to accommodate, if feasible as determined by DTSC, key Tribal ceremonies that involve the Topock Cultural Area.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8l	l. Provisions affording sufficient Tribal monitors to observe ground-disturbing activities and/or other scientific surveying (e.g., biological surveys) that may occur in preparation for construction activities. Ground-disturbing activities include trenching, excavation, grading, well excavation/drilling, decommissioning of the IM-3 Facility and subsurface pipeline, or other construction-related activities.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8m	m. Provisions of reasonable compensation for Tribal monitors consistent with historic rates.	CIMP; Memoranda of Understanding between PG&E and various Tribes	No Action	This measure is under implementation. No additional action will be required during IM-3 decommissioning, removal, and restoration.
Cultural Resources	CUL-1a-8n	n. Locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction.	CIMP and this Work Plan (Section 3)	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Cultural Resources	CUL-1a-8o	o. Protocols for the reporting of discoveries of cultural importance consistent with existing statutes and regulations.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8p	p. Protocols for the inspection of remediation facilities and/or staging areas throughout the construction phase.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-9	During selection of the design and specific locations for physical remediation facilities, PG&E shall, in communication with the Interested Tribes (and subject to their review), and to the maximum extent feasible, as determined by DTSC, give: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, such as but not limited to wells and pipelines, but not including IM-3 facilities. “Disturbed” areas in this context means those areas outside of documented archaeological site boundaries that have experienced ground disturbance in the last 50 years. PG&E shall produce an aerial map of these disturbed areas to guide project design, and PG&E shall make a good faith effort to provide Tribes with an opportunity to review and comment on the information displayed on the map in determining “disturbed” areas.	N/A	No Action	This mitigation measure applies to the design of the Final Remedy, not IM-3 decommissioning.
Cultural Resources	CUL-1a-10	PG&E shall consider the location of Loci A, B, and C of the Topock Maze during the design and approval of the physical facilities necessary for the final remedy and is prohibited from creating any direct physical impact on the Topock Maze, as it is manifested archaeologically. Through the design, PG&E shall prevent all indirect (e.g., noise, aesthetics) impacts on the Topock Maze, to the maximum extent feasible as determined by DTSC.	This Work Plan	Action	Figure 3-1 shows the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint does not create any direct physical impact on the Topock Maze as it is archaeologically manifested.
Cultural Resources	CUL-1a-11	PG&E shall provide an open grant for two part-time cultural resource specialist/project manager positions during the design and construction phases of the remediation project. The positions shall be filled by qualified members of an Interested Tribe as nominated by a majority vote of their Tribal Council(s) and appointed by DTSC’s project manager if more than two members are nominated. The award of the grants is for continued involvement in review of project documents and participation in project-related meetings, including TRC meetings, at rates of historic compensation. Additionally, in light of FMIT’s ownership of land in the project area and historical involvement in the environmental process, additional funding is guaranteed for one full-time FMIT position upon submission of an application by a qualified FMIT member who shall be appointed by the FMIT council, provided such funding is not duplicative of the services and funding provided by PG&E pursuant to the Settlement Agreement between PG&E and the FMIT in Fort Mojave Indian *Tribe v. Dept. of Toxic Substances Control, et al.*, Case No. 05CS00437 for a position with the FMIT’s Aha Makav Culture Society. The payment of grant monies shall be timed to the awarded Tribes’ fiscal cycles so that the Tribes are not forced to front funds for long periods of time. These positions shall act as cultural resources contacts and project managers for interactions between the Tribes, PG&E, and DTSC to ensure coordination for review and comment of subsequent project and/or environmental documents related to the design and implementation of the groundwater remediation project to avoid, reduce, or otherwise mitigate impacts on historical resources, as defined by CEQA. This funding is separate from provisions for Tribal monitor positions and shall not be used for routine Tribal business or legal counsel. For review and approval, PG&E shall provide DTSC with the names of the selected grant recipients and an annual report that summarizes activities associated with the grant program. Upon the conclusion of the construction phase of the project, the necessity and dollar value of the grant program shall be assessed by PG&E and, with the approval of DTSC, shall either be extended or terminated under the operations and maintenance phase.	N/A	No Action	This measure is under implementation. No additional action is required during the IM-3 decommissioning, removal, and restoration activities for compliance with this measure.
Cultural Resources	CUL-1a-12	PG&E shall provide sufficient opportunity, as determined by DTSC, for Interested Tribes to provide a traditional healing/cleansing ceremony (or ceremonies) before and after ground disturbing construction activities occur.	This Work Plan	Action	This measure will be implemented before and after the IM-3 decommissioning, removal, and restoration activities.

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Cultural Resources	CUL-1a-13	PG&E shall, in communication with Interested Tribes, develop as part of the CMI Workplan, a worker cultural sensitivity education program. The program shall be implemented before commencement of construction and throughout construction and operations as personnel are added. This program may include information provided directly by Tribal entities either in written form or on video, in a manner consistent with Appendix C in the existing BLM Programmatic Agreement. The worker cultural sensitivity education program shall ensure that every person working on the project as an employee or contractor, before participating in design or outdoor activities at the project site, is informed regarding: • the cultural significance of the Topock Cultural Area, • appropriate behavior to use within the Topock Cultural Area, • activities that are to be avoided in the Topock Cultural Area, and • consequences in the event of noncompliance.	Worker Cultural Sensitivity Education Program	Action	Prior to the start of field work, sensitivity training will be provided by the Topock Site Manager (Curt Russell) to IM-3 decommissioning, removal and restoration workers. Interested Tribes will be invited to attend the Project Initiation meeting and participate in providing training to workers.
Cultural Resources	CUL-1b and 1c	During Design, Construction, O&M, and Decommissioning Consider the Location of Historical Resources and Implement Measures to Avoid Resources to the Extent Feasible. The following actions will reduce the potential for impacts on identified historically significant resources (other than the Topock Cultural Area, which is separately addressed in CUL-1a) within the project area. As detailed below, these actions include consideration of the location of historical resources, preparation of a cultural resources study, and preparation of a treatment plan. Monitoring of ground-disturbing activities during project construction will further protect historically significant resources. Protective actions are also described pertaining to the discovery of any previously unidentified potentially significant cultural resources.	This Work Plan, Programmatic Agreement, the CHPMP, and the Treatment Plan	Action	Figure 3-1 shows the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint was selected in consideration of the location of historical resources. Applicable provisions under the CHPMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1b/c-1	PG&E shall consider the locations of the identified historic resources described above (EIR Table 4.4-3) during the design of the physical improvements necessary for the proposed project and avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible, as determined by DTSC. The final design plans for the project will be submitted to DTSC for review and approval.	This Work Plan, Programmatic Agreement, the CHPMP	Action	Figure 3-1 shows the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint was selected in consideration of the location of historical resources. Applicable provisions under the CHPMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1b/c-2	During preparation of the final design, and consistent with CUL-1 a-3, PG&E shall retain a Qualified Cultural Resources Consultant to prepare a cultural resources study that assesses the potential for the construction, operations, or decommissioning of specific proposed improvements to result in significant impacts on identified historically significant resources described in Impacts CUL-1b and CUL-1c. This may include a geoarchaeological investigation and/or non-destructive remote-sensing surveys of potentially disturbed areas to determine if a potential exists for buried historical and archaeological resources. “Significant impacts” as used here means the potential for construction to demolish or materially alter in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR. The study will be submitted to DTSC for review and evaluation to determine if existing mitigation measures are appropriate.	Treatment Plan	No Action	This measure is under implementation. No additional action is required during the IM-3 decommissioning, removal, and restoration activities for compliance with this measure.
Cultural Resources	CUL-1b/c-3	If the cultural resources study determines that the construction of physical improvements would result in significant impacts on identified historically significant resources described in Impacts CUL-1b and CUL-1c, and avoidance of the resource is not feasible, PG&E shall prepare a treatment plan that identifies measures to reduce these impacts (see above description of the CIMP) for DTSC’s review and approval. The treatment plan shall identify which criteria for listing on the CRHR contribute to the affected resource’s significance and which aspects of significance would be materially altered by construction, operations, or decommissioning and shall provide for reasonable efforts to be made to permit the resource to be preserved in place or left in an undisturbed state. Methods of accomplishing this may include capping or covering the resource with a layer of soil. To the extent that a resource cannot feasibly be preserved in place or left in an undisturbed state, excavation as mitigation shall be restricted to those parts of the resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a historically significant resource if the treatment plan determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource. The plan shall require communication with all Interested Tribes with regard to their perspectives and wishes for the treatment of the resources.	CHPMP	Action	Applicable provisions under the CHPMP will be implemented during the IM-3 decommissioning, removal, and restoration activities

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Cultural Resources	CUL-1b/c-4	Consistent with CUL-1a-3a above, PG&E shall retain a Qualified Cultural Resources Consultant to observe ground-disturbing activities and shall be required to request the participation of Tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction (see the description of the CMI Workplan, above). The Qualified Cultural Resources Consultant shall provide training to construction personnel on the locations of identified resources, values associated with the identified resources, responsibility for reporting suspected historic resources, and procedures for suspension of work in the immediate vicinity of the discovery, and shall use exclusionary fencing, flagging, or other appropriate physical barriers to mark the boundaries of identified resources. The Qualified Cultural Resources Consultant shall invite participation from Interested Tribal members to participate in the training. In the event that previously unidentified potentially significant cultural resources are discovered during ground-disturbing activities, the Qualified Cultural Resources Consultant shall have the authority to divert or temporarily halt ground-disturbing activities in the area of discovery to allow evaluation of the potentially significant cultural resources. If such discoveries occur on land managed by a federal agency, Stipulation IX (Discoveries) of the Programmatic Agreement shall apply and are deemed adequate by DTSC. If a discovery occurs on other lands within the project area, the Qualified Cultural Resources Consultant shall contact the PG&E and DTSC project managers at the time of discovery and, in consultation with DTSC and Tribal monitors, shall evaluate the resource before construction activities will be allowed to resume in the affected area. For significant cultural resources, and before construction activities are allowed to resume in the affected area, the resource(s) shall be recovered with coordination of the Tribal monitors and DTSC. Recovery may include a Research Design and/or Data Recovery Program submitted to DTSC for review and approval. The Qualified Cultural Resources Consultant (and Tribal monitors) shall determine the amount of material to be recovered for an adequate sample for analysis or data recovery. Any concerns or recommendations regarding the ground-disturbing activities or the handling of cultural resources shall be directed to the Qualified Cultural Resources Consultant or PG&E's site supervisor.	This Work Plan	Action	This measure will be implemented before and after the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-2	During Project Design Consider the Location of Unique Archaeological Resources and Avoid Resources to the Maximum extent Feasible. Cultural resources that qualify as unique archaeological sites in the project area would probably also meet one or more of the criteria for historical resources and would be subject to Mitigation Measures CUL-1b/c-2 and CUL-1b/c-3. The mitigation measures under this identified impact are the same as listed for Impact CUL-1b and CUL-1c. These mitigation measures would reduce the potential for impacts on unique archaeological resources.	This Work Plan, the CHPMP, and the Treatment Plan	Action	Figure 3-1 shows the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint was selected in consideration of the location of historical resources. Applicable provisions under the CHPMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-3	Conduct Survey and Construction Monitoring. A paleontological investigation, including a detailed survey of the project area by a qualified paleontologist, shall be conducted to refine the potential impacts on unique paleontological resources within the final design area and determine whether preconstruction recovery of sensitive resources and/or construction monitoring would be warranted. If construction monitoring is determined to be warranted, ground-altering activity would be monitored by a qualified paleontologist to assess, document, and recover unique fossils. Monitoring shall include the inspection of exposed surfaces and microscopic examination of matrix in potential fossil bearing formations. In the event microfossils are discovered, the monitor shall collect matrix for processing. In the event paleontological resources are encountered during earthmoving activities, recovered specimens shall be prepared by the paleontologist to a point of identification and permanent preservation. PG&E shall retain a Qualified Paleontologist to observe ground-disturbing activities where determined necessary based on the results of the paleontological investigation and shall be required to request the participation of Tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction (see above description of the CMI Workplan). Paleontological resources of scientific value shall be identified and curated into an established, accredited, professional museum repository in the region with permanent retrievable paleontological storage. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation.	Paleontological Resources Management Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Cultural Resources	CUL-4	With Discovery of Human Remains or Burials Suspend Work, Protect Remains, and Comply with Local, State, and Federal Laws Regarding Discoveries During Ground-Disturbing Activities. Ground-disturbing activities may disturb as-yet undiscovered human remains or Native American burials and associated grave goods. PG&E shall retain a Qualified Cultural Resource Consultant and request designated Tribal monitor(s) to train construction personnel in the identification of human remains so that they may aid in the identification of such resources (see above description of the CIMP). A Qualified Cultural Resource Consultant and Tribal monitor(s) shall be in place to adequately oversee all ground-disturbing activities. In the event human remains are uncovered over the course of project construction, operation and maintenance (O&M), and/or decommissioning activities, the following procedures shall be followed to ensure compliance with all applicable local, state, and federal laws.	This Work Plan and the CIMP (CUL-1a-8b)	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities. Implementation procedures are included in an appendix to the Construction/Remedial Action Work Plan.
Cultural Resources	CUL-4f	f) The construction contractor shall immediately suspend work within the vicinity of the discovery and determine if the remains discovered are human or nonhuman. This determination shall be made by the Qualified Cultural Resources Consultant, a qualified archaeologist and/or physical anthropologist with expert skill in the identification of human osteological (bone) remains.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4g	g) The Qualified Cultural Resources Consultant (and Tribal monitor), or construction contractor, shall protect discovered human remains and/or burial goods remaining in the ground from additional disturbance.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4h	h) The Qualified Cultural Resources Consultant, archaeologist, or construction site supervisor shall contact the San Bernardino County Coroner, and the PG&E and DTSC project managers immediately. In California, all subsequent action shall conform to the protocols established in the Health and Safety Code and regulations. In Arizona, the Qualified Cultural Resources Consultant or PG&E construction site supervisor will follow Arizona laws and the implementing regulations. Human remains found on federal land would require the notification of the BLM Havasu City field office and compliance with applicable federal laws and regulations, including the Native American Graves Protection and Repatriation Act if the remains are determined to be of Native American origin. The Qualified Cultural Resources Consultant shall coordinate the interaction between Interested Tribes, PG&E, the County, and DTSC to determine proper treatment and disposition of any remains.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4i	i) The San Bernardino County Coroner will determine if the remains are of recent origin and if an investigation of the cause of death is required (California Health and Safety Code Section 7050.5). If the coroner determines that the human remains are not Native American and not evidence of a crime, project personnel shall coordinate with the Qualified Cultural Resources Consultant (s) to develop an appropriate treatment plan. This may include contacting the next-of kin to solicit input on subsequent disposition of the remains. If there is no next-of-kin, or recommendations by the next-of-kin are considered unacceptable by the landowner, the landowner will reinter the remains with appropriate dignity in a location outside the project area and where they would be unlikely to be disturbed in the future.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4j	j) In the event that the San Bernardino County Coroner determines that the human remains are Native American and not evidence of a crime, project personnel shall contact the NAHC so that a most likely descendent (MLD) can be identified as required under California Public Resources Code Section 5097.98.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4k	k) The MLD (s) shall inspect the area in which the human remains were found and provide treatment recommendations to the landowner and PG&E site manager in accordance with the provisions of PRC Section 5097.98. The treatment may include reburial, scientific removal of the discovered human remains and relinquishment to the MLD(s), nondestructive analysis of human remains and/or other culturally appropriate treatment. If the MLD(s) so requests, the landowner would reinter the remains with the appropriate dignity in a location outside the area of disturbance in a location unlikely to be disturbed in the future.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4l	l) To the maximum extent feasible, Mitigation Measure CUL-4 shall be implemented in a manner that is consistent with mitigation required by local, state, and federal requirements.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Geology & Soils	GEO-1a	Construction, Operation and Maintenance, and Decommissioning Impacts Related to Erosion of Soils.			
Geology & Soils	GEO-1a-a	a) A DTSC-approved grading and erosion control plan, prepared by a California Registered Civil Engineer, shall be completed prior to implementation of any grading in areas of the site where there is a potential for substantial erosion or loss of top soils. The plan shall outline specific procedures for controlling erosion or loss of topsoil during construction, operation and maintenance, and decommissioning.	Future Site-Specific IM-3 Restoration Plan	Action	A grading and erosion control plan will be developed as needed during the preparation of the future Site-Specific IM-3 Restoration Plan.
Geology & Soils	GEO-1a-b	b) To ensure soils do not directly or indirectly discharge sediments into surface waters as a result of construction, operation and maintenance, or decommission activities, PG&E shall develop a SWPPP as discussed in mitigation measure HYDRO-1 of the "Hydrology and Water Quality" section of this EIR. The SWPPP shall identify best management practices (BMPs) that would be used to protect stormwater runoff and minimize erosion during construction. PG&E shall prepare plans to control erosion and sediment, prepare preliminary and final grading plans, and shall prepare plans to control urban runoff from the project site during construction, consistent with the substantive requirements of the San Bernardino County Building and Land Use Services Department for erosion control.	Appendix G of this Work Plan	Action	Appendix G of this Work Plan includes construction BMPs that may be used to protect stormwater runoff and minimize erosion during decommissioning.
Geology & Soils	GEO-1a-c	c) During road preparation activities, loose sediment shall be uniformly compacted consistent with the substantive San Bernardino County Building and Land Use Services Department requirements to aid in reducing wind erosion. Ongoing road maintenance including visual inspection to identify areas of erosion and performing localized road repair and re-grading, installation and maintenance of erosion control features such as berms, silt fences, or straw wattles, and grading for road smoothness shall be performed as needed to reduce potential for erosion.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Geology & Soils	GEO-1a-d	d) Regarding the potential for contaminated soils to be eroded and contribute contamination into receiving waters, Mitigation Measures GEO-2 and HAZ-2 shall be implemented. Mitigation Measure GEO-2 provides the provisions for mitigating erosion through BMPs which shall be implemented. Mitigation Measure HAZ-2 provides the provisions for safe work practices and handling of contaminated soils as investigation derived wastes.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Geology & Soils	GEO-1b	Construction, Operation and Maintenance, and Decommissioning Impacts Related to Differential Compaction of Soils.			
Geology & Soils	GEO-1b-a	a) BMPs shall be implemented during construction, operation and maintenance, and decommissioning activities to minimize impacts on the affected areas. Such BMPs could include, but would not be limited to, the following: uniform compaction of roadways created for accessing the project area as per San Bernardino County Building and Land Use Services Department requirements, returning areas adversely affected by differential compaction to preexisting conditions when these areas are no longer needed, and continuing maintenance of access roads, wellhead areas, and the treatment plant areas.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Geology & Soils	GEO-1b-b	b) Work area footprints shall be minimized to the greatest extent feasible to limit the areas exposed to differential compaction. Where possible, existing unpaved access roads and staging/working areas shall be reused and maintained for different stages of the construction. New graded areas for staging or for access roads shall be compacted to a uniform specification, typically on the order of 90 to 95% compaction and consistent with substantive San Bernardino County Building and Land Use Services Department requirements to reduce differential compaction and subsequent erosion of site soils.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Geology & Soils	GEO-1b-c	c) After the completion of the operation and maintenance phase, the disturbed areas which result in increased potential for compaction shall be returned to their respective preexisting condition by re-grading consistent with the preconstruction slopes as documented through surveys that may include topographic surveys or photo surveys. The areas will be returned to the surrounding natural surface topography and compacted consistent with unaltered areas near the access roads or staging areas in question. The habitat restoration plan outlined in mitigation measure BIO-1 shall include restoration of native vegetation or other erosion control measures where revegetation would be infeasible or inadequate, for purposes of soil stabilization and erosion control of the project area.	This Work Plan and Future Site-Specific IM-3 Restoration Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Hazardous Materials	HAZ-1a	Spills or Releases of Contaminants during Operation and Maintenance Activities.			
Hazardous Materials	HAZ-1a-a	a) PG&E shall store, handle, and transport hazardous material in compliance with applicable local, state, and federal laws.	N/A	No Action	IM-3 will not operate and will be in lay-up condition during Final Remedy O&M activities. Chemicals used for IM-3 will continue to be stored during lay-up in compliance with applicable local, state, and federal laws. There will be no active handling or transport of hazardous materials during lay-up. No additional activities will be required for compliance with this measure.
Hazardous Materials	HAZ-1a-b	b) All chemical storage and loading areas shall be equipped with proper containment and spill response equipment. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response.	N/A	No Action	IM-3 will not operate and will be in lay-up condition during Final Remedy O&M activities. Chemicals used for IM-3 will continue to be stored during lay-up in compliance with applicable local, state, and federal laws, and in secondary containment. No additional activities will be required for compliance with this measure.
Hazardous Materials	HAZ-1a-c	c) A project-specific HMBP, chemical standard operating procedure (SOP) protocols and contingency plans shall be developed to ensure that proper response procedures would be implemented in the event of spills or releases. Specifically, the HMBP and SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required personal protective equipment, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response. The field manager in charge of operations and maintenance activities shall be responsible for ensuring that these procedures are followed at all times.	Existing IM-3 HMBP and SOPs	No Action	IM-3 will not operate and will be in lay-up condition during Final Remedy O&M activities. The existing HMBP and SOPs for IM-3 will be implemented in the event of spills or releases. No additional activities will be required for compliance with this measure.
Hazardous Materials	HAZ-1b	Spill or Release of Contaminants during Construction and Decommissioning Activities.			
Hazardous Materials	HAZ-1b-a	a) Fueling areas and maintenance areas would be supplied with proper secondary containment and spill response equipment.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities; this measure is addressed in Section 3.
Hazardous Materials	HAZ-1b-b	b) PG&E shall develop fueling SOP protocols and a contingency plan that would be implemented at all fueling areas on-site. The SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required PPE, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. Potential measures include but are not limited to, fuel storage in bermed areas, performing vehicle maintenance in paved and bermed areas, and availability of spill kits for containment and cleanup of petroleum releases. The field manager in charge of construction and decommissioning activities shall be responsible for ensuring that these procedures are followed at all times.	Appendix C of this Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities. Appendix C includes fueling SOPs.
Hazardous Materials	HAZ-1b-c	c) PG&E shall comply with local, state, and federal regulations related to the bulk storage and management of fuels.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities; this measure is addressed in Section 3.

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Hazardous Materials	HAZ-2	Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil -- Before initiating ground-disturbing operations, a health and safety plan shall be developed and implemented by qualified environmental professionals to ensure health and safety precautions are being met. It is not possible to prepare the health and safety plan at this stage of the planning process because final construction plans and other design documents have not been finalized in sufficient detail. However, at a minimum, the health and safety plan shall include procedures to mitigate potential hazards, and such procedures shall include the use of PPE, measures that provide protection from physical hazards, measures that provide protection from chemical hazards that may be present at the site, decontamination procedures, and worker and health and safety monitoring criteria to be implemented during construction. The worker health and safety plan shall include protective measures and PPE that are specific to the conditions of concern and meet the requirements of the U.S. Occupational Safety and Health Administration's (OSHA's) construction safety requirements and Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). In accordance with OSHA requirements, appropriate training and recordkeeping shall also be a part of the health and safety program. The worker health and safety plan shall be certified by a Certified Industrial Hygienist in accordance with OSHA regulations. The worker health and safety plan shall be explained to the construction workers and all workers shall be required to sign the plan, which will be kept on the construction site at all times. Worker safety training shall occur prior to initiation of ground disturbing activities. Training shall include the review of all health and safety measures and procedures. All workers and engineering inspectors at the site shall provide written acknowledgement that the soils management plan (discussed below), worker health and safety plan, and community health and safety plan were reviewed and training was received prior to commencement of construction activities. The following are specific elements and directives that shall be included in the health and safety plan and implemented by PG&E during construction, operation and maintenance, and decommissioning of this project:	Construction HSP	Action	The Construction HSP was developed by PG&E and is included in an appendix of the Construction/Remedial Action Work Plan.
Hazardous Materials	HAZ-2a	a) Vehicles traveling on unpaved roadways or surfaces would be directed to avoid traveling in areas where contaminated soils are known to be present; vehicle speeds shall be controlled (e.g., limited to 15 mph or slower) to limit generation of dust; measures, such as wetting of surfaces, will be employed to prevent dust generation by vehicular traffic or other dust-generating work activities.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Hazardous Materials	HAZ-2b	b) Pre-mobilization planning shall occur during which the likelihood of encountering contaminated soils shall be reviewed along with the HMBP, site-specific health and safety plan, and SOPs so that the procedures are followed and the contingencies for handling contaminated soils are in-place prior to implementing the field operations.	This Work Plan and Appendix F, Soil Management Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Hazardous Materials	HAZ-2c	c) Should evidence of contaminated soil be identified during ground disturbing activities (e.g., noxious odors, discolored soil), work in this area will immediately cease until soil samples can be collected and analyzed for the presence of contaminants by the site supervisor or the site safety officer. Contaminated soil shall be managed and disposed of in accordance with a project-specific health and safety plan and soil management plan. The health and safety plan and soil management plan shall be approved by DTSC before beginning any ground disturbing activities. While the project is exempt from the requirements of the San Bernardino County Division of Environmental Health, the health and safety plan and soil management plan shall be prepared in general accordance with the substantive requirements of this agency.	Construction HSP and Appendix F, Soil Management Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities
Hazardous Materials	HAZ-2d	d) In the event that drilling sites must be located within areas of suspected soil contamination, the appropriate PPE shall be worn by all personnel working in these areas and methods specified in the health and safety plan used to control the generation of dust. When working in these areas, personnel shall be required to follow all guidance presented in the site-specific health and safety plan and soil management plan. The site-specific health and safety plan shall include provisions for site control such as, but not limited to, delineation of the exclusion, contaminant reduction and support zones for each work area, decontamination procedures, and procedures for the handling of contaminated soils and other investigation derived wastes. Soil that is excavated shall be loaded directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins. Suspected contaminated soils shall be segregated from suspected uncontaminated soils.	Construction HSP	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities
Hazardous Materials	HAZ-2e	e) Personnel working at the site shall be trained in Hazardous Waste Operations.	Construction HSP	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities

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Hazardous Materials	HAZ-2f	f) All soil excavated and placed in roll-off bins or trucks for transportation off-site shall be covered with a tarp or rigid closure before transporting, and personnel working in the area shall be positioned upwind of the loading location.	This Work Plan and Appendix F, Soil Management Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities
Hydrology and Water Quality	HYDRO-1	Exceedance of Water Quality Standards. The project shall implement BMPs to meet the substantive criteria of NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ NPDES No. CAS000002 (General Permit) (SWRCB 2009) as well as all other applicable federal, state, and local permit and regulatory requirements, even if a permit is not required pursuant to CERCLA, for purposes of ensuring the protection of receiving water quality. As such, a BMP plan shall be prepared and implemented for the project prior to construction and decommissioning phase activities. Impacts on water quality from pollutants, including soils from erosion, shall be controlled through use of the following types of BMPs, which shall be incorporated into the appropriate project-specific BMP plan. The General Permit requirements include specific BMPs as well as numeric effluent levels (NELs) and numeric action levels (NALs) to achieve the water quality standards (SWRCB 2009:3). Types of BMPs cited in the General Permit (SWRCB 2009: Attachment A:7) include: a) Scheduling of Activities; b) Prohibitions of Practices; c) Maintenance Procedures; d) Other Management Practices to Prevent or Reduce Discharge of Pollutants to Waters of the United States; e) Treatment Requirements; and f) Operating Procedures and Practice to Control Site Runoff, Spillage or Leaks, Sludge or Waste Disposal, or Drainage from Raw Materials Storage. Visual inspections and monitoring and sampling are required under the General Permit to evaluate the effectiveness of the BMPs and to determine whether modifying BMPs or implementing additional BMPs is required. The BMP designations cited below are based on those used by the California Stormwater Quality Association Construction BMP Handbook (California Stormwater Quality Association 2003) and are consistent with the types of BMPs referenced in the General Permit: g) Scheduling (SS-1): Proper scheduling assists in identifying ways to minimize disturbed areas, which allows for a reduction in the active project area requiring protection and also minimizes the length of time disturbed soils are exposed to erosive processes. h) Preservation of Existing Vegetation (SS-2): Preserving existing vegetation to the maximum extent practicable facilitates protection of surfaces from erosion and can also help to control sediments. Sensitive areas should also be clearly identified and protected. i) Hydraulic Mulch (S S-3), Straw Mulch (S S-6), and Wood Mulching (SS-8): Using various mulches is a method for temporarily stabilizing soil and can be used on surfaces with little or no slope. j) Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats (SS-7): These erosion control methods can be used on flat or, usually, sloped surfaces, channels, and stockpiles. k) Stabilized Construction Entrance/Exit (TC-1): A graveled area or pad located at points where vehicles enter and leave a construction site can be built. This BMP provides a buffer area where vehicles can drop their mud and sediment to avoid transporting it onto public roads, to control erosion from surface runoff, and to help control dust.	This Work Plan, and Appendix G, Construction BMP Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities; Appendix G addresses this mitigation measure.

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		l) Runoff Control Measures (SS-9, SS-10, and SC-10): These include graded surfaces to redirect sheet flow, diversion dikes or berms that force sheet flow around a protected area, and stormwater conveyances (swales, channels, gutters, drains, sewers) that intercept, collect, and redirect runoff. Diversions can be either temporary or permanent. Temporary diversions include excavation of a channel along with placement of the spoil in a dike on the downgradient side of the channel, and placement of gravel in a ridge below an excavated swale. Permanent diversions are used to divide a site into specific drainage areas, should be sized to capture and carry a specific magnitude of storm event, and should be constructed of more permanent materials. A water bar is a specific kind of runoff diversion that is constructed diagonally at intervals across a linear sloping surface such as a road or right-of-way that is subject to erosion. Water bars are meant to interrupt accumulation of erosive volumes of water through their periodic placement down the slope, and divert the resulting segments of flow into adjacent undisturbed areas for dissipation. m) Silt Fence (SC-1): A temporary sediment barrier consisting of fabric is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows. n) Gravel Bag Berm (SC-6) and Sand/Gravel Bag Barrier (SC-8): A temporary sediment barrier consisting of gravel-filled fabric bags is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows. o) Desilting Basin (SC-2) and Sediment Trap (SC-3): Constructing temporary detention structures facilitates the removal of sediment from waters. The devices provide time for sediment particles to settle out of the water before runoff is discharged. Secondary concerns include potential pollutants from inappropriate material storage and handling procedures and nonstormwater discharges. These will be addressed through the following types of BMPs, which shall be incorporated into the stormwater BMP plan: p) Material Delivery and Storage (WM-1): Provide covered storage for materials, especially toxic or hazardous materials, to prevent exposure to stormwater. Store and transfer toxic or hazardous materials on impervious surfaces that will provide secondary containment for spills. Park vehicles and equipment used for material delivery and storage, as well as contractor vehicles, in designated areas. q) Spill Prevention and Control (WM-4): Ensure that spills and releases of materials are cleaned up immediately and thoroughly. Ensure that appropriate spill response equipment, preferably spill kits preloaded with absorbents in an overpack drum, is provided at convenient locations throughout the site. Spent absorbent material must be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as nonhazardous. r) Solid Waste Management (WM-5): Provide a sufficient number of conveniently located trash and scrap receptacles to promote proper disposal of solid wastes. Ensure that the receptacles are provided with lids or covers to prevent windblown litter. s) Hazardous Waste Management (WM-6): Provide a sufficient number of proper receptacles to promote proper disposal of hazardous wastes. t) Concrete Waste Management (WM-8): Dispose of excess concrete in specific concrete washout facilities. u) Sanitary/Septic Waste Management (WM-9): Locate sanitary and septic waste facilities away from drainage courses and traffic areas. Maintain the facilities regularly. v) Vehicle and Equipment Cleaning (NS-8): Clean vehicles and equipment that regularly enter and leave the construction site. w) Vehicle and Equipment Fueling (NS-9): Fuel vehicles and equipment off- site whenever possible. If off-site fueling is not practical, establish a designated on-site fueling area with proper containment and spill cleanup materials. x) Vehicle and Equipment Maintenance (NS-10): Use off-site maintenance facilities whenever possible. Any on-site maintenance areas must be protected from stormwater runoff and on-site flooding.			

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Hydrology and Water Quality	HYDRO-1	In addition to BMPs implemented to avoid or reduce impacts from the construction and decommissioning phases, BMPs shall also be implemented to avoid or reduce impacts from the operations and maintenance phases. To address potential violation of water quality standards caused by insufficient treatment, system failure at concentrations in excess of water quality standards, proper design shall include contingency measures such as safeguards to shut down the extraction wells in case of pipeline failure or malfunction. In addition, operation of the proposed project will be governed by and follow an operations and maintenance plan. PG&E will comply with all applicable water quality standards, the General Permit, and any SWRCB or RWQCB resolutions identified as ARAR, as well as a corrective action monitoring program. Under the corrective action monitoring program, data will be collected to measure performance of the remedy, compliance with standards, and progress of the remedial action as a part of the project description. In addition, the project will be operated to continually assess performance issues and to modify the type, method, and configuration of the treatment delivery systems to enhance performance of the remedy to attain the cleanup goals and to respond to site conditions and performance issues as described in the project description.		No Action	This measure applies to O&M of the groundwater remedy, and does not apply to IM-3 decommissioning, removal, and restoration activities. Activities during IM-3 lay-up period will be covered under the existing IM-3 Industrial SWPPP.
Hydrology and Water Quality	HYDRO-1	A SWPPP will also be prepared for the proposed project, which will contain BMPs related to industrial activities (industrial SWPPP). The BMPs are designed to reduce pollutants in discharges that may affect receiving water quality during operations and maintenance of the proposed project. As noted above, BMP designations are based on those used by the *California Stormwater Quality Association Construction BMP Handbook* (California Stormwater Quality Association 2003) and those referenced in the General Permit The SWPPP will incorporate BMPs such as the following: y) Good Housekeeping: Maintain facility in a clean manner and train facility personnel to contribute to a safe, clean, and orderly environment by properly disposing of trash in designated containers, storing materials in appropriate locations, and keeping equipment clean and in good working condition. z) Preventative Maintenance: Prevent or minimize release of pollutants. Develop Standard Operating Procedures for operation and maintenance of facility components and train employees to follow the procedures. aa) Non-Stormwater Discharges (SC-10): Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Conduct regular inspections of high priority areas. bb) Spill Prevention, Control, and Cleanup (SC-1 1): Store materials properly to prevent spills from entering the storm drain system or surface waters. Ensure that spill cleanup materials are located on-site and are easily accessible. Clean up leaks and spills immediately using proper absorbent materials. Absorbents used to clean up hazardous materials must be disposed of as hazardous waste. Educate employees about spill prevention and cleanup. cc) Vehicle and Equipment Fueling (SC-20): Maintain clean fuel-dispensing areas using dry cleanup methods, such as sweeping or using rags and absorbents for leaks and spills. Cover the fueling area to prevent contact with stormwater. Train personnel in pollution prevention, focusing on containment of spills and leaks. dd) Outdoor Loading/Unloading (SC-30): Load and unload chemicals during dry weather, if possible, and load and unload in designated areas. Check equipment regularly for leaks. ee) Outdoor Liquid Container Storage (SC-3 1): Cover the storage area with a roof and provide secondary containment. Inspect storage areas regularly for leaks or spills. ff) Outdoor Equipment Operations (SC-32): Perform activities during dry weather, cover the work area with a roof, and use secondary containment. Train employees in proper techniques for spill containment and cleanup. gg) Waste Handling and Disposal (SC-34): Cover storage containers with leak-proof lids, check for leaks weekly, and clean storage areas regularly. Ensure that wastes are disposed of properly. hh) Tank Design System: Ensure that tank systems have sufficient strength to avoid collapse, rupture, or failure and that they are protected against physical damage and excessive stress. Provide adequate secondary containment.		No Action	This measure applies to O&M of the groundwater remedy, and does not apply to IM-3 decommissioning, removal, and restoration activities. Activities during IM-3 lay-up period will be covered under the existing IM-3 Industrial SWPPP.

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Hydrology and Water Quality	HYDRO-1	In conformance with the substantive requirements of General Permit (Order No. 2009-0009-DWQ, a monitoring and reporting program will be implemented to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary, to continue to reduce pollutants and impacts on receiving waters. The monitoring program shall include the following minimum elements as per the General Permit: ii) quarterly, non-stormwater visual inspections, jj) storm-related visual inspections within 2 business days of a qualifying rain event (producing precipitation of one-half inch or more of discharge), kk) visual inspection after a storm event, ll) monitoring of non-visual pollutants based on the calculated risk level for the project, with Risk Level 2 and 3 requiring a minimum of three samples per day during qualifying rain events (SWRCB 2009: Tables 5 and 6, 22–27), and mm) monitoring and reporting for linear projects as per Attachment A of the General Permit Results of this monitoring shall be reported annually to DTSC and to the Storm Water Multi-Application Reporting and Tracking System (SMARTS). The annual report shall include a summary and evaluation of all sampling and analysis results, original laboratory reports, and chain of custody forms; a summary of all corrective actions taken during the compliance year; and identification of any compliance activities or corrective actions that were not implemented. NEL Violation Reports and/or NAL Violation Reports are required for Risk Level 3 and linear underground/overhead project (LUP) Type 3 Discharges. Should the project meet these criteria, the respective reports shall be submitted within 5 days of the end of the storm event, as per General Permit requirements, and provide the required information identified (SWRCB 2009:26–27 and Attachment A). The implementation of stormwater plans shall include an education component to train workers on water quality concerns and proper BMP implementation, maintenance, and repair, in addition to stormwater management program training on the construction BMP plan and industrial SWPPP.		No Action	This measure applies to O&M of the groundwater remedy, and does not apply to IM-3 decommissioning, removal, and restoration activities. Activities during IM-3 lay-up period will be covered under the existing IM-3 Industrial SWPPP.
Hydrology and Water Quality	HYDRO-2	Exceedance of Water Quality Standards and/or Waste Discharge Requirements - Implement Mitigation Measure HYDRO-1. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling erosion and siltation. Consequently, any impacts associated with erosion and siltation resulting from alterations of drainage and hydrology and water quality during construction, operation and maintenance, and decommissioning.	See above	Action	See HYDRO-1.
Hydrology and Water Quality	HYDRO-3	Exceedance of Water Quality Standards and/or Waste Discharge Requirements. Implement Mitigation Measure HYDRO-1. Mitigation Measure HYDRO- 1 shall be implemented. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling potential pollutants, including sediment, and runoff discharges from the project area. Consequently, any impacts associated with pollutants resulting from alterations of drainage and water quality during construction, operation and maintenance, and decommissioning.	See above	Action	See HYDRO-1.
Noise	Noise-1	Short-Term Groundborne Noise and Vibration Levels Caused by Construction Activities near Sensitive Receptors.			
Noise	Noise-1a	a) Construct new wells a minimum of 45 feet from vibration-sensitive receptors. Avoid constructing wells within 30 feet of vibration- sensitive land uses located in California and 275 feet of vibration- sensitive land uses located in Arizona;		No Action	IM-3 decommissioning will not include constructing new wells.

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Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Noise	Noise-1b	b) A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near the entrance so that it is clearly visible to nearby receivers most likely to be disturbed. The coordinator will manage complaints resulting from the construction vibration. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby vibration-sensitive receptors, advising them of the construction schedule.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities. Curt Russell and Chris Smith have been selected as the designated disturbance coordinators for PG&E.
Noise	Noise-2	Project-Generated Construction-Related Noise Levels.			
Noise	Noise-2a	a) Construction equipment shall be properly maintained per manufacturer specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools shall be shrouded or shielded, and all intake and exhaust ports on power equipment shall be muffled or shielded.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Noise	Noise-2b	b) Construction equipment shall not idle for extended periods of time (more than 15 minutes) when not being utilized during construction activities.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Noise	Noise-2c	c) Construction activities shall include the use of berms, stockpiles, dumpsters, and or bins to shield the nearest noise-sensitive receptor adjacent to construction activities to within acceptable non-transportation noise level standards. When construction activities are conducted within the distances outlined above (i.e., 1,850 feet and 5,830 feet from California receptors and 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively) relative to noise-sensitive uses in the project area, noise measurements shall be conducted by a qualified acoustical consultant at the nearest noise-sensitive land use relative to the construction activities with a sound level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2) to ensure that construction noise associated with the project component complies with applicable daytime and nighttime noise standards. If noise levels are still determined to exceed noise standards, temporary barriers shall be erected as close to the construction activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards. All acoustical barriers shall be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission Class (STC) rating of 25 or greater as defined by the American Society for Testing and Materials' Test Method E90. Placement, orientation, size, and density of acoustical barriers shall be specified by a qualified acoustical consultant.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Noise	Noise-2d	d) A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near construction areas so that it is clearly visible to nearby receivers most likely to be disturbed. In addition, mailing of the same information will be sent to nearby receptors and all Tribes. The coordinator will manage complaints resulting from the construction noise. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby noise- sensitive receptors, advising them of the construction schedule.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities. Curt Russell and Chris Smith have been selected as the designated disturbance coordinators for PG&E.
Noise	NOISE-3	Land Use Compatibility of Future Project Noise Levels with Places of Worship and the Topock Cultural Area. Provided that the proposed project would be required to achieve the normally acceptable exterior noise level standard for places of worship, the following mitigation measure shall be incorporated in the project design:			
Noise	NOISE-3a	a) Implement all of the mitigation measures outlined for Impact NOISE- 1 and Impact NOISE-2;	This Work Plan and the CIMP	Action	See NOISE-1 and NOISE-2. Noise protocols for CUL-1a-8h will also be implemented during IM-3 decommissioning, removal, and restoration activities.
Noise	NOISE-3b	b) Upon completion of detailed project design, the determination of remediation activities and the schedule established to achieve these activities shall be communicated to Native American Tribes. PG&E shall maintain a liaison with requesting Tribes to alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis.	This Work Plan and the CIMP	Action	This measure and the noise protocols for CUL-1a-8h will be implemented during IM-3 decommissioning, removal, and restoration activities.

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TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Water Supply	WATER-1	Depletion of Groundwater. To mitigate potentially significant effects on local groundwater levels associated with the freshwater extraction wells, in the event that freshwater is to be supplied from wells rather than from a surface intake, a hydrologic analysis shall be conducted during the design phase of the project to evaluate the proposed pumping rates for extraction, the potential cone of depression, and the extraction effect on any existing wells in proximity. Proximity shall be defined by the cone of depression boundary of any well to be used in the extraction process. Extraction well location and/or extraction rates shall be adjusted during project design based on this analysis to be sure that extraction does not substantially adversely affect the production rates of existing nearby wells (e.g., adversely affect well production such that existing land uses would not be supported). It shall be demonstrated using computer simulations or other appropriate hydrologic analysis that production rates of existing nearby wells will not be substantially affected before the installation of any new freshwater extraction wells.	N/A	No Action	IM-3 decommissioning will not result in installing new freshwater extraction well(s). Water to be used during IM-3 decommissioning and restoration activities for dust control, cleaning, and decontamination will be supplied by the Compressor Station. The estimated duration for IM-3 decommissioning is approximately one year. It is expected that the water used for IM-3 decommissioning activities will not exceed the estimated quantity provided in the EIR (2 acre-feet annually). This is minimal compared to the estimated water use at the Compressor Station of 70 to 100 acre-feet annually, and therefore, will not adversely affect the existing water supply wells. Water use for restoring areas used by IM-3 and the source of that water will be provided in the future IM-3 Restoration Plan.

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TABLE 6-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Item No.	Reference Location in Document	Relevant Excerpt from Document	Triggering Event	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
1	Stipulation I(A)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to select and implement, or cause to be implemented, an alternative or combination of alternatives to remediate the groundwater and soil contamination in a manner that fulfills the requirements of CERCLA and the CERCLA Records of Decision (RODs) and protects the Colorado River, human populations, and the natural environment to the maximum extent practicable.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan proposes activities that are part of the Undertaking. The Plan was prepared in compliance with the requirements of CERCLA.
2	Stipulation I(B)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to Subject to I(A) above, carry out, and require others under their jurisdiction to carry out, all investigative, testing and remediation activities, including all supporting operations and maintenance activities, in ways that avoid, minimize, or mitigate adverse effects to cultural and historic properties within the APE, to the maximum extent practicable.	Implementation of Actions Proposed as part of the Undertaking	PG&E remediation resources specialist (Glenn Caruso) reviewed planned field activities and work areas proposed in the Work Plan. The purpose of the review is to ensure that the work activities and footprints of planned work areas are selected in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible. After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
3	Stipulation I(C)	The BLM, USFWS, USBR and PG&E shall consult with the Tribes that attach cultural significance to the TCP within the APE to develop a plan to ensure Tribal access to areas within the APE for religious, cultural, or spiritual purposes. Access shall be consistent with applicable laws, regulations, and agreements governing property within the APE, and may not impede the Topock Remediation Project, may not create health and safety concerns, and shall exclude the Topock Compressor Station and related facilities.	Development of Access Plan (Tribal Access)	The Tribal Access Plan for lands under federal management was completed on November 26, 2011. PG&E has also prepared an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan. The Access Plan is included in an appendix of the Construction/Remedial Action Work Plan. Additionally, per its agreement with PG&E, the Fort Mojave Indian Tribe has reasonable access to the IM-3 Property for religious, spiritual, or cultural purposes so long as such access does not interference with remediation activities.
4	Stipulation I(D)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to ensure that PG&E shall to the extent practicable restore the areas affected by the Topock Remediation Project within the APE, including, but not limited to, the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation and remediation-related appurtenances and facilities.	Planning for Restoration	This Work Plan presents the general approach for restoration of the areas originally affected by IM-3 operations. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. Implementation of this Work Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities, by grading, contouring, and revegetating the site.
4	Stipulation I(E)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to consult with other Signatories, Tribes, and Invited Signatories, following the guidelines in Appendix B of this PA, regarding actions proposed in this Undertaking, including establishment of any rights-of-way, time-critical, or emergency actions.	Implementation of Actions Proposed as part of the Undertaking	BLM will consult with the Signatories and Invited Signatories to the PA and the Tribes on this Work Plan.
5	Stipulation II(B)	At each phase (work plan or design document) of implementation of the Undertaking, an evaluation will occur to determine if the APE should be amended. This evaluation will coincide with the development of the work plan or design document for the specific phase of the Undertaking. Where alternatives under consideration consist of corridors or large land areas, or where access to properties is restricted, the agency official may use a phased process to conduct identification and evaluation efforts (36 CFR §800.4(b)(2)). Prior to implementation of each phase (work plan or design document) of the Undertaking, BLM will determine, in consultation with the AZ SHPO, CA SHPO, Tribes, and PG&E, what, if any, changes are required in the APE. If BLM determines that the APE must be revised, BLM will redefine the APE taking the input from those parties into account. Should such revision to the APE be needed, BLM will amend the CHPMP to include any changes to the APE.	Implementation of Actions Proposed as part of the Undertaking	BLM has consulted and is continuing to consult with the Tribes regarding actions proposed as part of the Undertaking under the PA's Consultation Protocol, including on the APE.
6	Stipulation III(B)(1), III(B)(2)(a) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, existing monitoring wells and related facilities shall be used to the maximum extent practicable.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan excludes the decommissioning of existing monitoring wells, allowing them to be re-used in the final groundwater remedy.

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Item No.	Reference Location in Document	Relevant Excerpt from Document	Triggering Event	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
7	Stipulation III(B)(2)(b) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, the need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the guidelines in Appendix B.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan does not propose any new facilities. BLM will consult with the Signatories and Invited Signatories to the PA and the Tribes on this Work Plan.
8	Stipulation III(B)(2)(c) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, new facilities or activities be placed in areas already disturbed by previous grading or other mechanized activities to the maximum extent practicable, consistent with protecting human health and the environment and achieving cleanup in a timely manner.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan does not propose any new facilities. Field activities proposed in the Work Plan are placed in areas already disturbed by previous grading or other mechanized activities to the maximum extent practicable.
9	Stipulation III(B)(2)(e) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, the performance of all field activities in support of the remedy shall be executed in such a way as to avoid and/or minimize adverse effects to cultural and historic properties to the maximum extent practicable.	Implementation of Field Activities in Support of the Groundwater Remedy	The planning of field activities in this Work Plan is executed under the guidance of PG&E remediation resources specialist (Glenn Caruso). After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
10	Stipulation III(B)(2)(f) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, subject to Stipulation I(A), direct, indirect, and cumulative adverse effects shall be considered and mitigated.	Implementation of Actions Proposed as part of the Undertaking	Adverse effects are being considered and mitigated through the implementation of the measures included in the PA, the CHPMP, and the EIR.
11	Stipulation III(B)(3)(a) - Remediation of GW contamination – Final Design	Consultation between the Signatories, Tribes, and Invited Signatories shall be initiated prior to final design and implementation of that alternative.	Implementation of Actions Proposed as part of the Undertaking	BLM has consulted and is continuing to consult with the Tribes regarding actions proposed in the Undertaking under the PA's Consultation Protocol. This Work Plan proposes activities that are part of the Undertaking. The Work Plan is included as Appendix B to the CIMP and in an appendix of the Construction/ Remedial Action Work Plan.
12	Stipulation III(B)(3)(b) - Remediation of GW contamination – Final Design	Every effort should be made to avoid and minimize adverse effects in accordance with the general principles set forth in Stipulation I.	Implementation of Actions Proposed as part of the Undertaking	PG&E remediation resources specialist (Glenn Caruso) reviewed planned field activities and work areas proposed in the Work Plan. The purpose of the review is to ensure that the work activities and footprints of planned work areas are selected in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible. After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
13	Stipulation III(B)(3)(c) - Remediation of GW contamination	Whatever the selected alternative, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the design, implementation, and monitoring activities to determine how best to restore the areas affected by the Topock Remediation Project. These areas will include, but not be limited to, the site of the existing treatment plant and related facilities but will exclude the Topock Compressor Station and related facilities. The Federal Agencies will ensure that environmental restoration to the conditions existing prior to the construction of the Project is planned and conducted to the extent practicable.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan presents the general approach for restoration of the areas originally affected by IM-3 operations. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. Implementation of this Work Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities, by grading, contouring, and revegetating the site.
14	Stipulation V(A)	All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. All such removal will be planned in consultation with the Signatories, Tribes, and Invited Signatories, following the guidelines in Appendix B [Consultation Protocol).	Planning for decommissioning	This stipulation was adhered to in planning for the decommissioning and removal of the IM-3 facilities. PG&E will begin decommissioning and removal of the IM-3 facilities as soon as is reasonably practicable after DTSC issues its written approval to proceed (with DOI's concurrence). Figure 9-1 presents a target timeline/ schedule for the implementation of this Work Plan.
15	Stipulation V(B)	The removal of such facilities shall be monitored following the monitoring guidelines in Appendix C.	Implementation of Field Activities	After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.

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16	Stipulation V(C)	The removal of such facilities shall take place along existing graded roads to the maximum extent practicable.	Planning for decommissioning	This stipulation was adhered to in planning for the decommissioning of the IM-3 facilities. Section 4 of this Work Plan presents the decommissioning procedures.
17	Stipulation V(D)	Prior to decommissioning of any remediation facility, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the development of the closure plan to determine how to best restore the areas affected by the Topock Remediation Project, including but not limited to, the site of the existing treatment plant and related facilities, but excluding the Topock Compressor Station and related facilities, to ensure that environmental restoration of conditions existing prior to the construction of the Project, is achieved to the extent practicable.	Planning for decommissioning	This Work Plan presents the general approach for restoration of the areas originally affected by IM-3 operations. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. Implementation of this Work Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities, by grading, contouring, and revegetating the site.
18	Stipulation V(E)	PG&E will draft a plan for decommissioning, removal, and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes, and Invited Signatories.	Planning for decommissioning	This Work Plan is included as Appendix B to the CIMP and in an appendix of the Construction/Remedial Action Work Plan. The Plan was drafted in consultation with the Tribes. Additionally, BLM will consult with the Signatories and Invited Signatories to the PA and the Tribes on this Work Plan.
19	Stipulation IX(A)-(D)	A. If the Undertaking affects a previously unidentified cultural and/or historic resource, including human remains and/or associated funerary objects or graves, or affect such resources in a way not previously anticipated, or have greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the BLM, in consultation with Tribal and Archaeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger area if warranted by specific circumstances) in which no further work is to take place until treatment of the discovery is resolved. At such point BLM will notify all Signatories, Tribes, and Invited Signatories of the nature and general location of the discovery. The BLM will implement appropriate measures, including stabilization or covering, to protect any discovery (human remains, funerary objects, sacred objects, or objects of cultural patrimony) from further disturbance in accordance with the principles set forth in Stipulation I. Ongoing work not within 50 meters (or a smaller area if determined appropriate by parties in the field) of the discovery may continue. If human remains and/or associated funerary objects compose all or part of the discovery, then BLM shall ensure the stipulations of the POA included in the CHPMP, as described in Stipulation VII (H) hereof, will be completed. Also, if human remains and/or funerary objects are encountered, all activities shall follow the procedures and direction provided in NAGPRA and California Public Resources Code sections 5097.98 and 5097.991. For Arizona, such activities shall follow the procedures and direction provided in NAGPRA and applicable state laws, including the Arizona Antiquities Act of 1927 (ARS § 41-841 to 41-846), Burial Protection Law of 1990 (ARS §41-865), and ARS §41-844 of 1990.	Field Implementation of Actions proposed as part of the Undertaking	This stipulation will be adhered to during the field implementation of this Work Plan. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.

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20	Stipulation IX(A)-(D) (continued)	B. If the Tribes, PG&E, and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed, and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E, and BLM will use their best efforts to resolve treatment as quickly as possible. C. If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. D. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will use the dispute resolution process in Stipulation XV of this PA to resolve any objection.	Field Implementation of Actions proposed as part of the Undertaking	This stipulation will be adhered to during the field implementation of this Work Plan. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
21	Appendix C Monitoring Protocol	Cultural sensitivity training will be required of all staff, workers, and contractors engaged in activities in the Topock Remediation Project APE to familiarize them with the sacred nature of the areas so that they will perform their job in a respectful manner. This training will also be given to new personnel before they are allowed to do fieldwork within the APE. This training will be conducted by PG&E with participation by Tribes and Tribal Monitors, Archaeological Monitors, Federal Agency staff, and PG&E supervising staff, as appropriate. Consistent with PG&E's stated policy, PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers, or contractors who do not comply with this section.	Implementation of Actions proposed as part of the Undertaking	Site orientation and the training on cultural/historical resources sensitivity will be provided at the project initiation meeting, to be held at the Topock Compressor Station. Site orientation will stress that all site activities will be conducted in a respectful manner. Sensitivity training will be provided by the PG&E Site Operations Manager and PG&E Remediation Resources Specialist, and PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate.
22	Appendix C Monitoring Protocol	Prior to execution of the PA for the Undertaking, PG&E sometimes invited the Tribes to be present on site during construction to monitor and observe non-maintenance grading, trenching, or other excavation for any facilities, new roads, or other project components related to the Undertaking that may have had the potential to adversely impact cultural and historic resources. The Tribal and Archaeological Monitors shall both be invited to monitor such field work.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
23	Appendix C Monitoring Protocol	This Protocol specifies ways in which the Tribes, BLM, and PG&E may ensure that: 1. Tribes, BLM, and PG&E each are kept well-informed of Undertaking activities and outcomes. 2. Tribal and Archaeological Monitors have the opportunity to alert PG&E's site supervisor (or designee) to potentially sensitive areas or issues that Monitors may be aware of or may become aware of while fieldwork is in progress. 3. PG&E's site supervisor (or designee) notifies BLM of potentially complicated situations. These situations may include discovery of a new cultural or historical resource, damage to a previously recorded cultural or historical resource, or unanticipated effects identified. 4. Tribal concerns regarding work activities are addressed while fieldwork is in progress.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
24	Appendix C Monitoring Protocol (Work Schedule)	Tribal and Archaeological Monitors will be provided with anticipated schedules for Topock Remediation Project work that requires monitoring as early as possible but at least three (3) business days in advance of the initiation of the identified project work, whenever possible. Recognizing that changes to the work schedule may be inevitable, any change in the work schedule will be provided to the Tribal and Archaeological Monitors as soon as possible after the change becomes part of the work schedule. If there is a question regarding need for a monitor, the questioning party shall consult the BLM Project or Field Manager who will make the final determination of need.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. The PG&E Site Operations Manager or his designee will provide the work schedule and inform the monitors of schedule changes as soon as practicable.

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Item No.	Reference Location in Document	Relevant Excerpt from Document	Triggering Event	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
25	Appendix C Monitoring Protocol (Discoveries)	If the Undertaking will affect previously unidentified resources, or affect a previously recorded cultural or historical resource in a way not previously anticipated, or have greater or different effects than previously anticipated, all work having potential for adverse effect shall cease within a fifty (50)-meter radius (or a smaller or larger area if determined appropriate by the BLM, the Monitors, and PG&E in the field) of the point of discovery. The Archaeological and Tribal Monitors will work with BLM and PG&E to ensure that the PA requirements of Stipulation VII (CHPMP) and Stipulation IX (Discoveries) are met.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
26	Appendix C Monitoring Protocol (Human Remains)	If the Undertaking affects previously unidentified human remains and/or associated funerary objects or graves, or affects such resources in a way not previously anticipated, or has greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the BLM, in consultation with Tribal and Archeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger area if warranted) in which no further work is to take place until treatment of the discovery is resolved.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
27	Appendix C Monitoring Protocol (Safety)	Tribal and Archeological Monitors will be required to meet with PG&E's site supervisor prior to initiating monitoring activity and will be required to obtain any applicable training required under 29 CFR 1910.120 and 40 CFR 300.150. The PG&E site supervisor will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors are invited to attend the safety meetings at the start of each workday or new work task. If the Monitors do not attend this meeting, they will be instructed about the safety concerns of the day by a PG&E representative. Tribal and Archaeological Monitors will be expected to wear all personal protective equipment specified by PG&E's site supervisor and required of other similarly situated field workers. Tribal and Archaeological Monitors will be expected to actively participate to enhance the safety of themselves and the other workers onsite by communicating with PG&E's site supervisor if any safety concerns are identified. Due to safety considerations at the Project site, Tribal and Archaeological Monitors will also be prohibited from conducting any monitoring within designated construction exclusion zones, unless otherwise authorized by PG&E. Such zones are to be clearly delineated to the Tribal and Archaeological Monitors by PG&E's site supervisor. In these situations, other efforts to provide alternative methods for accommodating Monitors including, but not limited to, high-powered binoculars, spotting scopes, or other vision enhancement tools or alternative viewing platforms will occur.	Implementation of Field Activities	The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities. During the project initiation meeting or at similar venues (as appropriate), the PG&E Site Operations Manager or his designee will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors will be invited to attend the safety meetings at the start of each work day or new work task. If they do not attend, they will be instructed of the safety concerns of the day by PG&E.

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TABLE 6-3
Summary of Compliance with Applicable Cultural and Historic Property Management Plan (CHPMP) Provisions
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Item No.	Reference Location in Document	Relevant Excerpt from Document	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
1	Section 6.2	Measures and principles to avoid, minimize, or resolve adverse effects include the following: • Existing monitoring wells and related facilities shall be used to the maximum extent practicable. • The need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the Guidelines in Appendix B. • New facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with human health and the environment and achieving cleanup in a timely manner. • The performance of all field activities in support of the remedy shall be executed in such a way as to avoid and/or minimize adverse effects to cultural and historic properties to the maximum extent practicable. • Subject to Stipulation I(A) above, direct, indirect, and cumulative impacts shall be considered and mitigated.	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c), (e) and (f).
2	Section 6.2.3	Refers to the requirement in the PA Stipulation V(E) and PG&E's 2006 Settlement Agreement with the Fort Mojave Indian Tribe that a plan will be prepared for the decommissioning, removal, and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes, and Invited Signatories. Additionally, PG&E will remove all other remediation facilities and appurtenances related to the Topock Remediation Project as soon as practicable following the attainment of cleanup standards and a determination by DOI that the removal of these facilities is protective of human health and the environment.	See responses to PA Stipulations V(A)-(E).
3	Section 6.3	"Environmental Restoration" refers to the restoration obligations in the Programmatic Agreement and the Consent Decree, including that PG&E draft a plan for decommissioning, removal, and restoration of the IM-3 facility and a Remedy Decommissioning Plan that will address post-remedy restoration of the site.	See responses to PA Stipulations I(D), III(B)(3)(c), and V(D)-(E).
4	Section 6.6.3	"Avoidance Measures/Management Thresholds" provides that: "The primary means for achieving avoidance will be through careful planning and placement of project facilities and installation of temporary barrier fences around significant cultural and historic properties. Metal fence posts and orange mesh all-weather fabric will be used, unless other appropriate materials are identified as preferable, for temporary fencing and will be regularly inspected and maintained. Permanent post-and double cable fencing may be required in high traffic areas. An archaeologist and/or Tribal representative(s) will clearly delineate the sensitive areas to be avoided by construction and will supervise fence installation. Project personnel will be notified that fenced locations are to be completely avoided."	See EIR MMRP CUL-1a. PG&E remediation resources specialist (Glenn Caruso) reviewed planned field activities and work areas proposed in the Work Plan. The purpose of the review is to ensure that the work activities and footprints of planned work areas are selected in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible. After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
5	Section 6.6.4	Construction Monitoring Monitoring of all earth-disturbing Project activities will be in accordance with Appendix C of the PA (Tribal and Archaeological Monitoring Protocol). Qualified archaeological and Tribal monitors will be notified in advance and invited to be on site during earth-disturbing construction activities (grading, trenching, boring, drilling, or other excavation) for new injection, extraction, or monitoring wells, new pipelines, new treatment facilities, new access roads, new staging areas, other new transportation facilities, or other new Project components. Because of safety considerations at the Project site, Tribal and archaeological monitors will comply with all safety requirements.	See responses to PA Appendix C, Monitoring Protocol. See also EIR MMRP CUL-1a-8(l).
6	Section 6.6.5	Periodic Site Monitoring Sound management of the archaeological and historical properties requires that any progressive degradation of sites be identified. Additionally, it is recognized that a mechanism is needed to identify any accidental damage that may occur. To accomplish these goals, PG&E will develop a proposal describing a program of periodic site monitoring and condition assessment. BLM, following consultation with the Tribes and other appropriate parties, will approve any monitoring program before implementation by PG&E. The program will include all historic properties within the APE. Any previously unknown properties that may be encountered during the Project also will be included in the monitoring program unless such properties are evaluated as ineligible. During its initial phase, periodic monitoring and condition assessment will consist of annual field visits to monitor site conditions and disturbances.	As part of the 2004 Cultural Resources Management Plan, Applied Earthworks conducted quarterly monitoring the first year, and since then (2005 – 2013) annual monitoring and condition assessment.
7	Section 6.8	"Protocols for Tribal and Archaeological Monitoring" states that monitoring for the Project will be performed in accordance with the PA's Appendix C (Tribal and Archaeological Monitoring Protocol).	See responses to PA Appendix C, Monitoring Protocol. See also EIR MMRP CUL-1a-8(l).
8	Section 6.9	If the Undertaking extends beyond the APE, BLM will determine, in consultation with the PA Signatories, Tribes, and Invited Signatories, what (if any) changes are required in the APE. If BLM determines that the APE must be revised, BLM will redefine the APE, taking into account the advice of the other Consulting Parties. Should such revision to the APE be needed, BLM will amend the CHPMP to include any changes to the APE (BLM et al. 2010:8).	See response to PA Stipulation II(B).

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TABLE 6-3
Summary of Compliance with Applicable Cultural and Historic Property Management Plan (CHPMP) Provisions
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Item No.	Reference Location in Document	Relevant Excerpt from Document	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
9	Section 7.1	1. Physical avoidance of the Topock Maze and associated prehistoric sites. 2. To the maximum extent practicable, PG&E will avoid all archaeological sites within the APE and protect all historic properties regardless of their NRHP status. The primary means for accomplishing avoidance will be through careful planning and placement of proposed access routes and drilling sites and by the installation of barrier fences around significant historic properties. A pre-project archaeological survey field verification will be conducted prior to any ground-disturbing activities. Consistent with other phases of work conducted at the Topock Remediation Project site, agency representatives and other stakeholders (including representatives of Native American Indian tribes involved with the Project) will be invited to the site for a project initiation meeting to discuss various cultural sensitivities associated with the Project. 3. Ensure that PG&E shall, to the extent practicable, restore the areas affected by the Topock Remediation Project within the APE, including but not limited to the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation- and remediation-related appurtenances and facilities per PA Stipulation I.D. 4. Remediation activities that propose the removal or introduction of vegetation on public lands shall be undertaken after coordination with the Tribes to assess if culturally significant native plant species are being impacted and if there could be potential visual impacts to the Topock TCP. 5. Existing monitoring wells and related facilities shall be used to the extent practicable per PA Stipulation III.B.2(a). 6. The need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the Guidelines in Appendix B and per PA Stipulation III.B.2(b). 7. New facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with human health and the environment and achieving cleanup in a timely manner per PA Stipulation III.B.2(c). 8. Clay deposits are an important resource identified by the Hualapai in their creation, and may be important as well to other Tribes. Accordingly, BLM, PG&E, and those Tribes that ascribe importance to clay deposits shall meet to identify the clay deposits that are considered a resource and develop a protocol to be followed if such clay deposits are encountered.	See responses to PA Stipulations I(B), I(D), III(B)(1), III(B)(2)(a)-(c) and (e), III(B)(3)(c), and V(D). See also EIR MMRPs CUL-1a-8(i), AES-1, and AES-2. Regarding Item 4, PG&E plans to avoid removing vegetation on public lands where possible in connection with the activities proposed in this Work Plan. Where impacts to vegetation cannot be avoided priority will be giving to trimming prior to removal of vegetation.The future Site-Specific IM-3 Restoration Plan will address habitat restoration and revegetation (see Section 8.1.3), and will be developed in consultation with the land owners and managers, including FMIT, USBR, and BLM. Signatories and Invited Signatories to the PA and the Tribes will also be consulted on the Site-Specific IM-3 Restoration Plan. Regarding Item 7, activities proposed in this Work Plan are placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable. Regarding Item 8, BLM met with the Hualapai Tribe and PG&E in late 2012 and discussed the Clay Monitoring Protocol. The Hualapai representative indicated that the Hualapai would make the initial draft of this protocol and then send it out for BLM and PG&E to review.
10	Section 7.2	Accommodation of Tribal Activities and Ceremonies Involving the Topock Maze/TCP The BLM will continue to work with the Tribes to identify tribal activities and ceremonies that are associated with the Topock TCP. When such activities and ceremonies are identified, BLM will consult with the Tribes and PG&E to develop treatment measures to accommodate them. Treatment measures may address scheduling of Undertaking work to accommodate ceremonial activities and to mitigate audible and visual impacts.	See response to EIR MMRP CUL-1a-8k. Additionally, per its agreement with PG&E, the Fort Mojave Indian Tribe has reasonable access to the IM-3 Property for religious, spiritual, or cultural purposes so long as such access does not interfere with remediation activities.
11	Section 7.3	Treatment of other cultural, historical, and archaeological properties within the APE "The only properties identified within the APE that are not contributing properties to the Topock TCP are the properties from the historic period (i.e., Route 66, the AT&SF Railroad Grade, and National Old Trails Road). None of these properties has been impacted, to date, by this Undertaking. These properties shall be avoided, to the extent practicable, in the implementation of the Undertaking. These properties are periodically monitored for condition assessment to assure that they are being protected."	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c) and (e).
12	Section 8.1	Discoveries - Steps to be taken if previously unrecorded properties are found	PG&E will follow the procedures specified in Appendix C of the CHPMP (Discovery Plan). See also response to PA Stipulation IX(A)-(D), EIR MMRP CUL-1a-8(b) and -8(o).
13	Section 8.2	Discoveries - Treatment of any human remains, funerary objections, ceremonial objects and items of cultural patrimony	PG&E will follow the procedures specified in Appendix D of the CHPMP (Plan of Action). See also response to PA Stipulation IX(A)-(D), EIR MMRP CUL-1a-8(b) and -8(o).
14	Section 8.3	Consultation Procedures Related to Unanticipated Discoveries The BLM will notify all Signatories of the PA, Tribes, and Invited Signatories of the nature and general location of any discovery. If the Tribes, PG&E, and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed, and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E, and BLM will use their best efforts to resolve treatment as quickly as possible. If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will use the dispute resolution process in Stipulation XV of the PA to resolve any objection.	See response to PA Stipulation IX(A)-(D). See also EIR MMRP CUL-1a-8(b) and -8(o).

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TABLE 6-4
Summary of Compliance with Identified ARARs
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/future document(s) will document continued compliance with this ARAR?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Chemical-Specific									
1	Federal Chemical-Specific	Federal Safe Drinking Water Act - 42 USC § 300f, et seq.; 40 CFR 141 -- Subpart F– Maximum Contaminant Level Goals (MCLGs)	ARAR Relevant and Appropriate	MCLGs are not federally enforceable drinking water standards, but CERCLA § 121(d) identifies MCLGs as relevant and appropriate requirements.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).
2	Federal Chemical-Specific	Federal Safe Drinking Water Act - 42 USC § 300g-1; 40 CFR 141 -- Subpart G – National Primary Drinking Water Regulations (MCLs)	ARAR Relevant and Appropriate	These MCLs are relevant and appropriate standards, which establish the maximum permissible level of contaminants (e.g., Chromium) in sources (or potential sources) of drinking water. MCLs may be applicable where water at a CERCLA site is delivered through a public water supply system.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).
3	Federal Chemical-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC §§ 1251-1387; 40 CFR 131.38	ARAR Applicable	These are federally promulgated Water Quality Standards for surface waters. Such water quality standards include specific criteria for water bodies in California, including standards for hexavalent chromium.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).
52	California Chemical-Specific	California Safe Drinking Water Act - Title 22, CCR, Div 4, Ch 15, §64431, §64444	ARAR Applicable	Maximum Contaminant Levels (MCLs) which shall not be exceeded in the water supplied to the public. California state MCLs for drinking water standards are more stringent than primary federal standards.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).
53	California Chemical-Specific	Secondary MCLs list for drinking water - Title 22, CCR, Div 4, Ch 15, §64449	ARAR Relevant and Appropriate	State secondary MCLs for drinking water standards are more stringent than federal standards. These secondary MCLs are relevant and appropriate standards, which establish the maximum permissible level of contaminants in sources (or potential sources) of drinking water. These secondary MCLs would be applicable if water at the site was used as drinking water and delivered through a community water supply system.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).

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TABLE 6-4
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Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/future document(s) will document continued compliance with this ARAR?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
55	California Chemical-Specific	Groundwater and vadose zone protection standards - Title 22, CCR, Div 4.5, Ch 15, Article 6, §66265.94	ARAR Applicable	RCRA hazardous waste Interim Status TSD facilities shall comply and ensure that hazardous constituents entering the groundwater, surface water, and soil from a regulated unit do not exceed the concentration limit from contaminants of concern in the uppermost aquifer underlying the waste management area beyond the point of compliance.	Remedy Implementation	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
Action-Specific									
31	Federal Action-Specific	Federal Safe Drinking Water Act - 42 USC §300f, et seq. Part C – Protection of Underground Sources of Drinking Water; 40 CFR 144-148	ARAR Applicable	These Underground Injection Control Regulations assure that any underground injection performed on-site will not endanger drinking water sources. Substantive requirements include, but are not limited to, regulation of well construction and well operation. These requirements will be applicable if underground injection is proposed as a part of a site remedy.	Underground injection activities	PG&E	Filing of inventory of injection wells	Action	USEPA Underground Injection Well(s), Class V Inventory Notification (USEPA Form 7520-16 'Inventory of Injection Wells') was submitted 3/24/2005; referenced USEPA ID No. CAR000151118. After the IM-3 injection wells (IW-2 and IW-3) are decommissioned, a letter will be sent to the USEPA to close out these wells.
32	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC § 1344 ; 40 CFR 230.10	ARAR Applicable	This section of the Clean Water Act prohibits certain activities with respect to on-site wetlands and waterways. No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed activity which would have less adverse impact to the aquatic ecosystem.	Activities that occur in the Colorado River or in jurisdictional waters of the United States that result in discharge of dredged or fill material.	PG&E	This Work Plan and CWA 404 avoidance and minimization measures, included in an appendix of the Construction/Remedial Action Work Plan.	Action	Decommissioning and restoration include activities in the jurisdictional waters of the US, subject to the jurisdiction of the USACE. Activities in these areas will be conducted in compliance with the CWA 404 avoidance and minimization measures, included in an appendix of the Construction/Remedial Action Work Plan. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.
33	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC § 1342; 40 CFR 122; 40 CFR 125	ARAR Applicable	These National Pollutant Discharge Elimination System (NPDES) requirements regulate discharges of pollutants from any point source into waters of the United States.	Point source discharges to waters of the US.	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not result in point source discharges to waters of the United States that will require an NPDES permit.

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Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/future document(s) will document continued compliance with this ARAR?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
34	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) -40 CFR 122.26	ARAR Applicable	These regulations define the necessary requirements with respect to the discharge of storm water under the NPDES program. These regulations will apply if proposed remedial actions result in storm water runoff which comes in contact with any construction activity from the site remediation.	Ground disturbance as a result of construction is > 1 acre	PG&E	This Work Plan, and Appendix G, Construction BMP Plan	Action	Appendix G (Construction BMP Plan) will be implemented during the IM-3 decommissioning, removal, and restoration activities.
35	Federal Action-Specific	River and Harbor Act of 1899 - 33 USC §§ 401 and 403	ARAR Applicable	This Act prohibits the creation of any obstruction in navigable waters, in addition to banning activities such as depositing refuse, excavating, filling, or in any manner altering the course, condition, or capacity of navigable waters. These requirements will apply if proposed activities at the Topock site have the potential of affecting any navigable waters on the site.	Activities with the potential to affect any navigable waters on the site	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities will not affect navigable waters.
38	Federal Action-Specific	Clean Air Act - USC §§ 7401, et seq. (National Emission Standards for Hazardous Air Pollutants (NESHAP)); 40 CFR 61; 40 CFR 63	ARAR Applicable	NESHAPs are regulations which establish emissions standards for certain hazardous air pollutants (HAPs) identified in the regulations. NESHAPs will apply if remediation activities on the site produce identified HAP emissions.	Activities produce identified HAP emissions	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include activities subject to NESHAPs.

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39	Federal Action-Specific	Religious Freedom Restoration Act - 42 USC § 2000bb	ARAR Applicable	Pursuant to this Act, the government shall not substantially burden a person's exercise of religion, unless the application of the burden is in furtherance of a compelling government interest, and it is the least restrictive means of furthering that interest. To constitute a "substantial burden" on the exercise of religion, a government action must (1) force individuals to choose between following the tenets of their religion and receiving a governmental benefit or (2) coerce individuals to act contrary to their religious beliefs by the threat of civil or criminal sanctions. If any remedial action selected imposes a substantial burden on a person's exercise of religion, it must be in furtherance of a compelling government interest and be the least restrictive means of achieving that interest.	Activities with the potential to impose a substantial burden on a person's exercise of religion.	DOI/BLM	This Work Plan	Action	IM-3 decommissioning, removal, and restoration activities do not substantially burden a person's exercise of religion. In an email dated June 3, 2013, DOI states the following: "The table of Applicable or Relevant and Appropriate Requirements is found in the Groundwater Corrective Measures Study/Feasibility Study (CMS/FS) Appendix B. The discussion found for ARAR 39 provides the judicial test as to what constitutes a "substantial burden" (in the context of the Religious Freedom Restoration Act). "To constitute a 'substantial burden' on the exercise of religion, a government action must (1) force individuals to choose between following the tenets of their religion and receiving a governmental benefit or (2) coerce individuals to act contrary to their religious beliefs by the threat of civil or criminal sanctions." Based on this information, activities performed to implement the groundwater remedy at the Topock site do not establish a "substantial burden" on the exercise of religion as that term is used in the Religious Freedom Restoration Act." In compliance with the PA, a Tribal Access Plan (BLM 2011) was completed for Tribal access to lands under federal management within the Topock site for traditional religious, cultural, or spiritual purposes during implementation of the groundwater remedy. Implementation of this Work Plan is anticipated to occur during groundwater remedy implementation. PG&E has also prepared an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan. The Access Plan is included in an appendix of the Construction/Remedial Action Work Plan.. BLM also developed the CHPMP to avoid, minimize and mitigate potential affects to historic properties, including the Topock TCP during implementation of the groundwater remedy. BLM issued the final CHPMP on January 20, 2012. The CHPMP can be modified and updated, as needed, to address new information and ongoing activities related to the project. Therefore, subsequent to the issuance of the CHPMP, BLM continues to hold periodic working meetings on the CHPMP. It should be noted that treatment measures are included in the CHPMP. A Treatment Plan will be submitted to the Agencies along with the 90% design.. Table 6-3 provides for IM-3 decommissioning, removal, and restoration activities, a summary of compliance with applicable CHPMP provisions.

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40	Federal Action-Specific	Endangered Species Act of 1973 - 16 USC §§ 1531-1544;50 CFR 402	ARAR Applicable	The ESA makes it unlawful to remove or "take" threatened and endangered plants and animals and protects their habitats by prohibiting certain activities. Examples of such species in or around the Topock site may include, but are not limited to, southwestern willow flycatcher, Mojave Desert tortoise, Yuma clapper rail, Colorado pike minnow, razorback sucker, and bonytail chub. Any remedial action selected for the Topock site will not result in the take of, or adverse impacts to, threatened and endangered species or their habitats, as determined based on consultation with the Fish and Wildlife Service under section 7 of the ESA.	Construction of remedy	DOI/USFWS/PG&E	Programmatic Biological Agreement (PBA)	Action	Compliance with this ARAR will occur during IM-3 decommissioning, removal, and restoration activities.
41	Federal Action-Specific	Migratory Bird Treaty Act - 16 USC 703-712	ARAR Applicable	This Act makes it unlawful to "take, capture, kill," or otherwise impact a migratory bird or any nest or egg of a migratory bird. The Havasu National Wildlife Refuge, which is part of the Topock site, was created as a refuge and breeding ground for migratory birds and other wildlife, therefore, there is potential for contact with migratory birds during proposed remediation activities. Any remedial action selected for the Topock site will be designed and implemented so as to not take, capture, kill, or otherwise impact a migratory bird, nest, or egg.	Remedial action for Topock site	PG&E	Future IM-3 Decommissioning Avoidance and Minimization Plan, the PBA, the BIAMP, and CWA 404/CDFW avoidance and minimization measures	Action	Compliance with this ARAR will occur during IM-3 decommissioning, removal, and restoration activities. An Avoidance and Minimization Plan will be developed in consultation with CDFW, BLM, and USFWS, prior to IM-3 decommissioning.
45	Arizona Action-Specific	Arizona Well Standards - A.A.C. R-12-15-850	ARAR	These requirements on the placement of wells will apply if the selected remedy includes placement of wells in Arizona.	During project design and before construction	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include any new monitoring wells in Arizona.
46	Arizona Action-Specific	Design criteria for treatment units - A.A.C. R18-5-(501-502)	ARAR	These minimum design criteria will apply if the selected remedy includes construction of a groundwater treatment plant.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve the construction of a groundwater treatment plant in Arizona.

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47	Arizona Action-Specific	Requirements for wells, groundwater withdrawal, treatment, and reinjection -A.R.S. §45-454.01	ARAR	This statute exempts new well construction, withdrawal, treatment, and reinjection into a groundwater aquifer as a part of a CERCLA Remedial Action from the requirements of the Arizona Groundwater Code, except that they must comply with the substantive requirements of A.R.S. 45-594, 45-595, 45-596, and 45-600. If groundwater that is withdrawn is not reinjected into the aquifer, the groundwater shall be put to reasonable and beneficial use.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of wells in Arizona.
48	Arizona Action-Specific	Well construction standards -A.R.S. §45-594 and 595	ARAR	These provisions identify the well construction standards and requirements for new well construction in the State of Arizona. These requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of wells in Arizona.
49	Arizona Action-Specific	Notice of intention to drill - A.R.S. §45-596	ARAR	Substantive requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of wells in Arizona.
50	Arizona Action-Specific	Report by driller - A.R.S. §45-600	ARAR	Substantive requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of wells in Arizona.
51	Arizona Action-Specific	Arizona Remedial Action Requirements - A.R.S. §49-282.06(A)(2)	ARAR	Any treatment of groundwater must be conducted in a manner to provide for the maximum beneficial use of the waters of the state.	Treatment of groundwater in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve treatment of groundwater in Arizona.
74	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 1, §66262.11	ARAR Applicable	Owners or operators who generate waste shall determine whether waste is a hazardous waste. Applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Activity that generates waste that could potentially be hazardous	PG&E	This Work Plan, specifically Section 5 (Waste Management Plan and Recoverable Materials) and Appendix F (Soil Management Plan)	Action	Section 5 (Waste Management Plan and Recoverable Materials) and Appendix F (Soil Management Plan), which include performing waste determinations, will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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75	California Action-Specific	Hazardous Waste Control Act (HWCA) - Title 22, CCR, Div 4.5, Ch 12, Article 1, §66262.12	ARAR Applicable	A generator shall not treat, store, dispose of, transport or offer for transportation, hazardous waste without having received an identification number. Substantive requirements will be applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Activity that generates waste that could potentially be hazardous	PG&E	USEPA ID Number	Action	Hazardous waste generated from implementation of this Work Plan will be managed under the existing USEPA ID number for the Topock groundwater remediation area, CAR000151118.
76	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards for owners and operators of hazardous waste transfer and TSD facilities Title 22, CCR, Div 4.5, Ch 14, Article 2	ARAR Applicable	Establish requirements for a hazardous waste treatment facility to have a plan for waste analysis, develop a security system, conduct regular inspections, provide training to facility personnel, and use a quality assurance program during construction. The requirements may be applicable if CERCLA response action includes treatment, storage, or disposal as defined under RCRA, or may be relevant and appropriate if the requirements address problems or situations sufficiently similar to the specific circumstances at the site that their usage will be well suited.	Activity associated with construction and operation of a treatment facility or long term (longer than 90 days) storage of hazardous waste. If waste is simply removed, stored in appropriate containers after characterization, and removed off-site within 90 days, PG&E will be required to follow the substantive requirements of PG&E of a generator, including use of manifests, record keep, segregation of incompatibles, etc.	PG&E	This Work Plan, specifically Section 5 (Waste Management Plan and Recoverable Materials), Appendix B (Decommissioning Quality Assurance and Control Plan), and Appendix F (Soil Management Plan)	Action	As discussed in Section 5.1.3 (Onsite Management), hazardous wastes will be removed from the site within 90 days from the date of generation. Procedures for the proper collection, characterization, storage, transportation, and disposal of waste generated during the decommissioning, removal, and restoration activities are described in Section 5 (Waste Management Plan and Recoverable Materials), Appendix D (Transportation Plan), and Appendix F (Soil Management Plan).
77	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 2, §66262.20, §66262.22	ARAR Applicable	A generator of hazardous waste who transports or offers hazardous waste for transportation shall prepare a manifest. Substantive requirements will be applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Preparation of offsite shipment of hazardous waste	PG&E	This Work Plan, specifically Section 5 (Waste Management Plan and Recoverable Materials), Appendix D (Transportation Plan), and Appendix F (Soil Management Plan)	Action	Section 5 (Waste Management Plan and Recoverable Materials), and Appendices D and F, which include use of the hazardous waste manifest, will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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78	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 3, §66262.30, §66262.31, §66262.32, §66262.33	ARAR Applicable	Before transporting hazardous waste or offering hazardous waste for transportation off-site, the generator must do the following in accordance with DOT regulations: package the waste, label and mark each package of hazardous waste, and ensure that the transport vehicle is correctly placarded.	Preparation of offsite shipment of hazardous waste	PG&E	This Work Plan, specifically Section 5 (Waste Management and Recoverable Materials)	Action	Section 5 (Waste Management and Recoverable Materials), which addresses the preparation of offsite shipment of hazardous waste, will be implemented during IM-3 decommissioning, removal, and restoration activities.
79	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 3, §66262.34	ARAR Applicable	Requirements with respect to accumulation of waste on-site.	Accumulation of hazardous waste onsite	PG&E	This Work Plan, specifically Section 5 (Waste Management and Recoverable Materials) and Appendix F (Soil Management Plan)	Action	Section 5 (Waste Management and Recoverable Materials) and Appendix F (Soil Management Plan), which address the requirements for onsite accumulation of hazardous waste by the waste generator, will be implemented during IM-3 decommissioning, removal, and restoration activities.
80	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 4, §66262.40, §66262.41	ARAR Applicable	Establishes requirements for record keeping of manifests, test results, waste analyses, and Biennial Reports. Any substantive requirements shall be attained.	Activity generating hazardous waste	PG&E	This Work Plan and Section 5 (Waste Management and Recoverable Materials)	Action	Section 5 (Waste Management and Recoverable Materials), which addresses the hazardous waste record keeping requirements, will be implemented during IM-3 decommissioning, removal, and restoration activities.
81	California Action-Specific	Corrective Action - Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.100 (a) through (d), (f), (g)(1), and (h)	ARAR Relevant and Appropriate	The owner or operator is required to take corrective action under Title 22, CCR, §66264.91 to remediate releases from the regulated unit and to ensure that the regulated unit achieves compliance with the water quality protection standard. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Remedy implementation	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.

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82	California Action-Specific	Corrective Action for Waste Management Units -Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.101	ARAR Relevant and Appropriate	The owner or operator is required to take corrective action to remediate releases from any solid or hazardous waste management unit at the facility to protect public health and the environment. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Remedy implementation	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
83	California Action-Specific	Closure and post-closure care -Title 22, CCR, Div 4.5, Ch 14, Article 7, §66264.111, §66264.112, §66264.115 through 120	ARAR Applicable	Owners and operators shall close a facility and perform post-closure care when contaminated subsurface soil cannot be practically removed or decontaminated. Contaminated soil, residues, or groundwater from remedial action at a site will achieve clean closure; otherwise, post-closure care requirements will be relevant and appropriate.	Decommissioning	PG&E	This Work Plan Documents required by the Soil RFI/RI and CMS/FS process	Action	Implementation of this Work Plan and the soil RFI/RI and CMS/FS process will achieve clean closure and satisfy the closure performance standard.
84	California Action-Specific	Use and management of containers -Title 22, CCR, Div 4.5, Ch 14, Article 9	ARAR Applicable	Containers used for the transfer or storage of hazardous waste must be in good condition, compatible with the waste, kept closed except to add or remove materials and be inspected weekly. The area used to store the containers must provide adequate secondary containment and be designed with runoff controls. Also, appropriate closure of the containers must take place.	Design and management of hazardous waste containers	PG&E	This Work Plan, specifically Section 5 (Waste Management and Recoverable Materials) and Appendix F (Soil Management Plan)	Action	Section 5 (Waste Management and Recoverable Materials) and Appendix F (Soil Management Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities.
85	California Action-Specific	Tank systems - Title 22, CCR, Div 4.5, Ch 14, Article 10	ARAR Applicable	The remedial activities may involve storage and/or treatment in tanks. These tanks are required to have secondary containment, be monitored and inspected, be provided with overfill and spill protection controls, and operated with adequate freeboard. Also, appropriate closure must take place.	During project design, operation and maintenance activities where tank systems are used to transfer, store or treat hazardous waste	PG&E	This Work Plan, specifically Section 5.1.3 (Onsite Management)	Action	Section 5.1.3 (Onsite Management), which addresses accumulation in portable tanks within secondary containment, will be implemented during IM-3 decommissioning and removal activities.

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86	California Action-Specific	Waste piles - Title 22, CCR, Div 4.5, Ch 14, Article 12	ARAR Applicable	The waste piles should be placed upon a lined foundation or base with a leachate system, protected from precipitation and wind dispersal, designed to prevent run on and run off. Also, closure and post-closure care requirements. Remedial action may involve soil excavation and the compiling of soil in a temporary waste pile. This requirement is applicable if the excavated waste meets RCRA hazardous waste criteria.	Under broad application, a triggering event could be any temporary stockpiling of haz soil	PG&E	This Work Plan, specifically Appendix F (Soil Management Plan)	Action	Appendix F (Soil Management Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities. Permanent waste piles subject to the requirements of Chapter 14 Article 12 will not be created during decommissioning. If necessary, temporary staging piles will be used that meet the requirements of California Health and Safety Code Section 25123.3.
87	California Action-Specific	Landfills - Title 22, CCR, Div 4.5, Ch 14, Article 14	ARAR Relevant and Appropriate	The requirements for landfills include the design and operation, action leakage rate, monitoring and inspection, response actions, surveying and recordkeeping and closure and post-closure care.	Design, construction, O&M, and closure of landfills (66260.10 defines "Landfill" as a disposal facility or part of a facility where hazardous waste is placed in or on land and which is not a pile, a land treatment facility, a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground mine, a cave, or a corrective action management unit.)	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of a landfill.

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88	California Action-Specific	Miscellaneous Units - Title 22, CCR, Div 4.5, Ch 14, Article 16	ARAR Applicable	Applies to waste management unit not otherwise regulated under RCRA. It may include pumps, auxiliary equipment, air strippers, etc. The substantive requirements include design, construction, operation, maintenance and closure of the unit that will ensure protection of human health and the environment. The actions include general inspections for safety and operation efficiency, testing and maintenance of the equipment (including testing of warning systems). Applicable if pumps are used for extraction and treatment of leachate that meets RCRA hazardous waste criteria.	Design, construct, O&M, and closure of waste management units not otherwise regulated under RCRA	PG&E	This Work Plan	Action	Procedures specified in Section 4 (Decommissioning Procedures) and Section 5 (Waste Management Plan and Recoverable Materials) will result in any equipment identified as a miscellaneous unit being appropriately classified, and either disposed or decontaminated and recycled.
89	California Action-Specific	Land Disposal Restrictions (LDR) for RCRA wastes and non-RCRA wastes - Title 22, CCR, Div 4.5, Ch 18, Articles 1, 3, 4, 10, 11	ARAR Applicable	Movement of hazardous waste to new locations and placed in or on land will trigger LDR. General applicability, dilution prohibited, waste analysis and record keeping, and special rules apply for wastes that exhibit a characteristic waste. Best Demonstrated Available Technology (BDA) standards for each hazardous constituent in each listed waste, if residual is to be disposed. Utilize treatment standards table when necessary. Where applicable, hazardous waste generated from remedial activities must comply with LDR and meet the treatment standards or notify the disposal facility of the treatment standards before disposal at an appropriate offsite disposal facility.	Activity that generates hazardous waste	PG&E	This Work Plan, specifically Section 5 (Waste Management Plan and Recoverable Materials)	Action	IM-3 decommissioning and removal activities are not expected to involve onsite placement of hazardous waste that will trigger the LDR requirements. Hazardous waste generated will be characterized to determine if LDR treatment standards are exceeded. A notification will be submitted to the disposal facility indicating whether the waste is restricted from land disposal and whether it exceeds an applicable treatment standard.

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90	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards for owners and operators of hazardous waste transfer and TSD facilities, Title 22, CCR, Div 4.5, Ch 14, Articles 3 and 4	ARAR Applicable	Establish requirements for a facility to plan for emergency conditions. In addition, the design and operation of the facility must be done to prevent releases. Other requirements include testing and maintenance of equipment and incorporation of communication and alarm systems and contingency plan. The requirements may be applicable if CERCLA response action includes treatment, storage, or disposal as defined under RCRA, or may be relevant and appropriate if the requirements address problems or situations sufficiently similar to the specific circumstances at the site that their usage will be well suited.	Design, construction, operation and maintenance of the remedy	PG&E	This Work Plan Construction/ Remedial Action Work Plan	Action	This Work Plan addresses best management practices and measures to prevent releases during IM-3 decommissioning and removal activities. The Construction/Remedial Action Work Plan address communications and contingencies during construction.
91	California Action-Specific	Hazardous Waste Control Act (HWCA) - Groundwater monitoring and response, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.91 (a) and (c)	ARAR Relevant and Appropriate	Owners or operators of a RCRA surface impoundment, waste pile, land treatment unit, or landfill shall conduct a monitoring and response program for each regulated unit. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, construction, operation and maintenance of the remedy	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
92	California Action-Specific	Hazardous Waste Control Act (HWCA) - Monitoring, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.97 (b), (c), (d) and (e)(1) through (e)(5)	ARAR Relevant and Appropriate	Requirements for monitoring groundwater, surface water, and vadose zone. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
93	California Action-Specific	Hazardous Waste Control Act (HWCA) - Detection Monitoring Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.98	ARAR Relevant and Appropriate	Requires the owner or operator of a regulated unit to develop a detection monitoring program that will provide reliable indication of a release. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.

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94	California Action-Specific	Hazardous Waste Control Act (HWCA) - Evaluation Monitoring, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.99	ARAR Relevant and Appropriate	Requires the owner or operator of a regulated unit to develop an evaluation monitoring program that can be used to assess the nature and extent of a release from the unit. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
95	California Action-Specific	Discharges of Waste to Land - Title 23 CCR, Div 3, Ch 15	ARAR Relevant and Appropriate	The regulations in this chapter pertain to water quality aspects of hazardous waste discharge to land, establishing waste and site classifications and waste management requirements for waste treatment, storage, or disposal in landfills, surface impoundments, waste piles, and land treatment facilities. Requirements in this chapter are minimum standards for proper management of each waste category. Pursuant to Section 2511 (Exemptions), because this remediation constitutes actions taken by public agencies to cleanup unauthorized releases of waste, these regulations will only apply if the proposed remedial activities include (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	Activities involve (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	PG&E		No Action	Because implementation of this Work Plan and the soil RFI/RI and CMS/FS process will achieve clean closure, this ARAR will not be triggered.
96	California Action-Specific	Consolidated Regulations for Storage, Treatment, Processing, or Disposal of Solid Waste - Title 27 CCR, Div 2, Subdivision 1	ARAR Relevant and Appropriate	The regulations in this subdivision (promulgated by the State Water Resources Control Board [SWRCB]) pertain to water quality aspects of discharges of solid waste to land for treatment, storage, or disposal. Pursuant to Section 20090 (Exemptions), because this remediation constitutes actions taken by public agencies to cleanup unauthorized releases of waste, these regulations will only apply if the proposed remedial activities include (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	Activities involve (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	PG&E		No Action	Because implementation of this Work Plan and the soil RFI/RI and CMS/FS process will achieve clean closure, this ARAR will not be triggered.

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97	California Action-Specific	Requirements for land-use covenants - Cal. Code Regs. Title 22, § 67391.1	ARAR Applicable	This regulation requires appropriate restrictions on use of property in the event that a proposed remedial alternative results in hazardous materials remaining at the property at levels which are not suitable for unrestricted use of the land. This is an ARAR with respect to PG&E-owned land at the Topock site.	A decision document finding that hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels which are not suitable for unrestricted use of the land.	DTSC		No Action	While implementation of this Work Plan itself does not trigger compliance with this ARAR, the final groundwater remedy includes restrictions on use of the groundwater for potable use. The land use covenants (institutional controls) are described in Section 5.0 of the 90% Design document.
98	California Action-Specific	California Water Code - Section 1380[c], California Well Standards, Bulletin 74-90 (Supplement to Bulletin 74-81)	ARAR Applicable	These standards for water, cathodic, and monitoring wells will be applicable if the remediation requires use of such wells.	Design, construction, decommission of groundwater wells	PG&E	This Work Plan, specifically Section 4.1 (Wells)	Action	The general approach for decommissioning wells has been developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes. Section 4.1 of this Work Plan includes procedures for decommissioning IM-3 wells consistent with this approach.
99	California Action-Specific	State Water Resources Control Board Resolution No. 88-63 Adoption of Policy Entitled "Sources of Drinking Water"	ARAR Applicable	With certain exceptions, all surface and ground waters of the State of California are to be considered suitable, or potentially suitable, for municipal or domestic water supply. The Regional Water Quality Control Board and State Water Resources Board have designated the beneficial use of the ground and surface waters in the Topock Site area as "municipal and domestic water supply." This designation is set forth in the Basin Plan.	Remedy implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities.
100	California Action-Specific	Water Quality Control Plan; Colorado River Basin-Region 7, June 2006 (Basin Plan)	ARAR Applicable	This Basin Plan designates the Colorado River and the Colorado Hydrologic unit as having the beneficial use of "MUN" (or, municipal or domestic water supply). The Basin Plan also prescribes General Surface Water Objectives and Ground Water Objectives, in addition to Specific Surface Water Objectives for the Colorado River, which include a flow-weighted average annual numeric criterion for salinity for the portion of the Colorado River on the Topock Site of 723 mg/L. This TDS value must not be exceeded in any remedial alternative being considered	Remedy implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities.

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Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/future document(s) will document continued compliance with this ARAR?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
101	California Action-Specific	State Water Resources Control Board Resolution No. 68-16 ("Antidegradation Policy") - Statement of Policy with respect to Maintaining High Quality of Waters in California	ARAR Applicable	Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.	Remedy implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3, beyond implementation of this work plan.
102	California Action-Specific	State Water Resources Control Board Resolution No. 92-49 -- Policies and Procedures for investigation and Cleanup and Abatement of Discharges under Water Code Section 13304	ARAR Relevant and Appropriate	Section III.A of this Resolution states that the Regional Water Board shall" "concur with any investigative and abatement proposal which the discharger demonstrates and the Regional Water Board finds to have a substantial likelihood to achieve compliance within a reasonable time frame…"	Remedy implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3, beyond implementation of this work plan.
Location-Specific									
5	Federal Location-Specific	Federal Land Policy and Management Act - (FLPMA);43 USC § 1701, et seq.; 43 CFR 2800	ARAR Applicable	In managing public lands, BLM is directed to take any action necessary to prevent unnecessary or undue degradation of the lands. Actions[3] taken on the public land (i.e. BLM-managed land) portions of the Topock site should provide the "optimal balance between authorized resource use and the protection and long-term sustainability of sensitive resources."	Activities on public lands	BLM	This Work Plan	Action	PG&E understands that DOI will coordinate its review of this submittal with BLM.

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TABLE 6-4
Summary of Compliance with Identified ARARs
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/future document(s) will document continued compliance with this ARAR?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
7	Federal Location-Specific	National Wildlife Refuge System Administration Act, as amended - 16 USC §§ 668dd-ee; 50 CFR Part 27	ARAR Applicable	This Act governs the use and management of National Wildlife Refuges. The Act requires that USFWS evaluate ongoing and proposed activities and uses to ensure that such activities are appropriate and compatible with both the mission of the overall National Wildlife Refuge System, as well as the specific purposes for which the Havasu National Wildlife Refuge (HNWR) was established. The Topock site includes portions of the HNWR. Prior to selection of a remedial action[3] by DOI/USFWS, that remedial action must be found by the Refuge Manager to be both an appropriate use of the HNWR and compatible with the mission of the HNWR and the Refuge System as a whole. [2]	Activities on the HNWR	USFWS/DOI	This Work Plan	Action	PG&E understands that DOI will coordinate its review of this submittal with USFWS.
13	Federal Location-Specific	Fish and Wildlife Coordination Act - 16 USC §§ 661-667e	ARAR Applicable	This Act requires that any federally-funded or authorized modification of a stream or other water body must provide adequate provisions for conservation, maintenance, and management of wildlife resources and their habitat. Necessary measures should be taken to mitigate, prevent, and compensate for project-related losses of wildlife resources. Any remedial action selected for the Topock site that includes any modification of a water body will be subject to these requirements.	Any modification of a water body	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve modification of a water body.

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14	Federal Location-Specific	National Historic Preservation Act - 16 USC § 470, et seq.;36 CFR 800.1, et seq.	ARAR Applicable	This statute and the implementing regulations direct federal agencies to consider the effects of their undertakings on historic properties included in or eligible for inclusion in the National Register of Historic Places and to consult with certain parties before moving forward with the undertaking. The agency must determine, based on consultation, if an undertaking's effects would be adverse and consider feasible and prudent alternatives that could avoid, mitigate, or minimize such adverse effects on a National Register or eligible property. The agency must then specify how adverse effects will be avoided or mitigated or acknowledge that such effects cannot be avoided or mitigated. The Topock site includes historic properties in or eligible for inclusion in the National Register and remedial action selected for the Topock site qualifies as an undertaking pursuant to the NHPA. Measures to avoid or mitigate adverse effects of any selected remedial action that are adopted by the agency through consultation must be implemented by the remedial action to comply with the NHPA.	Remedial action selected for the Topock site qualifies as an undertaking under NHPA	BLM, Advisory Council on Historic Preservation, California and Arizona State Historic Preservation Offices, USFWS, the Hualapai Indian Tribe and PG&E are parties to the PA	This Work Plan, the PA, the CHPMP, the Tribal Access Plan, Annual Reports	Action	Documents led by BLM include the PA, the CHPMP, the Brochure, the Annual Report, and the Tribal Access Plan. The PA has been completed under the National Historic Preservation Act. BLM has completed the Brochure to notify other state and federal agencies of the Signatories and Invited Signatories with the actions to be taken within the vicinity of the Topock Remediation Project, and the Topock Maze. The CHPMP, which is a requirement of the PA, was issued on January 20, 2012. The CHPMP can be modified and updated, as needed, to address new information and ongoing activities related to the project. Therefore, subsequent to the issuance of the CHPMP, BLM continues to hold periodic working meetings on the CHPMP. It should be noted that treatment measures are included in the CHPMP. A Treatment Plan will be submitted to the Agencies along with the 90% design.. Applicable requirements in the PA and CHPMP measures will be adhered to as set forth in this Work Plan in Tables 6-2 and 6-3. The Tribal Access Plan for lands under federal management was completed on November 26, 2011. PG&E has also prepared an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan. The Access Plan is included in an appendix of the Construction/Remedial Action Work Plan. Annual reports of cultural resources activities will be prepared and submitted to all Signatories, Tribes, and Invited Signatories as directed in the PA. BLM published the first Annual Report on November 25, 2011, and the second Annual Report on January 29, 2013. The Third Annual Report was provided by BLM to the Signatories, Tribes, and Invited Signatories for comment on June 18, 2014. The PA requires that such reports will be prepared and submitted by December 1 each year for the first five years after execution of the PA and every two years thereafter.

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17	Federal Location-Specific	National Archaeological and Historic Preservation Act - 16 USC § 469, et seq.; 36 CFR 65	ARAR Applicable	This statute requires the evaluation and preservation of historical and archaeological data which might otherwise be irreparably lost or destroyed through any alteration of terrain as a result of federal construction projects or a federally-licensed activity. The Topock site includes historical and archaeological data. Any remedial action selected for the Topock site must include measures for the evaluation and preservation of historical and archaeological data that might be lost or destroyed as a result of the remedial action.	Alteration of terrain that threatens significant scientific, historical or archaeological data.	Federal Agencies, PG&E	PA, CHPMP	Action	Requirements in the PA and the CHPMP will be adhered to (see Tables 6-2 and 6-3 for details).
18	Federal Location-Specific	Archaeological Resources Protection Act - 16 USC § 470aa-ii, et seq.;43 CFR 7.1, et seq.	ARAR Applicable	This statute provides for the protection of archeological resources located on public and tribal lands. The Act establishes criteria which must be met for the land manager's approval of any excavation or removal of archaeological resources if a proposed activity involves soil disturbances. The Topock site includes archaeological resources on public land. Any remedial action selected for the Topock site must satisfy the criteria applicable to excavation or removal of archaeological resources that might be affected as a result of the remedial action.	Disturbance of archaeological and historical sites	Federal Agencies, PG&E	PA, CHPMP	Action	Requirements in the PA and the CHPMP will be adhered to (see Tables 6-2 and 6-3 for details).

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19	Federal Location-Specific	Historic Sites Act - 16 USC 461-467	ARAR Applicable	Pursuant to this Act, federal agencies are to consider the existence and location of historic sites, buildings, and objects of national significance using information provided by the National Park Service to avoid undesirable impacts upon such landmarks. There are no designated historic landmarks within the APE, although 16 USC 461, through Public Law 106-45, provides for a cooperative program "for the preservation of the Route 66 corridor" through grants and other measures. Undesirable impacts on this site that might result from any remedial action selected for the Topock site will be evaluated and mitigated to the maximum extent practicable.	Existence of a historic landmark	Federal Agencies		No Action	There are no historic landmarks in the APE. No further action is required.
21	Federal Location-Specific	Native American Graves Protection and Repatriation Act (NAGPRA) - 25 USC § 3001, et seq.; 43 CFR 10.1, et seq.	ARAR Applicable	NAGPRA establishes requirements regulating the removal and trafficking of human remains and cultural items, including funerary and sacred objects. The Topock site may contain human remains. If remediation activities result in the discovery of Indian human remains or related objects, NAGPRA requirements must be met.	Federal Lands only - Discovery of human remains	PG&E	PA, CHPMP	Action	Requirements in the PA and the CHPMP will be adhered to (see Tables 6-2 and 6-3 for details).
22	Federal Location-Specific	American Indian Religious Freedom Act - 42 USC § 1996, et seq.	ARAR Relevant and Appropriate	The United States must "protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise [their] traditional religions..." Any remedial action selected for the Topock site must satisfy this requirement.	Remedy selection	Federal Agencies (BLM Lead), PG&E	Tribal Access Plan	Action	BLM led the preparation of the Tribal Access Plan for lands under federal management, and the Plan was completed on November 26, 2011. The EIR-required Access Plan was prepared by PG&E, and included as an appendix to the Construction/Remedial Action Work Plan.
27	Federal Location-Specific	Resource Conservation and Recovery Act - 42 USC § 6901, et seq.; 40 CFR 264.18	ARAR Applicable	These regulations promulgated under RCRA establish Seismic and Floodplain considerations which must be followed for treatment, storage, or disposal facilities constructed, operated, or maintained within certain distances of fault lines and floodplains. Portions of the Topock site are located on or near a 100-year floodplain.	Infrastructure in 100-year floodplain/ regulatory floodway	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve infrastructure in 100-year floodplain/regulatory floodway.

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43	Arizona Location-Specific	Archeological Discoveries - A.R.S. § 41-841 through 847	ARAR	This Act prohibits any person from knowingly excavating on Arizona State or State agency owned land which is a historic or prehistoric ruin, burial ground, archaeological or paleontological site. These requirements will apply if the selected remedy involves excavation in Arizona.	Only if remedy in Arizona - Discovery of any archaeological, paleontological or historical site or object (including human remains) that is at least fifty years old	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities will not occur in Arizona.
44	Arizona Location-Specific	Historic Preservation - A.R.S. § 41-865	ARAR	This Act restricts any person from disturbing human remains or funerary objects on lands other than lands[2] owned or controlled by the State. These requirements will apply if the selected remedy involves excavation in Arizona.	Only if remedy in Arizona on private lands - Discovery of human remains/funerary objects	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities will not occur in Arizona.
63	California Location-Specific	Seismic and Floodplain standards -Title 22, CCR, Div 4.5, Ch 14, Article 2, §66264.18	ARAR Relevant and Appropriate	These standards are relevant and appropriate for TSD facilities constructed, operated, or maintained within certain distances of fault lines, floodplains, or the maximum high tide.	Infrastructure in 100-year floodplain/ regulatory floodway	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve infrastructure in 100-year floodplain/regulatory floodway.

Notes:
[1] Source: Table 2 of the Groundwater Record of Decision, Pacific Gas and Electric Company Topock Compressor Station, Needles, San Bernardino County, California, December 2010 (DOI, 2011).
[2] As corrected by the Department of the Interior.
[3] The "action" notation in Location-specific ARARs #5 and 7 refers to the DOI Record of Decision (DOI, 2011), surnamed by the Bureaus (BLM, BOR, USFWS) and Bureau of Indian Affairs.

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SECTION 7

Soil Confirmation Sampling and Coordination with Soil RFI/Remedial Investigation

7.1 Sampling Objectives

Objectives for the soil sampling are as follows:

- Assess soil conditions in the vicinity of the IM-3 system, including the IM-3 Treatment Plant, a portion of the MW-20 Bench affected by IM-3 operations, vaults associated with the injection wells and extraction wells, and injection well support structure in the East Mesa. Background information, including operational history, incidental spill information, and summary of existing data for IM-3 Treatment Plan (AOC 29) and MW-20 Bench (AOC 30) is presented in the *Addendum to RCRA Facility Investigation/Remedial Investigation Report, Volume 1, Topock Compressor Station Needles, California* (CH2M HILL, 2014d).
- Collect sufficient soil samples in the IM-3 Treatment Plant (AOC 29) and MW-20 Bench (AOC 30) to support the data quality objectives set forth in the Soil RFI/RI program. To support this objective, additional data will be collected at these AOCs as part of the baseline sampling during the Topock groundwater remedy system installation, as proposed in the forthcoming Groundwater Remedy Implementation – Baseline Sampling and Analysis Plan. A portion of AOC 30 MW-20 Bench will be used to support the groundwater remedy, so this AOC will not be fully investigated until groundwater remedy decommissioning sampling is conducted.

7.2 Sampling Plan

Confirmation soil samples will be collected at the IM-3 Treatment Plant, MW-20 Bench, the vaults associated with the injection wells (IW-02 and IW-03) and extraction wells (TW-2S, TW-2D, TW-3D, and PE-1), and the injection well support structure in the East Mesa. Confirmation soil sampling is not proposed along the IM-3 pipelines, because new pipeline alignments proposed as part of the 90% design for the Final Remedy will be located adjacent to the existing IM-3 pipelines. Baseline soil samples will be collected along these new pipeline alignments during Final Remedy implementation. The baseline sampling data collected along the pipeline alignments will be used as the decommissioning confirmation samples and will be evaluated as described in Section 7.3. The proposed baseline soil sampling is presented in the *Baseline Soil Sampling and Analysis Plan, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California*, Appendix A of Volume 4 of the Draft O&M Manual for the Groundwater Remedy (CH2M HILL, 2013b).

If the Final Remedy pipeline alignments are adjusted or modified during the 90% design, or if a spill occurs along the IM-3 pipelines after implementing the baseline soil sampling, the new locations and spill information will be reviewed and appended to this Work Plan, as necessary.

7.2.1 Numbers and Locations

To assess soil conditions at the IM-3 Treatment Plant and MW-20 Bench and minimize the volume of soil sent offsite for analysis, soil samples will be collected using the following phased sampling approach:

Step 1 X-Ray Fluorescence (XRF) Screening: XRF screening will be used to identify areas of potential contamination where soil samples will be collected for off-site laboratory analysis (see Step 2 below). This first step will include collection of XRF screening samples (soil volume is considerably reduced from regular laboratory sample) on 50-foot centers across the AOCs, as shown on Figure 7-1. In areas with buildings, foundations, or pavement/gravel, XRF screening samples will be collected at 0.5 foot below these features after removal. If the excavation required to remove building and support structure foundations is greater than 3 feet below the ground surface (bgs), XRF screening samples will also be collected from the bottom of the excavation. The results of the XRF screening will be screened against Topock Specific Background Values (if available), and residential screening levels (screening levels).

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Step 2 Offsite Laboratory Analysis: If XRF metal results exceed applicable screening levels, an additional soil sample will be collected at the same location as the XRF screening location and sent to an offsite laboratory for analysis. If none of the XRF screening samples exceed screening levels, additional soil samples will be collected at the XRF screening locations in operational areas or areas where known releases occurred within each AOC. A minimum of 10 soil samples will be collected at each AOC to obtain sufficient data to satisfy the Soil RFI/RI Investigation Data Quality Objectives.

Samples will also be collected at injection/extraction well vaults and the injection wells support structure in the East Mesa. One sample from 0.5 feet below the bottom of the vault will be collected from the approximate center of well vault locations after the vault or structure has been removed (see Figure 7-2). The Well Vault completion depth and proposed soil sample depths are as follows:

Well Vault	Completion Depth (feet bgs)	Proposed Sample Depth (feet bgs)
IW-2, IW-3	5 ft, 8 inches	6 ft, 2 inches
PE-1	7 ft, 8 inches	8 ft, 2 inches
TW-2S, TW-2D, TW-3D	2 ft, 4 inches	2 ft, 10 inches

Sample locations will be modified to collect samples in areas of visible contamination or near potential release areas. Table 7-1 lists analytical suites for the sample locations.

7.2.2 Sampling and Analytical Procedures

For consistency between the IM-3 decommissioning and the Soil RFI/RI program, soil sample collection and handling activities will follow the SOPs included in the Soil RFI/RI Work Plan (CH2M HILL, 2013a). Following finalization, the SOPs will be appended to this Work Plan. Table 7-2 summarizes sample containers, preservation, and hold times.

7.2.3 Sample Management and Storage

Samples will be placed immediately into field coolers with ice; volatile organic compound (VOC) and total petroleum hydrocarbon (TPH)-gasoline containers will be arranged in the sample cooler standing upright. The field coolers will be taken to the sample management area, where the samples will be transferred into a refrigerator or freezer. If transport of a sample to the laboratory is scheduled for pick up more than 24 hours after sampling, samples will be stored in the freezer.

7.2.4 Shipping

Samples collected for chemical analysis will be transported to the laboratory via courier, generally daily. Chains-of-custody will accompany samples to the laboratory.

7.3 Soil Data Evaluation

Confirmation soil data collected at the IM-3 Treatment Plant (AOC 29) and MW-20 Bench (AOC 30) will be evaluated following the data gaps evaluation process outlined in the Soil RFI/RI Work Plan (CH2M HILL, 2013a). The data gaps evaluation for these AOCs, including results and conclusions, may be presented in the Compressor Station RFI/RI Volume 3 Report.

The results of confirmation soil data collected in areas outside of the IM-3 Treatment Plant and MW-20 Bench, including the baseline soil data from along the pipeline alignments, the vaults associated with the injection wells (IW-02 and IW-03), and the injection well support structure in the East Mesa, will be compared to the site-specific background values presented in Table 7-3. Initially, the comparison will be done on a point-by-point basis. If confirmation results are below the site-specific background values, then no further evaluation is necessary for that location. If confirmation results are above the site-specific background values, then an area-wide average

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concentration will be calculated as the 95th percent upper confidence limit of the mean, using ProUCL Version 4.0 software (USEPA, 2007). If area-wide average concentrations are below the site-specific background values, then no further evaluation is necessary. If area-wide average concentrations are above the site-specific background values, then further decisions for that specific area will be postponed until site-specific soil remedial goals have been developed.

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TABLE 7-1
Sites Planned for Removal and Confirmation Sampling Analytical Suite
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Soil RFI/RI Investigation Area	Analytical Suite
IM-3 Treatment Plant Area (AOC 29)	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, ferrous iron
MW 20 Bench (AOC 30)	Title 22 metals, hexavalent chromium
Injection/Extraction Well Vaults	Title 22 metals, hexavalent chromium
Injection Well Support Structure	Title 22 metals, hexavalent chromium

Notes:
PAH – polynuclear aromatic hydrocarbon
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

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TABLE 7-2
Sample Containers, Preservation, and Holding Times
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
Metals (except hexavalent chromium)	SW6010B or C, SW6020A, EPA200.7, EPA200.8, SM3120B, EPA245.1, SW7000 series methods	1-liter P or G	8-oz/P, G, or T	Water: add HNO_3 to pH<2; soil/sediment: none	28 days for mercury; 180 days for others
Hexavalent Chromium	SW7199	Not applicable	4-oz/P, G, or T	Soil/sediment: chill to 4°C (±2°C)	Soil: 30 days to extraction, 7 days to analysis
Hexavalent Chromium	EPA218.6	250-ml P	Not applicable	Chill to ≤6°C Laboratory or field filtration within 24 hours After filtration adjust the pH to 9 to 9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Hexavalent Chromium	SM3500-Cr B	250-ml P	Not applicable	Chill to ≤6°C Laboratory or field filtration within 24 hours After filtration adjust the pH to 9 to 9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Purgeable TPH	SW8015B, C or D Preparation methods: SW5035B (soil) SW5030B (water)	Three 40-ml G-TLC	Three 40-ml G-TLC	Water: add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: chill to 4°C (±2°C) and or • frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved within 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol
Extractable TPH	SW8015B, C or D	Two 1-liter G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis

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TABLE 7-2
Sample Containers, Preservation, and Holding Times
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Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
VOCs	SW8260B or C Preparation methods: SW5035B (soil) SW5030B (water)	Three 40-ml G-TLC	Three 40-ml G-TLC	Water: add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: chill to 4°C (±2°C) and or • Frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved with 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol
SVOCs	SW8270C or D	Two 1-liter G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
PAHs	SW8270SIM	Two 1-liter Amber G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
pH	SM4500H+B or SW9040	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C	15 minutes

Notes:

<	=	less than	NH_4OH	=	ammonium hydroxide
≤	=	less than or equal to	$(NH_4)_2SO_4$	=	ammonium sulfate
°C	=	degrees Celsius	oz	=	ounce
Cr	=	chromium	P	=	polyethylene
G	=	glass	PCB	=	polychlorinated biphenyl
HCl	=	hydrochloric acid	T	=	brass sleeves in the sample barrel (sometimes called California brass)
HNO_3	=	nitric acid	TLC	=	Teflon-lined closure
ml	=	milliliter			

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TABLE 7-3
Site-specific Background Values for Metals
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Analyte	Background Values (mg/kg)
Aluminum	16,400
Antimony	---
Arsenic	11
Barium	410
Beryllium	0.672
Cadmium	1.1
Calcium	66,500
Cr	39.8
Cr, Hexavalent	0.83
Cobalt	12.7
Copper	16.8
Cyanide	---
Iron	---
Lead	8.39
Magnesium	12,100
Manganese	402
Mercury [1]	---
Molybdenum	1.37
Nickel	27.3
Potassium	4,400
Selenium	1.47
Silver	---
Sodium	2,070
Thallium	---
Vanadium [2]	52.2
Zinc	58

Notes:

[1] Mercury: mercury, inorganic salts

[2] The oral reference dose (RfD) used for the vanadium screening level is derived from the Integrated Risk Information System oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

--- = data not collected, available or applicable

mg/kg = milligrams per kilogram

Source: CH2M HILL, 2009.

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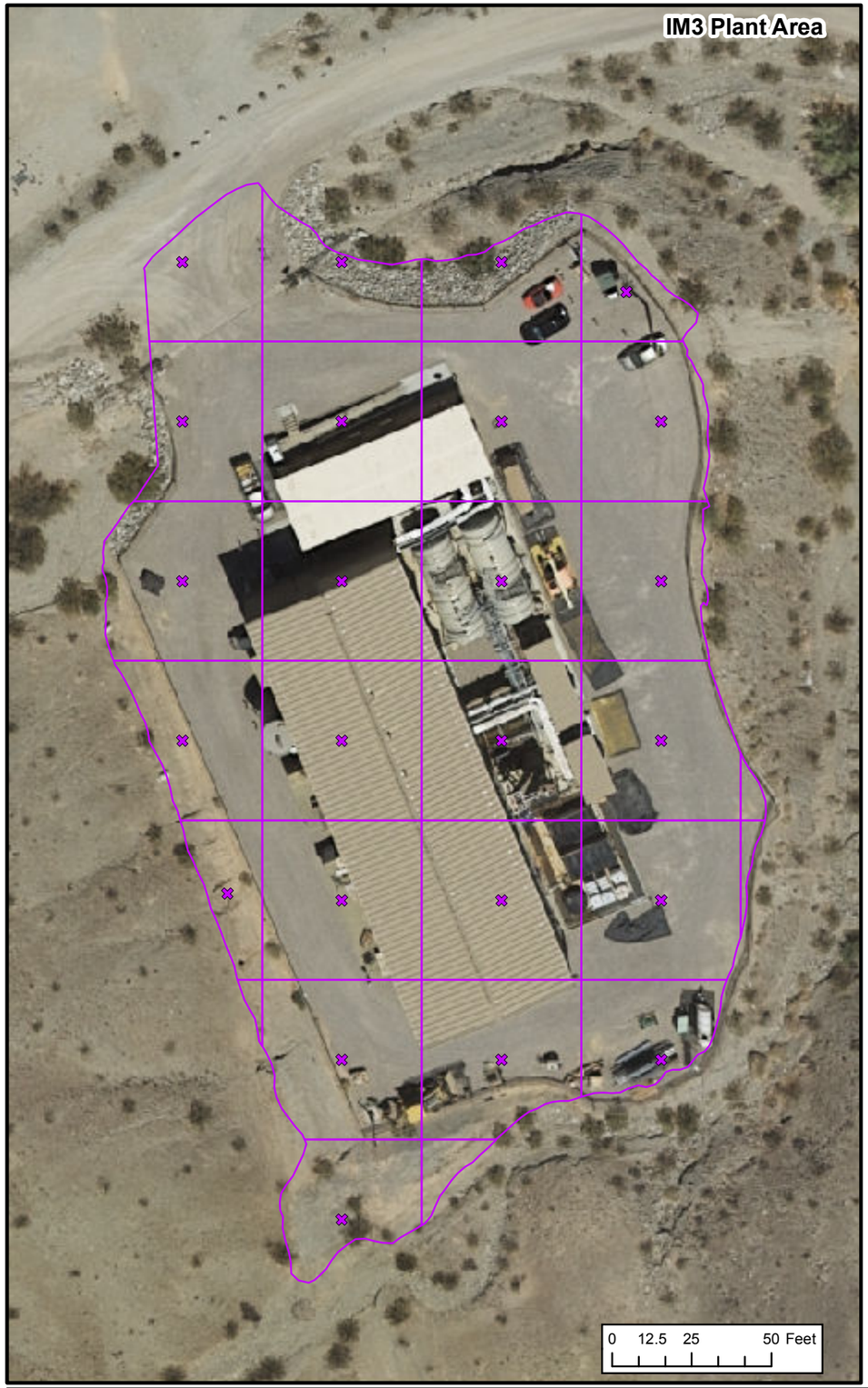
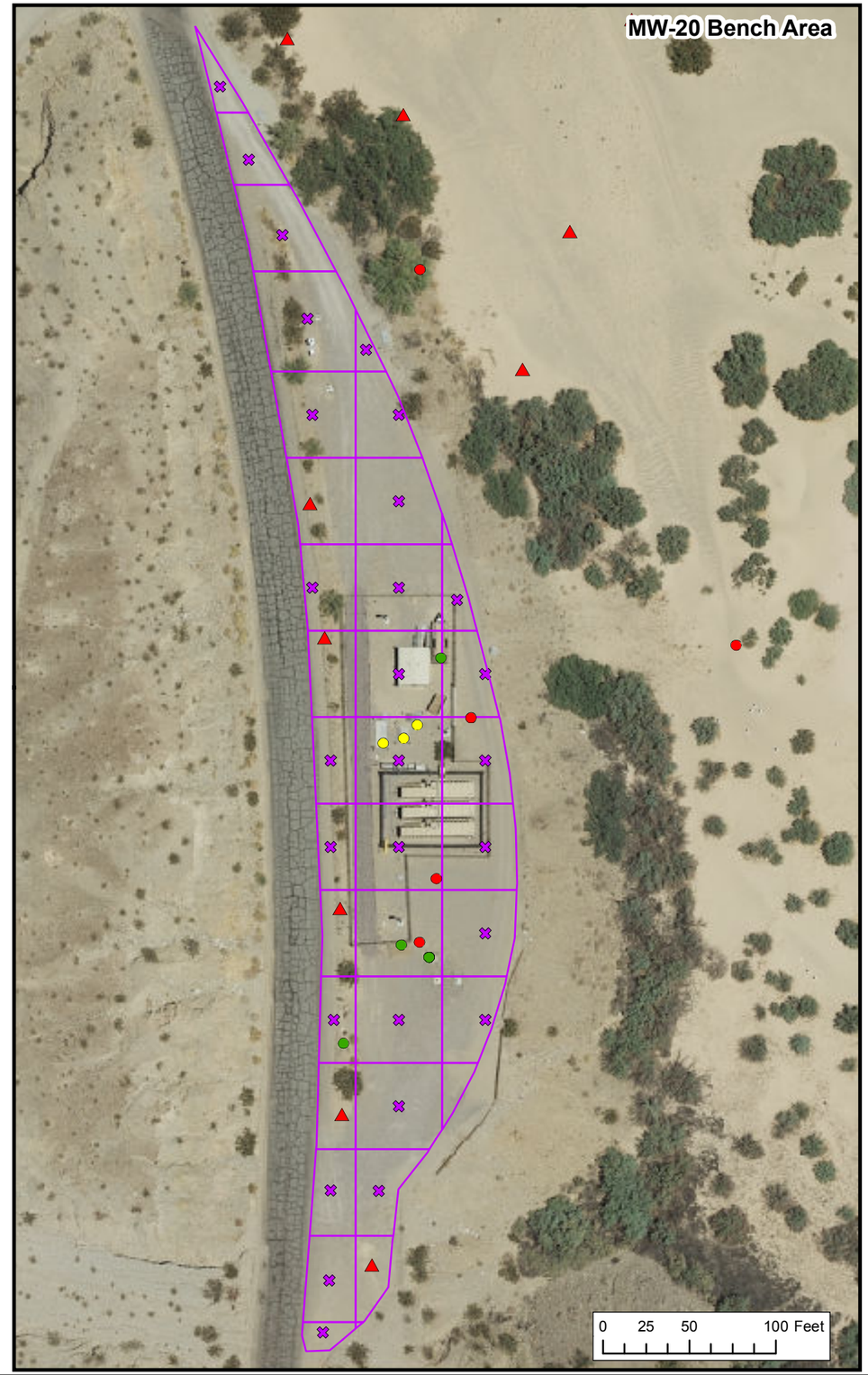
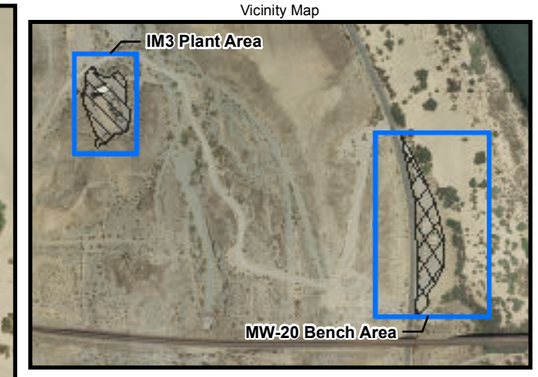




Vicinity Map



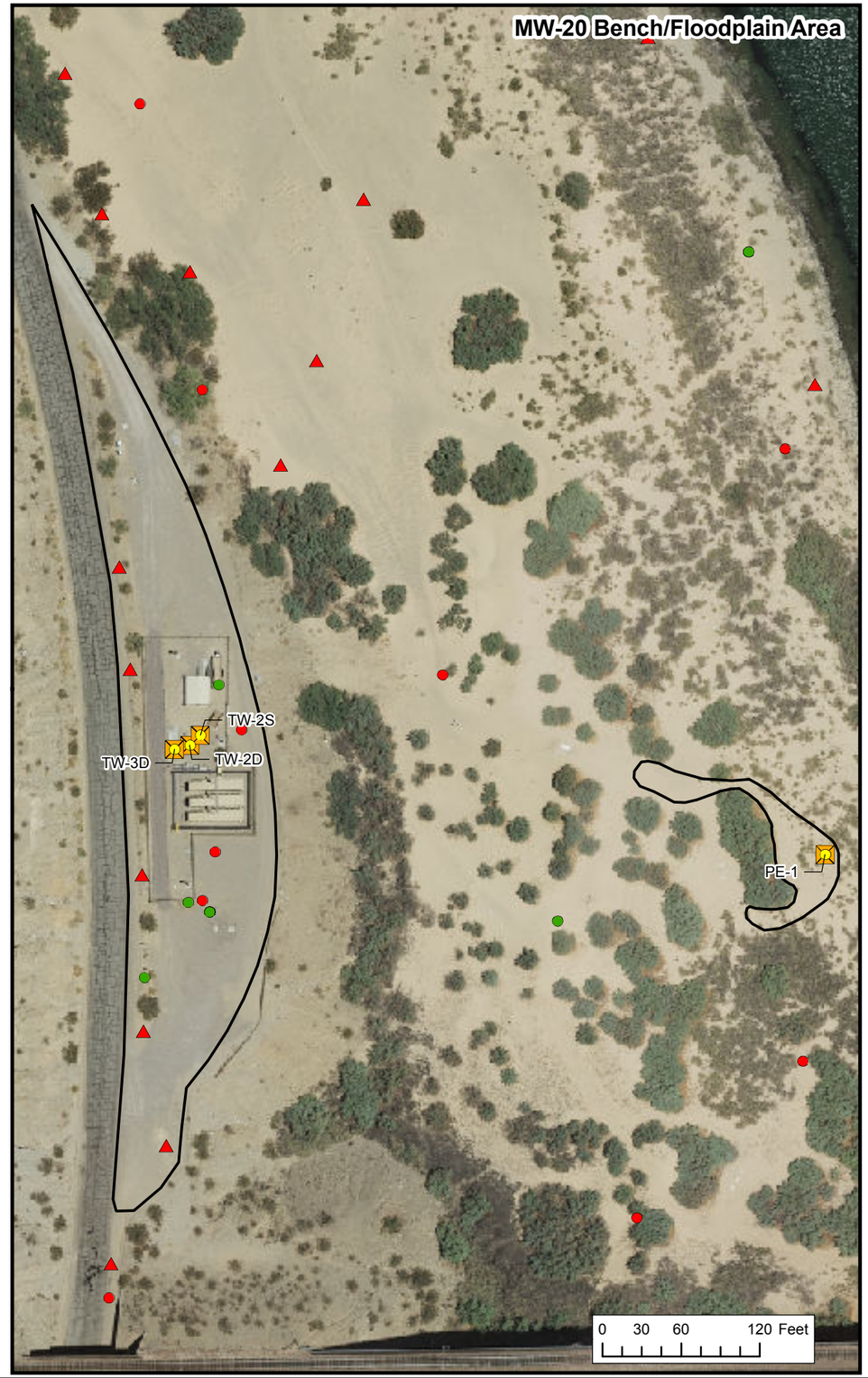
LEGEND

- Proposed Baseline Remedy System Soil Sample Location
- Proposed Baseline Remedy System Well and Vault Soil Sample Location
- Existing Soil Sample Location
- XRF Soil Screening Sample Location
- Decommissioning Soil Sampling Location
- 50-square-foot Sampling Grid

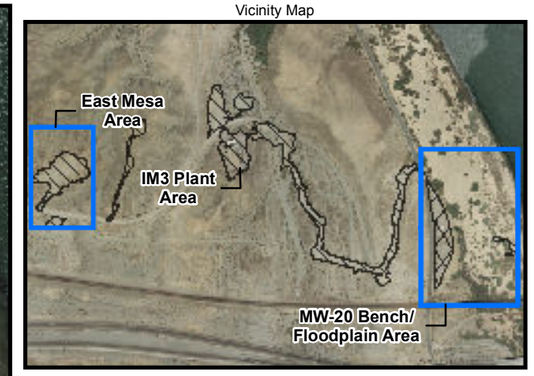
1. Baseline soil samples will be collected at 0.5 feet below ground surface (bgs) for aboveground Remedy System pipelines/conduit runs and from the bottom of the trench for underground Remedy System pipelines/conduit runs approximately every 500 linear feet along proposed pipeline/conduit runs.
2. Baseline soil samples will be collected at 1 foot bgs at each new Remedy System monitoring, extraction, injection, and recirculation well and at 0.5 feet bgs from the bottom of the associated well vault.
3. X-Ray Fluorescence (XRF) screening samples will be collected from surface soil or 0.5 feet bgs buildings, foundations or pavement/gravel. Results of the XRF screening will be screened against Topock Specific Background Values (if available), and residential screening levels (screening levels). If XRF metal results exceed applicable screening levels, an additional soil sample will be collected at the same location and sent to an offsite laboratory for analysis. If none of the XRF screening samples exceed screening levels, additional soil samples (minimum of 10 soil samples) will be collected at the XRF screening locations in operational areas or areas where known releases occurred within each AOC.
4. Decommissioning soil samples will be collected from 0.5 feet below the injection/extraction well vaults.

FIGURE 7-1
PROPOSED SAMPLE LOCATIONS AT IM3 AND MW-20 BENCH
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



Vicinity Map



LEGEND

- Proposed Baseline Remedy System Soil Sample Location
- Proposed Remedy System Well and Vault Soil Sample Location
- Existing Soil Sample Location
- Decommissioning Soil Sampling Location
- Injection Well
- Extraction Well
- Restoration area

1. Baseline soil samples will be collected at 0.5 feet below ground surface (bgs) for aboveground Remedy System pipelines/conduit runs and from the bottom of the trench for underground Remedy System pipelines/conduit runs approximately every 500 linear feet along proposed pipeline/conduit runs.
2. Baseline soil samples will be collected at 1 foot bgs at each new Remedy System monitoring, extraction, injection, and recirculation well and at 0.5 feet bgs from the bottom of the associated well vault.
3. X-Ray Fluorescence (XRF) screening samples will be collected from surface soil or 0.5 feet bgs buildings, foundations or pavement/gravel. Results of the XRF screening will be screened against Topock Specific Background Values (if available), and residential screening levels (screening levels). If XRF metal results exceed applicable screening levels, an additional soil sample will be collected at the same location and sent to an offsite laboratory for analysis. If none of the XRF screening samples exceed screening levels, additional soil samples (minimum of 10 soil samples) will be collected at the XRF screening locations in operational areas or areas where known releases occurred within each AOC.
4. Decommissioning soil samples will be collected from 0.5 feet below the injection/extraction well vaults.

FIGURE 7-2
PROPOSED SAMPLE LOCATIONS AT IM3 INJECTION WELLS, EXTRACTION WELLS, AND THE INJECTION WELL SUPPORT STRUCTURE

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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SECTION 8

Restoration and Demobilization

8.1 General Restoration Approach

This Work Plan presents the general approach for restoration of the areas originally affected by IM-3 operations. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed.

As stated in the responses to comments on the 60% design (response to comment [RTC] #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.

Implementation of this Work Plan and the Site-Specific IM-3 Restoration Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities, by grading, contouring, and revegetating the site. This Work Plan and the Site-Specific IM-3 Restoration Plan will meet the requirements of the EIR MMRP (BIO-2c); the PA (Stipulation V); the 2006 Settlement Agreement between PG&E and FMIT (Section VII); the Consent Decree between the federal government and PG&E; and other applicable requirements.

8.1.1 Restoration Areas

In July 2005, PG&E estimated the total area of floodplain and upland land disturbed by IM-3 construction activities to be approximately 8.0 acres. Of these 8.0 acres, approximately 3.9 acres are on ground that was previously significantly disturbed[3] and 4.1 acres are previously undisturbed land. Of the 4.1 acres, approximately 1.2 acres are located on public (BLM) land and 2.9 acres are located on land owned by FMIT (previously owned by PG&E). A detailed breakdown of this estimate and a description of the methods used to generate this estimate are documented in the IM-3, Land Area Use memorandum, dated July 8, 2005 (see Appendix H).

In addition to the 8.0 acres identified in Appendix H, approximately 1.3 acres that comprise the MW-20 Bench Facility, will be restored, with the exception of any facilities associated with the final remedy. The MW-20 Bench area was not included in the IM-3 Land Area Use memorandum as an area originally affected by IM-3 operations. However, three IM-3 extraction wells and Valve Vault No. 1 are located on this bench and will be decommissioned as a part of IM-3; therefore, this area is included as an area to be restored.

The total combined area to be restored in the floodplain and upland areas is approximately 9.3 acres. No additional undisturbed land outside of the estimated 9.3 acres is intended to be disturbed by IM-3 decommissioning activities. However, if land outside of the estimated 9.3 acres (excluding the proposed staging

[3] The July 2005 Land Area Use Memorandum noted that "Various past activities have resulted in significant previous disturbance of the area where the IM-3 construction is occurring. The area is traversed by a major railway line, several gas pipelines, historic U.S. Route 66, and the National Old Trails Highway. Portions of the area were disturbed by a former gravel quarry, roadside debris piles, World War II era military training exercises, and a former roadhouse/ restaurant adjacent to the IM-3 project site boundary. During the design of the IM-3 facilities, much care was taken to utilize these previously disturbed areas wherever possible. Trenching was routed along existing roadways and pipeline right of ways. The treatment plant and staging areas were located in the area previously disturbed by gravel quarrying during the construction of the former U.S. Route 66 highway."

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areas that will have ongoing activities) is disturbed during IM-3 decommissioning, it will be restored in accordance with the IM-3 Restoration Plan.

Primary IM-3 decommissioning activities will be restricted to the 9.3 acres identified and to the old rock quarry area (owned by FMIT and BLM), which is outside of the 9.3 acres. The anticipated work areas (general exclusion, primary support, and contaminant-reduction zones) will be within the 9.3 acres and the old rock quarry area. The rock quarry area will only be used for displaced materials storage, concrete crushing, potential recycling, reuse storage, and equipment staging. Established roads and access pathways will be maintained during decommissioning and restoration activities. After demobilization, the condition of established roads and access pathways will be returned to pre-mobilization condition.

Some staging areas identified for use during IM-3 decommissioning are outside of the identified 9.3 acre boundary. These areas include only ground that has been previously significantly disturbed that contains limited to no vegetation. These areas are reserved for either temporary facilities or staging activities, with only the exception of the old rock quarry area. Some of the identified staging areas will have ongoing activities (e.g. the Compressor Station, the Transwestern Metering Bench, the MW-24 Bench, the evaporation ponds area, the trailer park area in Moabi Regional Park, the parking areas off I-40, etc.). Given the sparse vegetation in the proposed staging areas outside the 9.3 acres and the ongoing activities, no formal site restoration and revegetation plan is anticipated. After demobilization, the condition of areas that were previously significantly disturbed outside of IM-3 construction and decommissioning activities will be returned to pre-mobilization condition. Figure 8-1 shows the IM-3 decommissioning work zones with an overlay of the 8.0 acres identified in the Land Area Use memorandum and the 1.3 acres that comprise the MW-20 Bench. This figure also identifies the property owners of areas included in the IM-3 decommissioning work zone.

8.1.2 Restoration Guidelines

After the aboveground IM-3 infrastructure and components have been decommissioned as discussed in Section 4, the land within the work zone will be returned to a safe condition prior to commencing restoration activities. To return the land to a safe condition, excavated infrastructure, such as buried well and pipeline vaults, partially buried buildings, the IM-3 Treatment Plant foundation, and trenches excavated to remove utility lines, will be backfilled with displaced material or foreign fill and compacted. Excess displaced material from the Final Remedy and displaced material from IM-3 Decommissioning activities may be used for backfill after the materials are tested and proven to be suitable for this use. Displaced material is defined as material removed from the earth as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The handling and disposition of displaced material will be in accordance with the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California*, which is Appendix F. Foreign fill may be used if there is not enough displaced site material to backfill the excavated area or if the displaced material is not suitable for backfilling a particular area.

Backfilling and grading the decommissioned IM-3 infrastructure areas will be coordinated with the selected remedial action for AOC 29 and AOC 30. If remedial action alternative selection for AOC 29 and AOC 30 is not complete at the time of subsurface infrastructure decommissioning, temporary controls, such as barricades or gravel, may be placed at excavated areas to render the locations safe until the final remedial action for AOC 29 and AOC 30 is selected and implemented, and the final backfilling and grading is established.

Following backfill and compaction, light grading may be required to provide proper drainage and to control erosion. Grading, contouring, drainage, and erosion control plans for the identified areas to be restored will be designed and included in the IM-3 Restoration Plan. Final grading and contouring will occur prior to revegetating the identified disturbed areas.

The following general steps will be conducted during restoration:

1. Verify that the above- and below-grade components, with the exception of any facilities associated with the final remedy, have been decommissioned in accordance with Section 4.

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2. Verify soil confirmation sampling is complete, in accordance with Section 7, and that remedial actions selected for AOC 29 and AOC 30 are implemented.
3. In coordination with the selected remedial action for AOC 29 and AOC 30, backfill holes or trenches created during the removal of IM-3 infrastructure or components with either displaced materials in accordance with Appendix F or with foreign fill.
4. Grade, contour, and compact the soil in accordance with the grading, drainage, and erosion control plans included in the Site-Specific IM-3 Restoration Plan.
5. Revegetate the area in accordance with the Site-Specific IM-3 Restoration Plan.
6. PG&E will seek opportunity with affected Tribes for blessings or other ceremonies before, during and after physical restoration activities.

The following section describes a procedural habitat restoration and revegetation approach, because they pertain to the areas to be restored.

8.1.3 Habitat Restoration and Revegetation

Restoration in the floodplain and other habitats subject to the jurisdiction of USACE and CDFW will be accomplished according to EIR measure BIO-1 as well as the substantive requirements of the CWA, Section 404 and CDFW Code Section 1602. Restoration in upland areas will be accomplished according to EIR measure BIO-2c and CUL-1a-5. Elements of the restoration of habitat within these areas will be as follows:

1. **Transplantation**–A qualified botanist prepared a Mitigation and Monitoring Plan for Culturally Significant Plants (CH2M HILL 2014i) that is included as Appendix A of the CIMP by transplanting indigenous plants to an onsite location, or providing a 2:1 ratio replacement to another location agreed upon between PG&E and members of the Interested Tribes, as described in *Topock Compressor Station Groundwater Remediation Project Revised Ethnobotany Survey Report* (CH2M HILL, 2014j). If special-status plants are found within the restoration area, transplantation will follow guidelines presented in *Topock Compressor Station Groundwater Remediation Project Revised Floristic Survey Report* (CH2M HILL, 2013g). Mature plants within Key Views 5 and 11 that are affected by restoration activities will need to be transplanted according to the Aesthetics and Visual Resources Protection and Revegetation Plan (CH2M HILL 2014d) per EIR measures AES-1 and AES-2. Transplanting measures from the Habitat Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014e) will be implemented in CDFW jurisdictional areas.
2. **Planting**–A qualified botanist will prepare a planting/monitoring plan as part of the Site-Specific IM-3 Restoration Plan that describes the planting of native bare root stock or container seedlings for restoring the site. Planting recommendations from *Topock Compressor Station Groundwater Remediation Project Revised Ethnobotany Survey Report* (CH2M HILL, 2014j), *Topock Compressor Station Groundwater Remediation Project Revised Floristic Survey Report* (CH2M HILL, 2013g), the Aesthetics and Visual Resources Protection and Revegetation Plan (CH2M HILL 2014d) and the Habitat Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014e) will be referenced in the Site-Specific IM-3 Restoration Plan.
3. **Seed mix**–If reseeding is a preferred method for restoration, a generalized seed mix for the vegetation community will be developed based on plant species observed in the general area. The community-specific seed mix will be developed with specified seed quantities and application rates per acre prior to completion of the decommissioning. The seed mix will be developed to be comparable to species diversity in similar undisturbed habitats adjacent to the restoration area.
4. **Performance criteria**–The performance standards/success criteria will focus on quantifiable cover attributes, including percent bare ground, percent cover, and overall species diversity based on the seed mix and volunteer species found within the restoration areas. EIR measure CUL-1a-5 requires a minimum 75 percent survivorship for indigenous plant species transplanted or planted within the restoration area.

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5. **Maintenance**–The restoration area will be maintained and monitored for a minimum of 3 to 5 years. A specific schedule of pre- and post-planting maintenance, monitoring, and reporting activities will be included in the Site-Specific IM-3 Restoration Plan.
6. **Monitoring**–Monitoring frequency will be included in a schedule in the Site-Specific IM-3 Restoration Plan. The monitoring will include maintenance and a performance evaluation. A qualified biologist or restoration specialist will conduct the monitoring to determine the effectiveness of maintenance activities at the restoration area and prescribe additional maintenance activities that may be required to meet performance criteria.
7. **Reporting**–The data collected in a given year will be compiled and included in an annual monitoring report. Annual monitoring reports will be submitted to DTSC, Tribes, and BLM. The performance reports will describe the existing conditions of the restoration area and compare annual success criteria with field conditions, identify problems, and recommend remedial measures necessary for successfully restoring the site.
8. **Adaptive management**–Adaptive management is a flexible, iterative approach to the long-term management of the site in the event of unforeseen circumstances. Adaptive management will use regular quantitative assessments and rapid qualitative assessment data to assess the health of vegetation communities at the restoration site. In the event of damage to any part of the site, these data will be used to assist with repairing the affected areas.

8.2 Demobilization

Demobilization includes the removal of equipment, material, the security fence and gate around the IM-3 Treatment Plant, and personnel from the project site. Demobilization will occur after identified IM-3 infrastructure and components are removed, waste streams are properly managed and transported offsite, soil confirmation sampling and/or appropriate soil remediation is completed, all PG&E punch list items have been addressed, and the site is left in a safe and restored condition in accordance with this Work Plan and amendments to this Work Plan. (Following substantial completion of the work, PG&E will conduct a formal inspection of the project site and generate a punch list of items to be addressed prior to final completion of the work). The timing of demobilization will be coordinated with the timing of the IM-3 restoration.

8.3 Development of Future Detailed, Site-Specific IM-3 Restoration Plan

As previously mentioned, in parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed.

As stated in the responses to comments on the 60% design (response to comment [RTC] #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.

This Work Plan and the Site-Specific IM-3 Restoration Plan will meet the requirements of the EIR MMRP (BIO-2c); the PA (Stipulation V); the 2006 Settlement Agreement between PG&E and FMIT (Section VII); the Consent Decree between the federal government and PG&E; and other applicable requirements. Specifically, the site-specific restoration plan will include the following key chapters, at a minimum:

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- **Chapter 1: Scope of Restoration including Goals and Objectives -** This chapter will define the scope, goals, and objectives of restoration. The general framework is as follows:
  - **Scope of Restoration**: This will be an expansion of the write-up in Section 8.1.1 (Restoration Areas) and will include additional details that will become available after the decommissioning and demobilization are complete. For example, a detailed description of each restoration area will be provided, along with ground and/or aerial photos of the area prior to the construction of IM-3 (as available) and after decommissioning/demobilization are complete. Similarly, topographic information will also be presented. In addition, description of areas used during decommissioning activities that are outside of the 9.3 acres described in Section 8.1.1, will be presented and returned to pre-mobilization condition.
    - Not included in the scope of this restoration are: a) areas proposed for use by the groundwater remedy *[these areas will be restored after the groundwater remedial facilities are decommissioned]* and b) proposed staging areas that will have ongoing activities and established roadways and access pathways *[these areas will be returned to their pre-mobilization condition]*.
  - **Restoration Goals**: Implementation of Site-Specific IM-3 Restoration Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities**.**
  - **Restoration Objectives:** Measureable objectives will be developed based on the restoration goals. The objectives describe the actions that will be completed as part of the restoration to attain the goals. The objectives will be measurable through monitoring.
- **Chapter 2: Restoration Design and Adaptive Management –** This chapter will present planned restoration design to meet the project objectives. Also presented will be an adaptive management approach that allows for evaluation of the effectiveness of the restoration through monitoring, and long-term management of the site in the event of unforeseen circumstances. Example of details to be presented in this chapter are:
  - Grading, drainage, and erosion control plans (engineering drawings) that specify how the soil will be graded, contoured, and compacted.
  - A planting/monitoring plan that describes the planting of native bare root stock or container seedlings for restoring the site.
  - Performance criteria, monitoring strategies, and monitoring frequency.
  - Process for rapid qualitative assessment of data to assess the health of vegetation communities at the restoration site.
- **Chapter 3: Implementation and Reporting –** This chapter will discuss implementation details and will specify activities to be conducted (including site maintenance). Reporting format and frequency will also be discussed.

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LEGEND

- Property Boundary
- Area Used* for IM-3 [Per IM No. 3, Land Area Used Memorandum (July 2005)]
- MW-20 Bench Restoration Area (including PE-1), subject to the continued use of remedial facilities

Notes:

1. * - The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.
2. The MW-20 bench area was not included in the Interim Measures No. 3, Land Area Use Memorandum (July 2005) as an area originally affected by IM-3 operations. However, three IM-3 extraction wells and Valve Vault No.1 are located on this bench and will be decommissioned as a part of IM-3, so the MW-20 bench is included as an area to be restored. The approximate area on the MW-20 bench to be restored is 1.27 acres.
3. The total combined area to be restored in the floodplain and upland areas is approximately 9.3 acres (of which 4.11 acres are previously undisturbed lands). No additional undisturbed land outside of the estimated 9.3 acres is intended to be disturbed by IM-3 decommissioning activities. However, if land outside of the estimated 9.3 acres (excluding the proposed staging areas that will have ongoing activities) is disturbed during IM-3 decommissioning, it will be restored in accordance with the future IM-3 Restoration Plan.

0 200 400 800 Feet

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FIGURE 8-1
PLANNED IM-3 RESTORATION AREAS
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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SECTION 9

Permits and Authorizations, Reporting, and Schedule

9.1 Anticipated Permits and Authorization for IM-3 System Decommissioning and Closure

Table 9-1 lists existing IM-3 operating permits and authorizations that will be required to be closed to complete IM-3 system decommissioning and closure. These permits and authorizations have specific closure requirements that will require action prior to IM-3 system shutdown, decommissioning and removal, and final closure and are listed under the "Close-out Comments" column of Table 9-1. In addition to compliance with the above, implementation of Work Plan activities will also require prior approval from DTSC and DOI pursuant to their authority under RCRA and CERCLA, respectively. Additional approvals and authorizations for implementation of this Work Plan are as follows below. Note that because IM-3 system shutdown, decommissioning, removal and restoration is part of a CERCLA response action, implementation of Work Plan activities conducted onsite are covered under the permit exemption codified in Section 121(e)(1) of CERCLA. While the permit exemption applies to the administrative or procedural elements (e.g., preparing and submitting permit applications and obtaining permits), the substantive requirements of the applicable laws remain.

Agency/Organization	Approvals and Authorizations
DOI	Approval of this Work Plan from DOI is required. It is PG&E's understanding that DOI's approval constitutes permission to implement this Work Plan and authorization to access federal properties. No other application of approval for access to federal lands will be required before field implementation. Notification will be provided to land managers prior to field implementation.
DTSC	Approval of this Work Plan from DTSC is required.
CDFW/USACE	The substantive requirements of CDFW Code Section 1602 and CWA Section 404 will be met in the future, as applicable. The CWA 404 and CDFW avoidance and minimization measures are included in an appendix of the Construction/Remedial Action Work Plan.
BLM/USFWS	Project activities will be consistent with the substantive requirements of applicable ARARs, including but not limited to the Endangered Species Act and the National Historic Preservation Act. Conservation measures included in the Programmatic Biological Assessment (PBA) will be implemented during project activities.
San Bernardino County	Substantive requirements of a demolition permit and an encroachment permit for activities in the County right-of-way.
CUPA	Closure requirements for facilities operating under the Conditional Authorization Tier for Hazardous Waste Treatment include: • Title 22 CCR, Section 66265.111 requires generator to close facility in a manner that minimizes further maintenance and is protective of public health and the environment. • Title 22 CCR Section 66265.114 requires generator to properly dispose of contamination generated during closure. • CA Health and Safety Code, Division 20, Chapter 6.5, Section 25200.3(g) specifies the generator shall remove or decontaminate all waste residues, containment system components, soils, and structures or equipment contaminated with hazardous waste from the unit; also, a generator conducting treatment who permanently ceases operation shall, upon completion of all activities required under this subdivision, provide written notification, in person or by certified mail, with return receipt requested, to the department and (the CUPA).
FMIT	Project activities are covered under the Settlement Agreement and the Easement Agreement between PG&E and the FMIT
Private Utility/Pipeline Companies	As needed, activities located in the right-of-way of any pipelines/utilities will be subject to prior coordination with the owner/manager of the associated facilities. Prior to implementing the subject activities, Underground Service Alert notifications will be made so that utility companies can locate and mark the locations of their underground facilities.

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9.2 Biological Evaluation

A biological evaluation will be performed to outline the IM-3 decommissioning, removal, and restoration activities as they relate to federally listed species in the area. The USFWS issued a concurrence letter on July 7, 2014 for the Final Remedy Programmatic Biological Assessment (PBA) which addressed a variety of activities, including activities identified in this Work Plan. The intent of the PBA is to provide programmatic coverage of these actions and avoid the need for individual project-specific consultations under the federal ESA. The federally listed species evaluated include the southwestern willow flycatcher (*Empidonax traillii extimus*), Yuma clapper rail (*Rallus longirostris yumanensis*), Mojave desert tortoise (*Gopherus agassizii*), bonytail chub (*Gila elegans*), razorback sucker (*Xyrauchen texanus*), Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and Sonoran desert tortoise (*Gopher morafkai*).

9.3 Archeological Surveys and Reviews/Historical Sites Evaluation

The area subject to activities described in this Work Plan was included in an archaeological and historical site survey of the Area of Potential Effect (Applied Earthworks, 2007).

Archaeological and historic sites within or near the work areas were previously surveyed and recorded in 2007, and placed on a GIS layer for planning purposes. A number of both archaeological and historic sites are adjacent to most work areas. Archaeological and historic sites will be avoided to the maximum extent practicable during the implementation of this Work Plan. The archaeological and historic sites will be protected or avoided, using appropriate protective measures, from work activities, and will be monitored during the course of work. The PG&E Field Contact Representative(s) will be responsible for providing cultural sensitivity training to the workers, along with any of the Interested Tribes that choose to participate, prior to work commencing. This sensitivity training will include the following topics:

- Cultural significance of the Topock Cultural Area
- Appropriate behavior to use within the Topock Cultural Area
- Activities that are to be avoided in the Topock Cultural Area
- Consequences in the event of noncompliance

The TCS site and adjacent lands are contained within a larger geographic area that is considered sacred by FMIT and by other Native American tribes. The Tribes believe that the environmental, cultural, and spiritual resources may not be physically perceptible, but nonetheless exist. DTSC has concluded within the January 2011 certified EIR (DTSC, 2011b) that the 779-acre project area (along with the Topock Maze), which encompasses a large portion of the IM-3 Property, “appears to qualify as a historic resource under CEQA [California Environmental Quality Act] as an area that is significant in the social and cultural annals of California,” and the BLM also has determined that a traditional cultural property or property of traditional religious and cultural significance that is eligible for listing on the National Register of Historic Places exists in the area of the Topock project, within the Area of Potential Effect (APE) (consisting of 1,600 acres of surface area and a section of the Colorado River), which also encompasses the IM-3 Property (DTSC, 2011b).

Therefore, work activities will be conducted in a manner that recognizes and respects these resources and the spiritual values of the surrounding lands. PG&E understands that the environmental, cultural, and spiritual resources may not be physically perceptible. To this end, site orientation will stress that site activities must be conducted in a respectful manner that is conscious of this context. In addition, PG&E will contact the Tribes that have expressed a desire for tribal monitors. If there is a desire to monitor this work, PG&E will make arrangements for field activity monitoring, as acceptable to the landowner and consistent with security and health and safety considerations.

9.4 Schedule and Reporting

For preliminary planning purposes, IM-3 decommissioning and removal is estimated to take approximately 15 months, and restoration is estimated to take approximately 6 years (of which approximately 3-5 years is for

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implementation of the restoration plan). Figure 9-1 presents the estimated schedule for IM-3 decommissioning, removal, and restoration; however, it does not include the schedule for IM-3 lay-up (as stated in Section 2.1, IM-3 shut down and lay-up could take up to 3 months). Note that this preliminary schedule could vary based on several factors, for example, inputs from Tribal consultation, stakeholders' inputs, and agencies' directions; inputs from contractors selected for implementation; timing of actual activities (e.g., could take longer during southwestern willow flycatcher season); content of actual approved plans (this work plan, the future Site-Specific IM-3 Restoration Plan), etc.

During the decommissioning and removal period, PG&E will prepare and submit quarterly electronic progress reports to DTSC and DOI. After completion of the decommissioning and removal, a report of decommissioning and removal (demolition) activities will be prepared. The report will address the following:

1. Decommissioning and removal (demolition) activities
2. Waste management
3. Confirmation sampling activities and results
4. Log listing quantities and receptor of recovered equipment and materials

The report will be submitted approximately 12 weeks after the completion of decommissioning activities described in this Work Plan. Reporting during the restoration period will be outlined in the future Site-Specific IM-3 Restoration Plan.

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TABLE 9-1
IM-3 Operating Permits and Authorizations
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Current Permits and Authorizations	Agency	Permit/Authorization Identification Number	Closeout Comments
IM	BLM	Action Memorandum No. 3 issued 9/17/2000 authorized IM-3 activities on BLM land	Inform BLM in writing during the following stages: • IM-3 treatment shut down • Prior to IM-3 removal actions • After removal and sampling
Hazardous Waste Generator	USEPA	USEPA (Hazardous Waste) Identification No. CAR000151118	PG&E Topock Remediation Project to use USEPA ID No. CAR000151118 for Final Remedy hazardous waste shipments. When IM-3 is closed, revisit Form to update with no references to IM-3.
Underground Injection Well(s)	USEPA	USEPA Underground Injection Well(s), Class V Inventory Notification (USEPA Form 7520-16 "Inventory of Injection Wells') was submitted 3/24/2005; referenced USEPA ID No. CAR000151118	Decommissioning and removing two injection wells. Write and send letter to USEPA.
IM-3 ARARs for waste discharge	DOI Regional Water Board	IM-3 ARARs documented in Attachment A to Letter Agreement issued July 26, 2011, from the Regional Water Board to DOI, and the subsequent Letter of Concurrence issued August 18, 2011, from DOI to the Regional Water Board.	When IM-3 is not in operation, or no discharge occurs, then provide letter stating such in place of quarterly reports. Inform DOI and Regional Water Board in writing: • Prior to IM-3 removal actions • After removal and sampling have occurred
Stormwater Permit, Industrial Activities	California State Water Resource Control Board Regional Water Board	General Permit No. CAS000001, Notice of Intent for coverage filed April 5, 2005, IM-3 WDID No. 7 36I 019443	File NOT for coverage under General Permit

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TABLE 9-1
IM-3 Operating Permits and Authorizations
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Current Permits and Authorizations	Agency	Permit/Authorization Identification Number	Closeout Comments
Conditional Authorization Tier for Hazardous Waste Treatment at IM-3	CUPA – San Bernardino County Fire Department Hazardous Materials Division	Facility ID No. FA36001, Conditional Authorization Notification update sent to CUPA October 6, 2010	The following hazardous waste treatment facility closure requirements will be met by following the procedures outlined in this Work Plan: • Title 22 CCR, Section 66265.111 requires generator to close facility in a manner that minimizes further maintenance and is protective of public health and environment. • Title 22 CCR Section 66265.114 requires generator to properly dispose of contamination generated during closure.
IM-3 Hazardous Materials Business Plan (Business Emergency/Contingency Plan)	CUPA	Facility ID No. FA0009150	Pursuant to the requirements of CHSC Section 25503, facilities that handle hazardous materials (including hazardous waste) in threshold amounts of 55 gallons, 500 pounds, or 200 cubic feet, PG&E will submit an annual HMBP update to CUPA by March 1. If IM-3 has onsite or handles hazardous materials in the threshold amounts, PG&E will submit an annual HMBP update to the CUPA by March 1. PG&E will inform the CUPA in writing within 30 days of removing hazardous materials from IM-3 to below the threshold amounts.
Use Permit/Occupancy Permit	San Bernardino County, Land Use Services Department	DS1455-257/2004/DR01	Inform County Department in writing when improvements (including laboratory) are decommissioned.
Sewage Holding Tank Permit	San Bernardino County, Public Health Department	Facility ID FA0013860; Permit No. PT0018324	Inform County Department in writing when sewage holding tank is removed. Call the County Department of Land Use Services, Division of Building and Safety to schedule a final inspection to confirm closure.
IM-3 Diesel Powered Backup/ Emergency Power Generator	Mojave Desert Air Quality Management District (MDAQMD) California Air Resources Board (CARB)	MDAQMD Authority to Construct No. E009727 CARB Portable Equipment Registration Program No. 120168	Leased to CH2M HILL/OMI from AG Engineering. Inform MDAQMD in writing within 5 days of generator being moved offsite.

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TABLE 9-1
IM-3 Operating Permits and Authorizations
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Current Permits and Authorizations	Agency	Permit/Authorization Identification Number	Closeout Comments
Backhoe and Forklift	CARB	CARB Portable Equipment Registration Program Nos.	Leased to CH2M HILL OMI from Jules and Associates. Coordinate with Jules and Associates to inform CARB within 5 days of backhoe and forklift being moved offsite.
Portable (trailer mounted) Air Compressor	CARB	CARB Portable Equipment Registration Program No. 137682	Owned by PG&E. Inform CARB within 5 days of portable air compressor being moved offsite.
Well Permits	San Bernardino County, Department of Public Health - Division of Environmental Health Services	Each well has a County well drilling permit number	The 4 extraction wells (PE-1, TW-3D, TW-2D, and TW-2S), and 2 injection wells (IW-2 and IW-3) will be decommissioned. Inform County Department in writing when wells are properly decommissioned. The County of San Bernardino is the local permitting agency for site wells located in California and has adopted the California Department of Water Resources standards. California Well Standards identify well destruction (or decommissioning for this Work Plan) requirements for both water supply wells, and MWs and exploratory boreholes. The general requirements for both well types are similar; however, special considerations for MWs and exploratory boreholes address the potential for these well types to be in areas of known or potential pollution or contamination.
Air Compressor Pressurized Vessel(s)	Cal-OSHA	Pressurized Vessel Permit	Inform Cal-OSHA in writing when pressurized vessel(s) are removed from site.

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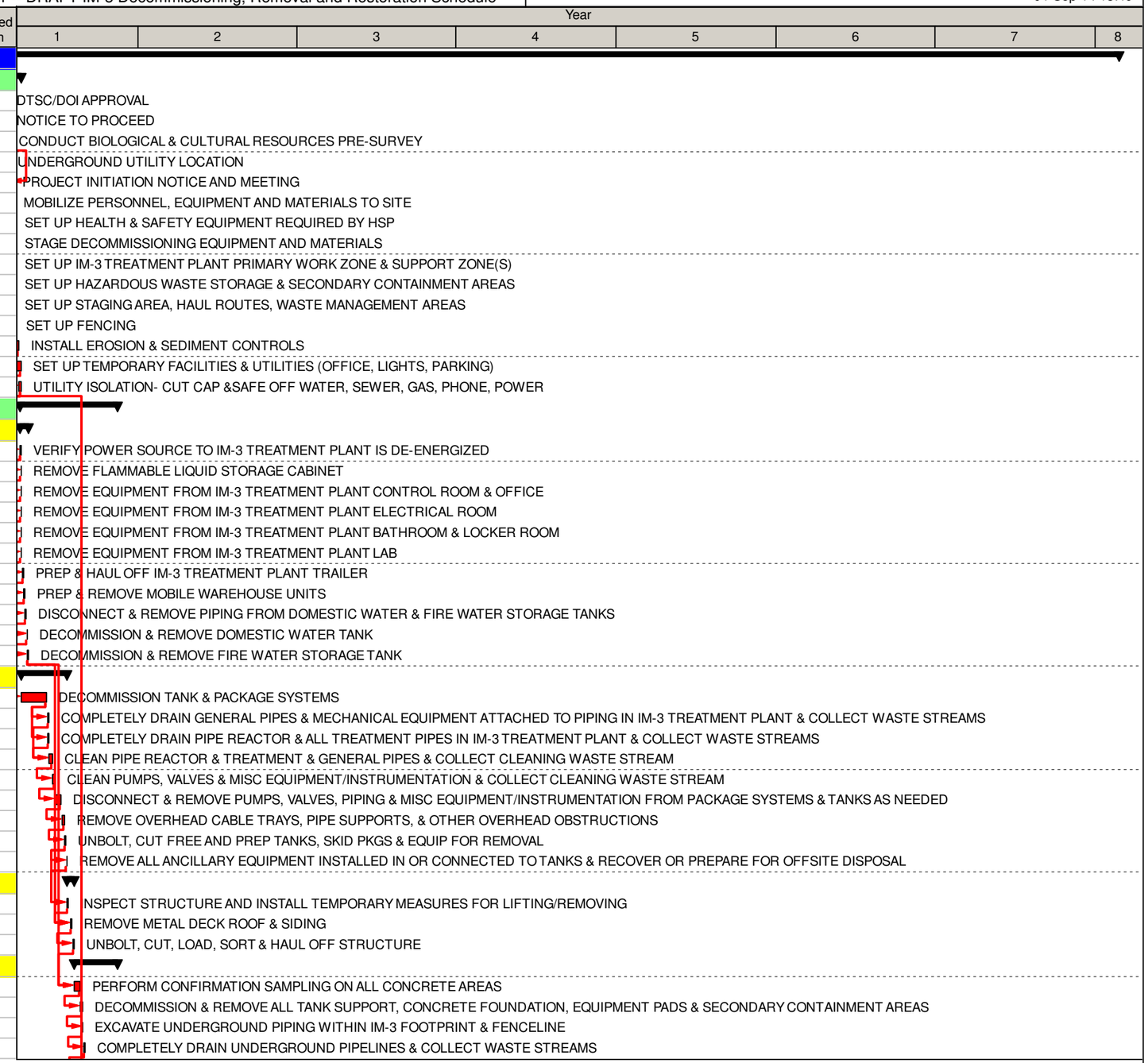
FIGURE 9-1 -- DRAFT IM-3 Decommissioning, Removal and Restoration Schedule

04-Sep-14 13:49

Activity ID	Activity Name	Estimated Duration
IM-3 Decommissioning		**1824**
PRE-DECOMMISSIONING		**27**
A1010	DTSC/DOI APPROVAL	0
A1020	NOTICE TO PROCEED	1
A3070	CONDUCT BIOLOGICAL & CULTURAL RESOURCES PRE-SURVEY	5
A1060	UNDERGROUND UTILITY LOCATION	2
A2060	PROJECT INITIATION NOTICE AND MEETING	10
A2930	MOBILIZE PERSONNEL, EQUIPMENT AND MATERIALS TO SITE	1
A1110	SET UP HEALTH & SAFETY EQUIPMENT REQUIRED BY HSP	2
A1150	STAGE DECOMMISSIONING EQUIPMENT AND MATERIALS	2
A1070	SET UP IM-3 TREATMENT PLANT PRIMARY WORK ZONE & SUPPORT ZONE(S)	3
A1100	SET UP HAZARDOUS WASTE STORAGE & SECONDARY CONTAINMENT AREAS	3
A1080	SET UP STAGING AREA, HAUL ROUTES, WASTE MANAGEMENT AREAS	4
A1170	SET UP FENCING	5
A1190	INSTALL EROSION & SEDIMENT CONTROLS	8
A1090	SET UP TEMPORARY FACILITIES & UTILITIES (OFFICE, LIGHTS, PARKING)	10
A1220	UTILITY ISOLATION- CUT CAP &SAFE OFF WATER, SEWER, GAS, PHONE, POWI	2
DECOMMISSION IM-3 TREATMENT PLANT		**160**
IM-3 TREATMENT PLANT TRAILER, MOBILE WAREHOUSE UNITS & UTILITY WATER		**14**
A2090	VERIFY POWER SOURCE TO IM-3 TREATMENT PLANT IS DE-ENERGIZED	1
A2850	REMOVE FLAMMABLE LIQUID STORAGE CABINET	1
A2100	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT CONTROL ROOM & OFFI(	2
A2570	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT ELECTRICAL ROOM	2
A2580	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT BATHROOM & LOCKER R	2
A2590	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT LAB	2
A2110	PREP & HAUL OFF IM-3 TREATMENT PLANT TRAILER	3
A2720	PREP & REMOVE MOBILE WAREHOUSE UNITS	2
A1280	DISCONNECT & REMOVE PIPING FROM DOMESTIC WATER & FIRE WATER STO	2
A2740	DECOMMISSION & REMOVE DOMESTIC WATER TANK	2
A2830	DECOMMISSION & REMOVE FIRE WATER STORAGE TANK	2
PIPES, PUMPS, VALVES, TANKS & PACKAGE SYSTEMS		**76**
A2810	DECOMMISSION TANK & PACKAGE SYSTEMS	44
A3040	COMPLETELY DRAIN GENERAL PIPES & MECHANICAL EQUIPMENT ATTACHED	3
A1250	COMPLETELY DRAIN PIPE REACTOR & ALL TREATMENT PIPES IN IM-3 TREATM	3
A2360	CLEAN PIPE REACTOR & TREATMENT & GENERAL PIPES & COLLECT CLEANIN(	5
A3050	CLEAN PUMPS, VALVES & MISC EQUIPMENT/INSTRUMENTATION & COLLECT CI	5
A1290	DISCONNECT & REMOVE PUMPS, VALVES, PIPING & MISC EQUIPMENT/INSTRUI	10
A2840	REMOVE OVERHEAD CABLE TRAYS, PIPE SUPPORTS, & OTHER OVERHEAD OB	5
A1470	UNBOLT, CUT FREE AND PREP TANKS, SKID PKGS & EQUIP FOR REMOVAL	2
A1310	REMOVE ALL ANCILLARY EQUIPMENT INSTALLED IN OR CONNECTED TO TANK	2
FACILITY SHADE STRUCTURE		**12**
A1330	INSPECT STRUCTURE AND INSTALL TEMPORARY MEASURES FOR LIFTING/RE	2
A2130	REMOVE METAL DECK ROOF & SIDING	3
A1340	UNBOLT, CUT, LOAD, SORT & HAUL OFF STRUCTURE	4
IM-3 TREATMENT PLANT FOUNDATION, SECONDARY CONTAINMENT AREAS & UNI		**71**
A2600	PERFORM CONFIRMATION SAMPLING ON ALL CONCRETE AREAS	10
A2140	DECOMMISSION & REMOVE ALL TANK SUPPORT, CONCRETE FOUNDATION, EQ	3
A2240	EXCAVATE UNDERGROUND PIPING WITHIN IM-3 FOOTPRINT & FENCELINE	2
A2390	COMPLETELY DRAIN UNDERGROUND PIPELINES & COLLECT WASTE STREAMS	2



Actual Work — Critical Remaining Work — Remaining Work — Milestone

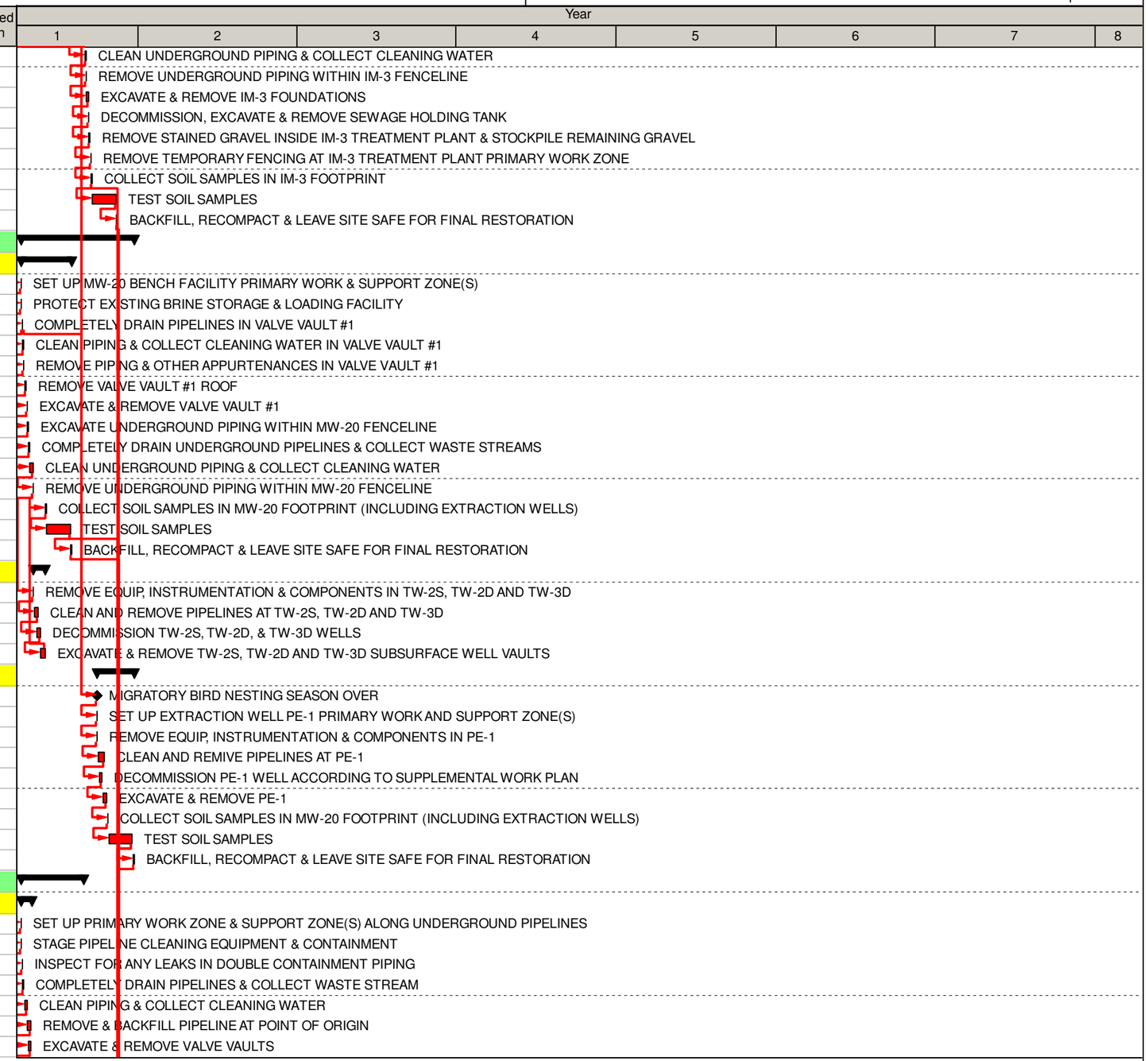
Date	Revision	Checked	Approved
09-08-14	Draft R5		
15-Jul-13	Draft R4		

September 8, 2014

FIGURE 9-1 DRAFT IM-3 Decommissioning, Removal and Restoration Schedule

04-Sep-14 13:49

Activity ID	Activity Name	Estimated Duration
A2380	CLEAN UNDERGROUND PIPING & COLLECT CLEANING WATER	2
A2370	REMOVE UNDERGROUND PIPING WITHIN IM-3 FENCELINE	1
A2150	EXCAVATE & REMOVE IM-3 FOUNDATIONS	3
A2950	DECOMMISSION, EXCAVATE & REMOVE SEWAGE HOLDING TANK	1
A3030	REMOVE STAINED GRAVEL INSIDE IM-3 TREATMENT PLANT & STOCKPILE REM.	2
A3080	REMOVE TEMPORARY FENCING AT IM-3 TREATMENT PLANT PRIMARY WORK Z	1
A2160	COLLECT SOIL SAMPLES IN IM-3 FOOTPRINT	2
A2170	TEST SOIL SAMPLES	40
A2180	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	2
DECOMMISSION MW-20 BENCH FACILITY & EXTRACTION WELLS		186
VALVE VAULT #1 & UNDERGROUND WORK WITHIN MW-20 BENCH FACILITY FENCI		84
A3060	SET UP MW-20 BENCH FACILITY PRIMARY WORK & SUPPORT ZONE(S)	1
A2610	PROTECT EXISTING BRINE STORAGE & LOADING FACILITY	1
A2440	COMPLETELY DRAIN PIPELINES IN VALVE VAULT #1	1
A2450	CLEAN PIPING & COLLECT CLEANING WATER IN VALVE VAULT #1	2
A2460	REMOVE PIPING & OTHER APPURTENANCES IN VALVE VAULT #1	1
A2470	REMOVE VALVE VAULT #1 ROOF	3
A2480	EXCAVATE & REMOVE VALVE VAULT #1	2
A2340	EXCAVATE UNDERGROUND PIPING WITHIN MW-20 FENCELINE	2
A2320	COMPLETELY DRAIN UNDERGROUND PIPELINES & COLLECT WASTE STREAMS	2
A2330	CLEAN UNDERGROUND PIPING & COLLECT CLEANING WATER	5
A2350	REMOVE UNDERGROUND PIPING WITHIN MW-20 FENCELINE	1
A2420	COLLECT SOIL SAMPLES IN MW-20 FOOTPRINT (INCLUDING EXTRACTION WEI	2
A2410	TEST SOIL SAMPLES	40
A2400	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	2
EXTRACTION WELLS TW-2S, TW-2D &TW-3D		19
A2530	REMOVE EQUIP, INSTRUMENTATION & COMPONENTS IN TW-2S, TW-2D AND TV	1
A2540	CLEAN AND REMOVE PIPELINES AT TW-2S, TW-2D AND TW-3D	7
A2960	DECOMMISSION TW-2S, TW-2D, & TW-3D WELLS	7
A2500	EXCAVATE & REMOVE TW-2S, TW-2D AND TW-3D SUBSURFACE WELL VAULTS	8
EXTRACTION WELL PE-1 (no work 5/1-9/30, nesting season)		62
A2820	MIGRATORY BIRD NESTING SEASON OVER	0
A2980	SET UP EXTRACTION WELL PE-1 PRIMARY WORK AND SUPPORT ZONE(S)	1
A2870	REMOVE EQUIP, INSTRUMENTATION & COMPONENTS IN PE-1	1
A2880	CLEAN AND REMIVE PIPELINES AT PE-1	10
A2970	DECOMMISSION PE-1 WELL ACCORDING TO SUPPLEMENTAL WORK PLAN	5
A2890	EXCAVATE & REMOVE PE-1	8
A2900	COLLECT SOIL SAMPLES IN MW-20 FOOTPRINT (INCLUDING EXTRACTION WEI	2
A2910	TEST SOIL SAMPLES	40
A2920	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	2
DECOMMISSION INJECTION WELL FIELD, CONVEYANCE PIPELINES, CONDUITS, & VA		104
UNDERGROUND CONVEYANCE PIPELINES, CONDUITS & VALVE VAULTS		19
A2990	SET UP PRIMARY WORK ZONE & SUPPORT ZONE(S) ALONG UNDERGROUND P	1
A1380	STAGE PIPELINE CLEANING EQUIPMENT & CONTAINMENT	1
A1410	INSPECT FOR ANY LEAKS IN DOUBLE CONTAINMENT PIPING	1
A1420	COMPLETELY DRAIN PIPELINES & COLLECT WASTE STREAM	3
A1430	CLEAN PIPING & COLLECT CLEANING WATER	5
A1440	REMOVE & BACKFILL PIPELINE AT POINT OF ORIGIN	7
A2250	EXCAVATE & REMOVE VALVE VAULTS	5



Actual Work
Critical Remaining Work
Remaining Work
Milestone

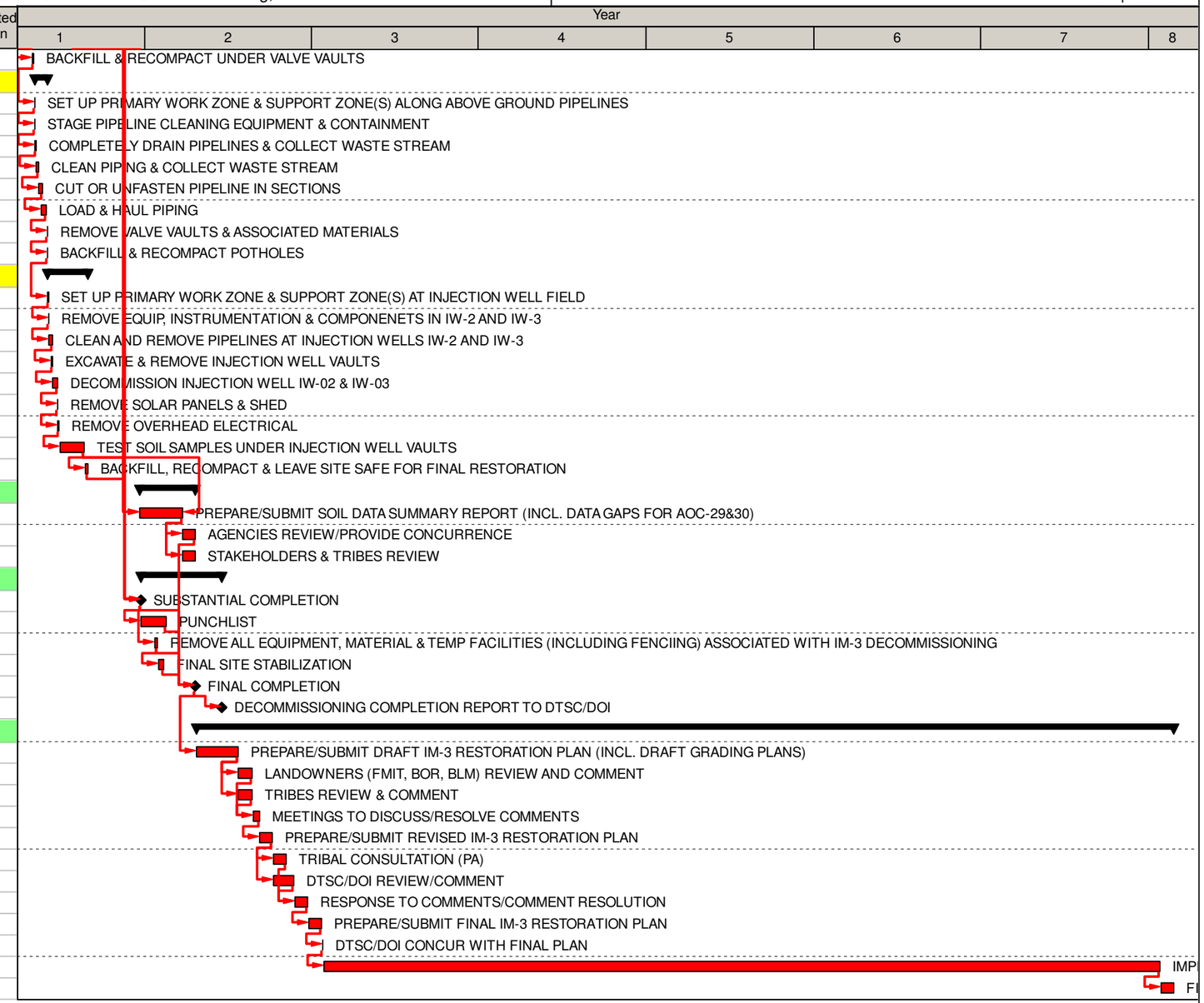
Date	Revision	Checked	Approved
09-08-14	Draft R5		
15-Jul-13	Draft R4		

September 8, 2014

FIGURE 9-1 DRAFT IM-3 Decommissioning, Removal and Restoration Schedule

04-Sep-14 13:49

Activity ID	Activity Name	Estimated Duration
A2290	BACKFILL & RECOMPACT UNDER VALVE VAULTS	2
ABOVEGROUND CONVEYANCE PIPELINES, CONDUIT & VALVE VAULTS		**22**
A3000	SET UP PRIMARY WORK ZONE & SUPPORT ZONE(S) ALONG ABOVE GROUND P	1
A2120	STAGE PIPELINE CLEANING EQUIPMENT & CONTAINMENT	1
A1490	COMPLETELY DRAIN PIPELINES & COLLECT WASTE STREAM	2
A1500	CLEAN PIPING & COLLECT WASTE STREAM	3
A1520	CUT OR UNFASTEN PIPELINE IN SECTIONS	6
A1530	LOAD & HAUL PIPING	7
A2190	REMOVE VALVE VAULTS & ASSOCIATED MATERIALS	1
A1540	BACKFILL & RECOMPACT POTHOLES	1
DECOMMISSION INJECTION WELL FIELD & DRY ELECTRICAL UTILITIES & MISC SIT		**63**
A3010	SET UP PRIMARY WORK ZONE & SUPPORT ZONE(S) AT INJECTION WELL FIELD	1
A2560	REMOVE EQUIP, INSTRUMENTATION & COMPONENETS IN IW-2 AND IW-3	1
A2550	CLEAN AND REMOVE PIPELINES AT INJECTION WELLS IW-2 AND IW-3	5
A2510	EXCAVATE & REMOVE INJECTION WELL VAULTS	3
A2860	DECOMMISSION INJECTION WELL IW-02 & IW-03	7
A2220	REMOVE SOLAR PANELS & SHED	2
A2230	REMOVE OVERHEAD ELECTRICAL	2
A2200	TEST SOIL SAMPLES UNDER INJECTION WELL VAULTS	40
A2300	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	5
SOIL DATA EVALUATION & REPORTING		**88**
A3120	PREPARE/SUBMIT SOIL DATA SUMMARY REPORT (INCL. DATA GAPS FOR AOC-2	66
A3130	AGENCIES REVIEW/PROVIDE CONCURRENCE	22
A3140	STAKEHOLDERS & TRIBES REVIEW	22
DEMOBILIZATION		**127**
A1030	SUBSTANTIAL COMPLETION	0
A2520	PUNCHLIST	40
A3020	REMOVE ALL EQUIPMENT, MATERIAL & TEMP FACILITIES (INCLUDING FENCIIN(	5
A2080	FINAL SITE STABILIZATION	10
A1040	FINAL COMPLETION	0
A2070	DECOMMISSIONING COMPLETION REPORT TO DTSC/DOI	0
RESTORATION		**1525**
A3150	PREPARE/SUBMIT DRAFT IM-3 RESTORATION PLAN (INCL. DRAFT GRADING PL	66
A3160	LANDOWNERS (FMIT, BOR, BLM) REVIEW AND COMMENT	22
A3170	TRIBES REVIEW & COMMENT	22
A3180	MEETINGS TO DISCUSS/RESOLVE COMMENTS	10
A3190	PREPARE/SUBMIT REVISED IM-3 RESTORATION PLAN	22
A3200	TRIBAL CONSULTATION (PA)	22
A3210	DTSC/DOI REVIEW/COMMENT	33
A3220	RESPONSE TO COMMENTS/COMMENT RESOLUTION	22
A3230	PREPARE/SUBMIT FINAL IM-3 RESTORATION PLAN	22
A3260	DTSC/DOI CONCUR WITH FINAL PLAN	1
A3240	IMPLEMENTATION OF IM-3 RESTORATION PLAN (Includes Progress Reports)	1305
A3250	FINAL REPORT TO DTSC/DOI	22



Actual Work — Critical Remaining Work
Remaining Work — Milestone

Date	Revision	Checked	Approved
09-08-14	Draft R5		
15-Jul-13	Draft R4		

SECTION 10

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Appendix A
Site Photographs

PHOTOGRAPH 1
Floodplain Where Extraction Well PE-1 is Located

PHOTOGRAPH 2
Extraction Well Vaults Over TW-2S, TW-2D, & TW-3D and Valve Vault #1 on MW-20 Bench Facility

PHOTOGRAPH 3
Extraction Well Vault Interior, Typical

PHOTOGRAPH 4
Valve Vault #1 Exterior

PHOTOGRAPH 5
Valve Vault #1 Interior View 1

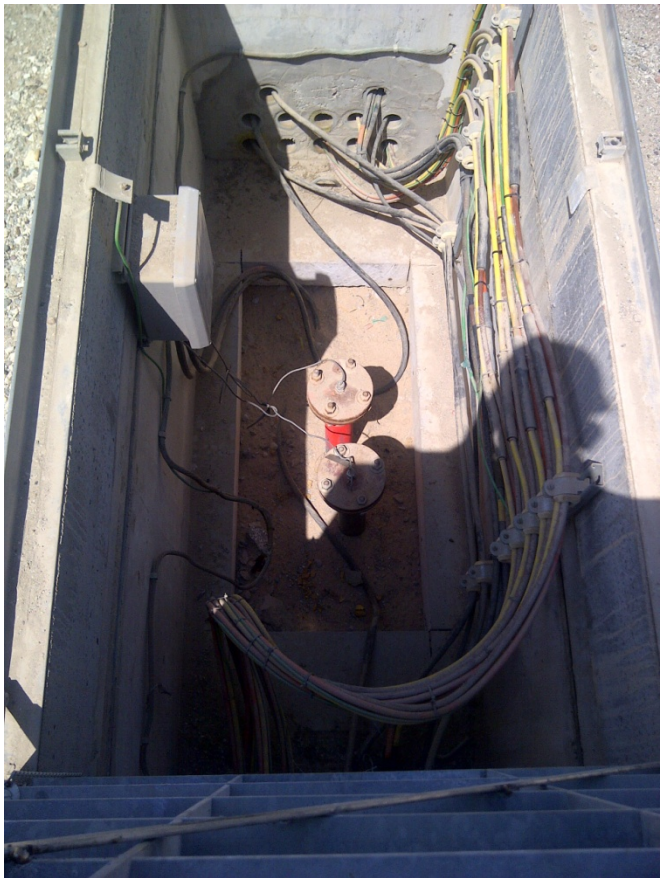
PHOTOGRAPH 6
Valve Vault #1 Interior View 2

PHOTOGRAPH 7
Valve Vault #1 Interior View 3

PHOTOGRAPH 8
Underground Double Contained Extraction Pipelines and Brine Pipes

PHOTOGRAPH 9
Underground Extraction and Brine Pipelines and Conduits

PHOTOGRAPH 10
Valve Vaults along Extraction and Brine Pipelines, Typical



PHOTOGRAPH 11
Extraction and Brine Lines Passing Through Valve Vault Interior

PHOTOGRAPH 12
Last Valve Vault Prior to Pipelines Entering IM-3 Treatment Plant

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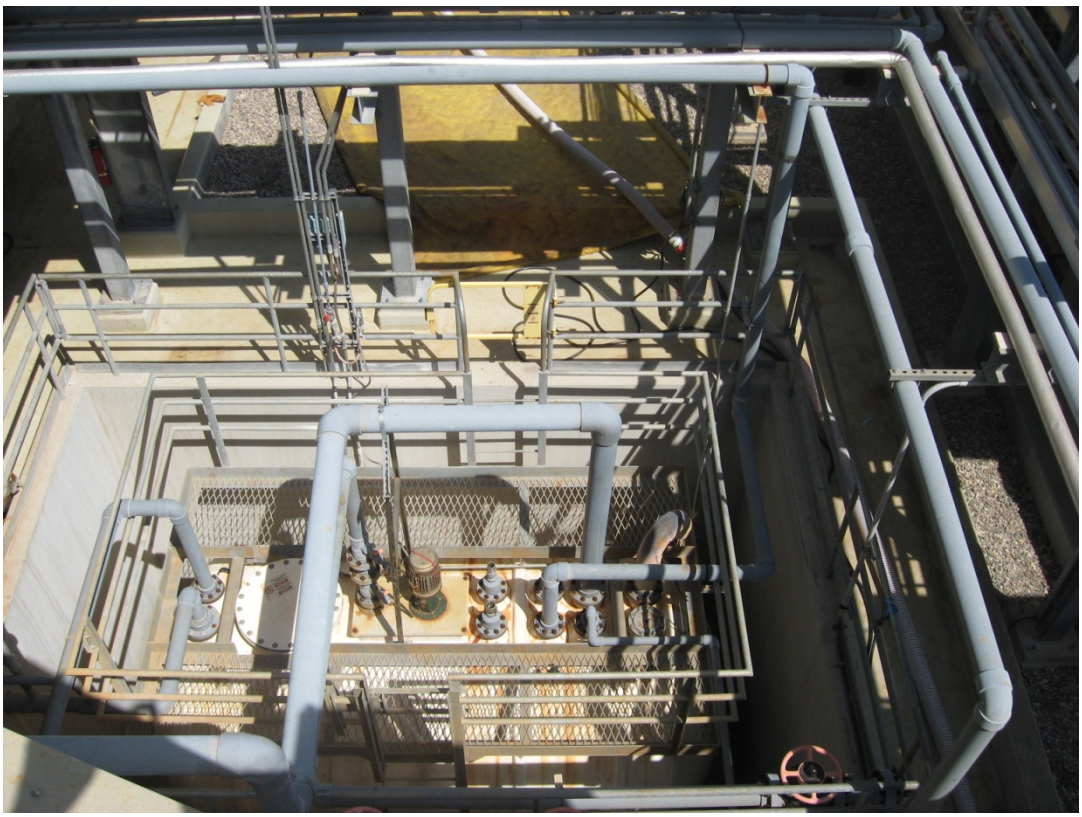

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Appendix B
Decommissioning Quality Assurance and Control Plan

Draft

Interim Measure No. 3 Decommissioning, Removal, and Restoration Quality Assurance and Control Plan, Topock Compressor Station, Needles, California

Prepared for:

Pacific Gas & Electric Company

September 2014

CH2MHILL Constructors, Inc.

3 Hutton Centre Drive, Suite 200
Santa Ana, California 92707

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Acronyms and Abbreviations

CAD	computer-assisted drafting
CM	Construction Manager
DQAC	Decommissioning Quality Assurance Control
DFW	Definable Feature of Work
IM-3	Interim Measure No. 3
NCR	Noncompliance Report
PG&E	Pacific Gas and Electric Company
PM	Project Manager
PQM	Program Quality Manager
QA	quality assurance
QC	quality control
RFI	request for information
Work Plan	IM-3 Decommissioning, Removal, and Restoration Work Plan

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SECTION 1

Introduction

This Decommissioning Quality Assurance and Control (DQAC) plan is a project-specific appendix to the Interim Measure No. 3 (IM-3) Decommissioning, Removal, and Restoration Work Plan (Work Plan) (CH2M HILL 2014). The purpose of this DQAC plan is to outline the quality control requirements applicable to executing the methods and technologies necessary for the planned decommissioning and removal of the IM-3 system and restoration of the areas originally affected by IM-3 operations.

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SECTION 2

Organization and Responsibilities

The Project Quality Control (QC) Manager and Demolition Project Manager (PM) are responsible for overall implementation and enforcement of the DQAC plan. Designated qualified individuals will assume execution responsibility of this plan. These individuals include the Project Engineer or other project personnel. The Program Quality Manager (PQM) has responsibility for verification of the effectiveness of the program and project QC.

A consistent project team is critical to the success of this project. The project team will be responsible for implementation of this plan and for the preparation of the final deliverables. Additional project team members may be added as needed; however, each new member will become familiar with this DQAC plan.

2.1 Project Team and Resolution of Conflicts

2.1.1 Project Team

- Demolition PM
- PM
- PQM
- Project QC Manager
- Senior Consultants
- Site QC/compliance, and health and safety
- Contract Administrator
- Project Engineer
- Project Controls Engineer
- Project Accountant
- Document and Data Manager

2.1.2 Resolution of Conflicts

If the QC team detects a nonconforming item, the issue will be investigated by the Project QC Manager. If the Project QC Manager determines that additional corrective action is warranted, the Project QC Manager will document and review the issue with the Demolition PM. The Project QC Manager has the authority to stop work on any nonconforming activity. If satisfactory resolution cannot be achieved between the Project QC Manager and the PM, it will be elevated to the PQM, and if necessary, to senior management (such as the Program Manager). The Pacific Gas and Electric Company (PG&E) Contracting Officer or Site Managers will be notified immediately of any nonconformance and will be advised of the impacts on the project cost or schedule, if any.

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SECTION 3

Inspection Activities

The Project QC Manager is responsible for performing inspection activities and documenting compliance with project requirements.

3.1 Inspections

The Project QC Manager's responsibilities include inspection of all recovered equipment and materials before being stored or turned over to a third party; inspection of waste management areas; and daily review of all decommissioning, removal, and restoration activities required to complete the scope of work, as identified in the final approved Work Plan.

As additional project-specific tasks are identified, this DQAC plan will be amended to include inspections for those tasks.

The Project QC Manager will conduct a detailed inspection prior to the Pre-final Inspection, when the work or an increment of work is deemed to be substantially complete. The work will be inspected for conformance to the Work Plan. The Project QC Manager will prepare an itemized list of work not properly completed, inferior workmanship, or work that does not conform to the Work Plan. The list will also include outstanding administrative items, such as record (as-built) utility drawings. The list will be included in the QC documentation and submitted to the PM following the inspection, and will specify an estimated date for correction of each deficiency. The completion inspection will be documented on the Daily Report (Attachment 1).

3.2 Punch List Inspections

Punch List Inspections may occur near the completion of work. The Project QC Manager will conduct an inspection of the work and develop a "punch list" of items that do not conform to the approved Work Plan. The punch list will include any remaining items on the "Rework Items List" (Attachment 2) that were not corrected before the Punch List Inspection. The punch list will include the estimated date when the deficiencies will be corrected. The Project QC Manager or staff will make Follow-on Inspections to ascertain that deficiencies have been corrected.

3.3 Pre-final Inspection

PG&E will perform a Pre-final Inspection to verify that the work is complete. A "Pre-final Punch List" may be developed as a result of this inspection. Each deficiency noted in the punch list will note the applicable reference in the Work Plan that the deficiency stems from. The Project QC Manager will verify that all items on this list are corrected before notifying that a "Final" Inspection can be scheduled. Any items noted on the Pre-final Inspection will be corrected in a timely manner and will be accomplished within the time slated for completion of the entire work, or any particular increment thereof if the project is divided into increments by separate completion dates.

3.4 Final Acceptance Inspection

The Project QC Manager, Construction Manager (CM), other project management personnel, and PG&E representatives will attend this inspection. Other PG&E personnel, land owners, land managers, regulatory agencies, and stakeholders may also attend. PG&E, based upon results of the Pre-final Inspection, will formally schedule the Final Acceptance Inspection. Notice should be given to PG&E at least 14 days before the Final Inspection. A Final Acceptance Inspection will be considered closed when the work has been accepted by PG&E, land owners, land managers, regulatory agencies, and stakeholders, and after acceptance has been documented and signed by all parties.

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SECTION 4

Meetings

Meetings will be held as necessary to discuss the project. These meetings may address problems, work status, scheduling, and conflict resolution. At a minimum, a project initiation meeting and weekly QC meetings will be held. This section details these meetings.

4.1 Project Initiation Meeting

Section 3.1 of the Work Plan discusses the project initiation meeting.

4.2 Quality Control Meetings

After the start of field activities, the Project QC Manager will conduct weekly QC meetings. The meetings will be held at the project site, and the following will be accomplished at each meeting:

1. Review the minutes of the previous meeting.
2. Review the schedule, including the following:
   a. Work accomplished since last meeting.
   b. Rework items identified since last meeting.
   c. Rework items completed since last meeting.
3. Review the work to be accomplished in the next 2 weeks and the following required documentation:
   a. Establish completion date for rework items.
   b. Required preparatory phases inspections.
   c. Required initial phases inspections.
   d. Required follow-up phases inspections.
   e. Status of offsite work.
   f. Required documentation.
4. Resolve open QC issues.
5. Address items that may require revisions to the DQAC plan.

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SECTION 5

Analytical Tests and Observations

The Project QC Manager is responsible for making certain that required analytical tests, as identified in the final approved Work Plan, are performed and results are documented. Completion of analytical tests will be documented in the Testing Plan and Log (Attachment 3). The Project QC Manager will obtain test results, update the Testing Plan and Log at least weekly, and maintain the records onsite in the project files.

For testing activities, the Project QC Manager and the CM will accomplish the following:

- Verify that testing procedures comply with Work Plan requirements.
- Verify that facilities and testing equipment are available and comply with testing standards.
- Check test instrument calibration data against certified standards.
- Verify that recording forms and the test identification control number system have been prepared.

Both passing and failing test results will be recorded in the Daily Report for the day the results are obtained. Pertinent specifications, location where tests were taken, and the sequential control number identifying the test will be recorded. Test reports will be submitted to the Demolition PM. As project-specific tasks are identified, the Testing Plan and Log will be amended to include analytical tests and observations for those tasks.

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SECTION 6

Quality Control Submittals

Quality control submittals are submittals generated by either the Project QC Manager during, or immediately before, decommissioning and removal (demolition) to demonstrate compliance with the Work Plan.

The Project QC Manager will log and track all submittals into the Submittal Register (Attachment 4). Specific responsibilities regarding submittals include the following:

- Coordinating submittal actions
- Maintaining necessary submittal records in an organized manner
- Maintaining and tracking submittals in the Submittal Register
- Reviewing and certifying submittals for compliance with the project plans, drawings, and specifications
- Approving submittals, except those designated to be approved by the Project Engineer, PG&E, or other party(ies)Checking material and equipment delivered to the project for compliance with the Work Plan

Certain designated submittals require approval by authorities other than the Project QC Manager (such as the Demolition PM, Project Engineer, or others). In such cases, the Project QC Manager forwards the submittal to the PM or Project Engineer who routes the submittal to the appropriate approver.

The CM and Project QC Manager are responsible for coordinating the submittal transmittal and approval process and following through to make certain that the process does not impact the project schedule.

6.1 Submittal Review and Control

A list of required submittals will be developed at the initiation of the project activities and revised as necessary. Submittals will be scheduled, reviewed, certified, and managed in accordance with procedures defined in this section.

PG&E will control and schedule submittals and document the process in the Submittal Register. The Project QC Manager is responsible for updating the submittal register at least weekly. The Project QC Manager will forward a copy of the Submittal Register onto the Demolition PM and PQM at the end of each month of project work. Each submittal will be routed using a Transmittal Form (Attachment 5). Units of weights and measures used on all submittals will be consistent with those used in the project documents.

Each submittal will be reviewed for completeness and compliance with the Work Plan requirements by individuals qualified to perform the review of that specific item. The submittal reviewers and approvers will be designated before construction.

Before each submittal, the Project QC Manager will certify that the submittal is in compliance with the project requirements. Submittals that do not comply with the requirements will be returned to the originator for correction and resubmittal. Substitutions or variations of specified requirements will be clearly noted. Certification of the approved submittals will be indicated by signing or initialing and dating the submittal form by the Project QC Manager. Required submittals may consist of the following types:

- **Data** – Submittals that provide calculations, analytical test results, descriptions, or documentation of the work.
- **Drawing** – Submittals that graphically show the relationship of various components of the work, schematic diagrams and layouts of particular elements, and other relational aspects of the work.
- **Instruction** – Preprinted material that describes the installation of a product, system, or material, including special notices and material safety data sheets concerning impedances, hazards, and safety precautions.

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- **Schedule** – Tabular lists showing the location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.
- **Statement** – A required document that confirms the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verifications of quality.
- **Report** – Reports of inspections or tests, each properly identified, and an interpretation of results that includes a description of test methods and all results.
- **Certificate** – A statement signed by an official authorized to certify on behalf of the manufacturer of a product, system, or material, attesting that the product, system, or material meets specified requirements. The statement must be dated after the award of this contract, state the contractor's name and address, name the project and location, and list the specific requirements that are being certified.
- **Sample** – Samples, including both fabricated and non-fabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.
- **Record** – Documentation to record compliance with technical or administrative requirements.

Additional submittals include, but are not limited to, the following:

- Personnel qualifications
- Product data
- Permits
- Samples
- Catalog cuts/pages
- Production, inspection, and test reports
- Material Certifications
- Progress reports, safety reports, or manpower reports
- As-built or certified data
- Operations and maintenance manuals
- QC records and certifications
- Sample and test results
- QC reports
- Photographs
- Contract close-out documents
- Completed hazardous and non-hazardous waste manifests and disposal certificates
- Completed list of recyclable materials/equipment
- Completed list of materials/equipment to be sold either through PG&E's Cost Recovery Program or Third Party

The following requirements apply to submittals:

- Units of weights and measures will match those used in the Work Plan and IM-3 Restoration Plan.
- Each submittal will be complete and in sufficient detail to allow determination of contract compliance.
- Each submittal will be reviewed by the Project QC Manager or an approved reviewer.
- Each submittal will be accompanied by a Catalog Cut/Shop Drawing Transmittal form certifying compliance with contract requirements.
- Proposed deviation from the contract requirements will be clearly identified.
- Spatial data, including computer-aided drafting (CAD) drawings, will conform to the Tri-Service Spatial Data Standard and be submitted as AutoCAD version 13 or Microstation version 5.0, or later, compatible format.

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6.2 PG&E Submittal Approval

Submittals for items that are extremely critical or complex, or are considered an extension of the Work Plan, should be submitted for PG&E approval. These submittals still require review for conformance and certification by the Project QC Manager.

Submittals will be reviewed to verify completeness, accuracy, and contract compliance. Items will be approved by the Project QC Manager and checked and approved by the Project QC Manager or designated representative. Any submittals requiring modifications or changes will be returned to the originating organization for correction and then resubmitted for review and approval by the Project QC Manager, or designee, prior to acceptance. Approved submittals will be stamped, signed, or initialed, and dated. During the preparatory phase of the QC inspections, the Project QC Manager or designee will verify that all materials and equipment have been tested and approved. No field activities will be performed without the required approval of applicable submittals.

Submittals will be presented to PG&E and project personnel, as determined by the distribution schedule. Each submittal will have a unique document control number. Every possible attempt will be made to schedule submittals to allow for sufficient review and approval time. However, certain submittals will require accelerated processing to maintain the construction schedule.

A Transmittal Form (Attachment 5) will accompany each submittal. Each transmittal will be identified with the following:

- Contract number
- Name and address of the submitting organization
- Date of submittal
- Description of item being submitted, including reference to specification section
- Approval of submitting organization indicating conformance to the requirements

The Project QC Manager will update the Submittal Register regularly. Material submitted for review by the Project QC Manager will indicate that it either conforms to established requirements or does not conform to established requirements. The Project QC Manager will advise submitter of the results of the review. The Submittal Register will be updated to indicate status. Conforming submittals will be transmitted to project and PG&E personnel, as determined by the distribution schedule. Non-conforming submittals will be returned to the submitter for correction, resolution of comments, and resubmittal.

Material submitted for review by the Project QC Manager will be signed to indicate that it conforms to requirements. Submittals reviewed by the Project QC Manager will then be transmitted to PG&E in accordance with the project distribution schedule for review and approval. Items sent to PG&E will be accompanied with a transmittal form indicating each item transmitted, the date reviewed by the Project QC Manager, and its review status. Upon review completion, PG&E will either return the transmittal sheet to the Project QC Manager for further action or accept the submittal as complete.

The Project QC Manager will advise the submitter of the results of the review in writing and include any comments. The Submittal Register will be updated to indicate status. Nonconforming submittals may be returned to the submitter for correction, resolution of comments, and resubmittal, if required. Revised submittals will be logged, reviewed, and processed in a manner identical with the initial submittal.

As project-specific tasks are identified, the Submittal Register will be amended to include documentation requirements for those tasks.

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SECTION 7

Change Control

Changes to the final approved Work Plan and field changes are subject to design verification measures commensurate with those applied to the draft project plans. The Demolition PM will approve work Plan changes in consultation with the Project Engineer.

Requests for Information (RFI) (Attachment 6) will be used to communicate and document clarifications and modifications requested by the subcontractor. The RFIs will be tracked and logged by the Project QC Manager to verify that each RFI is fully addressed and that changes to the plans, drawings, and specifications are completely and accurately documented. No work related to the RFI will be performed until the RFI is approved by the required parties.

Changes to materials, supplies, work approaches, and corrective action area design during the decommissioning, removal, and restoration effort will be documented in an overall effort to support sound engineering judgment and cost effective project delivery. Changes during decommissioning, removal, and restoration will be documented using the RFI process.

The RFI process involves identifying a situation in the field that requires change. The Project QC Manager will prepare an internal memorandum (RFI) identifying the concern and forward it onto the Demolition PM. The Demolition PM will review and forward the memorandum onto PG&E. The RFI will contain the project number, RFI Identification Number, and title. This information will be used for RFI tracking. The Demolition PM will forward the RFI onto the appropriate person, who is then responsible for identifying the appropriate design representative to evaluate the concern and prepare the appropriate response. The response should include a narrative explanation of the resolution and any drawings or specifications required to complete the work as attachments. The response will be returned to PM and forwarded onto the Project QC Manager and PG&E for field implementation.

Changes to drawings as a result of a RFI will be identified with a symbol in the border identifying the RFI identification number and title. The drawing will also be marked with a cloud, circle, or other mark to distinguish the change from the original drawings. The sheet will supersede the existing drawing in the drawing set.

The RFI process is a field tool for documenting changed field conditions or other issues that may require a deviation from project requirements identified in the Work Plan or IM-3 Restoration Plan. The RFI is intended to obtain input and concurrence from the Project Engineer responsible for developing the project plans. Approval of the RFI by the Project Engineer does not constitute approval for PG&E or its subcontractors to perform work outside of the project scope or budget. It should be clearly conveyed in the RFI if issues identified in the RFI require a change to the project scope, schedule, or budget. In these instances, it is the responsibility of the PM to work closely with the Contract Administrator to seek and obtain proper approval from PG&E (in accordance with established contract procedures) before implementing the change recommended in the RFI.

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SECTION 8

Noncompliance and Corrective Actions

The Project QC Manager will document any work or materials not conforming to the project plans or project/contract requirements onto a Noncompliance Report (NCR) (Attachment 7). The NCR will detail the nonconforming condition, recommended corrective action(s), and disposition of the corrective action(s). Qualified representatives from Engineering, QA, and Construction will review the NCR and either accept or reject the recommended corrective action or disposition. The NCR will remain open until the nonconforming condition has been satisfactorily resolved and verified by QC inspection staff and Project QC Manager. Following receipt of notification of detected nonconformance, NCRs for each item will be completed.

The Project QC Manager will notify the subcontractor of any detected noncompliance with the foregoing requirements. The subcontractor will take immediate corrective action after receipt of such notice. Such notice, when delivered to the subcontractor at the work site, will be deemed sufficient notification. If the subcontractor fails or refuses to comply promptly, the Project QC Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. Noncompliance notification or stop work orders will be documented into the Daily Report. Completion of corrective action will be noted on the Daily Report. Verification of the corrective action and its results will be performed by the Project QC Manager and documented in the Daily Report.

8.1 Identification of Nonconforming Items

Items identified as nonconforming will be documented in an NCR, including the following information:

- Description of nonconforming item or activity
- Detailed description of nonconformance
- Referenced criteria
- Recommended disposition and corrective action to prevent recurrence, as applicable
- Affected organization
- Deficient conditions, divided into the following three categories:
  - In-process deficiencies
  - Installed deficiencies
  - Conditions that require stop work

8.1.1 In-process Deficiencies

In-process deficiencies are those conditions discovered during the course of QC inspections that are intended to be corrected or brought into conformance with established acceptance criteria or requirements. In-process deficiencies will be noted briefly into the Daily Report and detailed on the In-process Deficiency Punch List. Items on the punch list that cannot be corrected will be considered as installed deficiencies.

8.1.2 Installed Deficiencies

Installed deficiencies are those conditions discovered during the course of QC inspection of completed work that do not meet established acceptance criteria or requirements and are not intended to or cannot be brought into conformance. These conditions will be noted on a Rework Items List in addition to an NCR for evaluation and disposition. The Project QC Manager will issue the report summarizing the discrepancies within 24 hours of discovery.

In the event that the deficiency is not resolved within 2 calendar days after issuance of the NCR, a notice of non-response will be issued to the Demolition PM. Each report will be consecutively numbered, logged, and updated by the Project QC Manager. Resolution of installed deficient conditions will be documented and approved by the PM. Copies of completed reports will be sent to PG&E.

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8.1.3 Condition Requiring Stop Work

If corrective actions are insufficient, resolution cannot be reached, or results of prior work are indeterminate, work may be stopped by the Project QC Manager. An Immediate Stop Work Order can be issued by anyone for health and safety issues. The Project QC Manager, Demolition PM, or PG&E can issue a Stop Work Order in writing to the CM who will direct site activities to stop. If there is a disagreement between the Project QC Manager and the PM, the difference will be brought to the attention of the PQM until resolution is achieved.

The conditions of the Stop Work Order will be noted in the Daily Report and described in detail on a Rework Item List in addition to the Deficiency Report to allow evaluation of the problem(s) and proper corrective action(s). Work will not continue until the Stop Work Order has been resolved and documented by the Demolition PM. All Stop Work Orders will be immediately reported to the PG&E Site Managers and PG&E Contracting Manager, with a follow-up notification of any cost and schedule impacts.

8.2 Nonconforming Items

The nonconforming items will be controlled to prevent inadvertent use of material or workmanship quality. Items noted as nonconforming will be clearly identified and segregated from acceptable items when practical. NCRs will be logged onto the NCR Log (Attachment 8).

8.3 Disposition

The disposition of NCRs will include the necessary actions required to bring the nonconforming condition to an acceptable condition and may include reworking, replacing, retesting, or reinspection. Implementation of the disposition may be done in accordance with the original procedural requirements, a specific instruction, or an RFI.

The CM and Project QC Manager will initiate RFIs to document a change to the approved plans, specifications, and drawings that occur in the field.

Changes will be qualified as follows:

- **Major change** – one that affects the intent of the original design, including equipment, component, system, or structure that relates to function, operation, or safety of the designed product and/or personnel safety
- **Minor change** – one that does not affect the intent of the original design or product, including equipment, component, system, or structure that relates to function, operation, or safety

Where the RFI is marked as a Minor Change, the CM and Project QC Manager may execute the change and, in parallel, obtain concurrence from the Demolition PM that the change was indeed minor.

Where the RFI is marked as a Major Change, disposition must be sought from the Demolition PM and PG&E before execution. The CM and Project QC Manager will respond by issuing an appropriately executed Design Change Notice. A Design Change Notice will not be issued for a Minor Change RFI.

The CM and Project QC Manager have the responsibility for identifying and providing input data relative to record conditions. Record drawings are drawings that reflect the as-installed conditions and consist of the latest revision of the design drawing plus attached copies of approved changes (RFIs and Design Change Notices).

8.4 Corrective Measure Plan

Resolution of failing test results or noncompliance reports will be completed through a Corrective Measure Plan. The Corrective Measure Plan will be developed and documented by the Project QC Manager in conjunction with the Demolition PM. The agreed-upon corrective measure plan will be implemented and documented by the Project QC Manager. Completion of the corrective measure plan is the responsibility of the Project QC Manager.

On detection of a nonconforming condition, the Project QC Manager will immediately take corrective action. In addition to resolving identified nonconforming conditions, corrective action records will also address the initial cause of adverse conditions and establish methods and controls to prevent recurrence of the same or similar types

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of nonconformances. The Project QC Manager will monitor the corrective actions to verify that they were properly implemented and accepted and that the NCR was closed out.

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SECTION 9

Quality Control Documentation

Preparation, review, approval, and issuance of documents affecting quality will be controlled to the extent necessary to determine that the documents meet specified requirements. Project documents to be controlled include the following (see Attachments 1 through 10):

- Attachment 1 - Daily Report
- Attachment 2 - Rework Items List
- Attachment 3 - Testing Plan and Log
- Attachment 4 - Submittal Register
- Attachment 5 - Transmittal
- Attachment 6 - RFIs
- Attachment 7 - NCRs
- Attachment 8 – NCR Log
- Attachment 9 – Photo Log
- Attachment 10 – Transportation and Disposal Log

9.1 Conference and Confirmation Notes

In addition to other required documentation, the Project QC Manager is responsible for taking notes and preparing the reports of conferences. Conference notes will be typed and the original report furnished to PG&E within 5 days after the date of the conference for concurrence and subsequent distribution to all attendees. At a minimum, this report will include the following:

- Date and place the conference was held
- List of attendees, including name, organization, and telephone number
- Written comments presented by attendees, attached to each report with the conference action noted: “A” for an approved comment, “D” for a disapproved comment, “W” for a comment that has been withdrawn, and “E” for a comment that has an exception noted
- Comments made during the conference and decisions affecting criteria changes
- Conference notes that augment the written comments

The Project QC Manager is also responsible for providing a record of items such as discussions, verbal directions, and telephone conversations in which PG&E personnel or their representatives participate on matters relating to this contract and work. These records, entitled “Confirmation Notices,” will be numbered sequentially and will fully identify participating personnel, subject discussed, and any conclusions reached. The Demolition PM, or designee, will forward a reproducible copy of the confirmation notices to PG&E within 5 working days.

9.2 Daily Report

The Daily Report is an essential tool for recording and reporting the daily production, safety, and QC activities. The Daily Report is the daily record of operations on the job site and must be kept current. These reports are the official record of work performance and compliance with project plans, drawings, and specifications. It is therefore critical that the reports are correct and timely.

The Project QC Manager is responsible for preparing the Daily Report and submitting them weekly to the PM and the PQM. The Project QC Manager will obtain operational information from the Site Supervisor. The Health and Safety Officer will provide information on health and safety activities. The report also includes reports from each site subcontractor to address the following, at a minimum:

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- Quality aspects of the project that are being performed by the subcontractor(s)
- Scheduling and resource issues
- Site safety inspections and concerns
- Environmental concerns
- Job progress
- Control inspections
- Tests performed and their results
- Onsite crafts, personnel, and equipment
- Material received

The project team must review the Daily Reports for accuracy and completeness, because they are often used to prepare the final reports for the project. The Demolition PM should review these reports and verify the QC process is working on their project. The PQM should review these reports and verify the program quality assurance (QA)/QC processes and systems are working.

Attachment 1 includes the Daily Report template. The following should be attached to the Daily Report:

- Tailgate safety meeting minutes and signatures
- Project status meeting minutes
- Submittals
- Testing Plan and log
- Permits
- Chain-of-custody records
- Waste disposal documentation

9.3 Field Documentation Operating Procedures

The objective of the field documentation operating procedures is to verify that appropriate project information is documented into logbooks during construction. This documentation is important for communicating activities with other staff members and PG&E.

Regular QC observations, inspections, and general activities include the following:

- Record daily progress and associated QA and QC sampling.
- Record operations, sequence, and staging into logbooks.
- Record operations onto photographs (Attachment 9).
- Maintain waste disposal records (Attachment 10; see Section 5 of the Work Plan for the Waste Management Plan).
- Describe deviations from expected conditions or unexpected problems and their resolution, including estimated impacts to cost and schedule.

9.4 Site Preparation

Section 3.2 of the Work Plan describes site preparation activities, and Section 3.3 describes utility isolation. Site preparation will be observed by the Project QC Manager with the following checks:

- Verify that the equipment delivered to the site is inspected and free of any defects, free of any leaks, meets all Agency requirements, (i.e., portable equipment CARB permitting, etc.), and is properly staged.
- Confirm that a clearance check is performed to locate and identify each pipeline for all known utilities.
- Make certain that primary work zones, contaminant reduction zones, and support zones are properly demarcated and staged.

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- Monitor the condition of the access roads. Verify that the proper signs are installed, roads are maintained, and that the road can accommodate construction traffic.
- Observe arrival and material testing as they are delivered onsite.
- Inspect delivered materials to verify there are no defects in workmanship.
- Monitor delivery, handling, and storage of materials in accordance with the specifications.
- Verify storage facilities are protected and secure to prevent damage to equipment and materials in accordance with specifications.
- Review manufacturer material certifications.

9.5 Field Logbook

The Project QC Manager will maintain a record of daily QC activities during decommissioning, removal, and restoration in a field logbook. The field logbook will be available for review upon request. Field logbooks and data forms are necessary to provide sufficient data and record observations to enable participants to reconstruct events that took place during the project, and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. Field logs will be kept in a bound logbook with sequentially numbered pages. Entries will be made in waterproof ink, dated, and signed. The Project QC Manager will sign or initial the bottom of each page of the field log and date the entry to show that notes are being taken daily.

As an operating procedure for logbook entries, the following items will be recorded, at a minimum:

- Name of person making log entry (signature)
- Names of onsite team members
- Names of onsite subcontractor personnel
- Equipment used
- Levels of personnel protection, including the following:
  - Level of protection originally used
  - Changes in protection, if required, and reasons for changes
- Summary of daily work performed
- Summary of weather conditions
- General description of work activities, size of work crew, equipment, and onsite personnel
- Duration of lunch break
- Start time and duration of downtime resulting from equipment breakdown, weather, or plant emergencies
- Summary of QC meetings and actions recommended to be performed
- QC testing equipment and personnel
- Identification of work locations
- Description of materials delivered to the site, including QC data provided by the suppliers
- Record of decisions made regarding defective work or corrective measures implemented, or both
- Field tests
- Field observations and remarks
- Unusual circumstances or difficulties

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- Initials of person recording the information

No pages will be removed for any reason. If corrections are necessary, they will be made by drawing a single line through the original entry (so that the original entry can still be readable) and writing the corrected entry alongside. The correction will be initialed and dated. Corrected errors may require a footnote explaining the correction.

9.6 Inspection Documentation

The Project QC Manager is responsible for the maintaining the inspection records. Inspection records will be legible and clearly provide necessary information to verify that the items or activities inspected conform to the specified requirements or, in the case of nonconforming conditions, provide evidence that the conditions were brought into conformance or otherwise accepted by the Project QC Manager.

In addition to the required QC field inspections, the PG&E Quality Program requires a Quality Management overview of the site QA/QC Plan implementation. The Project QC Manager will perform regular internal quality control checks on the site implementation of the QA/QC Plan. Reports of any deficiencies will be reported to the PM for corrective action. Inspections will be performed and checked for the following:

- Possession and use of approved procedures, standards, and project specifications
- Conformance with appropriate procedures, standards, and instructions
- Thoroughness of performance
- Identification and completeness of documentation generated during performance

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SECTION 10

Definable Features of Work

This section discusses the Definable Features of Work (DFW) for field activities, including that of subcontractors and suppliers, the inspection process, and the required meetings to verify compliance with the contract. DFWs establish the measures required to verify both the quality of work performed and compliance with specified requirements, and include inspecting materials and workmanship before, during, and after each DFW. The DFWs are based on the scope of work outlined in the Work Plan and future IM-3 Restoration Plan. The DFWs for this project are as follows:

- Planning
- Procedures for IM-3 lay-up
- Permitting
- Mobilization
- Site preparation
- Utility isolation
- Decommissioning of IM-3 system
- Waste management
- Best management practices and mitigation compliance
- Soil confirmation sampling
- Site restoration (in accordance with the future IM-3 Restoration Plan)
- Demobilization

Detailed descriptions of each DFW are presented in the Work Plan. The defined controls will be adequate to cover operations and are keyed to the proposed sequence. Project QC includes implementing the following three control phases for aspects of the work specified:

1. Preparatory phase
2. Initial phase
3. Follow-up phase

10.1 Preparatory Phase Inspection

The Project QC Manager will conduct Preparatory Phase Inspections, including the following actions:

- Review each paragraph (as applicable) of the Work Plan.
- Review the applicable drawings.
- Verify that materials/equipment have been approved.
- Verify that provisions have been made to provide required control inspection and testing.
- Examine the work area to verify that required preliminary work has been completed and is in compliance with the approved Work Plan requirements.
- Physically examine the required materials and equipment to verify that they are properly delivered to the site, conform to approved shop drawings or specifications, and are properly stored.
- Review the appropriate activity/job hazard analysis to verify safety requirements are met.
- Discuss procedures for the work, including potential repetitive deficiencies.
- Document tolerance and workmanship standards for the particular phase of work.

The Demolition PM, PG&E, and the appropriate site personnel will be notified at least 2 working days in advance of preparatory phase activity. This phase will include a meeting conducted by the Project QC Manager and attended by any other personnel involved in performing the DFW.

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The issues discussed during the preparatory phase meetings will be documented in the Daily Report. The Project QC Manager will direct personnel performing work activities as to the acceptable level of workmanship required.

10.2 Initial Phase Inspection

An initial inspection will be performed at the beginning of a DFW and will include the following:

- Check preliminary work to verify that it is in compliance with contract requirements.
- Review the Preparatory Phase Checklist to verify that it documents the results of the preparatory meeting.
- Verify full contract compliance, including required control inspection and testing.
- Establish the required level of workmanship, and verify that the work meets minimum acceptable standards.
- Resolve differences.
- Check safety requirements, verify compliance with and upgrade the Health and Safety Plan and activity/job hazard analysis.
- Review the activity/job hazard analysis with project personnel.

The Demolition PM, PG&E, and appropriate site personnel will be notified at least 2 working days in advance of any initial phase activity. The Project QC Manager will document initial inspections for each item in the Daily Report. The exact location of the initial phase inspection will be indicated for future reference and comparison with follow-up inspections.

An Initial Phase Inspection will be conducted each time a new crew arrives onsite or any time acceptable specified quality standards are not being met.

10.3 Follow-up Phase Inspection

During the completion of a particular work feature, follow-up inspections will be conducted to confirm continued compliance with contract requirements. The frequency of the follow-up inspections will depend on the extent of the work being performed on each particular feature. Each follow-up inspection will be documented in the Daily Report. A final follow-up check will be conducted on any completed work phase prior to commencing each subsequent phase. Any deficiencies will be corrected prior to starting additional phases of work or will be identified on a list of items that do not conform to the specified requirements or are incomplete.

10.4 Additional Preparatory and Initial Phases

The Project QC Manager may conduct additional preparatory and initial inspections on the same DFWs under any of the following circumstances:

1. If the quality of ongoing work is unacceptable as determined by the Project QC Manager, PG&E, or site personnel
2. If there are changes in the staff, onsite supervision, or work crew
3. If work on a DFW is resumed after a substantial period of inactivity
4. If other problems develop

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SECTION 11

Work Cited

CH2M HILL. 2014. *Draft Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan, Topock Compressor Station, Needles, California*. Prepared for Pacific Gas and Electric Company. September 8.

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Attachment 1
Daily Report

DAILY REPORT

Version 1.0

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

REPORT DATE:
REPORT NO:

PROJECT NAME / LOCATION: IM-3 Decommissioning, Removal, and Restoration, Topock Compressor Station, Needles, CA

PROJECT NUMBER:	**PROJECT DESCRIPTION:** Decommissioning and removal of IM-3 Treatment, Extraction, and Injection System and restoration of the land originally affected by IM-3 operations.		
DEMOLITION PROJECT MANAGER:	**QC REPRESENTATIVE:**	**PREPARED BY:**	
AM WEATHER:	**PM WEATHER**:	**HIGH TEMP**:	**LOW TEMP**:
WINDS:	**WIND DIRECTIONS:**	**DEW POINT:**	**PRECIPITATION:**

SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED

(Include Safety Violations, Corrective Instructions Given, Corrective Actions Taken, and Results of Safety Inspections Conducted):

- Safety Tailgate meetings are held each morning with all employees.
- **Mentioned need to contact PG&E same day of incident.**
- Completed Daily Tailgate forms are electronically filed and hard copies stored in the PG&E job site trailer.
- Tailgate topics discussed today:
  -

EQUIPMENT ON HAND

Description of Equipment	Make/Model/Manufacturer	Equipment ID Number	Inspection Performed By

COMMENTS (acceptance status, inspection findings, etc.):

MATERIALS DELIVERED TO JOB SITE

Description of Materials Received	Make/Model/Manufacturer	Equipment Lot Number	Inspection Performed By	Number/ Volume/ Weight

COMMENTS (acceptance status, inspection findings, etc.):

WORK FORCE – CONTRACTOR AND SUBCONTRACTOR

Company	Work Performed	Number of Employees	Hours per Employee	Total Hours
	Totals:			

WORK AND/OR TESTS ACCOMPLISHED OR IN PROGRESS

Performed Work / Test for Today:

-
-
-

Planned Work / Test for Tomorrow:

-
-

Planned Work / Test for Next Week:

-
-

SITE INSPECTIONS PERFORMED

Task/Activity	*Inspection Performed*	*Findings*

QUALITY AND/OR PRODUCTION ISSUES AND RESOLUTIONS

-

SUBMITTALS INSPECTION / REVIEW

Submittal No.	*Submittal Description*	*Specification/Plan Reference*	*Submittal Approval*	*Comment/Reason/Action*
			Yes ☐ No ☐	
			Yes ☐ No ☐	

CHANGED CONDITIONS/DELAY/CONFLICTS ENCOUNTERED

(List any conflicts with the delivery order [i.e., scope of work and/or drawings], delays to the project attributable to site and weather conditions, etc.)

-

VISITORS AND DISCUSSIONS

-

TRANSPORTATION AND DISPOSAL

Transportation and Disposal Activites/Summary Quantitites:

GENERAL COMMENTS

General Comments (rework, directives, etc.):

ATTACHMENTS

List of Attachments: (examples: submittals, meeting minutes, safety meeting minutes, COCs, weight tickets, manifests, profiles, rework item list, etc.):

NOTE: Write all entries legibly in ink. Line out all unused portions or designate as "not applicable". Preparer signs first name, middle initial and last name on each completed daily inspection record. This form may be filled out electronically and signed electronically.

PREPARER'S SIGNATURE DATE

Attachment 2
Rework Items List

ATTACHMENT 2
Rework Items List

Project Number:

IM-3 Decommissioning, Removal, and Restoration

Item	Date Identified	Description	Referenced Section of Work Plan	Action Performed	Resolution	Date Completed

Attachment 3
Testing Plan and Log

ATTACHMENT 3 TESTING PLAN & LOG

IM-3 Decommissioning, Removal, and Restoration

Reference	Test Required	Date Sampled	Sampled By	Tested By	Location of Test (on-site/ off-site)	Frequency	Date Test Completed	Remarks

Attachment 4
Submittal Register

IM-3 Decommissioning, Removal, and Restoration

Project No:

		Required in Closeout Report			Approval required before mobilization	Approval SOON after mobilization							
Submittal Number	Version	Section	Reference	Action (A) or Informational (I)	Submittal	Description	Lead Reviewer	From Sub	To Reviewer	From Reviewer	Rtn To Sub	Approval Status	Notes
1				A	Demolition Work Plan	Describes technical approach, number and responsibilities of personnel at site, tools, equipment/methods, quality control procedures, including testing requirements.							
2				A	Health & Safety Plan and AHAs	Site-specific HASP, including training, medical surveillance and drug testing records for all site personnel, plus AHAs for specific tasks							
3				A	Spill Response Plan	Site-specific spill prevention procedures and response procedures, notifications, and reporting							
4				A	Waste Management Plan	Describes how waste will be staged, labeled, managed, characterized, transported, and disposed of.							
5				A	Traffic Control Plan	Proposed methods, routes, equipment, and personnel for work being performed related to trucks, equipment, and personnel coming and leaving the site.							
6				A	Air Monitoring Plan	Descibes the methods of air monitoring for compliance.							
7				A	Construction Quality Plan	Describes the process and procesdures for assuring quality control and compliance for site activities.							
8				A	Compliance Checklist and Flowcharts	Checklist will be used to verify environmental compliance and flowchart will show procedures and process for compliance							
9				A	Project Schedule	Detailed project schedule depicting tasks necessary to complete construction, start dates, durations and predecessors/successors							
10				A	BMP Plan	BMP Plan review and acceptance as well as provide, maintain, and operate temporary facilities to control erosion and sediment releases. This plan will be reviewd for compliance with the site BMP Plan.							
11		YES		A	All Permits	Obtain all required permits for the abatement and demolition.							
12		YES		A	Import Material Data Sheets	Source, samples, certifications for imported material							
13		YES		A	Backfill Materials Placement Field Testing Results	Including in-place density tests per ASTM D1556, D2167, D2922, D3017							
14		YES		A	Recycle Documentation	Load, transport and dispose of waste materials at a PG&E approved off-site facility.							
15		YES		A	Waste Manifests	Waste manifests for non-haz, non-RCRA Cal haz, RCRA, or TSCA wastes							
16		YES		A	Load Tickets	Receipts from the disposal or recycling facility that are time and date stamped with weights from certified scales							
17		YES		A	Bill of Laden (or equivalent)	Shipping documents for all materials sent to recycling facilities.							
18				A	Construction Closeout Report	Prepare a Construction Closeout Report that includes all subcontractor daily reports, waste transportation and disposal logs, analytical testing, site photographs of construction progress, copies of all weight tickets associated with recycling and disposal, recycling compliance summary and any testing results that were performed during the course of demolition							

Attachment 5
Transmittal

T R A N S M I T T A L

To: **From:**

Attn: **Date:**

Contract: IM-3 Decommissioning, Removal, and Restoration

Project:

Re:

We Are Sending You:

Quantity	Description

If material received is not as listed, please notify us at once

Remarks:

Copy To:

Attachment 6
Requests for Information

REQUEST FOR INFORMATION/CLARIFICATION

CONTRACT NO. **PROJECT NO.**

PROJECT TITLE & LOCATION: **IM-3 Decommissioning, Removal, and Restoration, Topock Compressor Station, Needles, CA**

BRIEF DESCRIPTION OF RFI:

TO:	NAME		TITLE	
FROM:	NAME		TITLE	
Date Submitted:	RFI No		DC No	
Please Respond By:			Page:	of
REFERENCE				
WORK PLAN REFERENCE(S):				

1) DESCRIPTION OF EXISTING CONDITION AND/OR DEFICIENCY:

NAME TITLE

PROJECT TEAM MEMBER SIGNATURE DATE

2) RECOMMENDED SOLUTION:

NAME TITLE	NAME TITLE
PROJECT MANAGER APPROVAL SIGNATURE DATE	PROJECT TEAM MEMBER SIGNATURE DATE

3) RESPONSE/DISPOSITION:

NAME	NAME
LEAD ENGINEER SIGNATURE DATE	PROJECT MANAGER SIGNATURE DATE

RFC Required? Yes ☐ No ☐ **Schedule Impact?** Yes ☐ No ☐ **Cost Impact?** Yes ☐ No ☐

4) CTR RESPONSE/DISPOSITION CONCURRENCE:

NAME	NAME
QC MANAGER SIGNATURE DATE	AFCEE REP SIGNATURE DATE

REVIEW DISTRIBUTION			FINAL DISTRIBUTION		
☐ PGE REP	☐ TCS Rep	☐ LEAD ENG	☐ PG&E REP	☐ TCS Rep	☐ LEAD ENG
☐ PG&E COR	☐ PM	☐ Other	☐ PG&E COR	☐ PM	☐ Other
☐ PG&E KA	☐ PROJ ENG	☐	☐ PG&E KA	☐ PROJ ENG	☐

Attachment 7
Nonconformance Reports

ATTACHMENT 7
NON-CONFORMANCE REPORT

PART 1 – General Information

Date Submitted:	NCR Number:
Submitted To:	Company/ Title/Position:
Prepared By:	Company/ Title/Position:
Project Name: IM-3 Decommissioning, Removal and Restoration	Project Number:
PO Number:	Contract Number:

PART 2 – Non-Conformance Report

Description of Non-Conforming Item or Condition				
Contract Requirement or Project Specification/Drawing				
Test/Inspection/Audit Identifying Non-Conformance				
Reportable Release?	Yes ☐		No ☐	
Material Name:			Quantity:	
Disposition:	Repair ☐	Rework ☐	Use-As-Is ☐	Reject ☐

PART 3 – Investigation/Root Cause Determination

Personnel Responsible for Investigative Process:
Investigative Process Findings:
Probable Root and Contributing Cause(s):

PART 4 – Corrective Actions

Proposed Corrective Actions and Completion Dates:		
Personnel Responsible for Implementation of Corrective Actions:		
Resulting Actions and Effectiveness of Those Actions:		
Personnel Responsible for Monitoring Effectiveness of Corrective Actions:		
Corrective actions have been completed and monitored for effectiveness.		
Signature	Company/Title	Date

PART 5 – Response Approval

Responses Accepted By		
Signature	Company/Title	Date
Signature	Company/Title	Date

PART 6 – Quality Control Follow-Up

Comments/Findings of Follow-Up Observation / Inspection / Audit:		
Verification Results	Satisfactory ☐	Unsatisfactory ☐

PART 7 – NCR Closure

NCR Closed		
Project QC Manager		
Signature	Company/Title	Date

Attachment 8
Nonconformance Report Log

ATTACHMENT 8
NON-CONFORMANCE REPORT (NCR) LOG

Project No.

DESCRIPTION OF NONCONFORMANCE	NO NCR's FOR WEEK ENDING:	REPORT NO.	DATE FOUND	DATE CORRECTED	RESPONSIBLE CONTRACTOR

Attachment 9
Photo Log

Project No. **Photo Log**

PHOTO 1	

PHOTO 2	

PHOTO 3	

PHOTO 4	

PHOTO 5	

PHOTO 6	

PHOTO 7	

PHOTO 8	

PHOTO 9	

PHOTO 10	

PHOTO 11	

PHOTO 12	

PHOTO 13	

PHOTO 14	

PHOTO 15	

PHOTO 16	

PHOTO 17	

PHOTO 18	

PHOTO 19	

PHOTO 20	

PHOTO 21	

PHOTO 22	

PHOTO 23	

PHOTO 24	

PHOTO 25	

PHOTO 26	

PHOTO 27	

PHOTO 28	

PHOTO 29	

PHOTO 30	

Attachment 10
Transportation and Disposal Log

TRANSPORTATION AND DISPOSAL LOG

Project No	Project Name	Site Description	Container Type	Container Desig.	Accumula-tion Date	Waste Profile Sample No	Contractor	Transporter	Date Transported	Transporter EPA ID	Load ID	Disposal Facility	Disp Fac EPA ID	Media	Waste Type (Haz, Nonhaz, TSCA)	Waste Code/ Haz Waste No	Disposal Date	Manifest Number	Disposal Treatment Method (Enter disposal quantity under appropriate method)					Certif of Disp/ Destruc Date	Comments/Notes	File Status (see note)
																			Reuse	Recycle	Landfill	Other	Unit			

Appendix C
Safe Fueling and Fuel Handling Policy

Standard Operating Procedure
PG&E Topock Groundwater Remedy
Operations and Maintenance Plan

Title: Safe Fueling and Fuel Handling Policy

Number: Remedy-SOP-02_Rev0

Created Date: 7/15/2013

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS). The objective of this Standard Operating Procedure is to describe the policy required to refuel vehicles, fuel tanks, and equipment/portable containers safely during work on and off the project site.

2 Approvals

Each vendor/contractor must obtain approval from PG&E Topock Site Operations Manager, and or Sr. Environmental Inspector of a) the planned fueling and re-fueling methods for the contracted activities to be performed at the site, and b) the commercial fuel supplier prior to first use for contracted activities.

3 Safety Guidelines During Fueling Operations

PG&E requires all vendors/contractors to follow appropriate procedures during fueling/refueling activities in order to avoid spills and incidents. The following general guidelines will be followed unless pre-approved otherwise:

Preparation, Pre-Fueling and Fueling Guidelines

- Turn off all equipment or engines before refueling.
- When fueling at a pump, remain attentive to the fuel nozzle.
- When not fueling at a fixed pump, stage splash pad containment as needed.
- Identify and locate fire extinguisher prior to fueling.
- Do not become distracted while fueling by electronic devices, reading materials, or conversations with bystanders.
- Use only UL-approved containers for portable gasoline storage cans.
- When filling a portable container, always place the container on level ground and keep the pump nozzle in contact with the container when refueling to avoid a static electricity ignition of fuel vapors. Fill slowly to avoid spillage and skin/clothing contact and use a funnel if needed.
- When fueling from a portable container, stage splash containment as needed.
- Only store fuel in locations approved by PG&E, and never near any ignition sources.

- In the event of a fire, make use of fire extinguisher that is available. If fire cannot be contained, relocate yourself to a safe location and call 911.

General Remote Fueling Considerations

- Position the fuel supply source as close to the equipment to be fueled as is practicable and safe.
- Inspect fuel conveyance hose/equipment and all connections and fittings for signs of wear or defects prior to the initiation of fuel pumping or pouring. If pouring fuel from a portable container, a funnel constructed of suitable material must be used to avoid splashing.
- Stage splash containment and fire extinguisher as needed.
- Ensure the area is free from ignition sources (i.e., hot equipment/work, sources of spark or static electricity).
- Once fueling is complete, deactivate the fuel supply pump prior to removing the fill nozzle from the equipment, and ensure that residual fuel has been emptied from the conveyance hose (as appropriate based on design of the equipment used).
- Inspect work area for any signs of spills, and remove spill pad(s), as appropriate.

3 Communication and Contingency Action

If a spill occurs the appropriate clean-up actions should commence as efficiently and safely as possible. Use a natural fiber push broom and/or a spark resistant shovel or scoop.

In addition, the reason for the spill will be investigated, and the team will modify the fueling procedure or conduct equipment repairs as determined appropriate to minimize the potential for future spills. Further, PG&E Site Operations Manager/Sr. Environmental Inspector must be notified immediately.

4 Waste Management

All waste generated during refueling, such as oily absorbent pads, must be transported and disposed of as directed by PG&E immediately following generation. Do not dispose of any oil/fuel contaminated pads or rags in the soil roll-off bins or waste dumpsters.

Appendix D
Transportation Plan

Draft

Interim Measure No. 3 Transportation Plan, Topock Compressor Station, Needles, California

Prepared for:

Pacific Gas & Electric Company

September 2014

CH2MHILL Constructors, Inc.

3 Hutton Centre Drive, Suite 200
Santa Ana, California 92707

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Acronyms and Abbreviations

DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
IM-3	Interim Measure No. 3
PG&E	Pacific Gas and Electric Company
Plan	Transportation Plan

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SECTION 1

Introduction

This Transportation Plan (Plan) describes the hauling of waste for offsite disposal during the decommissioning and removal of the Interim Measure No. 3 (IM-3) Groundwater Extraction and Treatment System, and the restoration of the areas affected by IM-3 operations.

Wastes from the IM-3 decommissioning will be transported by a qualified (licensed/registered and insured) waste hauler in trucks using manifests or proper shipping documents to preapproved, permitted disposal facilities. This Plan provides the protocol and procedures for preparing, loading, transporting, and documenting transportation-related activities during IM-3 decommissioning, removal, and restoration. The plan covers the following activities:

- Removal of non-hazardous and hazardous materials and wastes from the project site in accordance with applicable federal, state, and local laws, regulations, and ordinances.
- Compliance with applicable regulations related to transportation of wastes to protect public health and safety.
- Compliance with Pacific Gas and Electric Company (PG&E) requirements for spill prevention and traffic safety.
- Transportation of waste materials in a manner that prevents the release of waste to areas outside of the approved disposal facilities.
- Disposal of waste materials after profiling and receipt of written acceptance from the permitted disposal facilities.
- Implementation of a traffic plan that includes staging and onsite access to minimize disruption to compressor station operations and prevent spills.
- Implementation of a site-specific health and safety plan and compliance with approved project procedures to prevent or minimize the occurrence of accident, spill, or worker exposure to hazardous materials.

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SECTION 2

Requirements for Transporters

Transporters of waste materials will comply with the procedures and requirements outlined in this section during IM-3 decommissioning, removal, and restoration.

2.1 Shipping Documents

Decommissioning wastes will be managed either as hazardous or non-hazardous waste, depending on the waste profile, and transported using the appropriate shipping documents (manifests, bill of lading, or invoice) by a licensed waste hauler. At a minimum, the shipping document for non-hazardous waste will include the following information:

- Name and address of waste generator, name and address of waste transporter
- Name and address of disposal facility
- Description of the waste
- Quantity of the waste shipped

The designated transportation and disposal coordinator will maintain a copy of shipping document for each truckload of waste or fill material until the removal action is complete.

2.2 License and Insurance

The selected haulers or transporters of waste or fill material will be licensed and insured in both the shipping and receiving states, and in states through which the waste will be transported. Hazardous wastes must be transported by a registered hazardous waste hauler. The designated transportation and disposal coordinator will verify the status of registration and insurance policy of the selected transporters.

2.3 Contingency Plan

Each transporter is required to have a written contingency plan for PG&E review and approval to address any of the following conditions:

- Emergency situations (such as vehicle breakdown, accident, waste spill, waste leak, fire, and explosion) during transportation of waste materials from the project site to the disposal site
- Change in waste characteristics and condition
- Inclement weather

The contingency plan will be prepared in accordance with DTSC's guidance for transportation plans for site remediation (DTSC 2001). After the transporter is selected, a copy of their contingency plan will be made a part of this Plan.

2.4 Site-specific Requirements for Transporters

Transporters are required to attend contractor training provided by PG&E. Transporters and onsite flaggers are required to inspect under and around their vehicle(s) for wildlife prior to moving the vehicle.

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SECTION 3

Traffic Control

This section describes traffic control procedures and requirements to be implemented during decommissioning.

3.1 Dust control

Most materials for offsite disposal will be transported in covered end-dump trailers/trucks, drums, or roll-off bins to an approved disposal facility. Some materials for disposal may be suitable for flatbed trucks or trailers. Project-related track out or spills on publicly maintained paved surfaces will be cleaned within 24 hours. For other required transportation-related, dust-control measures, see Table 6-1 (Air Quality and Hazardous Materials headers) and Appendix G of the IM-3 Decommissioning, Removal, and Restoration Work Plan.

3.2 Traffic Control

3.2.1 Speed Limit

While on the project site, vehicles are required to maintain speeds appropriate to the roadway for safety purposes and for dust control. While on streets or freeways, transporters will follow the posted speed limits and apply defensive driving techniques (traffic or road conditions) for traffic safety.

3.2.2 Site Access Control

Trucks will be well maintained; leaks and spills from vehicles are not acceptable. Trucks with excess grease or debris will be rejected and not allowed access to the project site. An inspector will be located at a designated location to inspect and approve vehicles, assisting the truck drivers to safely enter and depart the project site.

3.2.3 Truck Staging Area

Empty waste bins will be inspected by the designated transportation and disposal coordinator to confirm cleanliness prior to being off-loaded at sites designated within the IM-3 Decommissioning, Removal, and Restoration Work Plan, as directed by the inspector. Truck loading will be coordinated so as to avoid staging offsite and long wait times for trucks; idling will be limited to 5 minutes, except when queuing or as necessary for inspecting or servicing the vehicle, or operating a power take-off device.

3.3 Transportation Routes

3.3.1 Offsite Traffic Flow

Trucks will enter and exit the project through the IM-3 access road. Full and empty bins will be shuttled to the staging areas depicted on Figure 3-1 of the IM-3 Decommissioning, Removal, and Restoration Work Plan. Prior to entering the site, trucks will drive into a designated area for visual inspection of fuel or oil leaks, as well as inspection of empty bins. Figure 3-1 of the IM-3 Decommissioning, Removal, and Restoration Work Plan illustrates the proposed traffic routes. Appropriate signage will be developed to control traffic flow.

3.3.2 Onsite Traffic Flow

Only the designated onsite roll-off trucks will be allowed within the primary work zones to shuttle full and empty bins to the primary work areas. Trucks will wait inside the project site at a designated staging area until directions to loading areas within primary work zones are received. Traffic will be coordinated to reduce traffic on surrounding surface roads and reduce dust generation during onsite transportation. Figure 3-1 of the IM-3 Decommissioning, Removal, and Restoration Work Plan illustrates the proposed traffic route within the project site.

3.4 Truck Inspection and Cleaning

After loading, the trucks will be inspected to make certain they are clean prior to leaving the project site and entering offsite transportation routes. A cleanout station will be maintained for inspection and to keep trucks

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clean when leaving the project site. Dry decontamination will be used for onsite truck cleaning, when necessary. Trucks will be considered to be decontaminated if no solid material adheres to the outside of the vehicle. If trucks require washing, they will be washed offsite by the transporter.

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SECTION 4

Disposal Facilities

Disposal facilities receiving Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) waste (waste that contains CERCLA hazardous substances, pollutants, or contaminants) must be in compliance with 42 U.S.C § 9621 (d) (3) and 40 C.F.R. § 300.440. PG&E may ship waste material associated with the implementation of the Final Remedy from the Site to an offsite facility only if it demonstrates to DOI's satisfaction, prior to the first shipment, and annually thereafter, that USEPA has determined that the proposed receiving facility is operating in compliance with 42 U.S.C § 9621 (d) (3) and 40 C.F.R. § 300.440. If waste material is shipped to an out-of-state disposal facility, then PG&E will provide written notice of the disposal of waste to the appropriate state environmental official in each receiving facility's state and the DOI Project Manager prior to the first shipment of the waste material in accordance with the requirements of the Consent Decree. Wastes designated as RCRA or Non-RCRA hazardous wastes will be transported and disposed of in a pre-approved facility with the appropriate permits for the type of waste being accepted. Waste profiles will be established, and acceptance of the waste stream will be established prior to sending any waste material offsite. Receiving facilities for wastes designated as non-hazardous wastes will also be pre-approved. Facilities for the RCRA hazardous wastes, Non-RCRA hazardous and non-hazardous wastes will be identified just prior to implementing this Work Plan.

PG&E proposes use of the following potential disposal facilities for the project as well as others, subject to the communication and approval processes under the Consent Decree outlined above:

PSC Rancho Cordova – TSDF
11855 White Rock Road
Rancho Cordova, CA 95742

Chemical Waste Management – Kettleman Hills Facility – Landfill
35251 Old Skyline Road
Kettleman City, CA 93239

US Ecology Inc. - Landfill
Highway 95 (12 miles South of Beatty, NV)
Beatty, NV 89003

Clean Harbors Button Willow – Landfill
2500 West Lokern Road
Button Willow, CA 93206

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SECTION 5

Documentation

The designated transportation and disposal coordinator will be responsible for maintaining proper documentation of waste removal and transportation and site restoration activities.

5.1 Photographs

Photographic documentation representing activities, with particular attention to compliance with this Plan and the IM-3 Decommissioning, Removal, and Restoration Work Plan, will be collected throughout the course of the project.

5.2 Field Log Book

The designated transportation and disposal coordinator will be responsible for maintaining a field logbook to document observations, onsite personnel, truck arrival and departure times, and other vital project information.

5.3 Truck/Equipment Inspection Logbook

Trucks and equipment used in project activities will be inspected daily and prior to entering and leaving the project site. A logbook will be kept to document thorough and complete inspection.

5.4 Weekly Reports

As part of the weekly report, the designated transportation and disposal coordinator will summarize the transportation activities and accomplishments in the weekly report. The weekly report will also include the completion status of project objectives, verify designated transportation and disposal coordinator's adherence to proper site health and safety procedures, and describe the activities and goals for the following week.

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SECTION 6

Plan Review Corrective Actions

6.1 Plan Update Log

The designated transportation and disposal coordinator will keep a log of updates to this Plan and record written acknowledgment of changes or additions.

6.2 Corrective Action Log

The designated transportation and disposal coordinator will keep a log of corrective actions taken to accomplish project objectives.

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SECTION 7

Works Cited

CH2M HILL. 2014. *Draft Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan, Topock Compressor Station, Needles, California*. Prepared for Pacific Gas and Electric Company. September 8.

Department of Toxic Substances Control (DTSC). 2001. *Transportation Plan, Preparation Guidance for Site Remediation*. *Interim Final*. December.

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Appendix E
Utilities Drawing Set

(To be provided in the final work plan)

Appendix F
Soil Management Plan

This appendix is same as the Soil Management Plan that is currently under review with the 90% Basis of Design Report for the Final Groundwater Remedy (Appendix L, O&M Manual, Volume 4). The final version of this plan will be included with the final Work Plan.

Appendix G
Construction Best Management Practices (BMPs) Plan

APPENDIX G

Construction Best Management Practices (BMPs) Plan

In compliance with EIR mitigation measure HYDRO-1, the IM-3 decommissioning, removal, and restoration activities will implement BMPs to meet the substantive criteria of NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ NPDES No. CAS000002 (General Permit) (SWRCB 2009), as well as applicable Federal, state, and local permit and regulatory requirements. Although the IM-3 decommissioning, removal, and restoration activities are not required to obtain a General Permit, a current copy of the General Permit can be found at the State Water Resources Board website, *http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2009/wqo/wqo2009_0009_dwq.pdf*. This BMP plan has been prepared by a Qualified SWPPP Developer (QSD) and will be implemented prior to decommissioning activities under the direction of a Qualified SWPPP Practitioner (QSP). The BMPs are presented in Sections 1 and 2. Visual inspections, monitoring, and sampling are required to evaluate the effectiveness of the BMPs and to determine whether modifying or implementing additional BMPs is required. A monitoring and reporting program is presented in Section 4. Sections 5 and 6 discuss workers training and education, and record keeping. Final site stabilization is presented in Section 7.

The BMP designations cited below are based on those used by the California Stormwater Quality Association Construction BMP Handbook (California Stormwater Quality Association 2009) and are consistent with the types of BMPs referenced in the General Permit.

1. Pre-Decommissioning Control Practices

Scheduling of Activities (EC-1)

Proper scheduling assists in identifying ways to minimize disturbed areas, which allows for a reduction in the active project area requiring protection and also minimizes the length of time disturbed soils are exposed to erosive processes. Scheduling will occur at the start of the work and will be established to coordinate construction activities and BMP implementation during IM-3 decommissioning. Weather reports will be monitored by the Qualified SWPPP Practitioner (QSP) or his/her assigned representative and construction activities will be postponed during significant storm events. Prior to rain events, temporary soil stabilization BMPs will be implemented.

Preservation of Existing Vegetation (EC-2)

There is very sparse vegetation in the IM-3 primary work zones, staging areas, and access/haul routes (see Figure 3-1). The main areas of soil disturbance will be:

- PE-1 well site,
- MW-20 Bench Facility,
- Access road to IM-3 and the valve vaults located along that access road,
- IM-3 treatment plant,
- Access road from IM-3 treatment plant to the East Mesa injection well field,
- East Mesa injection well field, and
- Temporary staging areas at various locations.

Additional areas of anticipated minor soil disturbance are also shown in Figure 3-1. Prior to decommissioning, qualified biologist(s) will survey the work areas for sensitive species and habitats including confirmation/tagging the mature and sensitive plants (including ethnobotanically sensitive plants) previously identified in mapping efforts in compliance with mitigation measures AES-1/2 and CUL-1a-5. Areas that need to be preserved will be marked with temporary fencing. Protection methods and specifications described in future Avoidance and

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Minimization Plan will be followed (see Table 6-1); workers will be instructed to implement these avoidance and protection methods and be instructed to keep clear of areas outside of disturbance limits.

2. BMPs Addressing Control Site Run-on/Run-off, Prevent/Reduce Discharge of Pollutants to Waters of the United States, and Prevent Spills

BMPs Addressing Off-site Run-on to the Construction Site

Although the project site is in an arid region of California, there can be periods of intense rain. Run-on to the construction site is expected to be minimal but presents a high potential for sediment transport because of the intensity of the periodic rains and the susceptibility to the active work zones to erosion. Therefore, off-site run-on will be managed by constructing temporary berms or sandbag barriers above the work zones to route surface water around the work areas.

- Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats (EC-7): These erosion control methods can be used on flat or, usually, sloped surfaces, channels, and stockpiles. Plastic covers are typically used to cover soil stockpiles. Plastic covers can also be used under vehicles and equipment as spill, leak, and drip containment.
- Earth Dikes and Drainage Swales (EC-9): Temporary earth dikes and drainage swales use compacted soil or cement to divert offsite runoff around construction sites, divert runoff from stabilized and disturbed areas, and convey runoff to desired location. These include graded surfaces to redirect sheet flow, diversion dikes or berms that force sheet flow around a protected area, and stormwater conveyances (swales, channels, gutters, drains, sewers) that intercept, collect, and redirect runoff. Only temporary diversions will be used for IM-3 decommissioning work. Temporary diversions could include excavation of a channel along with placement of the spoil in a dike on the down gradient side of the channel, and placement of gravel in a ridge below an excavated swale.
- Velocity Dissipation Devices (EC-10): Velocity dissipation devices will be used at the downstream terminus of the channels to reduce the energy and velocity of the onsite runoff.
- Non-Vegetative Stabilization (EC-16): Roadways may be stabilized by addition of crushed rock or gravel for dust control and to prevent erosion from vehicle transportation. Areas stabilized with crushed rock or gravel should be maintained and additional gravel added as needed.

BMPs for Sediment Control

- Silt Fence (SE-1): A temporary sediment barrier consisting of fabric, held in place by supporting poles or stakes, is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flow. Silt fences are suitable for perimeter control and are placed below areas where sheet flows discharge from the site. They should also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion. Silt fences are most effective when used in combination with erosion control.
- Fiber Rolls (SE-6): Fiber rolls will be used to intercept runoff and reduce flow velocity. Fiber rolls will be placed at the perimeter of the disturbance areas to minimize sediment from leaving the construction area during storm events. Fiber rolls will also be installed to form a barrier around all of the stockpiles and will be anchored down with stakes. If the stockpiles are on paved areas, then gravel bags will be used to secure the fiber rolls. The fiber rolls shall be inspected prior to a forecasted rain event and after rain events to ensure the fiber rolls are working properly. Sediment accumulated by the fiber rolls should be removed to maintain the effectiveness of the fiber rolls.
- Gravel Bag Berm (SE-6): Gravel bag berm can be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. The QSP will determine if gravel bags will be placed along the up-gradient side of any equipment that is not in use. Gravel bags will also be used, if necessary, during trenching activities when stockpiles are left overnight. In the event that gravel bag berms are needed, they could be placed around the lay down area and trenching area.

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BMPs for Wind Erosion Control

- Wind Erosion Control (WE-1): Wind erosion control will be applied as necessary to prevent nuisance dust as directed by the QSP. Dust control shall be applied prior to grading activities. A water truck will be used to control dust as necessary. Care shall be taken not to over water the site to create runoff and sediment migration off site.
- EIR mitigation measure AIR-1a: Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes will be considered sufficient.
- EIR mitigation measure AIR-1b: Cover loaded haul vehicles while operating on publicly maintained paved surfaces
- EIR mitigation measure AIR-1c: Stabilize (using soil binders or establish vegetative cover) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions
- EIR mitigation measure AIR-1e: Curtail non-essential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.

BMPs for Tracking Control

- Stabilized Construction Entrance/Exit (TC-1): A temporary stabilized vehicular entrance located where traffic will enter and exit temporary staging areas. This purpose is to reduce the tracking of sediment onto public right of ways, streets, or parking areas where it could potentially be washed into drains or become air borne.
- EIR mitigation measure AIR-1d: Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours.

BMPs Addressing Material and Waste Storage and Handling Areas

- Material Delivery and Storage (WM-1) and Material Use (WM-2): Provide covered storage for materials, especially hazardous materials, to prevent exposure to storm water. Store and transfer hazardous materials on to impervious surfaces that will provide secondary containment for spills, leaks, or drips. Park vehicles and equipment used for material delivery and storage, as well as contractor vehicles, in designated areas. The storage area shall be covered and protected during non-working days and prior to and during rain events. Employees and subcontractors shall be trained on the proper material delivery and storage practices. Material Safety Data Sheets (MSDS) should be supplied for all materials used.
- Stockpile Management (WM-3): If stockpiles are left over night, they shall be located a minimum of 50 feet away from any concentrated flow of storm water, drainage courses, and inlets. Stockpiles will be covered with plastic and anchored down with gravel bags. Each stockpile will be surrounded with fiber rolls or gravel bag berm. Limit the use of plastic materials when more sustainable environmentally friendly alternatives exist.
- Spill Prevention and Control (WM-4): Ensure that spills and releases of materials are cleaned up immediately and thoroughly. Ensure that appropriate spill response equipment, preferably spill kits preloaded with absorbents in an over pack drum, is provided at convenient locations throughout the site. Spent absorbent material must be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as nonhazardous. Store materials properly to prevent spills from entering the storm drain system or surface waters. Ensure that spill cleanup materials are located on-site and are easily accessible. Clean up leaks and spills immediately using proper absorbent materials. Absorbents used to clean up hazardous materials must be disposed of as hazardous waste. Educate employees about spill prevention

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and cleanup and train workers in proper spill response procedures. Stop the source of spill and cleanup immediately, if it is safe to do so. Field crew to report all spills to PG&E.

- Solid Waste Management (WM-5): Work shall be performed in accordance with the Waste Management Plan. Maintain site in good order and free of litter and trash. Maintain storm drain inlets free of litter and construction wastes. Provide a sufficient number of conveniently located trash and scrap receptacles to promote proper disposal of solid wastes. Ensure that the receptacles are provided with lids or covers to prevent windblown litter. Maintain receptacles regularly.
- Hazardous Waste Management (WM-6): Provide a sufficient number of proper receptacles to promote proper disposal of hazardous wastes. Hazardous waste that cannot be reused or recycled must be stored, transported, handled, and disposed of in accordance with Federal, state, and local laws.
- Sanitary/Septic Waste Management (WM-9): Locate sanitary and septic waste facilities away from drainage courses (50 feet) and traffic areas. Maintain the facilities regularly.
- Liquid Waste Management (WM-10): Liquid waste shall be contained in a controlled area and not allowed to enter any water course. Potential sources of liquid waste and their appropriate disposal procedures shall be identified. Employees and subcontractors shall be educated on the proper practices of disposing liquid waste.

BMPs Addressing Non-Stormwater Controls

- Water Conservation Practices (NS-1): Water equipment shall be kept in good working condition and shall repair any water leaks promptly. Employees and sub-contractors shall be informed on the requirements of water conservation practices and will be required to implement the practices throughout the project.
- Clear Water Diversion (NS-5): Drainage pipes will be installed to divert water around the work area in order to reduce the potential storm water run on in the working areas.
- Illegal Connection/Illegal Discharge Detection Reporting (NS-6): All illicit connections or illegally dumped or discharged materials on the construction site will be reported to the QSP at the time of discovery. The site shall be inspected regularly during project duration for evidence of illicit connections, illegal dumping, or discharges.
- Vehicle and Equipment Cleaning (NS-8): Vehicle cleaning will be by dry brushing/wiping. Cleaning cloths will be managed and disposed of in accordance with federal, state, and local regulations. Soaps and solvents will not be used unless the resulting waste or wastewater is fully contained. Establish a designated area for equipment cleaning away from drainage courses. Vehicle washing should be kept to a minimum and in contained areas only using Phosphate-free, biodegradable soaps. Water used for washing should not be discharger or buried and must be captured and recycled or disposed of according to the requirements of WM-10, Liquid Waste Management or WM-6 Hazardous Waste Management. Vehicles should be cleaned offsite when possible and vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite. Employees and subcontractors should be educated in ways to prevent pollutions when washing. No steam cleaning is permitted onsite.
- Vehicle and Equipment Fueling (NS-9): Fuel vehicles and equipment off- site whenever possible. Follow fueling SOPs included in Appendix H of this Work Plan. Onsite re-fueling will be located away from any watercourse. Spill kits and absorbent spill clean-up materials shall be available in re-fueling areas and on trucks with portable re-fueling tanks. All fueling/re-fueling areas will have secondary containment and all spills shall be immediately cleaned up.
- Vehicle and Equipment Maintenance (NS-10): Use off-site maintenance facilities whenever possible. Any on-site maintenance areas must be away from any drainage course and protected from storm water runoff and on-site flooding. Use designated area that is a safe distance away from drainage facilities and water courses. Segregate and recycle wastes such as greases, used oil and oil filters, antifreeze, cleaning solutions, auto batteries, and hydraulic and transmission fluids. All maintenance areas will have spill kits and other spill protection devices.

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Good Housekeeping BMPs

The following good housekeeping measures should be implemented onsite for the duration of the IM-3 decommissioning, removal, and restoration:

1. Cover and berm loose stockpiled construction materials that are not actively being used.
2. Store chemicals in water tight containers (with appropriate secondary containment) to prevent any spillage and leakage in a completely enclosed storage shed.
3. Minimize exposure of construction materials to precipitation.
4. Prevent the tracking of loose construction and landscape materials offsite.
5. Prevent the disposal of rinse or wash waters or materials on impervious site surfaces.
6. Ensure the containment of sanitary facilities to prevent discharges of pollutants to the stormwater drainage system or receiving water. Regularly inspect sanitation facilities and clean or replace them as needed.
7. Cover waste disposal containers at the end of every business day and during rain events. Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water.
8. Contain and securely protect stockpiled waste materials from wind and rain at all times unless actively being used.
9. Contain all washouts so that there is no discharge into the underlying soil and onto the surrounding areas.
10. Prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters. Immediately clean up all leaked material and dispose of properly.
11. Contain fertilizers and other landscape materials when they are not being actively used.
12. Apply erodible landscape materials at quantities and application rates according to manufacturers' recommendations based on written specifications by knowledgeable and experienced field personnel. Discontinue the application of any erodible landscape material within two days before a forecasted rain event of during periods of precipitations. Stack erodible landscape materials on pallets and cover when not being used or applied.
13. Limit washing vehicles onsite to emergency situations only. Prevent non-stormwater discharges from vehicle washing from reaching drainage courses.
14. Provide soil cover for areas of construction that have been disturbed and are not scheduled to be re-disturbed for at least 14 days and for all finished slopes, open space, utility backfill, and completed lots.
15. Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to control erosion and sediment discharges from the site.
16. Conduct regular stormwater tailgate meetings with the workforce when the Project is staffed and work is underway.
17. Construction vehicles and equipment left idle for more than an hour should be placed on mats to prevent leaks from entering water bodies.
18. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (that is, poles, equipment pads, cabinets, conductors, insulators, bricks, and so forth).

3. Risk Determination

A Risk Type 1 has been calculated per the General Permit for the IM-3 decommissioning, removal, and restoration activities. The sediment risk was determined from a combination of the Rainfall Erosivity Factor (R value), the Soil Erodibility Factor (K value), and the hill slope length-to-gradient factor (LS value) to account for the effect of

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topography on erosion. These three values are multiplied to obtain a watershed erosion estimate, which then directly corresponds to a certain level of sediment risk.

The R value of 10.00 was calculated using the estimated annual R values and Erosivity Index Tables developed by the United States Department of Agriculture. The methodology is outlined by the EPA Fact Sheet 3.1 and is dependent on construction schedule and location. The K value of 0.10 was obtained from the Google Earth K Factor kmz file as provided by the SWRCB. The LS factor of 9.17 was calculated using Google Earth LS Factor kmz file as provided by the SWRCB. With these values, the combined watershed erosion estimate was found to be 9.17 tons per acre. Because it was calculated to be less than 15 tons per acre per the CGP this project is considered a Low Sediment Risk.

Stormwater runoff is expected to infiltrate or follow natural drainage courses to the receiving water body. The Project drains to the Colorado River. The Colorado River is not a 303d-listed impaired water body for sediment or siltation and is not deemed to have a beneficial reuse pertaining to COLD, SPAWN, and MIGRATORY. As a result, it is classified as a Low Receiving Water Risk. As classified by the Attachment A of the General Permit, the Risk Type determination for the Project is Type 1. Risk determination calculations are shown in Attachment 2 to this appendix.

Prior to implementation of the IM-3 Decommissioning, Removal, and Restoration Work Plan, the R value calculation will be updated using the actual construction dates.

4. Monitoring and Reporting Program

In conformance with the substantive requirements of General Permit (Order No. 2009-0009-DWQ), a monitoring and reporting program will be implemented to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary, to continue to reduce pollutants and impacts on receiving waters.

The Project Risk Type determines the monitoring and reporting requirements. The monitoring program will include the following minimum elements per Attachment A of the General Permit for Risk Type 1 projects:

- Quarterly, non-stormwater visual inspections,
- Daily visual inspections to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended,
- And before, during, and after storm inspections and once every 24 hour during extended storm events.
- Monitoring of non-visual pollutants per Attachment C of the General Permit Results of this monitoring shall be reported annually to the State Water Resources Control Board (SWRCB) through the Storm Water Multi-Application Reporting and Tracking System (SMARTS) and to DTSC. Sampling is not required for Risk Type 1 projects unless there is a leak, spill, or discharge of a non-visual pollutant.

An annual report is required for all projects with permit duration greater than 3 consecutive months. An annual report will be filed and will include a summary and evaluation of all sampling and analysis results, original laboratory reports, and chain of custody forms; a summary of all corrective actions taken during the compliance year; and identification of any compliance activities or corrective actions that were not implemented.

5. Workers Training and Education

Prior to the beginning of construction, construction workers will be trained on the overall storm water management program and more specifically, on proper implementation of this BMPs plan. Persons directly responsible for compliance with the plan, such as inspectors, workers installing and maintaining the erosion control devices, and workers collecting stormwater samples, will receive additional training. New personnel that require stormwater management training after the start of construction will be provided training. Documentation of the training will be kept onsite.

6. Record Keeping

The following records will be maintained onsite:

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- This BMPs Plan and any updates necessary to reflect current conditions and to maintain accuracy.
- Copies of relevant documents that would affect the provisions or implementation of the BMPs Plan.
- Descriptions and dates of any incidences of significant spills, leaks, or other releases pertaining to soil storage that resulted in discharges of pollutants in stormwater to a regulated municipal separate stormwater systems or to waters of the U.S., the circumstances leading to the release and actions taken in response to the release and measures taken to prevent the recurrence of such releases.
- Documentation of maintenance, including repairs of structural control measures, including the date(s) of discovery of areas in need of repair/replacement, date(s) that the structural control measure(s) returned to full function, and the justification for any extended repair schedules. The maintenance records shall include the date(s) of regular maintenance.
- BMP inspection reports and corrective action report forms (see Attachment 1 for an example of a corrective action report form which may be used for both California and Arizona).
- Annual reports.
- Training documentation.

7. Final Site Stabilization

After completion of decommissioning and removal activities, specific areas will need to be maintained until a plan for restoration is in place and associated work is complete. During this period, BMPs will be implemented to provide dust and erosion control. Soil stabilization will be conducted using a liquid soil binder (e.g., SoilTac) for dust control and erosion control. The soil binder may need to be reapplied based on periodic inspection and depending on the restoration plan. Final site stabilization has been achieved when:

- The site does not pose any additional sediment discharge risk than it did prior to the commencement of construction activities as determined by the QSP,
- There is no potential for construction related stormwater pollutants to be discharged into site runoff as determined by the QSP,
- Construction materials and waste have been disposed of properly, and
- Construction-related equipment, materials, and any temporary BMPs are no longer needed and removed from the site.

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Attachment 1
Inspection and Corrective Action Report Form

2013 Construction General Permit
Inspection & Corrective Action Report Form

Section I. General Information (see instructions)

Name of Project		CGP Tracking No.	AZCON – _____	Inspection Date	___ / ___ / _____

☐ **Check box when using this form to inspect an inactive/ unstaffed construction site (this option applies to an entire site only).** See Part 4.2(4) of the permit. Inspect the site immediately before becoming inactive/ unstaffed and every 6 months thereafter and within 24 hours of each storm event of 0.5 inch or greater in 24 hours.

Inspector Name, Title & Contact Information	**Name:** _____ **Title:** _____ **Contact information:** _____
Present Phase of Construction	

Inspection Schedule (all days are calendar days) *(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply.)*

Routine Schedule: ☐ Every 7 days ☐ Every 14 days and within 24 hours of a 0.5" storm event

☐ Once per month, but not within 14 days of the previous inspection and within 24 hours of a 0.25" storm event

Reduced Schedule: once per month (but not within 14 days of the previous inspection) and before an anticipated storm event and within 24 hours of the end of each storm event of 0.5 inch or greater in 24 hours.

☐ Once per month (in stabilized areas)

☐ Once per month (where discharges are unlikely based on seasonal rainfall patterns)

☐ Once per month (where winter conditions exist and earth-disturbing activities are being conducted)

Discharge points within 1/4 mile of an impaired water or outstanding Arizona water (OAW): ☐ Every 7 days and within 24 hours of a 0.5" storm event

Was this inspection triggered by either a 0.25" or 0.5" storm event? ☐ Yes ☐ No

If yes, duration of storm event: ☐ < 1 hour ☐ < 6 hrs ☐ > 6 hrs

If yes, how was the storm event determined (either 0.25" or 0.5")?

☐ Rain gauge on site ☐ Weather station representative of site. Specify weather station source: _____

Total rainfall amount that triggered the inspection (in inches)**:** _____

Identify all sources of non-stormwater discharges occurring at the site and the associated control measures in place

sources of non-stormwater discharges:	control measures associated with the non-stormwater discharges:
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

Adverse or Unsafe Conditions for Inspection

Did you determine that any portion of the site was unsafe for inspection per CGP Part 4.2(6)? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

Note: *Inspections may be postponed when adverse or unsafe conditions exist such as local flooding, high winds, or electrical storms, or situations that otherwise make inspections unsafe. However, the inspection must resume as soon as conditions are safe.*

Section II. Description of Discharges and Condition of the Discharge Locations (CGP Part 4.3(11)) (see instructions)

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
1.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
2.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
3.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section II. CONTINUATION SHEET FOR: Description of Discharges and Condition of the Discharge Locations [Print additional sheets as necessary]

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section III. Condition and Effectiveness of All On-site Control Measures (Erosion and Sediment (E&S)), Stabilization and Pollution Prevention (P2) Practices (CGP Part 3.1.1 through 3.1.3) (see instructions)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
1.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
2.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

Section III. CONTINUATION SHEET FOR: Control Measure Condition and Effectiveness [Print additional sheets as necessary]

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

ADEQ Arizona Department of Environmental Quality	Section IV. Corrective Action Report Form

Section IV.A. – General Information

(Complete this section within 24 hours of discovering the condition that triggered corrective action)

Date/ Time Problem First Discovered	Date: ___ / ___ / _____ Time: _____ ___AM ___PM	Today's Date	___ / ___ / _____
Name and Contact Information of Individual Completing this Form	**Name:** _____ **Contact information:** _____		

What site conditions triggered the requirement to conduct corrective action? *(Check the box that applies)*

- ☐ A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 2 and/or 3
- ☐ A prohibited discharge described in Part 1.4 has occurred or is occurring
- ☐ ADEQ or USEPA has determined that modifications to the control measures are necessary to meet the requirements of Part 3.

Provide a description of the problem: (Provide description of the specific problem that triggered the need for corrective action, and the specific location where it was found. If you have already provided this explanation in an inspection report, you can refer to that report.)

Deadline for completing corrective action:

- ☐ Work will be completed no more than 7 calendar days after the date the problem was discovered (enter date): ____ / ____ / _____
- ☐ It is infeasible to complete work within the first 7 days, therefore, the work will be completed as soon as practicable following the 7th day (enter date): ____ / ____ / _____

If the estimated date of completion falls after the 7-day deadline, document the following: (1) The reason it is infeasible to complete work within 7 days, and (2) The schedule for installing and making the new or modified stormwater control operational in the soonest practicable timeframe.

NOTE: *Any corrective actions that result in changes to any of the stormwater controls or procedures shall be documented in the SWPPP within 7 calendar days of completing the corrective action work.*

Section IV.B. – Stormwater Control Modifications to be Implemented in Response to a Corrective Action Trigger [Print additional sheets as necessary]			
List of stormwater control(s) to be modified or replaced to correct the condition that required the Corrective Action	**Actual or Planned Completion Date**	**SWPPP Update Necessary?** **If yes, specify date SWPPP modified**	**Notes and observations**
1.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
2.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
3.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
4.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
5.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
6.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
7.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	

Section V. CONTINUATION SHEET for Miscellaneous Items (see instructions) **[Print additional sheets as necessary]**
Use this space for miscellaneous information or as continuation of items found elsewhere in this report.

Section VI. Certification and Signature (CGP Appendix B. 9.)

Section VI.A. – Certification and Signature by Contractor or Subcontractor performing the inspections (if applicable)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Contractor or Subcontractor: _____ Title: _____

Printed name : _____ Date: _____

Business / Agency: _____ Phone number: _____

Section VI.B. – Certification and Signature by Permittee (permittee / operator or a duly authorized representative is required to sign)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Permittee or
"Duly Authorized Representative": _____ Title: _____

Printed Name: _____ Date: _____

Business / Agency: _____ Phone number: _____

Appendix H
Land Use Memorandum

Interim Measures No. 3, Land Area Use

DATE: July 8, 2005

Introduction

Ongoing Topock cleanup activities include construction of a groundwater treatment system under the direction of the California Department of Toxic Substances Control (DTSC) as part of Interim Measure No. 3 (IM-3). In response to a request from tribal representatives, DTSC has asked Pacific Gas and Electric (PG&E) to estimate the area of land that has already or will be used in some manner[1] during construction of the groundwater treatment plant and associated pipelines, roadways, and wells. This memorandum provides an updated summary of the ground use associated with IM-3, including the analysis methodology and assumptions. [2]

Construction of IM-3 facilities commenced in late September 2004, and startup of operations is anticipated to begin no sooner than July 16, 2005, pending approvals by the county, state and federal regulatory agencies. Approval of IM-3 by the Bureau of Land Management (BLM) and DTSC was subject to conditions provided in separate biological and cultural resource assessments of IM-3 activities. In conformance with these conditions, pre-construction surveys of all areas subject to use during construction of IM-3 facilities were conducted. Under the terms of the BLM approval, all construction work was conducted in areas where significant cultural or biological resources are not present. In addition, appropriate physical barriers were placed and construction activities were continuously monitored by qualified professional staff to insure the protection of nearby cultural and biological resources.

Methods Used to Measure Used Area

To assess the area of use associated with IM-3, a survey using Global Positioning System (GPS) technology was conducted to delineate the sub-areas subject to ground-use construction activities. Such activities include grading associated with the IM-3 treatment plant, staging area, injection wells, conveyance piping, monitoring wells, and access roads.

Various past activities have resulted in significant previous disturbance of the area where the IM-3 construction is occurring. The area is traversed by a major railway line, several gas pipelines, historic U.S. Route 66, and the National Old Trails Highway. Portions of the area were disturbed by a former gravel quarry, roadside debris piles, World War II era military training exercises, and a former roadhouse/restaurant adjacent to the IM-3 project site boundary. During design of the IM-3 facilities, much care was taken to utilize these previously disturbed areas wherever possible. Trenching was routed along existing roadways and pipeline right of ways. The treatment plant and staging area were located in

---

[1] The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.

[2] This memorandum was originally submitted on February 7, 2005. The updated summary of the ground use associated with IM-3 has been updated to reflect conditions at completion of construction in July 2005.

the area previously disturbed by gravel quarrying during the construction of the former U.S. Route 66 highway. To minimize disturbance of that historic roadway pursuant to the requirements of BLM, above-ground piping was installed to convey treated water from the treatment plant to the injection wells. As further protection of that resource, a fabric and gravel blanket was placed over the historic roadway – this blanket is not included as IM-3 construction use because it is mitigation and because the blanket is removable. In calculating the areas used by the IM-3 construction, previously disturbed ground was distinguished from ground that did not appear to be significantly disturbed previously.[3]

Data collected during the GPS survey data was imported into the geographic information system (GIS) maintained for the IM-3 project. Polygons were defined for each sub-area used as a result of IM-3 construction activities. In addition, polygons were defined for those areas determined to be previously disturbed. The acreage of each of the polygons was determined, and the total (net) area of use resulting from IM-3 was calculated by subtracting the previously disturbed acreage from the gross acreage used during IM-3 construction.

The assessment of IM-3 ground use also includes an estimate of use associated with IM-3 compliance monitoring wells. Four compliance monitoring wells were installed in the vicinity of the eastern injection well field. Access routes were provided to three of the four compliance monitoring wells. These are not constructed roadways, but rather just tracks of vehicles driving over the ground surface, but are included as "used area". In addition, the area used for installation of a potential extraction well (PE-1) was calculated and included.

The attached table summarizes the total area of use related to IM-3. Sub-totals are provided for each sub-area associated with IM-3 (e.g., treatment plant site, staging area, injection well areas, etc.). The summary table provides sub-totals for private (PG&E) and public (BLM) lands to reflect land ownership. The total area used includes all areas used by the construction activities, regardless of the prior condition of the ground. Also shown in the table is the area of ground that did not appear to be significantly disturbed previously and which was used by the construction activities.

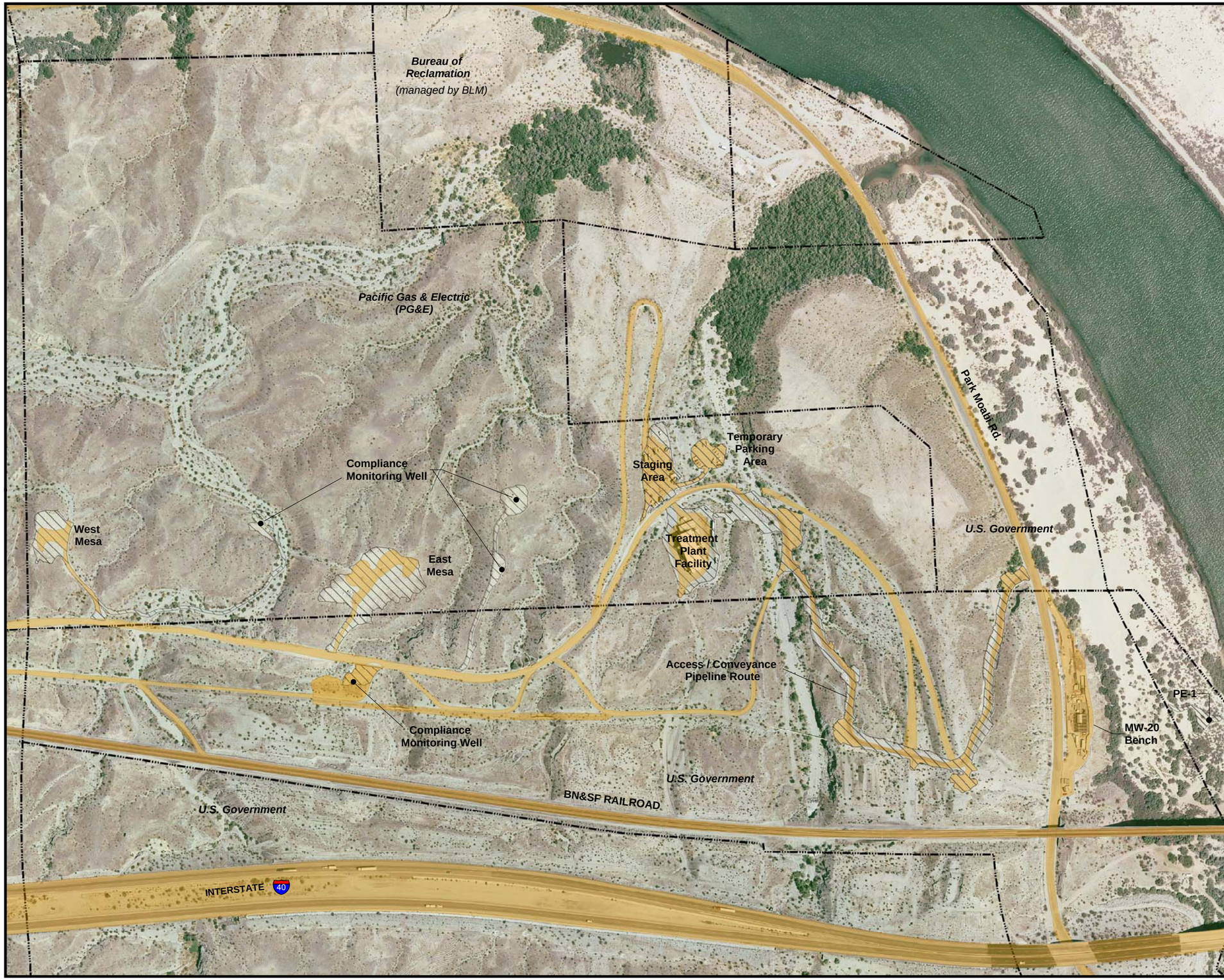
Conclusion

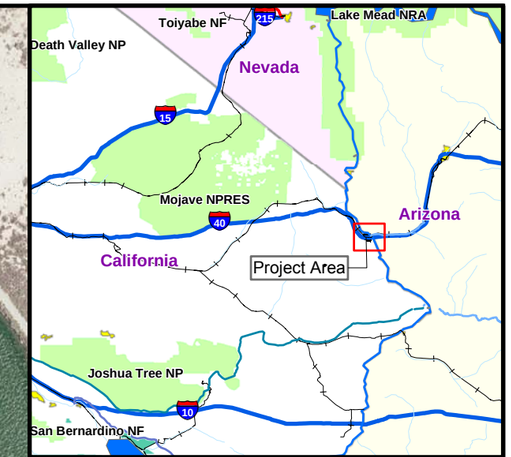
The total area of use resulting from construction of the IM-3 facilities is approximately 8.0 acres. Of these 8.0 acres, approximately 3.9 acres are on ground that was previously significantly disturbed. Thus, the net area of ground which was used, and which did not appear to be significantly disturbed previously, is about 4.1 acres. Approximately 1.2 acre of such area is located on public (BLM) land and 2.9 acres are located on private (PG&E) land.

[3] Land that did not appear to be previously disturbed may, in fact, have been significantly disturbed in the past, prior to the construction of IM-3.

GROUND USE ASSOCIATED WITH IM-3					
IM-3 Sub-Area	**Public Land**		**Private Land**		**Total Public & Private Land**
	Total Area Used by IM-3 (acres)	Previously Undisturbed Ground[1] Used by IM-3 (acres)	Total Area Used by IM-3 (acres)	Previously Undisturbed Ground[1] Used by IM-3 (acres)	Previously Undisturbed Ground Used by IM-3 (acres)
West Mesa	NA	NA	0.57	0.33	0.33
East Mesa	0.15	0.11	1.28	0.84	0.95
Staging Area	NA	NA	0.95	0.16	0.16
Treatment Facility	NA	NA	1.11	0.38	0.38
Pipeline Trench[2]	1.91	0.84	0.89	0.51	1.35
Compliance Monitoring Wells and PE-1	0.37	0.22	0.72	0.72	0.94
Total	**2.43**	**1.17**	**5.52**	**2.94**	**4.11**

Notes:
NA – Not Applicable
1 – Does not include acreage affected by prior ground-disturbing activities unrelated to IM-3 (e.g., roadways, pipelines, etc.). Land noted as being “previously undisturbed” did not appear to be significantly disturbed at the time of the construction of IM-3, but, in fact, may have been subject to prior disturbance.
2 – The acreage calculation for the pipeline trench includes the area used during improvement of the eastern access road.





N

0 175 350 700 Feet

1 inch equals 350 feet

LEGEND

- Property Boundaries
- Previously Disturbed Area
- Area Used* for IM-3

*The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.

Sources: San Bernardino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, and Plat maps provided by BLM.

TOPOCK IM3 PROJECT
LAND USE MAP
JULY 2005

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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Appendix I
Perimeter Air Monitoring Plan

Perimeter Air Monitoring Plan

IM-3 Decommissioning and Removal Topock Compressor Station, Needles, CA

Prepared for

Pacific Gas and Electric

September 2014

CH2MHILL®
155 Grand Avenue
Suite 800
Oakland, CA 94612

ES082614215856BAO

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SECTION 1

Introduction

This perimeter air monitoring plan (PAMP) has been developed to assist site personnel with monitoring and evaluating the effectiveness of the dust monitoring measures, guide modifications to field activities, if necessary, and document that adequate measures are being used to prevent the distribution of dust beyond the boundaries of the work zone during the decommissioning and removal of the IM-3 treatment plant at Topock Compressor Station (Compressor Station) located in San Bernardino County, near Needles, California.

During the decommissioning and removal activities, samples will be collected from the exclusion zone of the IM-3 treatment plant. Personnel air monitoring will be conducted by Contractors in accordance with the Contractors' health and safety plans, and is not addressed in this PAMP.

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SECTION 2

Key Personnel and Responsibilities

The PG&E Site Manager and the designated Project Air Monitoring Officer (AMO) have the primary responsibility for implementing the PAMP.

PG&E Site Manager

The PG&E Site Manager is responsible for directing and controlling all site activities and is responsible for enforcing on-site compliance with the provisions of the PAMP.

Project Air Monitoring Officer

The AMO will be responsible for implementing the PAMP under the direction of the PG&E Site Manager. The specific site duties will include, but will not be limited to:

- Assuring availability of air monitoring equipment per this PAMP,
- Maintaining documentation of manufacturers' calibration of equipment,
- Conducting and documenting daily field calibrations of equipment,
- Operating and maintaining meteorological station and utilizing meteorological data to identify air sampling locations,
- Conducting exclusion zone and perimeter air monitoring as required by this PAMP,
- Checking and documenting equipment operation during each shift,
- Making and documenting visual observations of potential emissions from equipment or processes,
- Downloading data from direct reading instruments and comparing to appropriate action levels,
- Shipping the samples to the appropriate laboratory for analysis, as required,
- Collecting laboratory data and comparing to appropriate action levels, as required,
- Notifying the PG&E Site Manager immediately of any action level exceedances, and
- Coordinating actions to be taken in the event of action level exceedances with the PG&E Site Manager and Construction Manager/Field Lead.

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SECTION 3

Potential Generation of Air Contaminants, Control Measures, and Chemicals of Concern

Potential Generation of Air Contaminants and Control Measures

Potential air contaminants include contaminants that could result from ground disturbance of contaminated soils and/or from specific decommissioning and removal activities. Controls will be used to minimize the potential generation of airborne contaminants. For example, abrasive blasting will be performed in a controlled environment. As a result, the contamination generation from abrasive blasting is not anticipated to leave the exclusion zone. The chemical transfer of the storage tank content will occur primarily as a closed system; the generation of airborne concentrations of the contents of the storage tanks is not expected to be sustained during transfer. The greatest potential risk of generating airborne concentrations is in the event of a release or spill. Similarly, the removal of the contents of the chemical storage tanks from the site will occur in closed containers. The generation of airborne concentrations of the contents is not expected to occur.

Work activities that have the highest potential to generate airborne contaminants are activities that generate dust, e.g., excavation of piping and vaults, decommissioning of wells, mechanical destruction and excavation of concrete pads, etc. The EIR mitigation measure AIR-1 specifies the following fugitive dust control measures below any construction and/or demolition activities:

- AIR-1a: Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient;
- AIR-1b: Cover loaded haul vehicles while operating on publicly maintained paved surfaces;
- AIR-1c: Stabilize (using soil binders such as SoilTac^{R}) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions;
- AIR-1d: Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours; and
- AIR-1e: Curtail nonessential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. A reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion will be considered sufficient to maintain compliance.

Available Soil Data

Tables 16-18 and 20-21 of the *Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1, Pacific Gas and Electric, Needles, California* (May 2014) contains a summary of the available soil data for the IM3 Treatment Plant (AOC 29), the East Mesa area, and the MW20 Bench (see Appendix A). Based on the available soil data, there are no chemicals present that exceed both background and human health screening levels. The metals that exceed site background levels are barium, chromium, lead, selenium, and zinc.

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Monitoring Parameters, Frequency, Action Levels, and Responses

Because the concentrations of metals detected in soils, based on available data, are well below residential Regional Screening Levels (RSLs) and California Human Health Screening Levels (CHHSLs) and the potential for generation of airborne contaminants outside of the exclusion zone will be minimized through implementation of control measures, the PAMP will focus primarily on action levels for particulate matter. The AMO may adjust the monitoring frequency and add monitoring parameters as needed to achieve the objective of the PAMP.

The Action Levels will be based on MDAQMD requirements. An exceedance of an action level does not automatically indicate an adverse health impact but rather, indicate that certain response actions are required to improve the effectiveness of fugitive dust control measures.

TABLE 3.3-1
Monitoring Parameters, Action Levels, and Responses

Monitoring Parameters	Monitoring Equipment	Tasks	Action Levels	Responses	Frequency[4]	Calibration
Wind speed and direction; average temperature; and precipitation	Meteorological Station - Wind[5]	All work activities	High winds (gusts in excess of 25 mph, or in excess of 15 mph on a 15-minute average)	Reduce earth-moving activity, altering the pace of excavation or work activities, modifying work practices to minimize fugitive dust emissions, temporarily halting work activities, or stopping activity until conditions are more favorable	Continual data recording during active work activities; check every two hours during active work activities	Per Manufacturer's Instructions
Visible Dust	Visual	All site activities		Reduce earth moving activities	Continual visual observations during active work activities	Not applicable
PM 10[6]	TSI 8530 DUSTRAK aerosol monitor or equivalent with environmental monitoring enclosure, e.g., the 8535 or 8537 and omni-	All work activities	$\geq$50 µg/m^3	Continually monitor dust levels and implement fugitive dust control measures specified in EIR mitigation measure AIR-1	Continual data recording during active work activities; check every two hours during active work activities	Daily or more frequently as needed

4 The exact frequency may be adjusted as determined by the AMO.

5 The MDAQMD Rule 403.2 states that a reduction of earth moving activity is required under high wind conditions. High winds are defined as gusts in excess of 25 miles per hour (mph), or in excess of 15 mph on a 15-minute average.

6 The Mojave Desert Air Quality Management District (MDAQMD) allowable concentration of fugitive respirable dust (PM10) is 50 µg/m^3 for a 24-hour average.

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TABLE 3.3-1
Monitoring Parameters, Action Levels, and Responses

Monitoring Parameters	Monitoring Equipment	Tasks	Action Levels	Responses	Frequency[4]	Calibration
	directional sampling inlet		$\geq$90 µg/m^3	Suspend work		

Monitoring Locations and Frequency

During site activities that will generate airborne dust, perimeter monitoring will be conducted by the AMO or designee at the exclusion zone boundary line to assess whether dust is leaving the exclusion zone. Generally, four monitoring locations will be identified for the exclusion zone boundary.

The specific locations of the monitoring will be established by the AMO or designee and adjusted as needed based on the predominant wind direction. Generally, one monitoring location will be upwind of the exclusion zone. One monitoring location will be directly downwind of the exclusion zone, and two monitoring locations on either side of the downwind location, but at roughly 60 degrees from the center line. Another way to view this is if the upwind location is at 12 o'clock, and the downwind location is at 6 o'clock. The other two monitoring locations would be located at 4 and 8 o'clock. The reason for the monitoring to be located in this manner is to account for minor variations in wind direction during the sampling period. If a monitoring location is not between the work being performed and the observers, a 5th location may be required.

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SECTION 4

Reporting Requirements

Direct reading instrumentation data will be collected by the AMO on a daily basis. The AMO will report all exceedances of any action level to the Site Manager immediately. The AMO will prepare a summary report of all air monitoring results on a weekly basis. The Site Manager will provide any reports as required by any agency with the support of the AMO.

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Appendix A
Available Soil Data

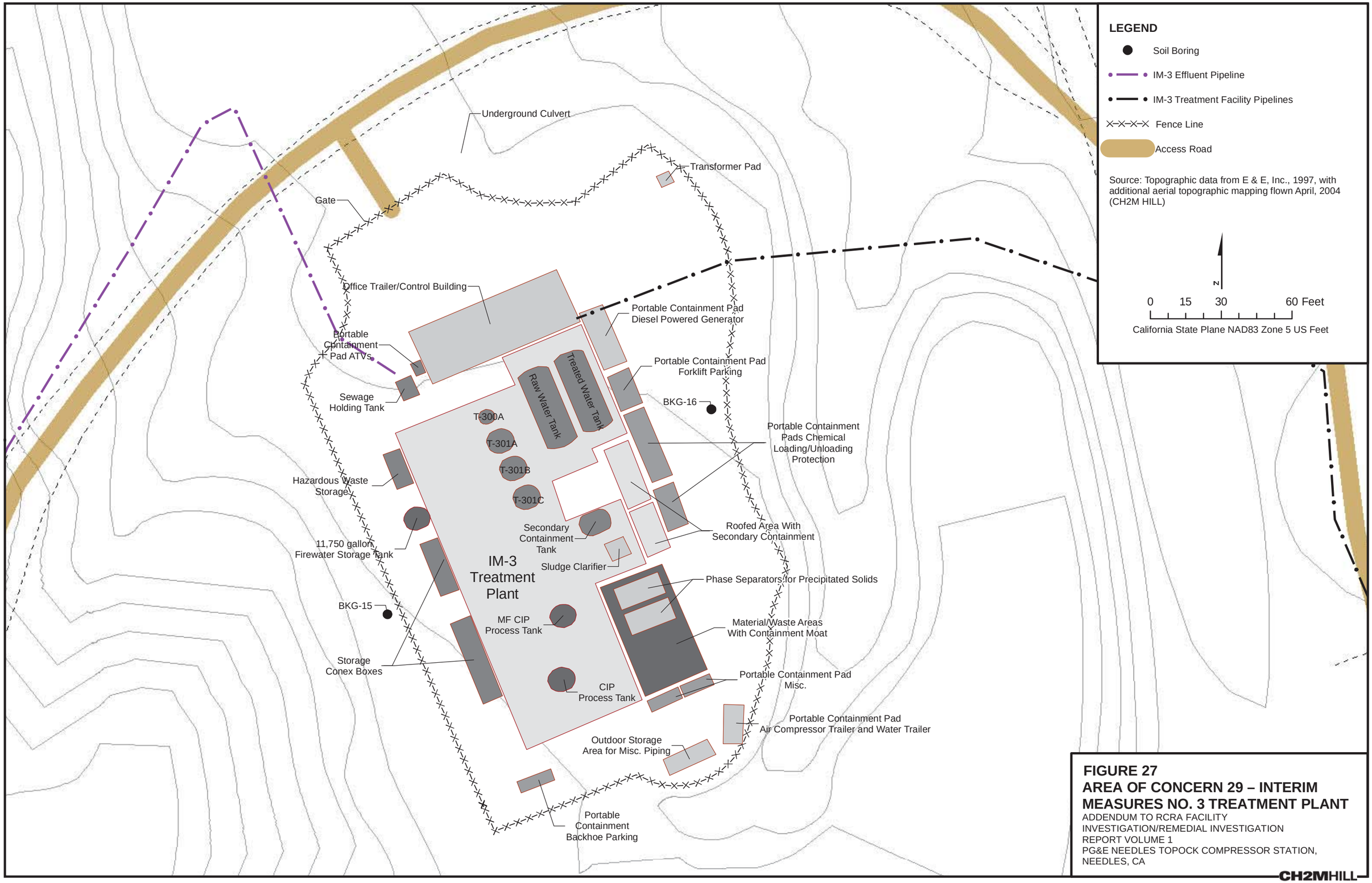

FIGURE 27
AREA OF CONCERN 29 – INTERIM MEASURES NO. 3 TREATMENT PLANT
ADDENDUM TO RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT VOLUME 1
PG&E NEEDLES TOPOCK COMPRESSOR STATION, NEEDLES, CA

CH2MHILL

\\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MAPFILES\2014\SWP_B\IM3_TREATEMENTPLANT.MXD ECLARK1 3/10/2014 11:42:41 AM

Table 16
Sample Results: Metals
Area of Concern 29 - Interim Measures No. 3 Treatment Plant
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
Pacific Gas and Electric Company Topock Compressor Station Needles, California

				Metals (mg/kg)																	
Interim Screening Level [1]:				**0.285**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**0.0125**	**1.37**	**27.3**	**1.47**	**5.15**	**2.32**	**52.2**	**58**
Residential Regional Screening Levels [2]:				**31**	**0.062**	**15,000**	**160**	**70**	**0.29**	**280**	**23**	**3,100**	**150**	**10**	**390**	**1,500**	**390**	**390**	**5.1**	**390**	**23,000**
Residential DTSC CHHSL [3]:				**30**	**0.07**	**5,200**	**16**	**39**	**17**	**NE**	**660**	**3,000**	**80**	**18**	**380**	**1,600**	**380**	**380**	**5**	**530**	**23,000**
Ecological Comparison Values [4]:				**0.285**	**11.4**	**330**	**23.3**	**0.0151**	**139.6**	**36.3**	**13**	**20.6**	**0.0166**	**0.0125**	**2.25**	**0.607**	**0.177**	**5.15**	**2.32**	**13.9**	**0.164**
Background [5]:				**NE**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**NE**	**1.37**	**27.3**	**1.47**	**NE**	**NE**	**52.2**	**58**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium, Hexavalent	Chromium, total	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
BKG-15	09/20/08	0 - 0.5	N	ND (2) *	4.8	160	ND (1) *	ND (1)	ND (0.404)	10	4.2	5.4	5.2	ND (0.1) *	ND (1)	7.5	ND (1)	ND (1)	ND (2)	22	24
	09/20/08	2 - 3	N	ND (2) *	1.8	120	ND (1) *	ND (1)	ND (0.408)	15	7.6	9.1	2.4	ND (0.1) *	1	11	1.8	ND (1)	ND (2)	33	34
	09/20/08	5 - 6	N	ND (2) *	2.6	180	ND (1) *	ND (1)	ND (0.407)	21	8.5	8.9	2.7	ND (0.1) *	1.3	12	ND (1)	ND (1)	ND (2)	33	39
	09/20/08	9 - 10	N	ND (2) *	2.6	100	ND (2) *	ND (1)	ND (0.409)	26	12	12	2.6	ND (0.1) *	ND (2) *	16	2	ND (2)	ND (4.1) *	40	47
BKG-16	09/23/08	0 - 0.5	N	ND (2) *	5.3	160	ND (2) *	ND (1)	ND (0.435)	12	5.4	10	6.5	ND (0.1) *	ND (2) *	9.4	ND (1)	ND (2)	ND (4) *	22	35
	09/23/08	2 - 3	N	ND (2.1) *	4.4	210	ND (1) *	ND (1)	ND (0.407)	15	6.7	8.5	4	ND (0.1) *	ND (1)	10	ND (1)	ND (1)	ND (2.1)	30	34
	09/23/08	5 - 6	N	ND (2) *	2.4	130	ND (1) *	ND (1)	ND (0.406)	14	6.3	6.8	2.7	ND (0.1) *	1.2	10	ND (1)	ND (1)	ND (2)	29	33
	09/23/08	9 - 10	N	ND (2) *	2.5	130	ND (1) *	ND (1)	ND (0.41)	16	8.8	11	2.4	ND (0.1) *	ND (1)	10	ND (1)	ND (1)	ND (2)	32	40

[1] Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.
[2] USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.
[3] California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.
[4] ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28.
[5] CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.
Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table 17
Sample Results: Contract Laboratory Program Inorganics
Area of Concern 29 - Interim Measures No. 3 Treatment Plant
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
PG&E Topock Compressor Station, Needles, California

				Contract Laboratory Program (CLP) Inorganics (mg/kg)						
Interim Screening Level[1] :				**16,400**	**66,500**	**55,000**	**12,100**	**402**	**4,400**	**2,070**
Residential Regional Screening Levels[2] :				**77,000**	**NE**	**55,000**	**NE**	**1,800**	**NE**	**NE**
Residential DTSC CHHSL[3] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Ecological Comparison Values[4] :				**NE**	**NE**	**NE**	**NE**	**220**	**NE**	**NE**
Background[5] :				**16,400**	**66,500**	**NE**	**12,100**	**402**	**4,400**	**2,070**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**Aluminum**	**Calcium**	**Iron**	**Magnesium**	**Manganese**	**Potassium**	**Sodium**
BKG-15	09/20/08	0 - 0.5	N	5,200	20,000	11,000	5,100	210	1,100	290
	09/20/08	2 - 3	N	8,100	14,000	18,000	6,200	260	2,500	380
	09/20/08	5 - 6	N	10,000	15,000	20,000	7,300	300	4,100	850
	09/20/08	9 - 10	N	12,000	34,000	22,000	8,300	340	3,300	890
BKG-16	09/23/08	0 - 0.5	N	8,400	33,000	14,000	8,100	290	2,700	ND (240)
	09/23/08	2 - 3	N	8,700	28,000	16,000	7,000	260	2,700	ND (700)
	09/23/08	5 - 6	N	7,800	17,000	16,000	6,000	240	2,800	ND (1,100)
	09/23/08	9 - 10	N	9,700	13,000	19,000	7,000	290	3,900	ND (850)

[1] Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

[2] USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

[3] California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil" November 2004 (January 2005 Revision). January.

[4] ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil". May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison Values for Additional Detected Chemicals in Soil." July 1.

[5] CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table 18
Sample Results: Pesticides
Area of Concern 29 - Interim Measures No. 3 Treatment Plant
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
PG&E Topock Compressor Station, Needles, California

				Pesticides (µg/kg)																					
Interim Screening Level [1] :				**2.1**	**2.1**	**2.1**	**33**	**77**	**430**	**270**	**77**	**5**	**370,000**	**370,000**	**370,000**	**21,000**	**21,000**	**21,000**	**500**	**430**	**130**	**53**	**340,000**	**460**
Residential Regional Screening Levels [2] :				**2,000**	**1,400**	**1,700**	**29**	**77**	**1,600**	**270**	**77**	**30**	**370,000**	**370,000**	**370,000**	**18,000**	**18,000**	**18,000**	**520**	**1,600**	**110**	**53**	**310,000**	**440**
Residential DTSC CHHSL [3] :				**2,300**	**1,600**	**1,600**	**33**	**NE**	**430**	**NE**	**NE**	**35**	**NE**	**NE**	**NE**	**21,000**	**21,000**	**21,000**	**500**	**430**	**130**	**NE**	**340,000**	**460**
Ecological Comparison Values [4] :				**2.1**	**2.1**	**2.1**	**NE**	**NE**	**470**	**NE**	**NE**	**5**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**470**	**NE**	**NE**	**NE**	**NE**
Background [5] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**4,4-DDD**	**4,4-DDE**	**4,4-DDT**	**Aldrin**	**alpha-BHC**	**alpha-Chlordane**	**beta-BHC**	**delta-BHC**	**Dieldrin**	**Endo sulfan I**	**Endo sulfan II**	**Endosulfan sulfate**	**Endrin**	**Endrin aldehyde**	**Endrin ketone**	**gamma-BHC**	**gamma-Chlordane**	**Heptachlor**	**Heptachlor Epoxide**	**Methoxy chlor**	**Toxaphene**
BKG-15	09/20/08	0 - 0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-16	09/23/08	0 - 0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)

1 Interim screening level is DTSC residential CHHSL. If CHHSL is not available, the USEPA residential regional screening level is used. If an ecological comparison value has been calculated, then the lowest between the ecological comparison value or the CHHSL/regional screening level is used.

2 USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

3 California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.

4 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison values for Additional Chemicals in Soil." July 1.

5 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
µg/kg	micrograms per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

LEGEND

- Sample Location
- AOC 30 (MW-20 Bench)

N

0 25 50 100 150

Feet

FIGURE 32
AREA OF CONCERN 30 - MW-20 BENCH
EXISTING SOIL SAMPLE LOCATIONS

ADDENDUM TO RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT VOLUME 1
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Path: D:\Projects\Topock\MapFiles\2013\MW20_AOC30SampleLocs.mxd

Table 21
Sample Results: Metals
Area of Concern 30 - MW-20 Bench
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
PG&E Topock Compressor Station, Needles, California

				Metals (mg/kg)																	
Interim Screening Level [1]:				**0.285**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**0.0125**	**1.37**	**27.3**	**1.47**	**5.15**	**2.32**	**52.2**	**58**
Residential Regional Screening Levels [2]:				**31**	**0.062**	**15,000**	**160**	**70**	**0.29**	**280**	**23**	**3,100**	**150**	**10**	**390**	**1,500**	**390**	**390**	**5.1**	**390**	**23,000**
Residential DTSC CHHSL [3]:				**30**	**0.07**	**5,200**	**16**	**39**	**17**	**NE**	**660**	**3,000**	**80**	**18**	**380**	**1,600**	**380**	**380**	**5**	**530**	**23,000**
Ecological Comparison Values [4]:				**0.285**	**11.4**	**330**	**23.3**	**0.0151**	**139.6**	**36.3**	**13**	**20.6**	**0.0166**	**0.0125**	**2.25**	**0.607**	**0.177**	**5.15**	**2.32**	**13.9**	**0.164**
Background [5]:				**NE**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**NE**	**1.37**	**27.3**	**1.47**	**NE**	**NE**	**52.2**	**58**
Location [6]	**Date**	**Depth (ft bgs)**	**Sample Type**	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium, Hexavalent	Chromium, total	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
BG01	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (13.9)	---	---	---	---	---	---	---	---	---	---	---
BG02	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	31	---	---	---	---	---	---	---	---	---	---	---
BG03	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	15.8	---	---	---	---	---	---	---	---	---	---	---
BG04	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	25	---	---	---	---	---	---	---	---	---	---	---
BG05	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	21.1	---	---	---	---	---	---	---	---	---	---	---
BG06	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (9.69)	---	---	---	---	---	---	---	---	---	---	---
BG07	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (13.8)	---	---	---	---	---	---	---	---	---	---	---
BG08	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (12.4)	---	---	---	---	---	---	---	---	---	---	---
BG09	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	15	---	---	---	---	---	---	---	---	---	---	---
BG10	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (11.2)	---	---	---	---	---	---	---	---	---	---	---
	05/25/05 [6]	0 - 1	FD	---	---	---	---	---	---	ND (13.5)	---	---	---	---	---	---	---	---	---	---	---
CS01	04/21/05 [6]	0 - 1	N	---	---	---	---	---	ND (0.42)	23	---	---	---	---	---	---	0.82	---	---	---	---
CS02	04/21/05 [6]	0 - 1	N	---	---	---	---	---	ND (0.42)	14	---	---	---	---	---	---	0.96	---	---	---	---
CS03	04/21/05 [6]	5 - 6	N	---	---	---	---	---	ND (0.41)	17	---	---	---	---	---	---	0.67	---	---	---	---
CS04	04/28/05 [6]	7 - 8	N	ND (6.4) *	6.2	290	ND (0.53)	---	ND (0.43)	16	---	8.8	3.9	---	---	---	ND (0.53)	---	---	27	22
CS05	04/30/05 [6]	1 - 2	N	ND (6.2) J*	6.4	81	ND (0.52)	---	ND (0.41)	15 J	---	10	7.4	---	---	---	1.3	---	---	32 J	23
CS06	07/05/05 [6]	6 - 7	N	---	---	---	---	---	---	15 J	---	---	---	---	---	---	---	---	---	---	---
CS07	07/05/05 [6]	6 - 7	N	---	---	---	---	---	---	19	---	---	---	---	---	---	---	---	---	---	---
CS08	07/13/05 [6]	9 - 10	N	---	---	---	---	---	---	23 J	---	---	---	---	---	---	---	---	---	---	---
CS09	04/21/05 [6]	0 - 1	N	---	---	---	---	---	ND (0.41)	19	---	---	---	---	---	---	0.79	---	---	---	---
CS10	07/05/05 [6]	3 - 4	N	---	---	---	---	---	---	21	---	---	---	---	---	---	---	---	---	---	---
CS11	04/30/05 [6]	1 - 2	N	ND (6.2) *	6.1	170	ND (0.52)	---	ND (0.42)	27	---	8.5	6.1	---	---	---	0.69	---	---	31	24
CS12	04/30/05 [6]	1 - 2	N	ND (6.2) *	6.2	110	ND (0.52)	---	ND (0.41)	22	---	9.9	8.5	---	---	---	0.98	---	---	31	26
CS13	04/21/05 [6]	5 - 6	N	---	---	---	---	---	ND (0.41)	11	---	---	---	---	---	---	0.78	---	---	---	---
	04/21/05 [6]	5 - 6	FD	ND (6.3) *	4.4	130	ND (0.52)	ND (0.52)	ND (0.42)	29	ND (5.2)	8.4	16	ND (0.1) *	ND (4.2) *	8.1	0.97	ND (1)	ND (1)	22	27
CS14	04/28/05 [6]	6 - 7	N	ND (6.3) J*	5.9	47	ND (0.52)	---	ND (0.42)	20	---	11	3	---	---	---	0.54	---	---	26	22
CS15	07/05/05 [6]	3 - 4	N	---	---	---	---	---	---	25	---	---	---	---	---	---	---	---	---	---	---
CS16	07/08/05 [6]	6 - 7	N	---	---	---	---	---	---	27	---	---	---	---	---	---	---	---	---	---	---
Middle	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	15	---	---	---	---	---	---	---	---	---	---	---
NE Corner	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	15	---	---	---	---	---	---	---	---	---	---	---
NW Corner	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	18	---	---	---	---	---	---	---	---	---	---	---
SE Corner	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	10	---	---	---	---	---	---	---	---	---	---	---
SW Corner	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	18	---	---	---	---	---	---	---	---	---	---	---
TS-1	01/28/02 [6]	1	N	---	---	---	---	---	ND (0.02)	7.7	---	5	---	---	---	4.5	---	---	---	---	19.1
TS-1A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	11.8	---	13.7	---	---	---	6.8	---	---	---	---	33.4

Table 21
Sample Results: Metals
Area of Concern 30 - MW-20 Bench
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
PG&E Topock Compressor Station, Needles, California

				Metals (mg/kg)																	
Interim Screening Level [1]:				**0.285**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**0.0125**	**1.37**	**27.3**	**1.47**	**5.15**	**2.32**	**52.2**	**58**
Residential Regional Screening Levels [2]:				**31**	**0.062**	**15,000**	**160**	**70**	**0.29**	**280**	**23**	**3,100**	**150**	**10**	**390**	**1,500**	**390**	**390**	**5.1**	**390**	**23,000**
Residential DTSC CHHSL [3]:				**30**	**0.07**	**5,200**	**16**	**39**	**17**	**NE**	**660**	**3,000**	**80**	**18**	**380**	**1,600**	**380**	**380**	**5**	**530**	**23,000**
Ecological Comparison Values [4]:				**0.285**	**11.4**	**330**	**23.3**	**0.0151**	**139.6**	**36.3**	**13**	**20.6**	**0.0166**	**0.0125**	**2.25**	**0.607**	**0.177**	**5.15**	**2.32**	**13.9**	**0.164**
Background [5]:				**NE**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**NE**	**1.37**	**27.3**	**1.47**	**NE**	**NE**	**52.2**	**58**
Location [6]	**Date**	**Depth (ft bgs)**	**Sample Type**	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium, Hexavalent	Chromium, total	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
TS-2	01/28/02 [6]	0	N	---	---	---	---	---	0.021	12.8	---	9.8	---	---	---	6.8	---	---	---	---	28.9
TS-2A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	12.3	---	14.9	---	---	---	7.8	---	---	---	---	34.7
TS-3	01/28/02 [6]	0.5	N	---	---	---	---	---	0.021	15.4	---	10.2	---	---	---	7.2	---	---	---	---	36.2
TS-3A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	12.4	---	14.6	---	---	---	6.9	---	---	---	---	56.7
TS-4	01/28/02 [6]	0	N	---	---	---	---	---	ND (0.02)	21.8	---	12.2	---	---	---	13.7	---	---	---	---	35.7
TS-4A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	10.2	---	8.8	---	---	---	6.5	---	---	---	---	22.2
TS-5	01/28/02 [6]	0	N	---	---	---	---	---	ND (0.02)	14.3	---	8.1	---	---	---	6.8	---	---	---	---	29.9
TS-5A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	11.8	---	13.7	---	---	---	7.3	---	---	---	---	29.5
TS-6	01/28/02 [6]	0	N	---	---	---	---	---	ND (0.02)	10	---	7.2	---	---	---	6.2	---	---	---	---	28
TS-6A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	15.6	---	13.9	---	---	---	8.8	---	---	---	---	45.3

[1] Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.
[2] USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.
[3] California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.
[4] ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28.
[5] CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.
[6] Sample locations starting with TS are background soil samples collected by Ecology and Environment.

Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table 22

Sample Results: Contract Laboratory Program Inorganics
Area of Concern 30 - MW-20 Bench
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
Pacific Gas and Electric Company Topock Compressor Station Needles, California

				Contract Laboratory Program (CLP) Inorganics (mg/kg)
Interim Screening Level[1] :				**55,000**
Residential Regional Screening Levels[2] :				**55,000**
Residential DTSC CHHSL[3] :				**NE**
Ecological Comparison Values[4] :				**NE**
Background[5] :				**NE**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**Iron**
CS01	04/21/05	0 - 1	N	13,000
CS02	04/21/05	0 - 1	N	12,000
CS03	04/21/05	5 - 6	N	13,000
CS09	04/21/05	0 - 1	N	12,000
CS13	04/21/05	5 - 6	N	7,200
	04/21/05	5 - 6	FD	9,900

1 Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

2 USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

3 California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil" November 2004 (January 2005 Revision). January.

4 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil". May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison Values for Additional Detected Chemicals in Soil." July 1.

5 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Appendix B
Air Monitoring Forms

Direct Reading Air Monitoring Form

Date	Sampled by

Sample Location	PM 10 Ave.	PM 10 Peak	Wind Speed Ave.	Wind Speed Peak	Wind Direction	Temp. Ave.	Temp. Peak	Precipitation

TSP or PUF Calibration Form

Date	Sample Location	Contaminant

Pump Serial Number:		**Pump Mfg. & Model:**	
Precalibration Date:		**Calibrator:**	
Calibrated by:		**Last Mfg. Calibration:**	

1st Reading	2nd Reading	3rd Reading	Pre-Flow Rate

Post Calibration Date		**Calibrated by:**	

1st Reading	2nd Reading	3rd Reading	Post-Flow Rate	% Error[7]	Average Flow Rate

Sample Number	Start Time	Stop Time	Total Time	Sample Flow Rate	Sample Volume

Observations:

[7] (1) if pre and post is <5%, then use average of the two, (2) if >5% and <10% use lowest of the two, or (3) if >10% sample is voided difference too large.

Appendix G
Havasu National Wildlife Refuge, Habitat Restoration Plan
(*on CD-ROM only*)

Final

Topock Compressor Station Groundwater Remediation Project, Havasu National Wildlife Refuge, Habitat Restoration Plan

Prepared for

Pacific Gas and Electric Company

September 2014

Prepared by

CH2M HILL, Inc., and E2 Consulting Engineers, Inc.

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Appendixes

A Vegetation Maps (with photo points) and Preconstruction Photographs
B Commercial Nurseries that Grow Native Mojave Desert Plants
C Photo Point Monitoring Datasheet

Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe
Caltrans	California Department of Transportation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
CIP	clean-in-place
compressor station	Topock Compressor Station
C/RAWP	Construction/Remedial Action Work Plan
DOI	Department of the Interior
DTSC	Department of Toxic Substances Control
ER	East Ravine
GIS	geographical information system
GPS	global positioning system
HNWR	Havasu National Wildlife Refuge
I-40	Interstate 40
IRL	inner recirculation loop
IRZ	in situ reactive zone
ISA	International Society of Arboriculture
O&M	operation and maintenance
PBA	Programmatic Biological Assessment
PG&E	Pacific Gas and Electric Company
PPD	preconstruction photo documentation
project	implementation of the groundwater remedy
RB	riverbank
ROD	Record of Decision
RPD	revegetation photo documentation
SWPPP	stormwater pollution prevention plan
TCS	Topock Compressor Station
TWB	Transwestern Bench
U.S.	United States
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service

SECTION 1

Introduction

In December 1951, Pacific Gas and Electric Company (PG&E) began operations near Topock, Arizona, to compress natural gas supplied from the southwestern United States (U.S.) for transport through pipelines to PG&E's service territory in central and northern California. The Topock Compressor Station (TCS or compressor station) is approximately 15 miles southeast of Needles in San Bernardino County, California (Figure 1). The station is still active and is anticipated to remain active into the foreseeable future. Operations at the compressor station consist of six major activities: water conditioning, compressing natural gas, cooling compressed natural gas and compressor lubricating oil, wastewater treatment, facility and equipment maintenance, and miscellaneous operations.

Historical wastewater discharge from TCS operations to Bat Cave Wash and the East Ravine have resulted in chromium contamination in groundwater. In 1996, PG&E entered into a Corrective Action Consent Agreement with the California Department of Toxic Substances Control (DTSC) to oversee the investigation and remediation of the TCS site under California state law. DTSC is the California state lead agency charged with directing investigative activities in the action area in accordance with the Resource Conservation and Recovery Act. The U.S. Department of the Interior (DOI) is the lead federal agency overseeing response actions for land under its jurisdiction, custody, or control near the TCS pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In July 2005, PG&E and the federal agencies (DOI, Bureau of Land Management [BLM], Bureau of Reclamation [USBR], and U.S. Fish and Wildlife Service [USFWS]) entered into an Administrative Consent Agreement. In addition, PG&E and the United States have entered into a Remedial Design/Remedial Action Consent Decree under CERCLA governing the groundwater remedy, which was entered by the U.S. District Court for the Central District of California in November 2013.

In January 2011, the DOI issued a Record of Decision (ROD) selecting the groundwater remedy for the site, and at the same time, DTSC adopted the Final Remedy for groundwater contamination at the site. The 2013 Consent Decree requires the planning, design, construction, operation and maintenance (O&M), post-remediation monitoring, decommissioning, and restoration of the groundwater remedy selected in the ROD.

Implementation of the groundwater remedy (the project) consists of several phases, including construction, O&M, post-remediation monitoring, decommissioning, and restoration. Activities associated with the project are described in Section 2.

Figures 2a through 2c show the planned final groundwater remedy system layout in California, Moabi Regional Park, and Arizona, respectively. The project is expected to operate for several decades (estimated duration between 30 and 50 years).Generally, the Final Groundwater Remedy will include the following key features:

- An in situ reactive zone (IRZ) along the National Trails Highway that will use a line of wells that may be used as both injection and extraction wells to circulate groundwater and distribute an organic carbon source that will promote reduction of the hexavalent chromium to trivalent chromium.
- An inner recirculation loop (IRL) that comprises:
  - Extraction wells near the Colorado River (referred to as the riverbank [RB] extraction wells) to provide hydraulic capture of the deep hexavalent chromium groundwater concentrations, accelerate cleanup of the floodplain, enhance the flow of contaminated groundwater through the IRZ line, and control migration of IRZ-generated byproducts toward the Colorado River.

  - Injection wells to re-inject groundwater extracted from the RB extraction wells, which may be amended with an organic carbon source, in the upgradient portion of the hexavalent chromium plume to flush the plume through the IRZ.
- A TCS recirculation loop, which includes:
  - East Ravine (ER) extraction wells near the eastern end of the East Ravine to capture contaminated groundwater in the shallow bedrock.
  - Transwestern Bench (TWB) extraction wells near the eastern portion of the TCS parcel to capture contaminated groundwater downgradient of the compressor station.
  - TCS injection wells located within the compressor station for the re-injection of groundwater extracted from the ER and TWB extraction wells. The extracted water will be amended with an organic carbon source to promote reduction of hexavalent chromium to trivalent chromium and reduce elevated hexavalent chromium groundwater concentrations from the alluvial aquifer in the vicinity of the compressor station.
- The freshwater supply system will convey water from supply well(s) in Arizona to assist with flushing the chromium plume through the National Trails Highway IRZ and constrain the westward spread of carbon-amended water and in situ byproducts from the IRL.

The purpose of this HNWR Habitat Restoration Plan is to describe the overall program approach for restoration for the duration of the project beginning with the completion of the remedy construction and extending through the operation phase of the remedy system up to the decommissioning and removal phases. Specifics related to the actual impacts are presented in this document, as available. However, some specifics related to mitigation plantings and precisely how the plantings will take place within a restoration area (e.g., number of species, plant size and container type, locations, and irrigation system design) will be provided to the agencies for review in a separate Planting Plan prior to implementation. Furthermore, a separate Final Restoration Plan will be prepared to address restoration and planting after the final groundwater remedy system has been decommissioned and removed.

1.1 Groundwater Remedy In Relation to the Havasu National Wildlife Refuge

The Havasu National Wildlife Refuge (HNWR), managed by USFWS, includes 37,515 acres and stretches for approximately 26 miles along the Colorado River, extending from Needles, California, to Lake Havasu City, Arizona. Portions of the project will be located on HNWR lands in California on the southern side of the Burlington Northern Santa Fe (BNSF) Railroad and in Arizona along the Oatman-Topock Highway (Figure 2).

1.2 Regulations and Project Requirements

This document has been prepared to comply with the requirement in Paragraph 13(b) of the Consent Decree, that the Construction/Remedial Action Work Plan (C/RAWP) shall include a Habitat Restoration Plan. Appendix C to the Consent Decree, *Scope of Work*, further describes the Habitat Restoration Plan at Section 3.6, stating: “If during the design, complete avoidance of sensitive habitats under the jurisdiction of the United States Fish and Wildlife Service (“FWS”), United States Army Corps of Engineers (“USACE”), or the California Department of Fish and Game [now Department of Fish and Wildlife] cannot be achieved, PG&E will be responsible for preparing a Habitat Restoration Plan that includes measures for restoration, rehabilitation, and/or replacement of the habitats. The Plan will be developed in coordination with the FWS Havasu National Wildlife Refuge Manager.”

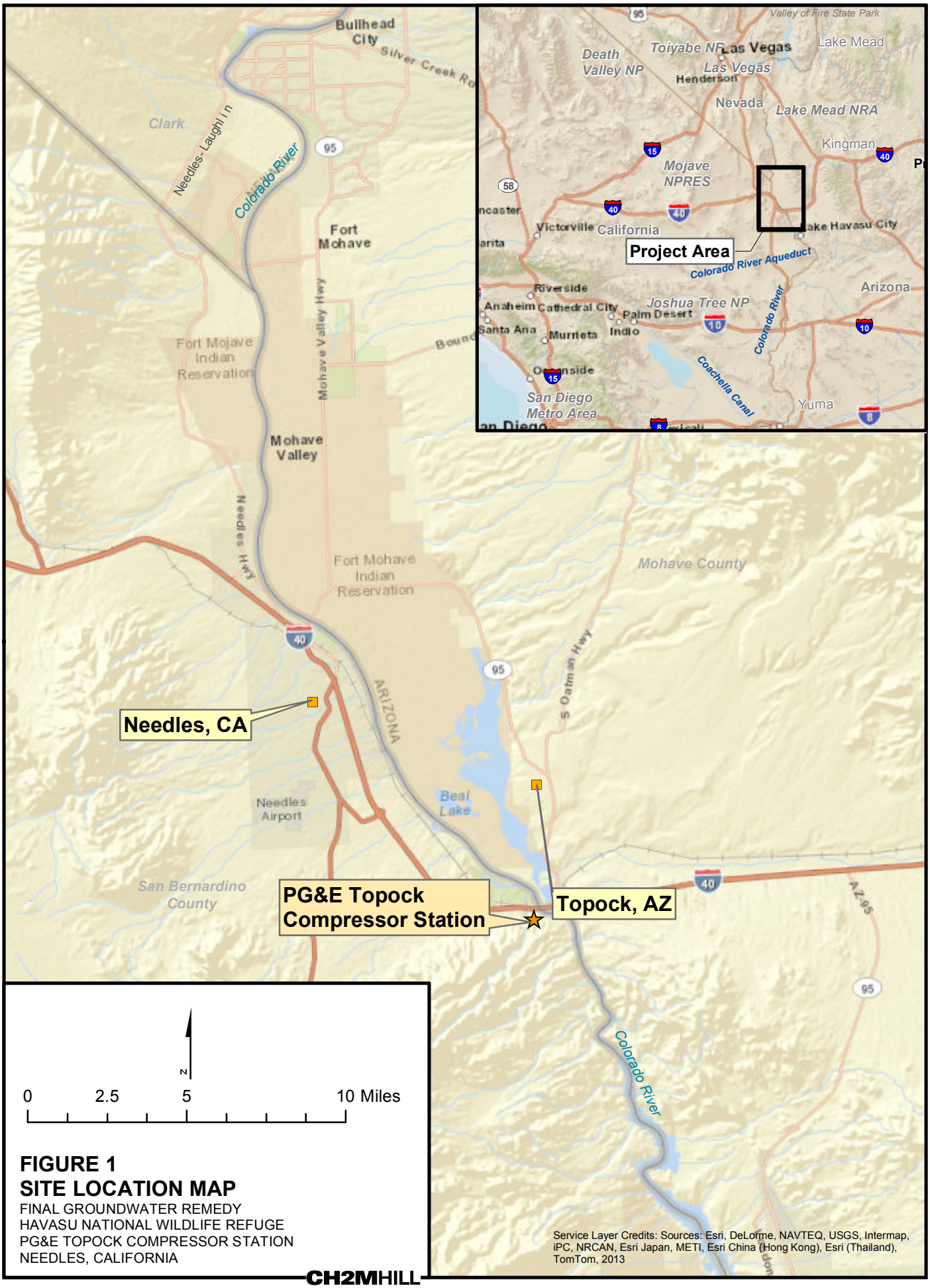
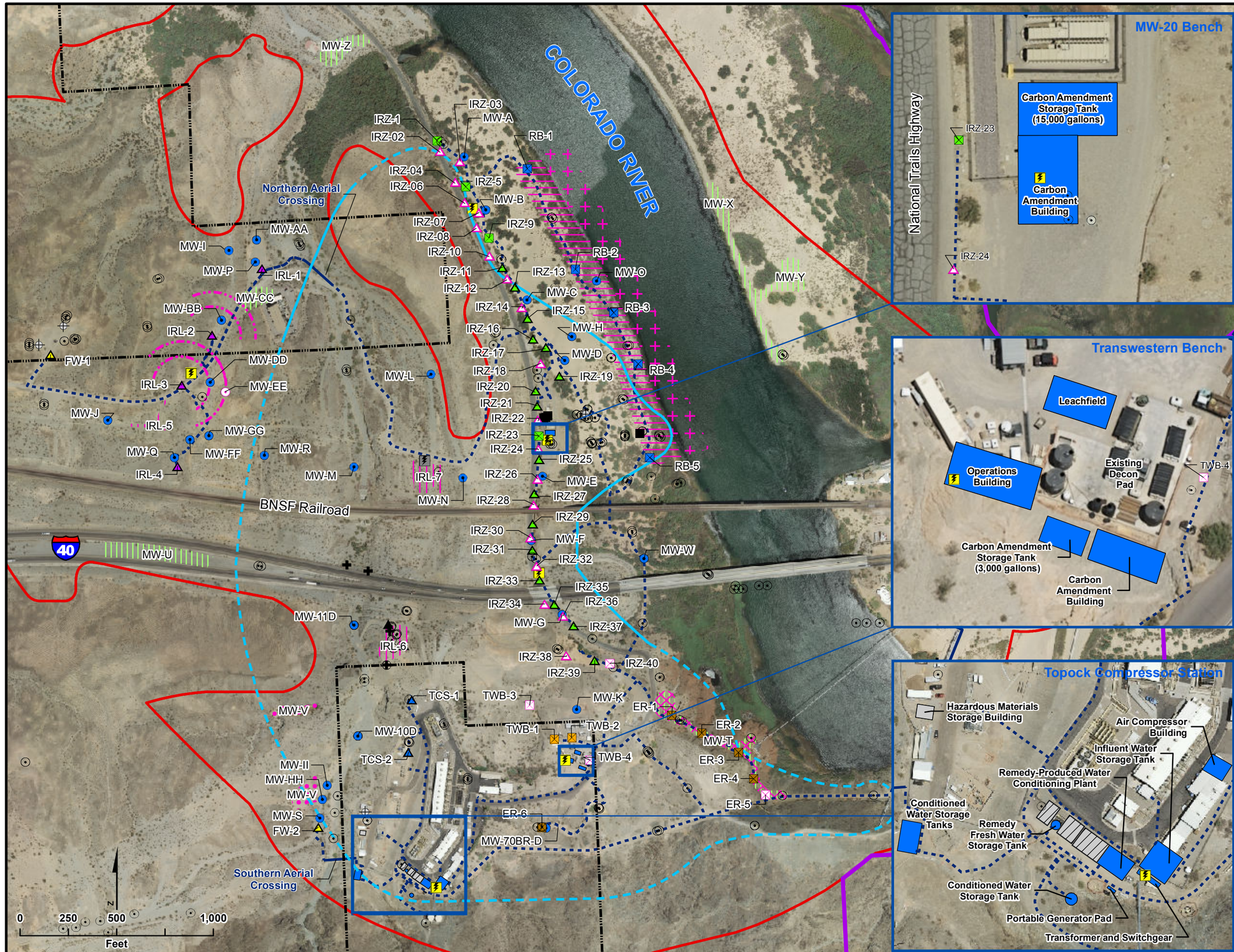


FIGURE 1
SITE LOCATION MAP
FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\HNWR\FIG1_SiteLocationHNWR.mxd Date Saved: 5/7/2014 8:43:36 AM



LEGEND

- Property Boundaries
- Area of Potential Effects (APE)
- EIR Project Area

Existing Wells:

- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:

(Items in Pink are Provisional)

- Extraction Well
- Injection Well
- Monitoring Well (MW-EE is a pending/future provisional monitoring well)
- Arc for IRL-2 and IRL-3 Arsenic Monitoring Wells [3]
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:

- Extraction, East Ravine
- Extraction, National Trails Highway (NTH) In-situ Reactive Zone (IRZ)
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Pipeline Corridor for Remedy

- Aboveground Pipe
- Underground Pipe/Conduit

Remedy Facilities

- Planned Transformer
- Future Provisional Transformer
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth ingroundwater based on fourth quarter 2013 sampling events. Dashed where based on limited data.

Note:

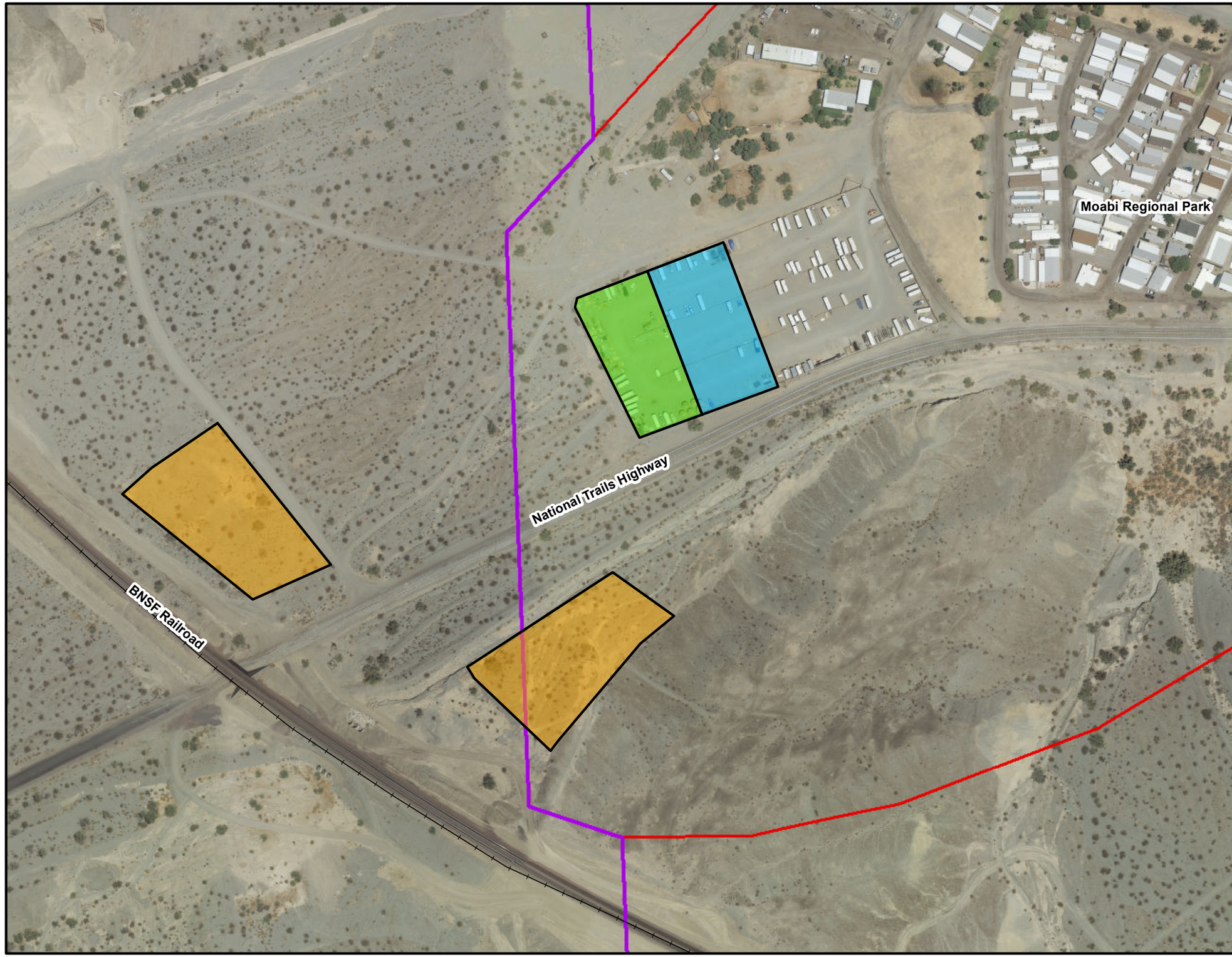
1. Note that in compliance with EIR mitigation measure CUL-1a-9, as well as PA and CHPMP mitigation measures, the pipeline along the dirt road west of National Trails Hwy is located in an existing, previously disturbed, access road. In addition, the location of the road and pipeline was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10, PA, and CHPMP mitigation measures.
2. All well and structure locations are approximate.
3. Arcs for IRL-2 and IRL-3 arsenic monitoring wells represent a range of potential well locations. Portions of the arcs are not suitable for well installation due to technical and/or cultural resources constraints.

FIGURE 2A
GENERAL REMEDY SYSTEM LAYOUT - CALIFORNIA

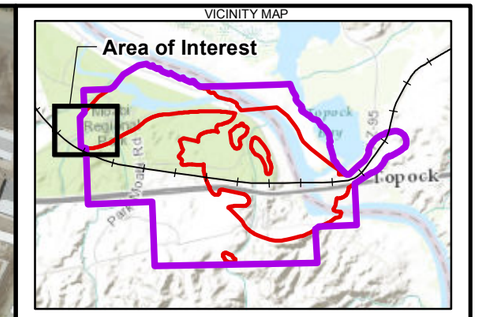
FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\Vegetation\FIG2A_90pct_CAdetails.mxd



VICINITY MAP



LEGEND

- Long Term Remedy Support Area (1.2 acres approx.)
- Soil Storage Area (Each 1.5 acres approx.)
- Temporary Construction Laydown Area (1.3 acres approx.)
- Area of Potential Effects (APE)
- EIR Project Area

Notes:
1. This is a conceptual layout. Locations are approximate.
2. Descriptions of activities/functions anticipated for the construction support areas are included in the Construction/Remedial Action Work Plan.
3. Descriptions of activities/functions anticipated for the long-term remedy support areas are included in Section 3.5 of this BOD, and the O&M Manual.

N

0 95 190 380 Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

FIGURE 2B
GENERAL REMEDY SYSTEM LAYOUT - MOABI REGIONAL PARK

FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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Site B

County Highway 10

HNWR-1A

HNWR-1

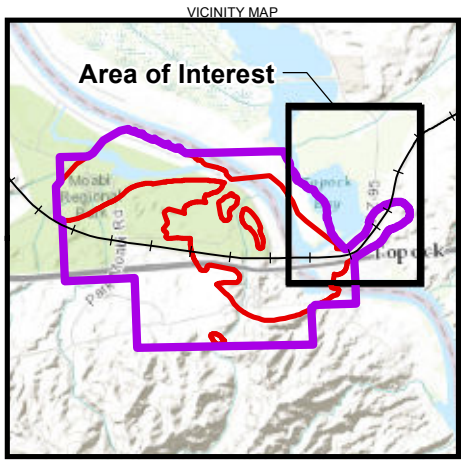
MW-X

MW-Y

BNSF Railroad

40

VICINITY MAP



LEGEND

Existing Wells:

- Monitoring Well
- Water Supply Well

Planned Wells:

- Area for Monitoring Well (Applies to MW-X and MW-Y)

Provisional Wells:

- Area for Potential Slant Well Screens

Pipeline Corridor for Remedy

- Aboveground Freshwater Pipe
- Underground Freshwater Pipe
- Future Provisional/Contingent Fresh Water Pipe

- Area of Potential Effects (APE)
- EIR Project Area

Note:
All wells and remedy structure locations are approximate.

N

0 200 400 800 Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

FIGURE 2C
GENERAL REMEDY SYSTEM LAYOUT - ARIZONA
FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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Additionally, the National Wildlife Refuge System Administration Act of 1966, as amended, is an Applicable or Relevant and Appropriate Requirement (ARAR) that was identified in the ROD. This previous act is amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57), which is also considered as an ARAR. The ROD states that the Act "requires that FWS evaluate ongoing and proposed activities and uses to ensure that such activities are appropriate and compatible with both the mission of the overall National Wildlife Refuge System, as well as the specific purposes for which the Havasu National Wildlife Refuge was established" and that "[p]rior to selection of a remedial action by DOI/FWS, that remedial action must be found by the Refuge Manager to be both an appropriate use of the Refuge and compatible with the mission of the Refuge and the Refuge System as a whole."

The ROD also states that "[a]s the Selected Remedy is designed and implemented, DOI will continue to consult with USFWS to ensure that proposed activities remain appropriate and compatible with the Refuge mission…" This document will provide information to the Refuge Manager for their analysis under the National Wildlife Refuge System Improvement Act, Additional relevant information was provided to the Refuge Manager in Attachment B to RTC# 2 to the 60% Basis of Design Report. This information was updated and included in Table 6.2-1A of the 90% Basis of Design Report.

This plan also fulfills the requirements of Mitigation Measure BIO-1 in the TCS Final Remedy Environmental Impact Report for areas within the HNWR. Mitigation Measure BIO-1 requires PG&E to prepare a habitat restoration plan for areas that would be subject to jurisdiction by USACE or the California Department of Fish and Wildlife ("sensitive habitat areas") absent an exemption and that will be disturbed by final remedy activities. As required by Mitigation Measure BIO-1, this restoration plan includes measures to achieve "no-net-loss" of habitat functions and values existing before remedy implementation. This document also includes an assessment of the anticipated project impacts and the techniques that will be used to mitigate potential loss of functional values for refuge habitat while the Final Groundwater Remedy is in operation.

1.3 Refuge Goals and Objectives

The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. The 1997 National Wildlife Improvement Act established general policies and goals for the Refuge System that includes the following:

- Conserve a diversity of fish, wildlife and plants
- Develop and maintain a network of habitats
- Conserve those ecosystems, plant communities, wetlands that are unique within the United States
- Provide and enhance opportunities to participate in compatible wildlife dependent recreation
- Help to foster the public's understanding and appreciation of the diversity of fish, wildlife, and plants and their habitats

The policy also established three management priorities:

- Conserve fish, wildlife, and plants and their habitats
- Facilitate compatible wildlife dependent recreational uses
- Consider other appropriate and compatible uses

The 1997 National Wildlife Improvement Act specifically identifies appropriate wildlife dependent activities as hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

1.3.1 Havasu National Wildlife Refuge

The HNWR was established by Executive Order by President Franklin D. Roosevelt in 1941 for the primary purpose of providing breeding habitat for migratory birds and other wildlife. The 37,515-acre refuge consists of two management units. The Topock Marsh Management Unit includes all of the refuge lands, water, and

wildlife resources from the northern border of the refuge south to the southern end of the Topock Marsh and the Interstate 40 (I-40) bridge over the Colorado River. The Topock Gorge Management Unit includes all of the lands, waters, and wildlife resource located south of the I-40 bridge to the southern boundary of the refuge at Lake Havasu City in Arizona.

Management of the refuge is focused on three primary subunits: Topock Marsh, Topock Gorge, and the Havasu Wilderness Area. Primary management concerns include federal and state–listed threatened and endangered species including the Yuma clapper rail (*Rallus longirostris yumanensis*), California black rail (*Laterallus jamaicensis coturniculus*), southwestern willow flycatcher (*Empidonax traillii extimus*), Arizona Bell's vireo (*Vireo bellii arizonae*), razorback sucker (*Xyrauchen texanus*), and bonytail chub (*Gila elegans*). Additionally, waterfowl, wading birds, shorebirds, and other migratory birds are another major management focus of the refuge. While not actively managed, the desert uplands provide habitat for a number of species of raptors and other birds, as well as mammals, reptiles, and other fauna and flora.

The HNWR has no visitor center and no wildlife trails; however, wildlife tours are led by private contractors in some areas of the refuge under a special use permit. Refuge staff provide presentations, talks, and tours to groups upon request. Hunting includes open hunting on the Topock Marsh and limited reservation hunting in the Pintail Slough Management subunit. Upland game hunting for quail, dove, and rabbit is permitted on refuge lands. Fishing for catfish, largemouth bass, and crappie is one of the most popular uses of the refuge, particularly in the Topock Marsh and the Colorado River. Other non-wildlife oriented recreation such as boating, jet skiing, waterskiing, and swimming are popular during the summer months on the Colorado River.

Camping is not permitted on the HNWR; it was formerly allowed at the Five Mile Landing Concession, but no longer is. However, off-road vehicles are still permitted. Illegal trespass by off-road vehicles is a considerable problem on the refuge particularly in the desert upland habitats where damage to fences, gates, soils, and vegetation as well as vandalism and trash dumping continue to be problems.

1.4 Description of Existing Conditions in the Project Area

The following sections provide general descriptions of the habitats and vegetation within HNWR in the areas where remedial activities will occur.

1.4.1 Colorado River

The Colorado River is the primary surface water feature in the area. Upstream of the I-40 bridge, the river channel ranges from approximately 600 to 740 feet wide. Downstream of the bridge, the river traverses the exposed bedrock of the Chemehuevi Mountains, and the channel width narrows to approximately 435 feet.

Significant changes to the Colorado River hydraulic regime occurred after construction of Hoover Dam and Parker Dam. With the completion of Hoover Dam in 1936, annual spring floods and associated scouring events ended. With the completion of Parker Dam in 1938, and subsequent filling of Lake Havasu, the Colorado River channel between Needles and Topock rapidly aggraded (Metzger and Loeltz, 1973). By 1944, the aggradation of the river channel caused elevated groundwater levels and flooding in low-lying areas. In response to this condition, USBR conducted extensive dredging of the river channel to maintain channel geometry and reduce flooding.

The water elevations in the Colorado River fluctuate seasonally and daily due to upstream flow regulation from the Davis Dam, located approximately 41 river miles upstream of the I-40 bridge. Data from the U.S. Geological Survey river gauge at the Topock Marsh inlet shows that average flows in this section of the river ranges from a low of 14 cubic feet per second (cfs) in January to a high of 99 cfs in June.

The channel banks along the Arizona side of the river north of the Topock Marina are characterized by steep slopes that have been armored along much of this reach with large boulders. The banks along the inlet to the Topock Marina are characterized by narrow sandy beaches and eroded sandy banks. Low sandy beaches

also are present along the Arizona side of the river south of the Topock Marina and the BNSF Railroad Bridge. Steep sandy banks with dense vegetation are present along most of the channel on the California side of the river, with narrow sandy beaches occurring in scattered locations. Along the California side of the channel north of the Park Moabi inlet/slough (outside the project area), the banks have been modified by constructed elevated campgrounds and low sandy beaches. Patches of emergent vegetation including southern cattail (*Typha domingensis*), southern bulrush (*Schoenoplectus californicus*), common reed (*Phragmites australis*), and giant reed (*Arundo donax*) occur in scattered locations along edges of the river.

1.4.2 Sacramento Wash

The Sacramento Wash is near the northern end of the project area east and northeast of the Topock Marsh. The Oatman-Topock Highway bisects the wash with an at-grade crossing. Within the project area, the Sacramento Wash is a broad, open sandy channel that is largely confined within constructed levees. The channel ranges from approximately 50 to 70 feet wide and has a flat, generally uniform bed that lacks well-defined low flow channels. Minor benches and terraces are along the channel in a few locations, but there is no active floodplain outside the channel because of the constructed levees along this section of the wash. On the eastern side of the highway, the main flow channel is nearly devoid of vegetation; however, the adjacent sides of the wash are covered with extensive athel tamarisk (*Tamarix aphylla*) thickets.

On the western side of the highway, the wash continues to flow through a channel confined by levees for approximately 950 feet where it then broadens out along the floodplain adjacent to the Topock Marsh west of the project area. Some blue palo verde (*Parkinsonia florida*) trees are present along the levees on the western side of the road, and a few small trees and shrubs including salt cedar (*Tamarix ramosissima*), smoke tree (*Psorothamnus spinosus*), bush seepweed (*Suaeda nigra*), and creosote bush (*Larrea tridentata*) occur within the wash channel.

Before a large wildfire in October 2008, dense salt cedar and athel tamarisk (*Tamarix aphylla*) thickets also were present along both sides of the wash in this area. The Sacramento Wash has a large and generally unaltered watershed, and as a result, significant flows, sediment transport, and flooding of the highway area are relatively common in this area when heavy rainstorms occur in the region.

1.4.3 Ephemeral Drainages and Washes

The alluvial terraces located along the southern and western sides of the Colorado River and north of the Chemehuevi Mountains are characterized by numerous incised drainage channels and ephemeral washes. One of the largest ephemeral drainages in the project area is Bat Cave Wash, a north-south trending channel immediately west of TCS that flows into the Colorado River. Large volume surface flows are generally infrequent and occur only briefly in response to high intensity rainfall events. Within the project area, the upper part of Bat Cave Wash is confined by steep rocky slopes and has an approximately 30-foot-wide gravel-cobble floodplain.

Vegetation in the upper reaches is sparse, consisting of scattered shrubs such as Anderson's box-thorn (*Lycium andersonii*), catclaw acacia (*Senegalia greggii*), and desert lavender (*Hyptis emoryi*). As the wash continues downslope, the channel broadens to more than 190 feet wide in some areas and multiple low flow channels are present. Vegetation cover also increases downslope with blue palo verde and salt cedar trees scattered throughout the channel. Other common shrubs on or immediately adjacent to the channel include brittlebush (*Encelia farinosa*), creosote bush (*Larrea tridentata*), white bur-sage (*Ambrosia dumosa*), sweetbush (*Bebbia juncea*), and white rhatany (*Krameria bicolor*). Total vegetative cover throughout most of the wash is less than 30 percent, with the exception of a dense stand of salt cedar present at the northern end of the wash, just southwest of the Bat Cave Wash viaduct that crosses under National Trails Highway.

Several small, incised tributary drainages also are present within the project area. These drainages are characterized by a single low-flow channel and generally have sandy-gravel, cobble, or rocky substrates. The low-flow channels are devoid of vegetation or have only sparse scattered herbaceous species such as spurge

(*Chamaesyce* spp.), Spanish needle (*Palafoxia arida*), ovate plantain (*Plantago ovata*), and needle grama (*Bouteloua aristidoides* var. *aristidoides*). Common trees and shrubs along the lower slopes and channel edges in these areas include blue palo verde, catclaw acacia, Anderson's box-thorn, creosote bush, white bur-sage, white rhatany, and sweetbush.

1.4.4 Topock Marsh

The project area includes a small piece of the Topock Marsh on the northern side of Oatman-Topock Highway in Arizona. In this location, the marsh is characterized by dense growth of southern bulrush. Surface water to a depth of 7 inches was present at the sample location at the time of the February 2012 survey.

1.4.5 Adjacent and Shore Zone Wetlands along the Colorado River

Shore zone emergent wetlands include scattered patches of southern cattail, southern bulrush, common reed, and giant reed growing along the edges of the Colorado River below the ordinary high water line. These wetlands are found in scattered locations along the Colorado River and are most developed near the Topock Marina and in the southern part of the project area.

Adjacent emergent wetlands include wetland features that are immediately adjacent to the Colorado River, but occur above the ordinary high water and inland of the shore zone wetlands. The largest adjacent wetland is on the southern side of the I-40 bridge on the western side of the Colorado River. This wetland is characterized by a dense monoculture of common reed. At the time of the February 2012 survey, saturated soils and groundwater were present at a depth of 8 inches. Based on the location and elevation of this wetland, surface water is likely present in the summer months (May through July) during higher flow levels of the Colorado River.

An adjacent wetland also is present on the eastern side of the Colorado River, north and east of the Topock Marina. This wetland is characterized by a strip of emergent wetland immediately above the shoreline and includes a narrow band of low trees and shrubs further inland. Emergent vegetation is characterized by iris-leaved rush (*Juncus xiphioides*), Dallis grass (*Paspalum dilatatum*), and marsh pennywort (*Hydrocotyle verticillata*) with scattered common reed and southern bulrush. A shallow water table and saturated soils were present at 12 inches below ground surface at the time of the February 2012 survey. This area appears to be just above the ordinary high water elevation of the river. Given the low topographic position, this area is likely subject to some flooding during higher flows and appears to have saturated conditions in the upper part of the soil for most of the year.

1.4.6 Creosote Bush Scrub

The most common and widespread plant community in the upland deserts is creosote bush scrub. This vegetation type is characterized by widely spaced creosote bush with associated species such as white bursage, white rhatany, brittlebush, beavertail cactus (*Opuntia basilaris* var. *basilaris*), and silver cholla (*Cylindropuntia echinocarpa*). Creosote bush scrub occurs throughout the dissected alluvial terraces north and west of the Chemehuevi Mountains in California and east of the BNSF Railroad tracks, north of I-40 in Arizona.

1.4.7 Blue Palo Verde Woodland

Blue palo verde woodland occurs along the edges and throughout the channel bottoms of the larger ephemeral washes of the dissected alluvial terraces south of the Colorado River. Total vegetation cover is generally low, but species diversity is relatively high. Blue palo verde is the dominant tree with scattered individuals of salt cedar, athel tamarisk, and smoke tree also present in some areas. Associated shrubs include catclaw acacia, Anderson’s box-thorn, brittlebush, sweetbush, cheesebush (*Hymenoclea salsola*), climbing milkweed (*Funastrum hirtellum*), desert lavender, white bursage, white rhatany, and creosote bush. Common herbaceous species include small-seeded spurge (*Chamaesyce polycarpa*), small-flowered

California poppy (*Eschscholzia minutiflora*), Emory rock daisy (*Perityle emoryi*), Spanish needle, and Arizona lupine (*Lupinus arizonicus*).

1.4.8 Foothill Palo Verde Scrub

Foothill palo verde scrub is restricted to a small area east of TCS along the slopes of the Chemehuevi Mountains, south and west of the Colorado River. Vegetation in this area is characterized by scattered foothill palo verde (*Parkinsonia microphylla*). Associated species include creosote bush, pygmy-cedar (*Peucephyllum schottii*), brittlebush, white rhatany, beavertail cactus, buckhorn cholla (*Cylindropuntia acanthocarpa*), California barrel cactus (*Ferocactus cylindraceus* var. *cylindraceus*), and inflated desert trumpet (*Eriogonum inflatum* var. *inflatum*).

1.4.9 Western Honey Mesquite Bosque

Western Honey Mesquite bosque is restricted to the low sandy terraces along the Colorado River where it often intermixes with tamarisk thickets. This vegetation type is characterized by western honey mesquite (*Prosopis glandulosa*). Common associated species include salt cedar and some areas where screwbean mesquite (*Prosopis pubescens*) has been planted.

1.4.10 Quailbush Scrub

Quailbush scrub is dominated by big saltbush (*Atriplex lentiformis*) and occurs on low-lying alkaline or saline soils. In the project area, it is most common along the Topock-Oatman Highway where it occurs on sandy saline/alkaline soils north of the Topock Marsh.

1.4.11 Tamarisk Thicket

Tamarisk thicket is found primarily on the low sandy terraces adjacent to the Colorado River. Vegetation is characterized by open to dense stands of salt cedar. In many locations, salt cedar trees and shrubs occur as monospecific stands; in other areas, associated trees or shrubs include athel tamarisk, western honey mesquite, screwbean mesquite, blue palo verde, and arrow weed (*Pluchea sericea*). Herbaceous vegetation is absent within dense thickets of salt cedar, but occurs in openings between such thickets where scattered individuals of fanleaf crinklemat (*Tiquilia plicata*), Spanish needle, and *Cryptantha* spp. may be present.

1.4.12 Burn Area

The area on the eastern side of the Oatman-Topock Highway previously was dense salt cedar and athel tamarisk that was burned during a wildfire in October 2008. In early 2011, USFWS initiated restoration activities in the burn area that included removing logs and woody debris, irrigation to leach salts form the soils, and planting of native vegetation. To date, 22 acres of the 240-acre burn area have been planted with native vegetation. Native species planted in this area include screwbean mesquite, blue palo verde, desert broom (*Baccharis sarothroides*), four-wing saltbush (*Atriplex canescens*), needle grama (*Bouteloua aristidoides*), alkali sacaton (*Sporobolus airoides*), James' galleta (*Pleuraphis jamesii*), and desert globe mallow (*Sphaeralcea ambigua*). The remaining areas are barren with the exception of the occasional seedlings of athel tamarisk and Russian thistle (*Salsola tragus*). Some of these areas have been covered with wood chips, and scattered logs and woody debris piles are present in a few locations.

SECTION 2

Resource Impact Assessment

The following subsection provides a brief summary of project activities that may have impacts to sensitive natural resources. The assessment of potential impact areas is provided in the following subsection.

2.1 Summary of the Groundwater Remedy Features

A detailed description of all the proposed activities associated with the groundwater remedy is provided in the Programmatic Biological Assessment (PBA; CH2M HILL, 2014). Figure 2 provides a visual depiction of the entire remedy layout.

A brief description of the key project features is provided in Section 1. The project also will include utility and support facilities necessary to make the remedy effective and safe over the anticipated decades-long operation. Utilities will include electrical power supply, communications systems, and instrumentation and control systems. Support facilities will include carbon amendment facilities, access routes, facilities to manage wastewater, operator's facilities (office space, bathrooms, etc.), long-term storage of excess soil, equipment and materials storage, equipment maintenance and testing areas, waste or refuse containers, and an onsite laboratory.

In addition, temporary facilities will be required for construction of the remedy. Potential locations within the project area have been identified for temporary staging locations during construction, including a construction yard. These temporary staging areas and the construction yard are in existing developed or disturbed areas. It is anticipated that the construction yard will include at a minimum multiple trailers serving as a work place for personnel, a central check-in/out location for site visitors, a place for daily briefings/project meetings, and a staging area for equipment and materials as well as other construction-related functions.

In compliance with Mitigation Measure CUL-1a-9, the Groundwater Remediation Mitigation and Monitoring Reporting Program, the remedy infrastructure has been designed in a manner that gives: (1) priority to previously disturbed areas for the placement of new physical improvements, and (2) priority to reuse of existing physical improvements, such as, but not limited to, wells and pipelines, but not including the IM 3 Treatment Plant.

2.2 Summary of the Groundwater Remedy Activities

Project activities are divided into different components that include construction, O&M, sampling and monitoring, decommissioning, and restoration. While soil storage is another activity associated with the remedy, no soil storage facilities are proposed on HNWR lands. Construction of the remedy facilities is expected to take approximately 3 years to complete, and the remedy will operate between 30 and 50 years until the groundwater remedial action objectives have been achieved.

The construction footprint represents the maximum project footprint because it includes the construction areas that will be needed to build each of the proposed wells. It also includes the construction corridors for the associated pipeline, which will range in total width from 25 to 60 feet, and encompasses the access routes. It is assumed that project decommissioning and restoration activities will occupy the same areas as the construction footprint. Other activities related to O&M and sampling and monitoring will affect a much smaller footprint within the existing construction footprint. Furthermore, these activities will be periodic or infrequent, of short duration, and generally less intensive than the construction phase. For these reasons, the assessment of project impacts is based on the maximum construction footprint, rather than the footprint, for other activities because the construction footprint represents a conservative (worst-case) estimate of the area requiring restoration.

2.2.1 Construction Activities

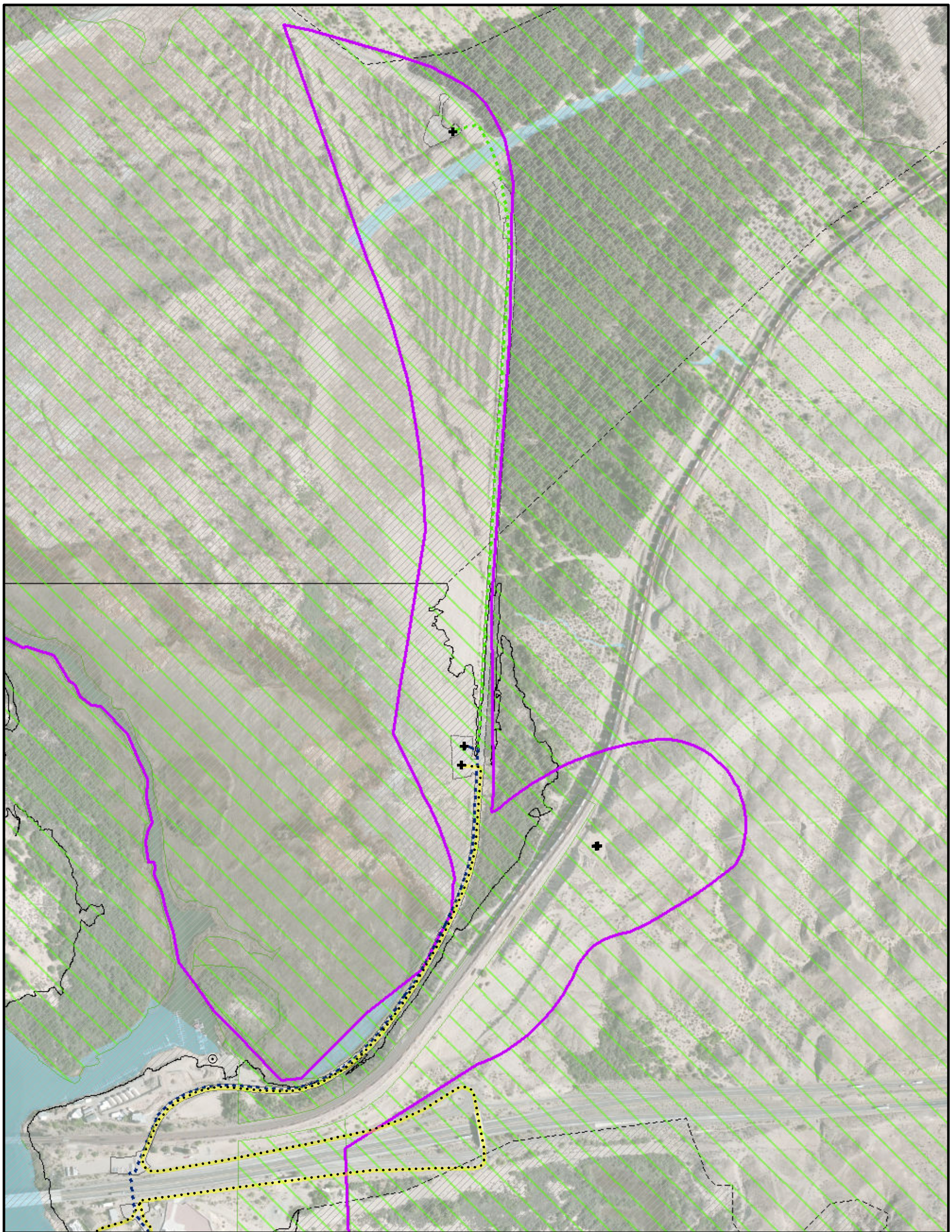
The groundwater remedy freshwater supply system begins with two existing wells: HNWR-1 and Site B well, which are west of the Oatman-Topock Highway in Arizona (Figure 3). A new, third well, HNWR-1A, was constructed in close proximity to HNWR-1 and will be the primary supply well. Both the HNWR-1 and the Site B wells are for contingency use only depending on the results of water quality and quantity testing from the new well. The freshwater supply pipeline will extend from HWNR-1A within a narrow trench within the existing shoulder of the Oatman-Topock Highway. Options for installing the power supply for the water supply well are currently under discussion with DOI and the Refuge but will include some combination of new power poles and overhead or underground utility lines.

If piping to the Site B well is included, the adjacent soil berms to the north and south would be avoided. Ancillary facilities that will be constructed for the freshwater supply system will include two small concrete pads with shade structures at each functioning well to support pump and electrical control facilities. A sand separator also will be installed at the freshwater well HNWR-1A to allow for purging of sand at the wellhead and minimize sand settling in the pipe. The purged sand and water stream will be allowed to percolate into the ground via a dry well that will be filled with rock and located near HNWR-1A. The well, pump and electrical control facilities will be protected with security fencing and cameras. The pipeline leaves the HNWR property at the point where it enters the privately owned property associated with the Topock Marina. It does not cross into HNWR lands again until it crosses over the Colorado River on the existing pipe bridge (i.e., former Route 66 bridge).

Upon reaching the California side of the Colorado River, the freshwater supply pipeline will be installed underground to follow the existing access roadway and gas pipeline corridor to the west approximately 500 feet to where it will split into two separate lines (Figure 4). One line will follow the access road to the north and west to where it will cross over the TCS access road into the developed area just northeast of the Transwestern Bench, which is just outside the HNWR property. The second underground freshwater supply line will follow the existing roadway and gas pipeline corridor to the west-southwest to the point where it leaves the HNWR property and enters the TCS property. Other activities include the installation of a new monitoring well (MW-K) and a new access roadway to the north-northeast of the Transwestern Bench.

The northern branch of the pipeline will be installed beneath the TCS access road using a horizontal drilling technique to extend the pipeline east of the roadway (Figure 5). From this point, the pipeline will follow an existing access route through a tamarisk stand beneath the I-40 bridge. These activities occur within the California Department of Transportation (Caltrans) right-of-way until the freshwater pipeline corridor crosses a narrow strip (approximately 150 feet wide) of HNWR land between the I-40 bridge and the BNSF Railroad bridge.

The last of the construction activities on HNWR land will occur west of the TCS property (Figure 6). At this location, the freshwater pipeline will be constructed upon a new aerial pipe bridge across Bat Cave Wash. The new pipe bridge will be adjacent to the existing natural gas pipeline (See Photo 1, Appendix A). The bridge support footings will be located outside the Bat Cave Wash channel. Once the pipeline crosses to the western side the wash, it will run underground within an elevated bench for approximately 175 feet until it reaches the freshwater injection well location, FW-2 shown on Figure 6. Additional monitoring wells (Well S, MW-V, MW-HH, MW-II, and MW-11D) will be installed on the northern side of the freshwater injection well FW-2 within the existing access routes or along Bat Cave Wash. Additional activities in this area include improvements to an existing access road and associated stormwater features on the western side of Bat Cave Wash



LEGEND

Existing Wells:

- Monitoring Well
- Water Supply Well
- Proposed Access Routes
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/Contingent Fresh Water Pipe
- PBA Update Action Area
- Wetlands and/or Waters of the U.S.
- Havasu National Wildlife Refuge (HNWR)
- 100yr. Floodplain*
- Construction Footprint

* Where line is dashed - 100 yr. Floodplain is inferred, taken from Federal Emergency Management Agency (FEMA) http://www.msc.fema.gov (11/7/2011).

N

0 237.5 475 950 Feet

FIGURE 3
AREA 1 – FRESHWATER WELL LOCATION
FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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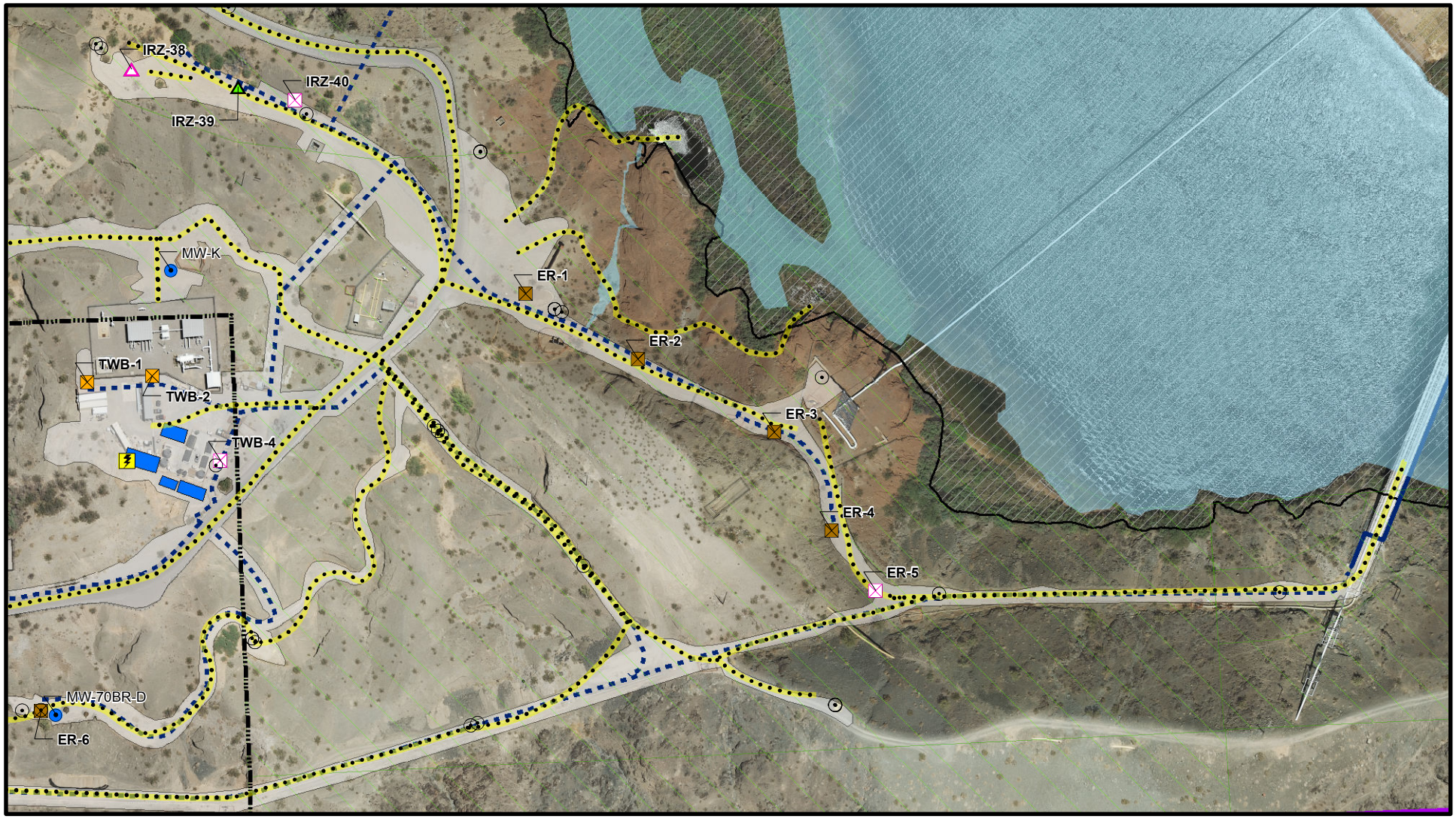


LEGEND

Existing Wells:
- Monitoring Well

Provisional Wells:
- Extraction Well
- Injection Well

Planned Wells:
- Extraction, East Ravine
- Extraction, NTH IRZ
- Extraction, Transwestern Bench
- Injection, NTH IRZ

- Planned Transformer
- Proposed Access Routes
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/Contingent Fresh Water Pipe
- Wetlands and/or Waters of the U.S.
- Havasu National Wildlife Refuge (HNWR)

- Property Boundaries
- Proposed Remedy Structure
- Area of Potential Effects (APE)
- Construction Footprint
- 100yr. Floodplain

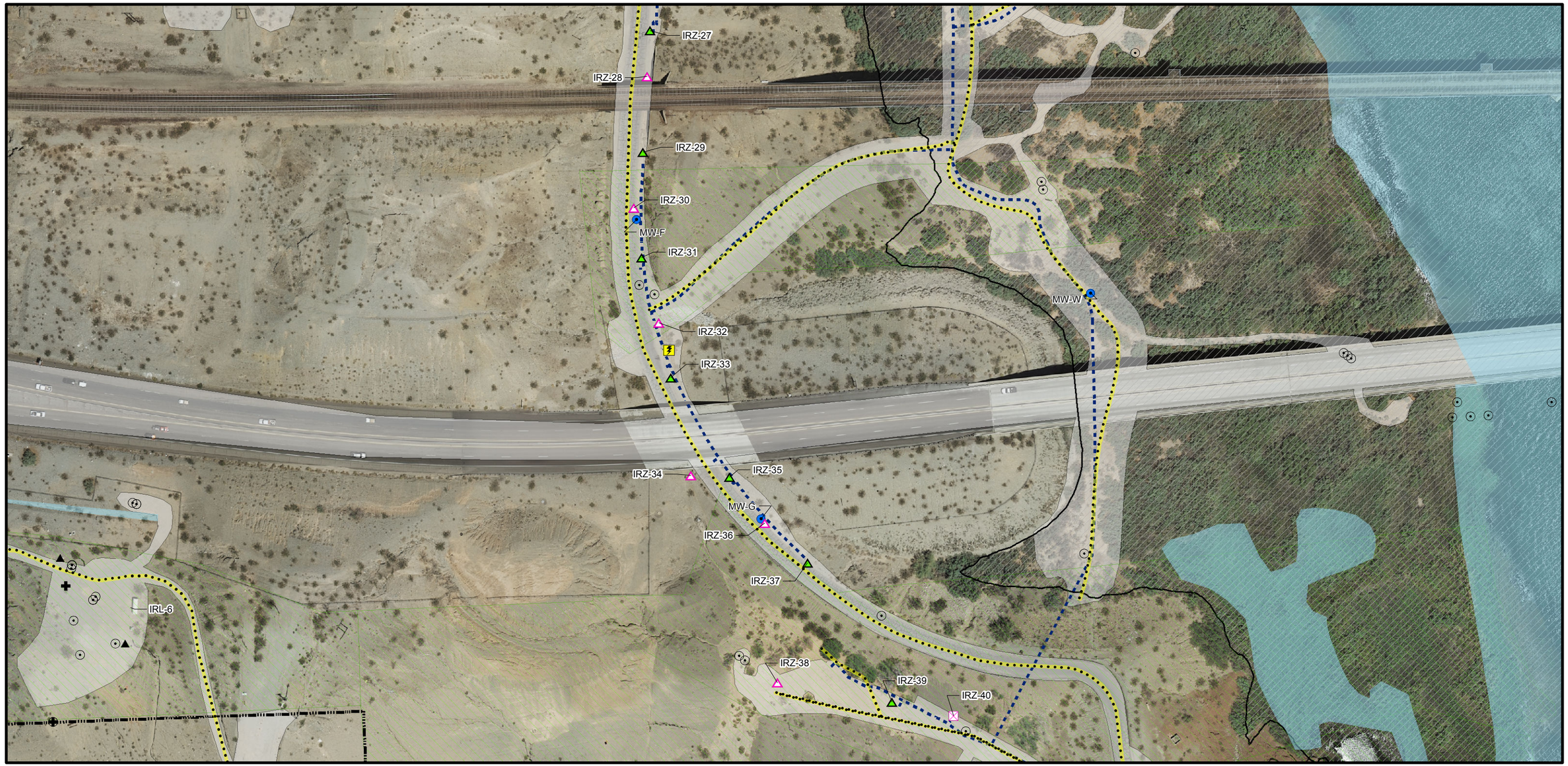
0 100 200 400 Feet

N

FIGURE 4
AREA 2- EAST SIDE OF COMPRESSOR STATION
FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\HNWR\FIG4_RemedyFacilities_a.mxd



LEGEND

Existing Wells:
- Monitoring Well
- Water Supply Well

Provisional Wells:
- Extraction Well
- Injection Well
- Injection/Extraction Well

Planned Wells:
- Extraction, NTH IRZ
- Injection, NTH IRZ
- Remedy Monitoring Well
- Recirculation Well

- Planned Transformer
- Proposed Access Routes
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/Contingent Fresh Water Pipe

- Property Boundaries
- Wetlands and/or Waters of the U.S.
- PBA Update Action Area
- Havasu National Wildlife Refuge (HNWR)
- Construction Footprint
- 100yr. Floodplain
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.

N

0 55 110 220 Feet

FIGURE 5
AREA 3- CALTRANS LEASED AREAS
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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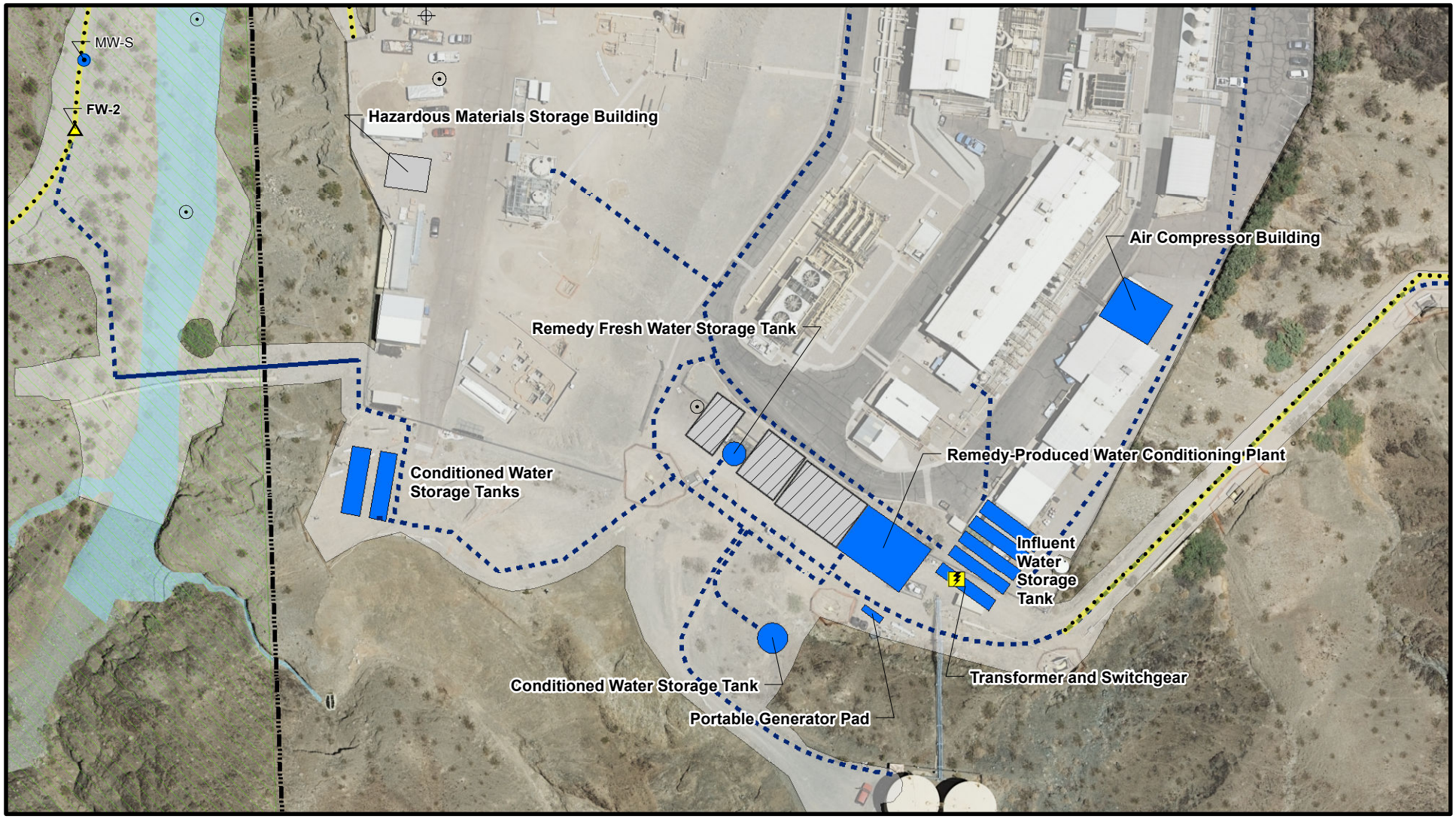
Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\HNWR\FIG5_CALTRANS.mxd



LEGEND

Existing Wells:
- Injection Well
- Monitoring Well

Planned Wells:
- Injection, Freshwater
- Remedy Monitoring Well

- Planned Transformer
- Proposed Access Routes

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/Contingent Fresh Water Pipe

- Property Boundaries
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Havasu National Wildlife Refuge (HNWR)
- Wetlands' to 'Wetlands and/or Waters of the U.S.
- Construction Footprint

0 25 50 100 Feet

N

FIGURE 6
AREA 1 – WEST SIDE OF COMPRESSOR STATION
FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\HNWR\FIG6_RemedyFacilities_a.mxd

Because the existing water supply wells in Arizona, as well as the pipeline corridors, will be constructed in previously cleared areas associated with the former 2008 Sacramento Wash burn area or within developed portions along shoulder of the Oatman-Topock Highway, there will be no habitat impacts within Arizona. Minor trimming of perennial vegetation, including honey mesquite and blue palo verde, may be required along the southern side of Topock Marsh, but no tree removal will be required. Similarly, two new monitoring wells will be constructed along the shoreline of the Colorado River to the north of the Topock Marina in Arizona. These wells will be constructed within previously cleared areas and will not result in any new habitat impacts.

Within California, the northern freshwater supply pipeline crosses the HNWR property between I-40 and the BNSF Railroad bridges. This segment occurs along an existing access route within the 100-year flood elevation of the Colorado River and will affect primarily tamarisk. On the western side of Bat Cave Wash, the underground freshwater pipeline will require removing several creosote bushes.

Work in the project area would not have impacts on fish species, and impacts to wildlife would be limited to temporary disturbance resulting from noise and increased human activity during construction and monitoring events. Some tree trimming may be required during installation of the freshwater supply pipeline between the Oatman-Topock Highway and the Topock Marsh. Tree trimming (like other construction activities) would be avoided during the breeding season when immobile young may be present (i.e., March 15 to May 31). Any tree trimming (or construction activities) within the remaining portion of the breeding season (June 1 to July 1) would be limited to a single USFWS-approved work window (7 to 10 days in length). In other areas, some creosote bush may be trimmed to allow access of equipment, but the root systems will be left intact to the extent possible. Following construction, plants left in this trimmed condition are expected to naturally recover by resprouting from the rootstocks. Sensitive habitat areas including wetland will be avoided, and impacts in upland areas will consist primarily of removing creosote, which is an abundant and widespread species occurring throughout the uplands in this part of the HNWR. The minor impacts to this vegetation type resulting from the project are not expected to result in significant adverse habitat impacts. No wildlife dependent recreational activities are within the parts of the refuge in the project area.

2.2.2 Operation and Maintenance Activities

Normal operation of the remedy facilities include groundwater extraction and recirculation within remediation wells and pipelines, carbon substrate storage and deliveries, carbon substrate injections, and regularly scheduled maintenance and repairs of the remedy system. Remediation wells will be subject to operation activities that will be mostly automated; however, carbon substrate dosing of individual wells may occur periodically. In these cases, a vehicle will carry the dosing tank along the existing access routes to complete the procedure. Normal O&M activities also will include the freshwater supply and conveyance system, as well as the power supply and distribution system.

Non-intrusive routine maintenance of the wellhead and wells includes regular surging and pumping techniques. A more aggressive routine maintenance technique uses AquaGard that injects cryogenic liquid carbon dioxide into existing well access tubes and requires all or some of the following: an injection trailer, a storage vessel, pump rig and/or crane (if a pump or pipe needs to be installed/removed), and a support truck.

Non-routine maintenance consists of intrusive methods requiring removal of existing equipment from well and include drop-pipe replacement, submersible pump repair/replacement, and well repair and well rehabilitation methods. Depending on the specific plan for well rehabilitation, some or all of the following equipment may be required: a pump rig and/or crane, support or pipe truck, generator(s), air compressor, chemical trailer (mixing tanks and pumps), neutralization trailer (mixing tanks and pumps), video van, vacuum or tanker truck, forklift, and 20,000-gallon portable, aboveground storage tank.

Pipeline maintenance and repair also will be required. Cleanouts and blowoffs will be installed to allow access to the pipeline for removing sediment. A sand separator will be installed at the freshwater well HNWR-1A to allow for purging of sand at the wellhead and minimize sand settling in the pipe. The purged sand and water stream will be allowed to percolate into the ground via a dry well that will be filled with rock and located near the freshwater supply well. Pipeline maintenance also will be required. A clean-in-place (CIP) system for the IRZ will operate as a closed loop system to use approved chemicals to remove biological films and mineral scale deposits within remedy pipelines. Spent CIP solutions will be collected and managed as liquid wastes.

Sections of underground pipe that requires repairs will need to be exposed by excavation, whereas below ground pipe section insides precast concrete trenches can be accessed via maintenance manhole(s). Aboveground pipeline repairs will be done according to manufacturer's recommendations. Aboveground pipeline will need to be repainted periodically for upkeep and aesthetic reasons.

Over time, access roads and pathways are likely to exhibit deterioration and/or overgrowth, and will require maintenance for safety and to ensure access to and protection of remedy infrastructure and facilities. This maintenance will be coordinated with the Refuge to limit the potential for conflicts. Depending on the road or pathway surface and condition, the proper maintenance method(s) will be different. Typically, road maintenance consists of stabilizing disturbed areas, filling/regrading, and pruning overgrowth.

A number of other facilities will be required to support long-term O&M activities, including the main Operations Building at the TWB, satellite equipment/tools storage and maintenance yard at Park Moabi, onsite laboratories at the Water Condition Plant at the TCS/Carbon Amendment Building at the MW-20 Bench/a trailer at Park Moabi. These facilities will not be on HNWR lands.

None of the O&M activities is anticipated to affect new habitat because these activities can be accomplished within a smaller footprint than was disturbed during the construction phase.

2.2.3 Sampling and Monitoring Activities

Once the groundwater remedy and associated new monitoring wells are installed, a new flexible, adaptive program will be developed as part of the remediation compliance monitoring and the remedial system performance monitoring. This will determine the analytes and monitoring frequencies for particular wells, as dictated by the location and well category during remedy operations. As data are collected during remedy installation and initial operations, the conceptual site model will be updated. The monitoring program may be refined based on baseline data before remedy operation, and the sampling program will be revisited and refined after the first 2 years of operation.

All sampling events will follow standard operating procedures that will be provided in the O&M manual and will provide detailed method descriptions of activities, including purging and sampling of groundwater monitoring wells; purging and sampling of active and inactive water supply wells; depth-specific surface water sampling; sample field filtration and preservation for metals analyses; decontamination of water sampling equipment; spill prevention, containment, and control measures for monitoring well sampling; access routes; process water sampling; and safe fueling and fuel handling procedures.

Access to monitoring wells typically will occur using a pickup truck or all-terrain utility vehicle with a trailer. On HNWR lands, vehicle access is limited to existing roads. On average, two field personnel will be involved in sampling activities for each well. Sampling procedures require purging the wells before sampling can be conducted. Depending on the well characteristics, approximately 15 to 200 gallons of water typically will be purged. This water will be either re-injected into the IRZ or transported to the onsite remedy-produced water treatment facility. Pumping of purge water typically will involve using a portable generator unless the well pump has a dedicated (direct line) power source.

The period to complete field sampling activities at an individual well ranges from approximately 15 minutes to several hours. Several of the monitoring sites include clusters of two to three wells sampled at different

groundwater depths. The total time to complete a sampling event ranges from 1 day for monthly events or 2 days for surface water/river sampling events, to 7 or 8 weeks for a biennial event. Existing and new access routes that are kept as part of the new groundwater monitoring program will be used to access these wells.

Baseline soil sampling will be conducted in conjunction with the installed remedy facilities to provide comparable data to evaluate potential impacts of the final remedy features at the time that they are being decommissioned. Baseline soil samples will be collected along the remedy pipelines/conduits alignments, which include direct burial pipelines/conduits, pipeline trenches, and the new remediation wells (i.e., injection and extraction wells) that are connected to those pipelines, as well as at the new remedy monitoring well locations. Baseline soil sampling will not occur along the alignment of the freshwater pipeline in Arizona, and on the California side, leading to TCS because the freshwater from HNWR-1 has low concentrations of inorganic compounds, so potential risks to underlying soil from incidental releases, spills, or leaks from the pipeline are negligible.

None of the sampling and monitoring activities is anticipated to affect new habitat because these activities can be accomplished within a smaller footprint than was disturbed during the construction phase.

2.2.4 Decommissioning and Restoration Activities

PG&E will submit a decommissioning plan within 120 days of DOI's certification of completion of the remedial action and a determination by DOI that removal of such facilities is protective of human health and the environment (the "Plan for Decommissioning of Remedial Facilities and Restoration"). The Plan for Decommissioning of Remedial Facilities and Restoration will describe procedures for the removal of the remedy facilities and associated infrastructure. The plan will also describe the post-remedy restoration of the site to the conditions existing prior to the implementation of the remedy construction, to the extent practicable.

After decommissioning and removal of the remediation facilities, the areas will be restored using decompaction and grading techniques designed to decrease erosion and accelerate revegetation of native species. The decommissioning of monitoring wells will occur after an appropriate time span following the decommissioning of the remediation facilities. The Plan for Decommissioning of Remedial Facilities and Restoration for the remedy facilities will incorporate the approaches and feedback gathered from the previously prepared IM- 3 Restoration Plan. It is anticipated that some details related to restoration, such as the amount of earthwork and earth material needs for the restoration, will be deferred until decommissioning is complete because these details will best be determined when the actual conditions of ground surface are known.

The decommissioning and restoration activities are not anticipated to affect new habitat because these activities can be accomplished within the same footprint that was disturbed during the construction phase. One possible exception to this might be habitat that develops within the previously disturbed construction footprint over the course of 30 to 50 years of remedy system operation.

2.3 Summary of Potential Impacts for the Groundwater Remedy Activities

This impact assessment is specific to HNWR lands and was completed using a geographical information system (GIS) to combine the expected project construction footprint based on the 90 percent design with previously mapped areas that were considered to be undisturbed land, sensitive resources, including wetlands and waters of the United States, and focused vegetation inventory and mapping within the project footprint.

2.3.1 Disturbed and Undisturbed Areas

The Topock area has cultural significance to a number of local and regional tribes and, as such, measures have been taken during the design stages of the final remedy to avoid or minimize any impacts to culturally significant resources, including ethnobotanical plants. The Final Environmental Impact Report included Cultural Resources Mitigation Measure CUL-1a-9 that specifically states:

> *During selection of the design and specific locations for physical remediation facilities, PG&E shall, in communication with the Interested Tribes (and subject to their review), and to the maximum extent feasible, as determined by DTSC, give: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, such as but not limited to wells and pipelines, but not including IM-3 facilities.*
>
> *"Disturbed" areas in this context means those areas outside of documented archaeological site boundaries that have experienced ground disturbance in the last 50 years. PG&E shall produce an aerial map of these disturbed areas to guide project design, and PG&E shall make a good faith effort to provide tribes with an opportunity to review and comment on the information displayed on the map in determining "disturbed" areas.*

The proposed methodology for the identification and mapping of disturbed areas was presented to the project team (including tribal representatives) at the team meeting held on February 24, 2011. In late February and early March of 2011, field surveys were conducted and the disturbance area maps were circulated to the project team for review and comment. These disturbance maps were then used to guide the design of the final remedy. The following disturbance categories were used in the impact assessment for the HNWR:

1) **Highly Disturbed** areas include existing infrastructure and facilities, paved and unpaved but graded and maintained roads, and well-used access routes. Highly disturbed areas also included dredged sand deposits adjacent to the Colorado River and other highly disturbed areas that were generally devoid of vegetation, such as the portion of the HNWR where vegetation has been cleared within the Sacramento Wash following a wildfire in 2008.
2) **Lightly Disturbed** areas include areas that have some level of disturbance including some vehicle tracks, utilities, bank cuts, or other types of disturbance, but also support some vegetation. Such areas include access routes and well locations within Bat Cave Wash and other low-impact access routes.
3) **Undisturbed** areas include areas that were not mapped as either disturbed or lightly disturbed on the 2011 disturbance maps and are located outside of an existing roadway or well-established access routes.

Within the project footprint that occurs on HNWR lands (27.95 acres total), the three mapped different levels of disturbance occur as follows: highly disturbed areas comprise 24.47 acres or about 88 percent; lightly disturbed areas comprise 2.23 acres or about 8 percent; and undisturbed areas comprise 1.25 acres or about 4 percent of the total HNWR lands within the proposed final groundwater remedy footprint.

2.3.2 Wetlands and Waters of the United States

A wetland delineation for the entire project area was completed in February 2012 and submitted to DTSC and DOI on August 22, 2013. Consultation occurred with the USACE and it was determined that a permit (under Section 404 of the Clean Water Act) would not be required for this project due to the CERCLA exemption. However PG&E is required to comply with all substantive permit requirements.

The project has been designed to avoid impacts to wetlands and waters of the U.S. to the extent possible. The 90 percent design footprint includes 0.99 acre of desert wash habitat. This includes 0.70 acre of Bat Cave Wash that will mostly be used for temporary construction. Long term impacts within the wash will be

limited to a few well locations and the continued use of existing access routes. The freshwater supply pipeline will span Bat Cave Wash parallel to an existing natural gas pipeline on the west side of the Compressor Station. An additional 0.29 acre of a tributary to Bat Cave Wash could also be impacted by installation of a provisional monitoring well. The downstream portion of the wash (0.04 acre) is highly disturbed and there is an existing large earthen berm across the channel. Upstream of the berm the remainder of the wash (0.25 acre) is mapped as undisturbed. In addition 6.66 acres of the project area is located on uplands that are within the current 100-year floodplain of the Colorado River.

2.3.3 Vegetation Impacts

Focused surveys to identify and map all vegetation in the 90 percent design footprint were conducted between August 6 and 8, 2014. The vegetation assessment and inventory included any identifiable persistent perennials, succulents, and all woody shrubs and trees. Non-persistent perennial and annual plants were not included in the inventory. Most of the plants were individually mapped using a Trimble GEO XT global positioning system (GPS) device; however, some vegetation including dense stands of arrow weed, salt cedar, or abundant and widespread creosote bushed were mapped on aerial photos and later digitized into GIS. Plants that were just outside of the polygon footprint were generally not mapped unless they represented an important resource to avoid. Dead vegetation within the footprint was also not mapped. This methodology provided a fairly comprehensive inventory of vegetation located on the HNWR within the 90 percent design project footprint.

For most species, the vegetative cover associated with individual perennial plants was approximated by buffering the mapped GPS points to approximate the canopy cover evident on the aerial photograph. A few areas of dense salt cedar and scattered arrow weed were mapped as polygons and in these areas vegetative cover was estimated on the estimated areal extent of the vegetation within the polygon. Vegetation impacts and the associated estimated acreage impacts within the 90 percent design footprint on HNWR lands are shown in Table 1. Vegetation maps, photo points, and preconstruction photographs are provided in Appendix A.

It should be noted that the plant information depicted on the Appendix A maps shows a mixture of polygons and symbols, not the actual impact areas. The symbols may deviate slightly from the underlying aerial photograph images. These deviations are due to inherent sources of error associated with GIS technology which include: changes in vegetation cover since the aerial photograph base map was taken in 2011, satellite geometry over the course of the mapping; the “canyon effect” near buildings and very steep slopes, geo-referencing changes where measured vertical elevation deviates from actual, and effect of high temperatures on the accuracy of the GPS unit.

TABLE 1
Summary of Vegetation Impacts within the 90% Design Footprint on HNWR Lands

Species	Number of Plants[a, b.]	Estimated Acreage
Anderson’s desert thorn (*Lycium andersonii*)	7	0.004
Arrow weed (*Pluchea sericea*)[c]	NA	0.080
Beaver tail (*Opuntia basilaris*)	23	0.001
Big saltbush (*Atriplex lentiformis*)	3	0.001
Brittlebush (*Encelia farinosa*)	91	0.049
White bursage (*Ambrosia dumosa*)	52	0.026
Catclaw acacia (*Senegalia greggii*)	23	0.041
Cattle saltbush (*Atriplex polycarpa*)	5	0.002

TABLE 1
Summary of Vegetation Impacts within the 90% Design Footprint on HNWR Lands

Species	Number of Plants[a, b.]	Estimated Acreage
Cheesebush (*Ambrosia salsola*)	75	0.035
Creosote bush (*Larrea tridentata*)	394	0.275
Desert lavender (*Hyptis emoryi*)	15	0.013
Honey mesquite (*Prosopis glandulosa*)	7	0.004
Jimson weed (*Datura wrightii*)	1	<0.001
Honey sweet (*Tidestromia oblongifolia*)	3	<0.001
Blue palo verde (*Parkinsonia florida*)	19	0.029
Pygmy cedar (*Peucephyllum schottii*)	2	0.001
Salt cedar (*Tamarix ramosissima*)	NA	0.163
Silver cholla (*Cylindropuntia echinocarpa*)	1	<0.001
Skeletonweed (*Stephanomeria paucifolia*)	1	<0.001
Sweetbush (*Bebbia juncea*)	111	0.059
White Rhatany (*Krameria grayi*)	8	0.004
Total of Vegetation	**841**	**0.787**

Notes
[a] Number of plants and estimated cover within the 90 percent design footprint. Actual plant impacts will be less with implementation of avoidance measures in the field.
[b] NA = Not assessed. Arrow weed and salt cedar were assessed as mapped polygons, not individuals.
[c] Acreage estimated based on an estimated average of 25% cover within 0.320 acre of mapped polygons

BOLDFACE species are those that will be transplanted or replaced with new plantings.

2.3.4 Preconstruction Photo-Documentation

As part of the vegetation surveys for the 90 percent design, representative photographs were taken of the preconstruction conditions. Photo locations and photographs are provided in Appendix A.

SECTION 3

Avoidance, Minimization, and Salvage/ Replanting Measures

This section provides information on avoidance and minimization measures that will be implemented to reduce impacts to vegetation resources and provides information on plant salvage and other replacement methods that will be used where long-term impacts to vegetation are unavoidable. The information included in this section also is intended to provide general guidance on salvage, planting, and seed collection that may be used for mitigation, habitat enhancement, and/or revegetation following decommissioning of the project. Detailed planting plans will be provided at a later date.

3.1 Design and Construction

Throughout the design process for the project, efforts have been made to locate pipelines and wells along roadways, pipeline rights-of-way, and other previously disturbed areas to avoid impacts to vegetation. Construction areas, as well as staging and storage areas, have also been located in previously disturbed and/or developed areas to minimize and avoid impacts to vegetation and other sensitive resources. To further minimize impacts, a biologist will conduct preconstruction surveys and areas of native vegetation and sensitive habitats in the immediate vicinity of the construction areas will be identified and clearly marked with flagging, fencing, and/or signage. Construction workers also will be provided with environmental awareness training regarding biological resources including sensitive species and habitats.

The issue of soil stabilization is being addressed separately under a stormwater pollution prevention plan (SWPPP) that will be included in the C/RAWP and O&M Manual. However, the use of herbaceous vegetation covers as a soil stabilization technique is not being proposed for this project because this approach was not considered appropriate for this environment. Soil stabilization techniques will be an integral part of the SWPPP because these measures minimize dust and protect desert topsoil, particularly in areas of contamination or with minimal surface soil. Vegetative covers are not discussed further in this document.

Similarly, grading plans also will be developed and submitted for review as part of the 90 percent design submittal.

3.2 Habitat Requirements for Mitigation Planting

Native plants in the project area have different habitat requirements and ecological tolerances, which are reflected in the sites that they occupy. Blue palo verde is a relatively large tree associated with sandy areas, is widely distributed on the edges and bottoms of the ephemeral washes that dissect the upland alluvial terraces, and occurs along sandy roadsides. In contrast, the related hillside palo verde is a tree of shorter stature that is restricted to rocky hillsides above the Colorado River in the southern portion of the project area.

Western honey mesquite and screw bean mesquite typically grow in areas with root access to permanent underground water; however, western honey mesquite is more likely to occur in somewhat drier habitats than screwbean mesquite. While both species are salt tolerant, screwbean mesquite has a higher tolerance level than western honey mesquite (Miyamoto et al., 2004), an important consideration when planting mitigation trees. Transplanting or replacement planting of native species will be located in areas where the species are growing to ensure appropriate environmental conditions are present for the establishment and survival. The exact planting locations will be determined as part of the final design based on the number of transplants and/or mitigation plantings and the locations and extent of the work areas and access routes.

3.3 Transplantation, Salvage and Replacement of Trees, Shrubs, and Perennial Species

The following section provides general guidelines for salvage, transplant, and replacement of trees, shrubs, and perennial species.

3.3.1 Transplanting Trees

Native trees identified in the project area can exceed 20 feet in height when mature. However, large individuals are unlikely to survive salvage and replanting because of "transplant shock" caused by extensive and unavoidable loss of roots. Therefore, salvage of native trees should be limited to small individuals or saplings whose root systems are small enough to excavate and transport with minimal damage. Such individuals are more likely to recover and survive the physiological stress of transplanting. In general, trees most suitable for transplanting will be less than 4 inches in diameter at the base of the trunk and no more than 6 feet tall. Trees shall be transplanted between November and March, when temperatures are cooler, trees are dormant, and irrigation demands are less. Transplanting will occur before bud break to allow the roots time to recover and proliferate before they are required to withstand excessive transpirational loads caused by higher ambient temperatures. To the extent possible, young trees will be relocated to areas in the immediate vicinity of the work area that have similar soil types, exposure, and drainage conditions, but distant enough that they will not be affected by future work activities. If there are no suitable transplantation areas in the vicinity of the work area, the trees will be relocated to other sites within the project area where the species is known to occur and will not be affected by work activities.

The following transplanting specifications follow general guidelines from the International Society of Arboriculture (ISA, 2013) and the American Standard for Nursery Stock (American Nursery and Landscape Association, 2004).

To minimize the time the roots of a salvaged tree are exposed and to increase survivability, the transplant location will have been identified and a hole excavated before the tree is removed from the soil. The transplant hole will be large enough to accommodate the root system at the same depth or slightly shallower than the tree being moved. The initial hole shall be at least two to three times the width of the root ball near the surface and taper down to the size of the root ball at the bottom. The depth of the hole shall be no greater than the distance from the trunk flare[1] to the bottom of the root ball.

Where possible, pre-dig the perimeter of the root ball using a sharp spade or shovel to avoid breaking and tearing of the roots. Pre-digging the root ball can stimulate regeneration of roots and increase root density in the final root ball. If a backhoe is used to excavate the root ball, the initial hole shall be larger than the final root ball. The final root ball will be shaped by hand using loppers to cut the roots cleanly. Table 2 provides size guidelines for the minimum size of the root ball for transplanted trees.

Depth of the root ball is variable depending on the size of the tree but generally will be between 24 and 36 inches deep. The root ball shall taper along the sides slanting inwards slightly toward the base. If the soil is hard and compact, it may be necessary to add water before cutting the root ball. The final root ball shall stand on a pedestal before being undercut. Once the root ball has been cut and shaped, wrap the sides and top in burlap to secure the roots and soil. A skirt shall be left hanging to cover the bottom of the root ball. Secure the burlap wrapping with rope or twine before lifting from the hole. If necessary secure any branches with burlap or ropes to prevent damage and breaking. Pruning of branches should generally not be required, but if some branches need to be trimmed it will be kept to a minimum with no more than 20 percent of the canopy removed in accordance with ANSI 300A Part 1 (American National Standard, 2008). Once the root ball and any branches have been secured, lift the tree straight up from the root ball to remove from the hole; do not lift by the trunk as this can damage the trunk and roots.

[1] The area at the base of the plants stem or trunk where the stem or trunk broadens to form roots

TABLE 2
Size Guidelines for Root Balls when Transplanting Trees

Trees Height or Stem Diameter*	Minimum Root Ball Diameter (Inches)
Trees < 6 feet tall and/or stem < ¾ inch in diameter near the base	16
Trees > ¾ inch diameter and stem < 2 inches in diameter near the base	24
Trees 2-3 inches in diameter near the base	32
Trees 3 -4 inches in diameter near the base	42

Note:
*Stem diameter for trees less than 4 inches is measured at 6 inches above the ground surface

Transport the excavated tree immediately to its new location and lower it (by holding the root ball not the trunk) into the hole. Remove the burlap from around the root ball and backfill around the roots with the soil that was removed from the planting hole. Do not add any additional soil amendments, fertilizer, or mulch to the soil, as these have been found to be unnecessary for desert trees and shrubs (Bainbridge et al., 2001). When backfilling, add water to minimize air pockets. Be sure the soil is firmly packed around the bottom of the root ball to ensure the tree is vertical and well supported. The remaining soil shall be tamped down lightly around the roots, but not firmly compacted. Water thoroughly and slowly after the hole is completely filled.

Staking of the trees shall be avoided, as staking can often result in detrimental effects such as reduced trunk taper, smaller root system development, and greater instability once the stakes are removed (ISA, 2013). If additional support is required, a single stake located upwind of the tree may be sufficient. The stake shall be driven into the ground outside the newly planted root zone. Stabilize the tree as low on the trunk as possible, while still providing support with broad, slightly elastic, material that will not damage the tree. Any staking supports shall be removed within 2 years of the initial planting.

3.3.2 Shrubs

There is little available information on transplanting of native shrubs. Most desert shrubs have extensive fibrous root systems that would likely be extensively damaged during excavation and transplanting. Some desert shrub species, such as creosote bush and arrow weed, are capable of regeneration as long as the roots remain intact and undamaged. In areas were vegetation clearing is necessary for temporary construction access, cutting or flattening the aboveground stems while leaving the root systems intact generally will facilitate natural regeneration in a relatively short time. Additionally, many desert shrubs are propagated by seed or nursery stock (Abella and Newton, 2009; Clary and Slayback, 1984). In areas where natural regeneration is not possible, seed collection from local material can be used to establish container plants that can be used to establish new shrubs in selected planting areas.

3.3.3 Perennial Species

Cacti and other succulents typically do well when transplanted because they have lower water demand and smaller root systems than trees and shrubs. Generally, plants are salvaged before construction using machinery (e.g., a front loader or excavator), although smaller plants may be dug by hand (Bainbridge, 2007). Cactus tend to survive better if they are replanted in the same orientation they were growing, so before removal, mark the northern side of the plant. Survival of transplanted succulents can be high as long as the work is timed carefully, plants are handled gently and after care at the transplant site is good (Bainbridge, 2007).

Bulbs such as desert lily (*Hesperocallis undulata*) may be transplanted, but only when they are dormant. Therefore, it is important to identify their location with a flag and/or GPS in order to locate them later for transplant during flowering. Bulbs shall be stored in a cool, dry, shaded area until they can be replanted

either immediately or in late summer or early fall. Plants also can be grown from seed, but this is more time consuming and would require nursery facilities.

Other small perennials that have herbaceous stems and a woody base may be transplanted. Such plants often benefit from pruning stems back to about 12 inches above ground. The plants can then be transplanting to a new position away from the impacted area or directly into 1-gallon containers for temporary storage. Bowler (1994) recommends harvesting and transplanting during the winter immediately during or immediately following rain when the soil is moist to saturated. Other salvage methods for desert perennials include collection and storage of seeds during late spring or early summer. Seed should be stored in a cool dry environment and then sown directly into the soil in early winter. Additionally, seed can be collected and germinated in containers and grown in a nursery until plants are at least 12 inches tall. The container grown plants can then be planted out in late winter or early spring.

3.4 Replacement Planting and Seeding

This section includes specific methods that may be used for re-establishing plant populations within the project area. The restoration method will be dependent on the site conditions as well as during remediation activities at the site.

3.4.1 Seed Collection

Where transplanting of trees, shrubs and herbaceous plants is not possible, seed can be collected from the site for mitigation. Rainfall is variable in the project area and dry years can dramatically affect germination of annual plants as well as flowering and seed production of trees, shrubs and perennial species. Therefore, seed collection should only occur during “good” years with sufficient rainfall to stimulate germination and abundant flowering of the target species. The specific number and distribution of collection sites will vary according to size, density, continuity of populations, as well as the desired quantity of seed to be obtained. A general rule of thumb is to collect from a minimum of five collection sites at least 0.5 to 1 mile apart, and from no more than 20 percent of an individual’s seed crop. Collection from multiple populations in the project area may not be possible, since the number of known populations is limited for some species. If additional seed is needed, collections should be made from the regional project vicinity (within 10 miles if possible). Seed that is not used immediately should be stored in a cool, dry place until mitigation sites can be prepared or seeds can be sown in containers for propagation in a nursery. Reseeding of small disturbed sites (less than 0.5 acre) may be done by hand sowing in fall or early winter.

3.4.2 Container Grown Plants

Impacts to shrub species as well as larger trees (over 4 inches in diameter) likely will require replacement plantings using container-grown materials. Trees and shrubs including palo verde, western honey mesquite, screwbean mesquite, cattle saltbush, and big saltbush are relatively easy to propagate in a nursery and well adapted to transplanting with a minimal amount of care and maintenance (Bainbridge and Virginia, 1990; Bainbridge, 2007; Romney et al., 1989). Several commercial nurseries grow native plants from the Mojave Desert (Appendix B).

Depending on the number of trees and shrubs that are required for revegetation of disturbed areas, PG&E will consider contracting with a nursery that specializes in desert plant propagation to collect local seed and establish trees, shrubs and other plants from on-site material prior to mitigation planting. This would ensure that replacement plants are suitable for local environmental conditions. If only a small number of plants are required, appropriate available nursery stock may also be used.

Replacement planting for native trees including blue palo verde, hillside palo verde, western honey mesquite, and screwbean mesquite will consist largely of container-grown plants. Containers shall be long and narrow to encourage deep root growth such as Tall One Tree Pots (Steuewe & Sons, Inc., 4.5 inches wide by 14 Inches deep). Seedlings/saplings shall be between 4 to 6 months old when transplanted to

prevent the plants from becoming root-bound in the pots. Replacement planting of shrubs such as mesquite, cattle saltbush, big saltbush, and others shall be grown in 4- to 6-inch tube packs and transplanted when 9 to 12 months old.

Based on experimental results from the Mojave Desert, the median survival rate for species such as western honey mesquite is around 50 percent (Edwards et al., 2000; Grantz et al., 1998). Therefore, to achieve the desired density of plant species the number of container grown plants should be more a higher ratio to account for anticipated mortality.

Transplanting of container-grown trees and shrubs typically is done in the late winter to early spring between February and April (Romney et al., 1989; Edwards et al., 2000). Planting holes shall be excavated using an 8- to 10-inch-diameter power auger to a depth equal or just slightly more than the depth of the container (Grantz et al., 1998). Carefully remove the saplings from the container and place against one side of the planting hole, using excavated soils to backfill around the roots. Do not add additional soil amendments, fertilizer, or mulch to the soil as these have been found to be unnecessary for desert trees and shrubs (Bainbridge et al., 2001; Romney et al., 1989). When backfilling, add water simultaneously to minimize air pockets. Be sure the soil is firmly packed around the roots, but not firmly compacted. Water thoroughly and slowly after the hole is completely filled.

Trees will be spaced to maintain a density similar to the area from which they are removed or in similar spacing based on undisturbed areas near the project, but no closer than 8 feet apart. Shrubs will be spaced in a density similar to the density in the undisturbed surrounding vegetation, but no closer than 3 feet apart. To ensure soil and other environmental factors are most favorable for establishment, replacement plants will be planted in areas where individuals of the same species are healthy and growing well.

Some type of initial herbivore protection (such as wire mesh or tree shelters placed around the seedlings) is necessary to ensure good survival and growth of transplanted trees and shrubs (Romney et al., 1989; Grantz et al., 1998). Plastic tree shelters such as Tree-Pee (Bailey's Inc.) have been found to result in significantly higher survivorship than using wire mesh (Grantz et al., 1998).

Transplanted trees and shrubs should be watered using deep irrigation pipes (Bainbridge, 2006; Bainbridge et al., 2001). Deep pipe irrigation has been shown to produce much better survival rates and to require less water than other irrigation methods (Bainbridge et al., 2001). Bainbridge et al. (2001) had an establishment success rate of 71 percent for seedlings of western honey mesquite, by using only 5.3 gallons over 3.5 years with deep pipe irrigation when trees were planted with tubular tree protectors to minimize herbivory.

The method for using deep irrigation is described in Bainbridge (2006). For each transplanted tree or shrub, a hole is drilled to a depth of 20 to 30 inches with a soil auger. A polyvinyl chloride pipe (2 inches in diameter and 20 inches long with a series of 1/16-inch holes drilled 2 to 3 inches down one side beginning 7 inches below the top) is inserted to the bottom of the hole such that the side with holes faces the seedling or shrub with about 4 inches protruding above the ground surface for easy filling. The pipe shall be situated about 3 to 4 inches from the seedling. Two or three pipes can be situated around the root ball for transplanting shrubs or small trees.

Water (1 quart) will be directly applied to seedlings once every week for the first 8 weeks. Then irrigation pipes will be filled with 2 quarts every other week for at least 3 months after the initial watering. Watering will be continued at least until the end of August each year and will be done for the first 2 years after planting.

For relatively small areas where a large number of replacement trees may be needed, a gravity feed drip irrigation system from a large 4,000- to 5,000-gallon storage tank shall be used as an alternative watering method. This method will depend on the ability to situate the tank in an area accessible to a water truck for periodic refilling. This method was used successfully for the screwbean mesquite restoration project under the freeway bridge next to the Colorado River from 2006–2009 at TCS (C. Smith, pers. comm., 2013). For

that project, newly planted trees were watered three times per week for about 3 to 4 hours per day for the first year and once per week in the subsequent 2 years.

There is generally no evidence that additional mulching enhances long-term survival and plant growth and some indication it may do more harm than good (Bainbridge et al., 2001), so no additional mulching is recommended. If tree seedlings or shrubs are planted from containers, inoculation of soil biota can be done by backfilling with excavated soil. In general, inoculation of soil biota is only required for severely degraded sites where the natural soil biota has been significantly depleted or is absent (Bainbridge and Virginia, 1990).

SECTION 4

Success Criteria, Monitoring, and Adaptive Management

Due to the fact that replacement saplings do not provide the same habitat value as mature trees a mitigation ratio of 3:1 will be used to offset impacts to riparian trees. Replacement trees will be propagated from locally collected seeds and grown in a nursery for 1 year prior to planting in selected mitigation sites. The success criteria for mitigation plantings will be a final minimum plant replacement ratio of 2.25:1 (75% overall survival rate) of mitigation plantings at the end of a minimum 5-year monitoring period.

Monitoring will continue for a minimum of 5 years following mitigation plantings. In the event that mortality rates or trends in declining vigor of the mitigation plantings result in less than a minimum of a final 2.25:1 mitigation ratio additional saplings will be planted. Any replacement plantings will be monitored for 5 years from the time of the initial planting to ensure that the mitigation success criteria have been met.

In order to account for anticipated mortality rates that may be as high as 50 percent for desert mitigation plantings, the initial replanting will include twice as many saplings as required by the mitigation ratios. This initial higher planting ratio is intended to compensate for expected sapling mortality over time and ensure that the final mitigation ratios are obtained. For example, if three palo verde trees will be removed during construction they would be replaced at a 3:1 ratio with seedlings grown from locally sourced seeds. The initial mitigation would therefore require nine replacement plantings. The success criteria would be 75% overall survival of these plantings after 5 years, resulting in a final mitigation ratio of 2.25:1 or survival of 6.75 (rounds to 7) out of nine initial plantings.

Taking into account expected mortality rates, the initial mitigation planting would be doubled to include 18 replacement plantings during the first year (see Table 3). It is anticipated that with the higher number of initial plantings and adaptive management at least 7 of the 18 saplings will become successfully established after 5 years. It is possible that even more plants may become established if adaptive management techniques result in increased survival. In the event mortality or trends in declining vigor indicate that success criteria will not be met, additional plantings and monitoring will be required to ensure that the final mitigation ratio is met.

TABLE 3
Example of Replacement Planting Ratios and Success Criteria

Number of Trees Impacted	3:1 Replacement Plantings	Initial Planting to Account for Anticipated Mortality	Final Success Criteria Minimum of 2:1 Replacement After 5 Years
3	9	18	7

Assuming 18 initial plantings with a potential 50% mortality rate and a final success criteria of 7 replacement trees

Monitoring	Anticipated Minimum Survivorship (Vigor Class of 2 or Greater)	Number of Plantings Remaining*	Mortality Thresholds Triggering Additional Plantings	Number of Plantings Remaining*
Year 1	90%	17	60% or less survivorship	11 or less
Year 2	80%	14	60% or less survivorship	11 or less
Year 3	70%	13	50% or less survivorship	9 or less
Year 4	60%	11	40% or less survivorship	7 or less
Year 5	50%	9	Success criteria not met	Less than 7

Note:
*Values are rounded to nearest whole number where required.

4.1 Tree and Shrub Assessment

Assessment of the vigor of trees and shrubs will use a modified index initially developed by Bainbridge et al. (2001):

- 0 = dead, stems brown brittle with no green or purple
- 1 = barely alive, stems still flexible with some green or purple
- 2 = some green or purple on stem, a few green leaves
- 3 = green or purple stem and a number of green leaves
- 4 = green or purple stem and green leaves, vigorous

4.2 Herbaceous Plant Assessment

Response of herbaceous plants can be highly variable depending on the amount and timing of rainfall. Therefore, monitoring of any transplanted bulbs (e.g., desert lily) as well as seeded areas will need to assess conditions relative to undisturbed areas. In years with good rainfall and an abundance of flowering annuals and good plant growth in the project area, mitigated areas should exhibit similar abundances of the seeded annuals and transplanted perennials. Annual monitoring for herbaceous plants will include both reference areas (undisturbed sites) and revegetation areas. Representative photographs of each area as well as a qualitative description of each site will be included as part of the monitoring.

4.3 Maintenance and Adaptive Management

Adaptive management involves learning from experience and modifying subsequent behavior in light of that experience. Data may be collected and analyzed throughout the monitoring period and the results used to modify (adapt) restoration approaches, as appropriate, to ensure successful establishment of transplanted species and the desired density and cover of plants. Maintenance and adaptive management will focus on the following areas: weed control, irrigation modification, herbivory protection, and mortality rates.

4.3.1 Weed Control

Weedy species, such as Russian thistle (*Salsola tragus*), Sahara mustard *(Brassica tournefortii*), and salt cedar can significantly affect growth and survival of transplants. Transplant and seed sites shall be relatively weed-free and shall be monitored regularly for weed infestations. It is much easier to prevent the establishment of weeds in an area than it is to eradicate weed populations once they have become established. Monitoring for weed seedlings of Russian thistle, Sahara mustard, and salt cedar will be done early in the growing season (March–April) to allow for treatment and removal of weedy species before flowering and seed dispersal. In addition, young weed seedlings can be removed by hand, thereby avoiding the need for more intensive mechanical or chemical treatments.

4.3.2 Irrigation Modification

Because the objective is to obtain the maximum survival rate of transplanted individuals, it may be necessary to modify the irrigation schedule and/or amount of water during the restoration process. While irrigation will only be used during the initial establishment phase, the condition of the plants will be monitored throughout the monitoring period. If after the initial watering, plants show a notable decline in vigor, it may be necessary to increase the amount and or timing of irrigation to prevent mortality and reduced vigor. Care will be taken not to overwater the plants.

4.3.3 Herbivory Protection

Tree and shrub protectors will be maintained until the plants are large enough to withstand herbivory or prior to the growth of the plant being impacted by the barrier. PG&E will be responsible for removing the tree and shrub protectors.

4.3.4 Mortality Rates

It is expected that the initial plantings will experience some level of mortality. If survivorship drops below target levels of 50 percent, additional plantings will be required. To prevent further mortality, adjustments to the watering regime and/or herbivore protection will be necessary, depending on the most probable cause of the mortality.

4.4 Photo Monitoring Stations

Photo-monitoring stations will be established at selected locations throughout the project area to document preconstruction conditions, document natural recovery and as part of the monitoring of revegetation and restoration areas. The following methods and procedure are adapted from the U.S. Department of Agriculture's Photo Point Monitoring Handbook (Hall, 2002).

4.4.1 Objectives

The objectives of the photo-monitoring include the following objects:

- Document the preconstruction site conditions of the project work areas on the HNWR for restoration activities after decommissioning
- Document the post-construction site conditions of the project work areas on the HNWR
- Document changes in vegetation over time in the work areas, including natural regeneration and recovery of native plants
- Document revegetation and/or restoration sites, including vegetation changes over time as well as general qualitative documentation of plant cover and vegetation condition

4.4.2 Equipment

The following equipment will be needed for the photo monitoring:

- Digital camera
- GPS unit with sub-meter accuracy
- White board and black dry erase pen
- Compass
- Photo monitoring data sheets (Appendix C)

4.4.3 Methods

Before starting construction, multiple photo monitoring locations will be selected throughout the project area that will be used to document the pre- and post-construction conditions. This will be referenced to as preconstruction photo documentation (PPD). PPD will be completed to assist in restoration activities after remedy decommissioning. A subset of the PPD photo points will be located in areas to specifically document areas where existing vegetation and habitats will be impacted by project activities. These photo points will be referred to as revegetation photo documentation (RPD). The exact locations and views of the photo monitoring stations will be determined once the final project design has been completed and the limits of the work areas have been firmly established. Additional photo monitoring stations also will be established at revegetation/restoration sites as well as any reference plant community locations.

Once the photo monitoring sites have been determined, a GPS unit with sub-meter accuracy will be used to record the location of the camera position. Notes will be taken on the locations including any notable landmarks and other information that will assist in easily relocating the position. Photo point locations will then be mapped on aerial photographs that have roads and other major landmarks clearly labeled.

Once the scene to be captured by the photo point has been determined, record the compass direction of the camera view in both cardinal directions (north, south, southwest, etc.) and degrees. Subsequent photographs taken from the same photo point will be taken in the same direction each time.

On the data sheet, describe the scene including notable items in the view that mat help with reorientation of the camera during subsequent monitoring. Provide a general description of the photo point including plant species, ground cover, disturbance, vegetation condition, etc.

After the first photo monitoring event is completed, maps, directions, and instructions on the orientations and views for each photo location will be prepared that will be used as the basis for subsequent monitoring events at each location.

After photographing the selected scene at each location, it may be useful to include additional site photographs of particular features and plants to provide additional detail on the site. For each additional photo, include a description of the setting or conditions that are being documented and include the photos and additional information with the photo monitoring report.

4.4.4 Frequency

Photo monitoring will occur before starting construction and following construction concurrent with monitoring of the revegetation sites. Photo documentation will be taken for 5 years post-construction and will occur in years 1, 2, 3 and 5. Post-construction and RPD monitoring will occur with each vegetation monitoring event, and photos will be appropriately archived in monitoring reports for use during post-decommissioning restoration.

4.5 Reporting

Following each monitoring event, a monitoring report will be prepared. The first monitoring report will be prepared during the first year following completion of construction activities. The first monitoring report will include specific information on the number, species, and locations of trees and shrubs that were removed or otherwise permanently impacted during construction as well as the number, species, and locations of mitigation plantings. The report also will include information on areas where aboveground trimming of shrubs occurred, but belowground root systems were left intact. The first monitoring report will include pre- and post-construction photographs from the photo monitoring stations, as well as photographs of the revegetation sites. The first report also will include the necessary documentation to relocate the photo monitoring stations in subsequent years.

Additional monitoring reports will be prepared for the following year 2, 3, and 5 monitoring events. These reports will include observations of natural recovery in construction areas, with particular emphasis on those areas where the belowground roots were left intact. Assessment of the revegetation areas including the condition of the revegetation plantings, discussion of any problems, and recommendations for adaptive management actions needed to be taken to address the problems. These reports also will include photographs and information from each of the photo monitoring stations.

Monitoring reports will be submitted to USFWS within 90 days of the completion of each monitoring event.

SECTION 5

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Appendix A
Vegetation Maps (with photo points) and Preconstruction Photographs

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

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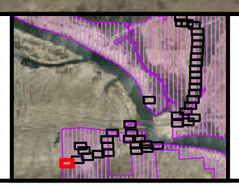

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 1 of 42

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
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Footprint
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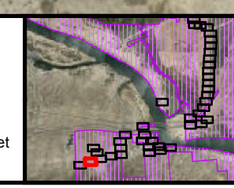

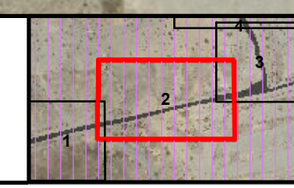

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 2 of 42

Anderson's desert thorn
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Brittlebush
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Catclaw acacia
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Photo Location and Direction

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Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

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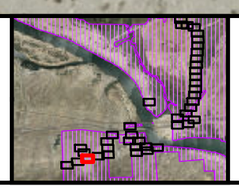

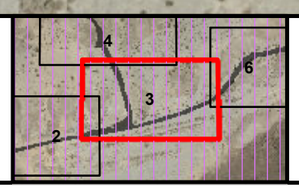

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 3 of 42

Anderson's desert thorn
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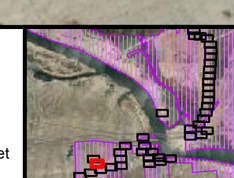

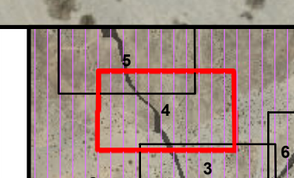

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 4 of 42

Anderson's desert thorn
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Beavertail
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Brittlebush
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Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
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Desert Willow
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Palo Verde
Catclaw acacia
Creosote bush
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Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

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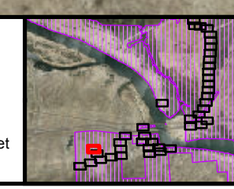

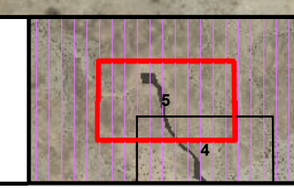

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 5 of 42

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Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
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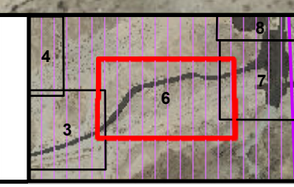
Salt Cedar

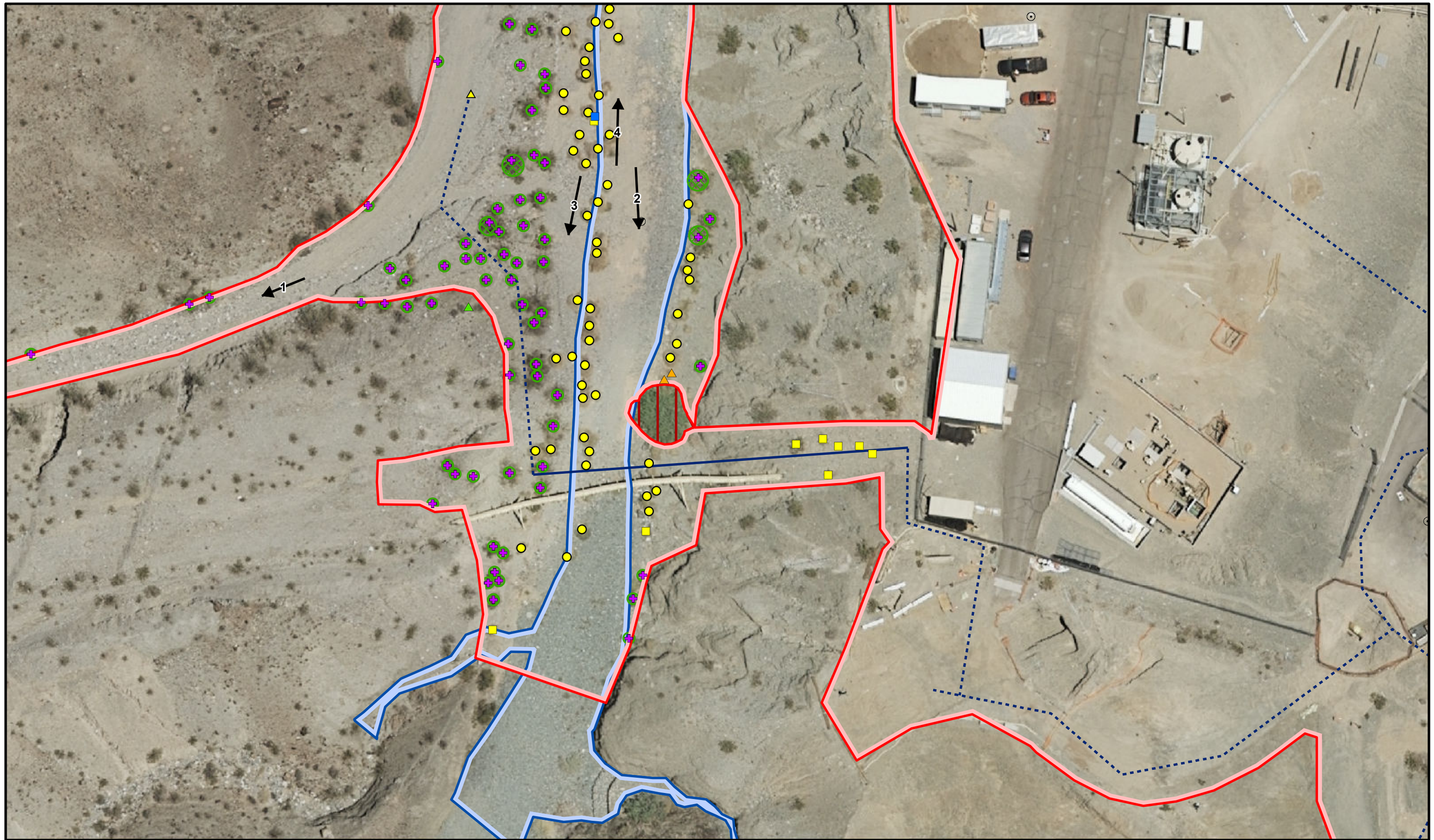
Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet



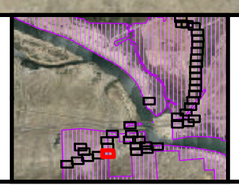
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 6 of 42



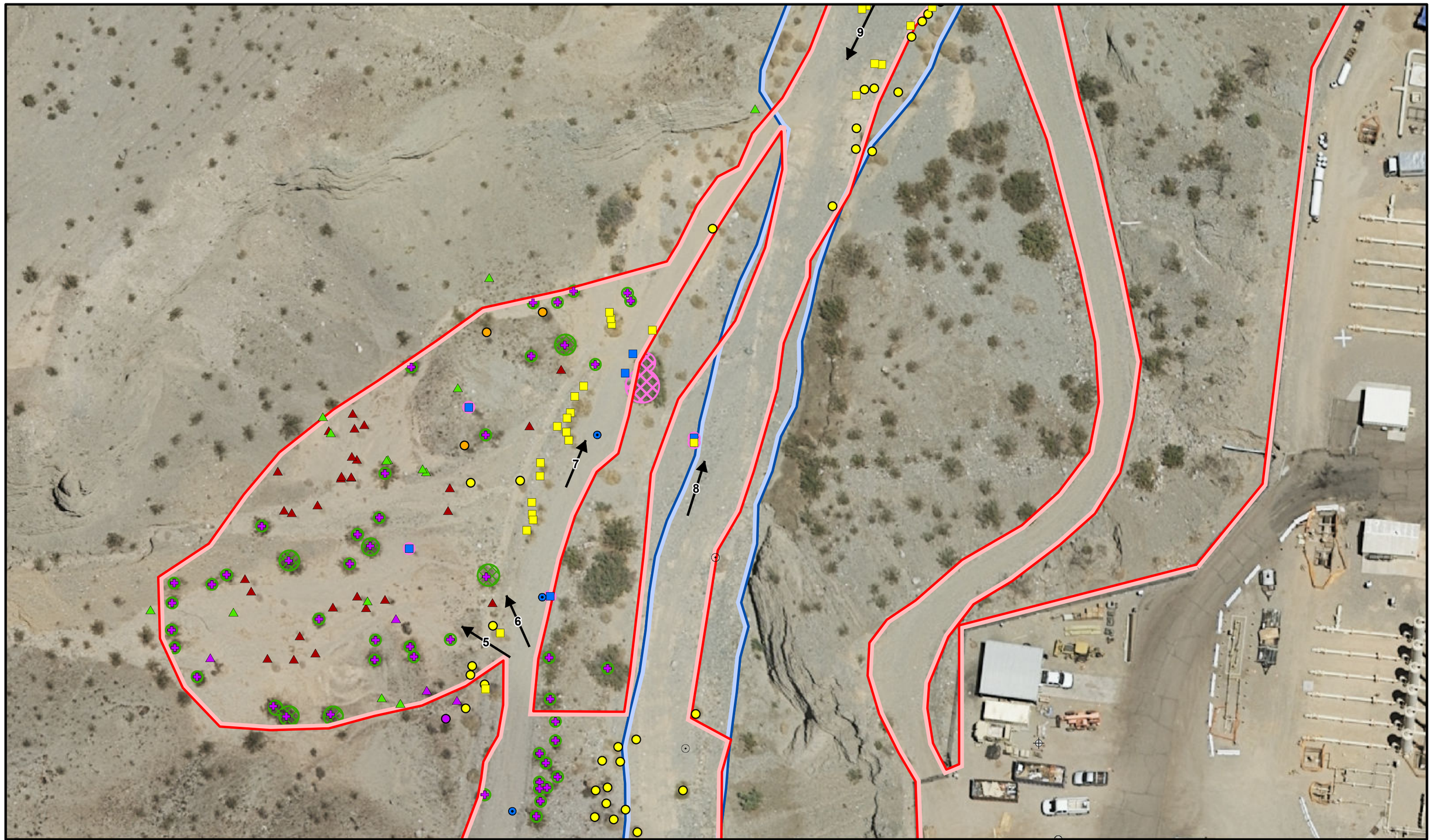
- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



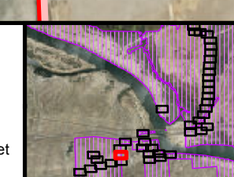
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 7 of 42



- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 8 of 42

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
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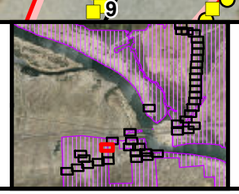
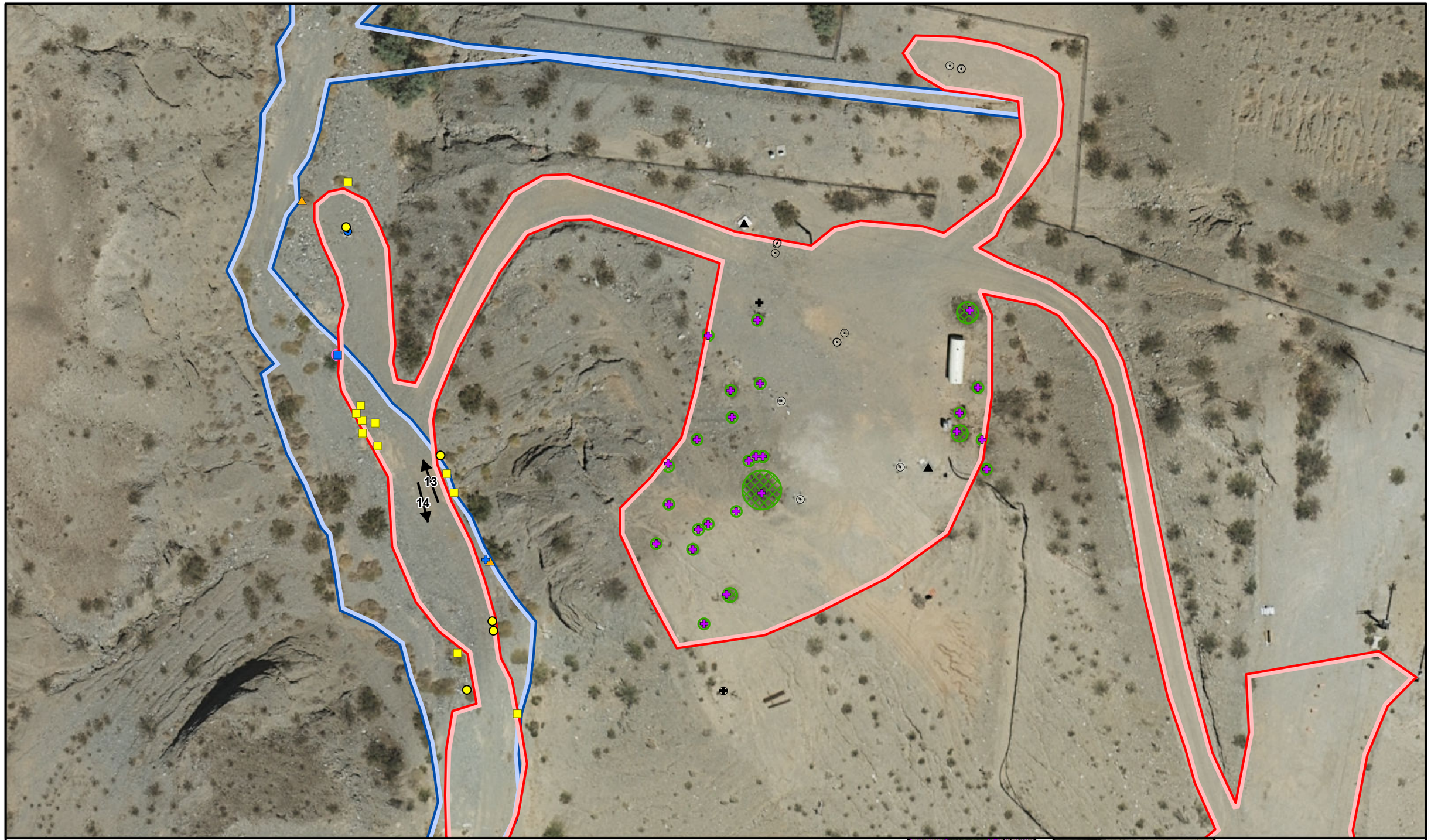
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



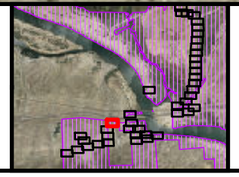
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 9 of 42

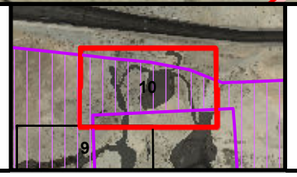


- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

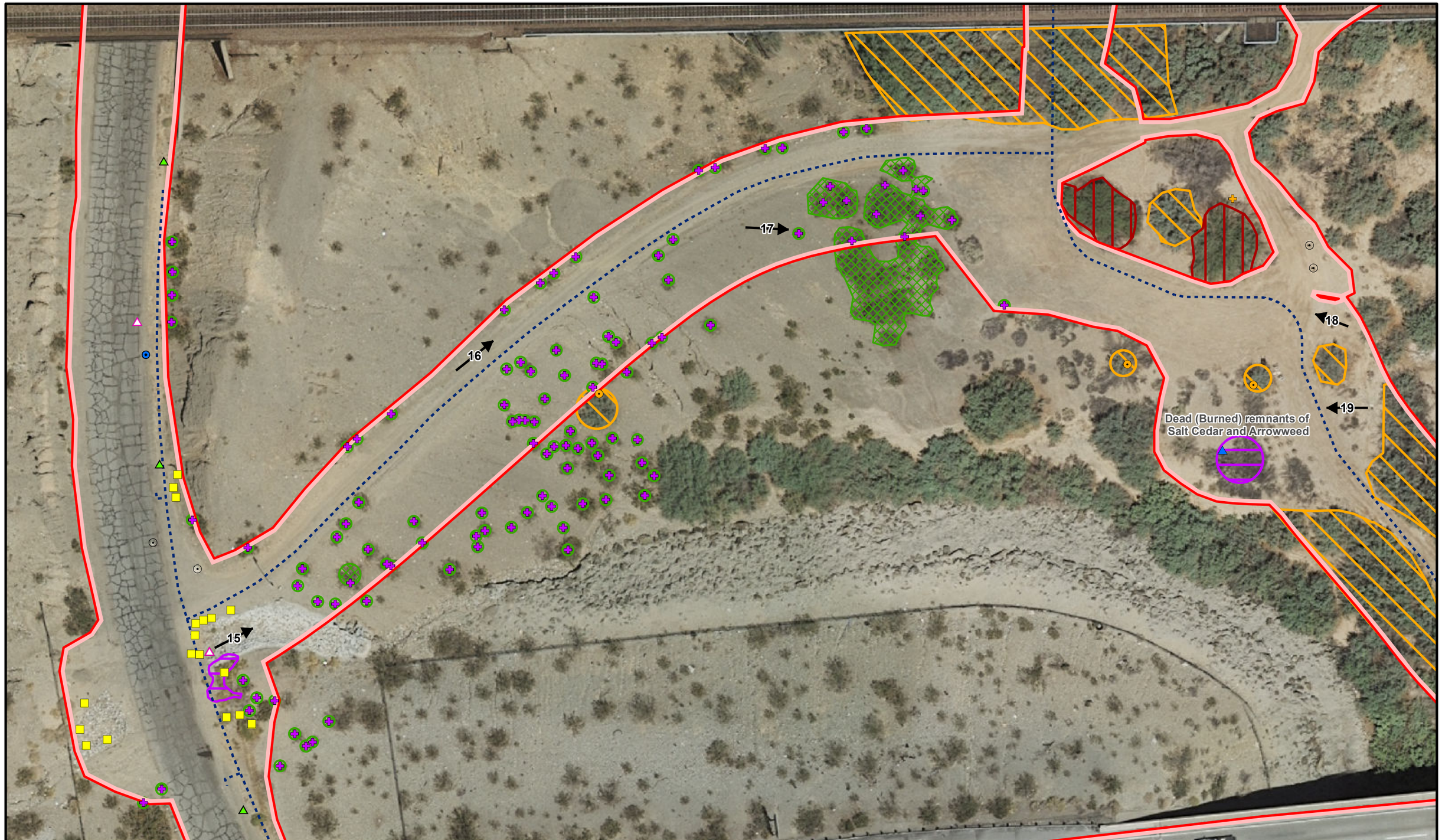
N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 10 of 42

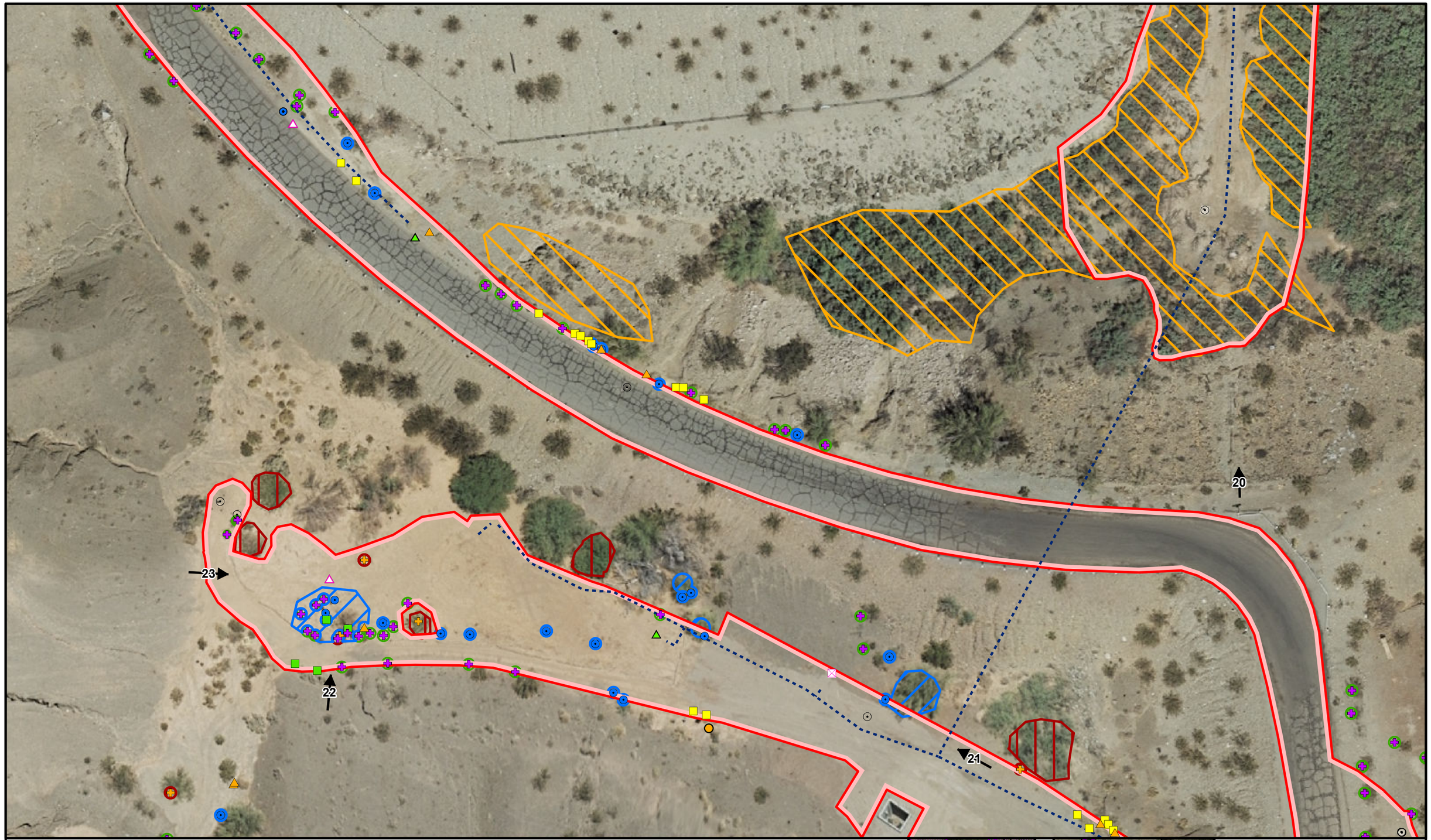


Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar
Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 11 of 42



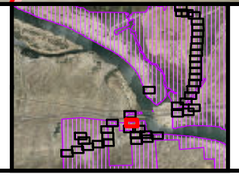
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

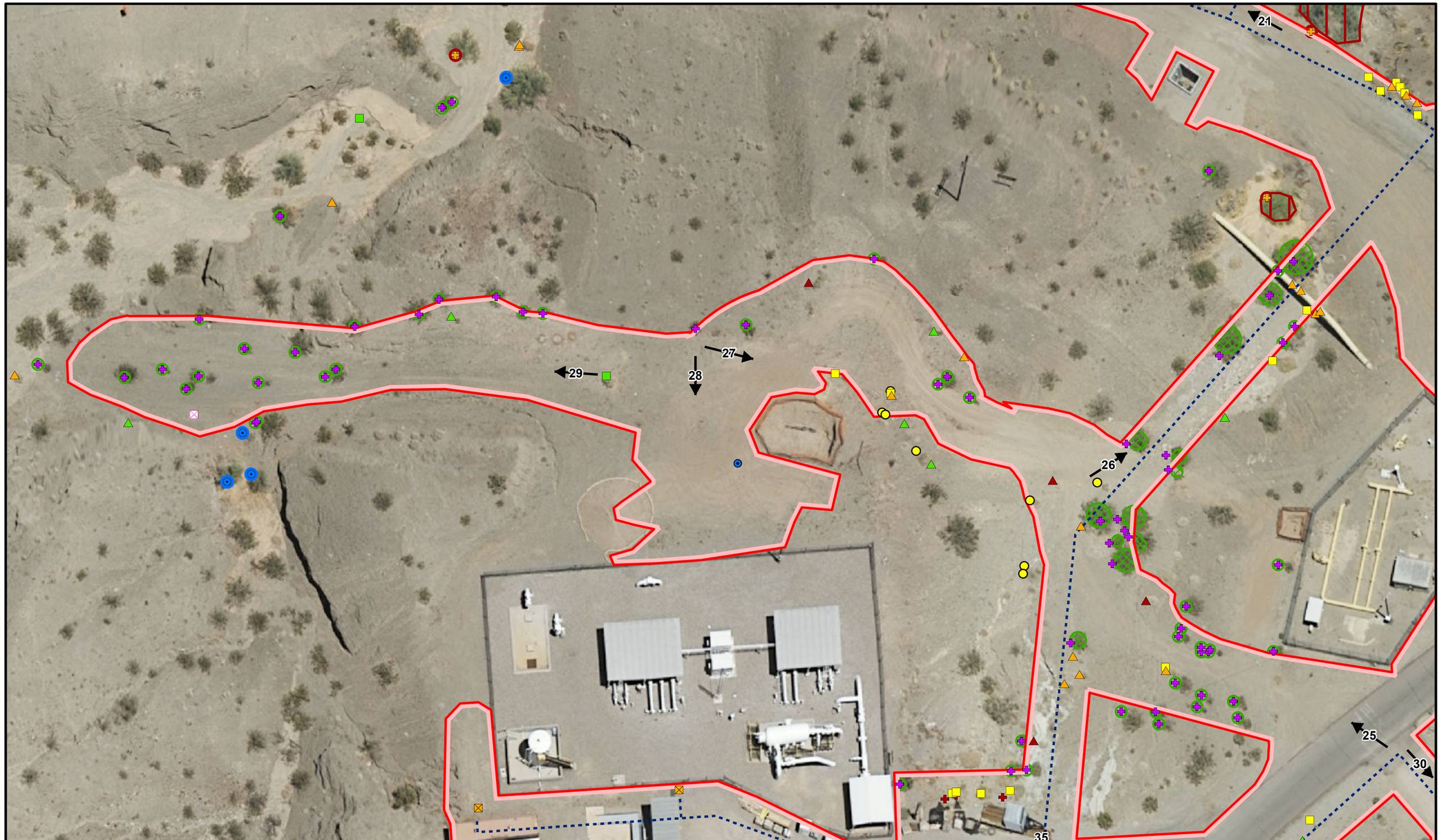
Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 12 of 42



- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
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- Catclaw acacia
- Cattle saltbush
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- Desert Tobacco
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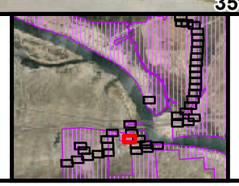
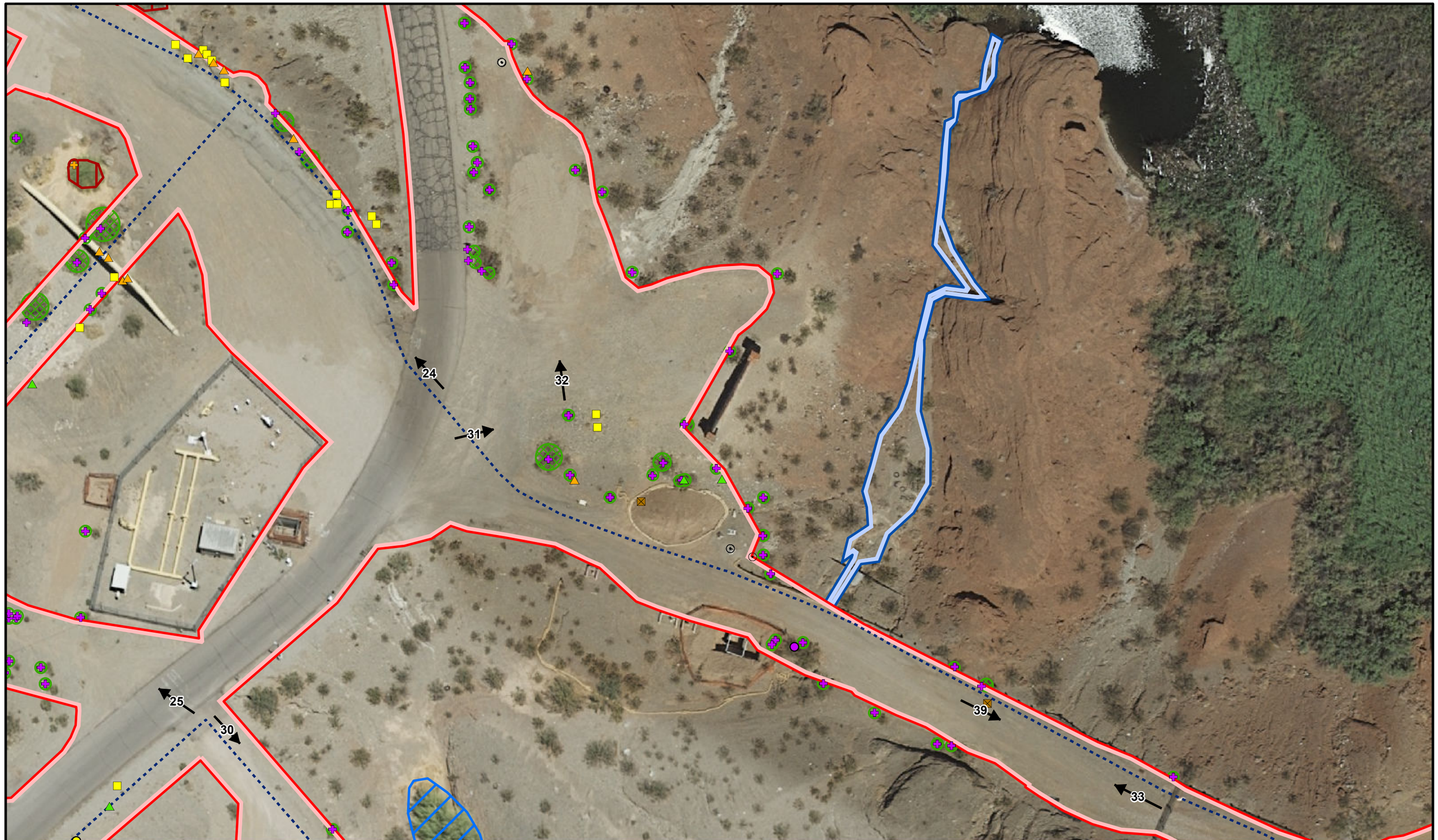
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 13 of 42



- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
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- Burrow bush
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- Cattle saltbush
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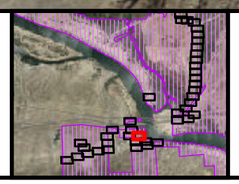
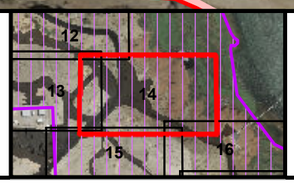
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 14 of 42

35

36

37

34

38

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
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- Creosote bush
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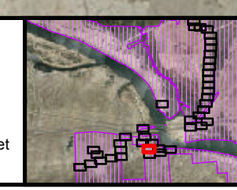
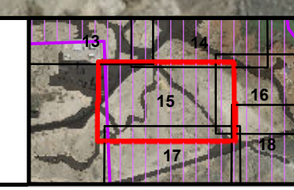
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

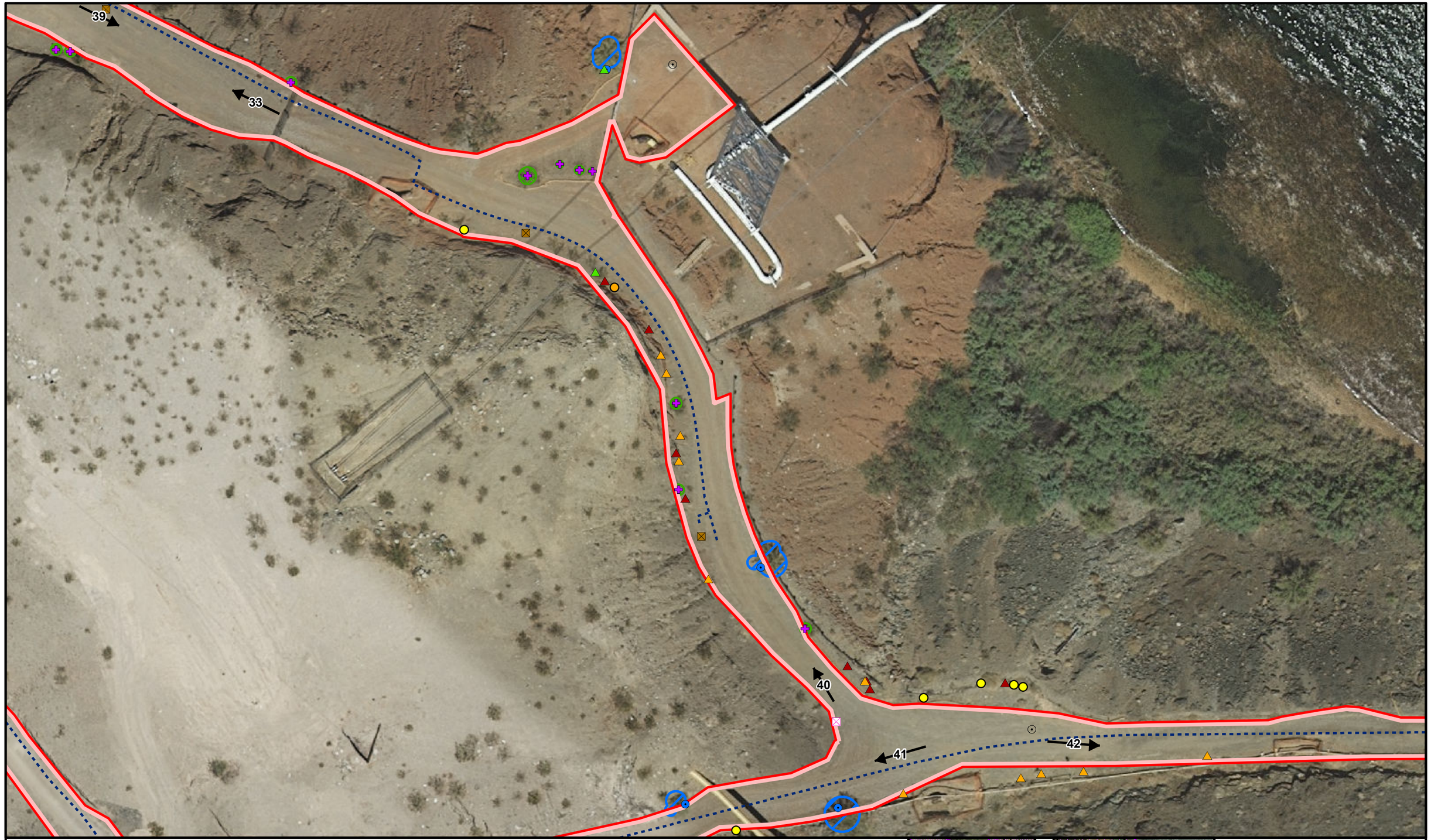
N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 15 of 42



- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
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- Desert Tobacco
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- Salt cedar
- Silver cholla
- Sweetbush
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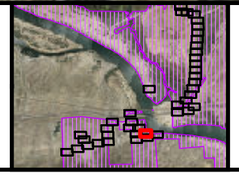
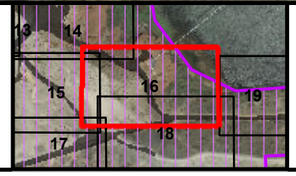
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 16 of 42

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
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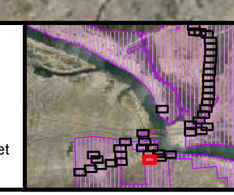
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 17 of 42

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
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- Cheesebush
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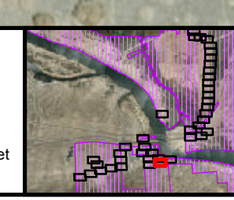
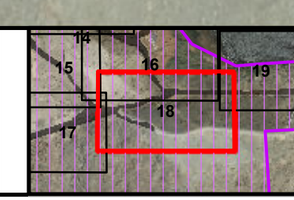
N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 18 of 42

48

49

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
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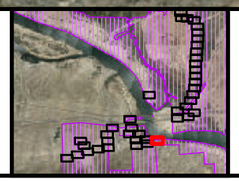
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 19 of 42

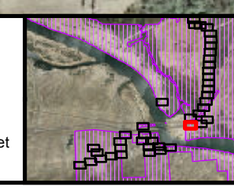
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

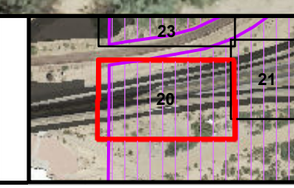
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

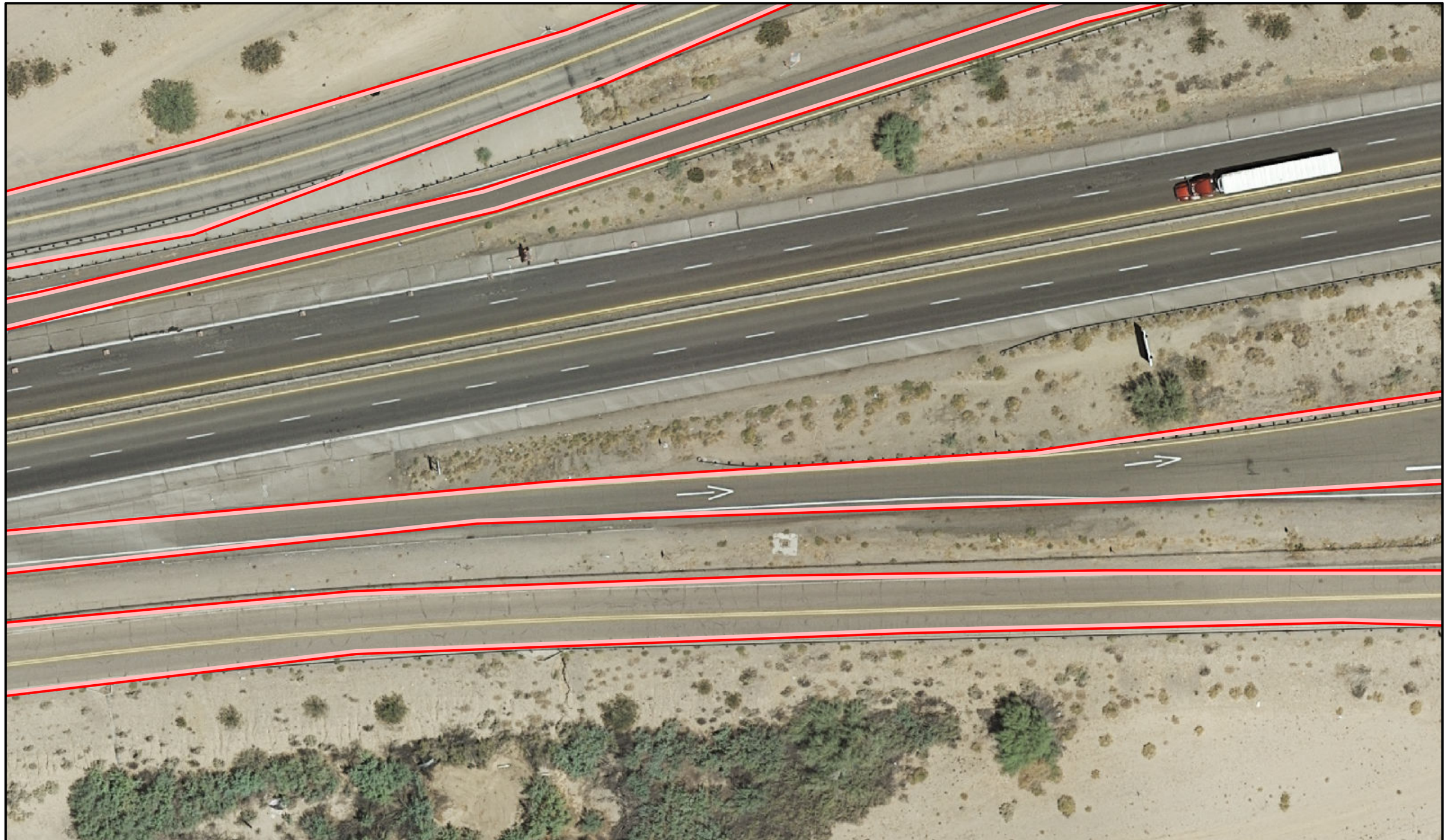
N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 20 of 42



Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
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Creosote bush
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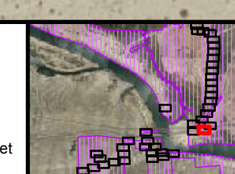
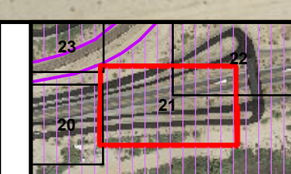
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar
Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 21 of 42

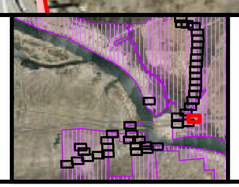
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

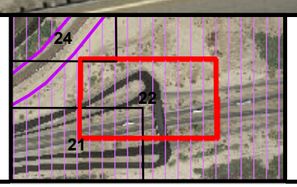
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

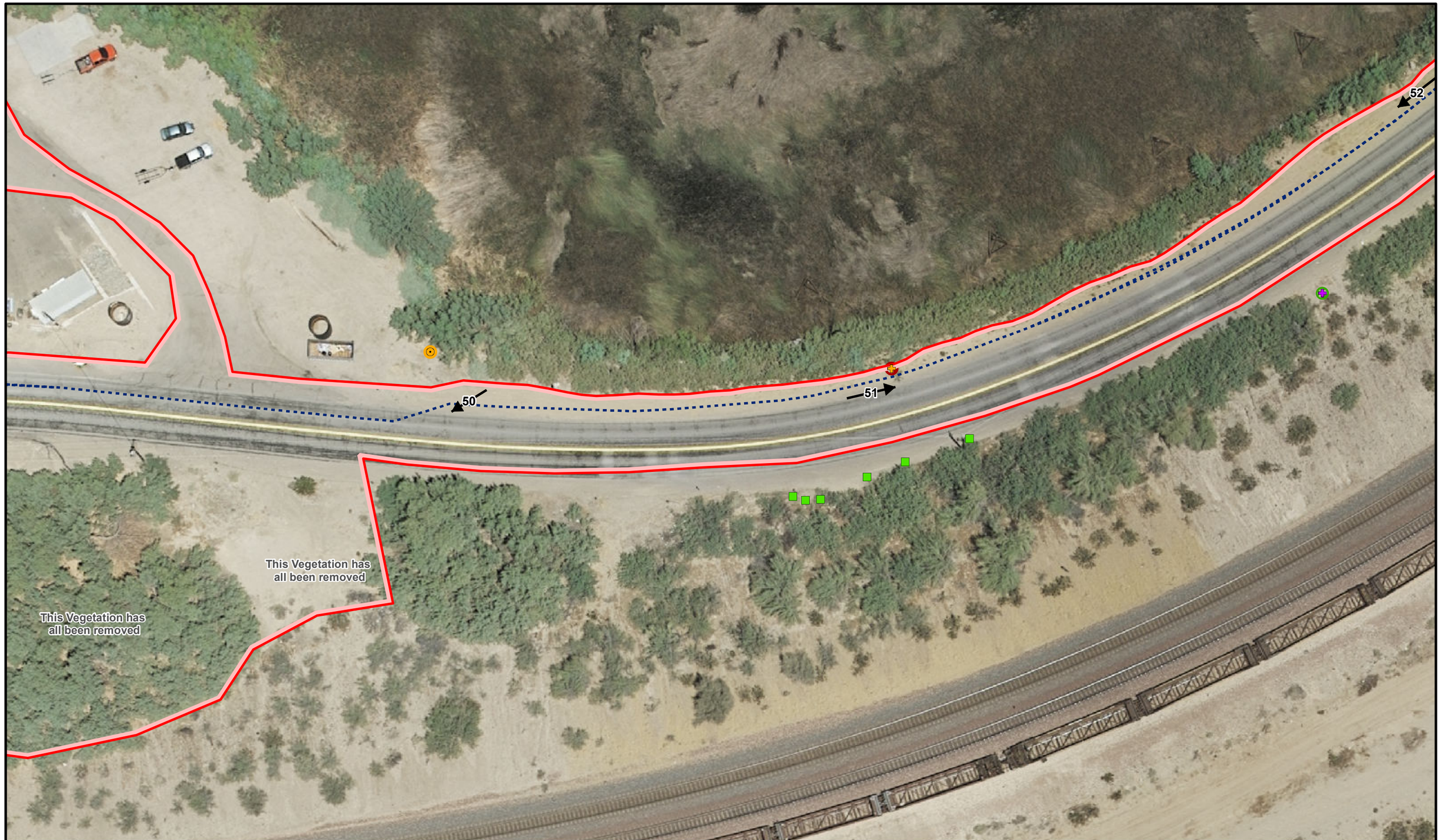
N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 22 of 42

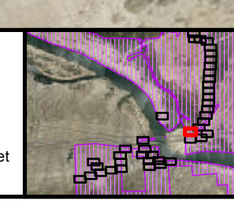


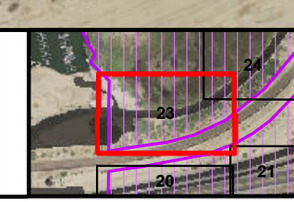
- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction

- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 23 of 42

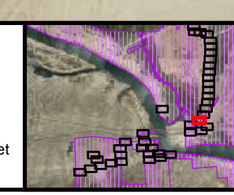
53

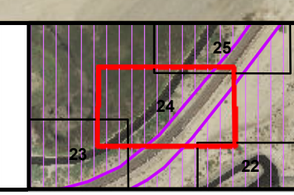
52

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 24 of 42

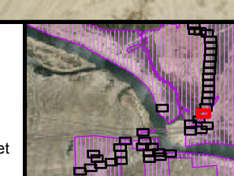
54

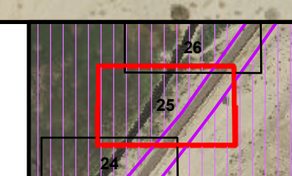
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar
Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

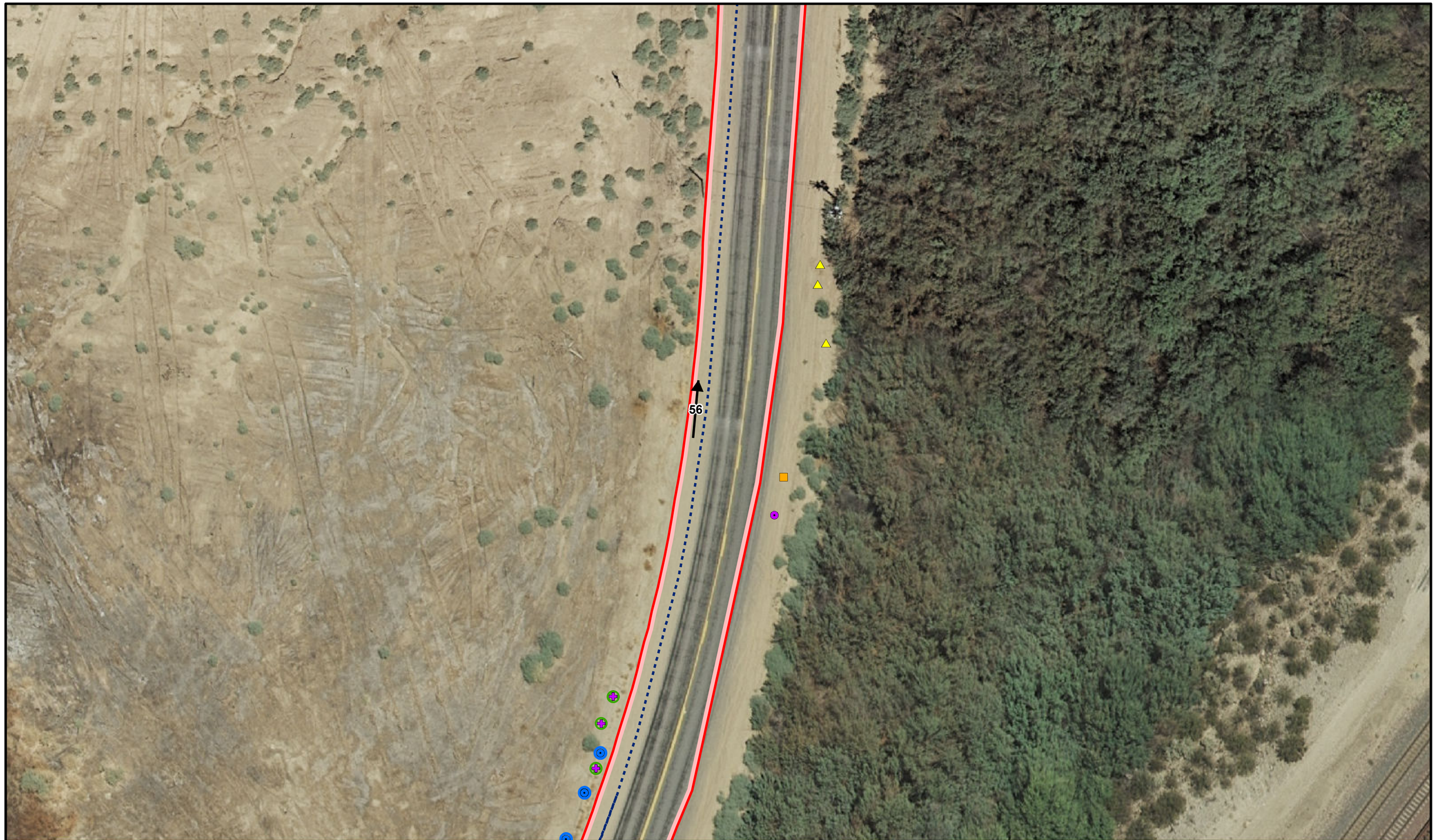
0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 25 of 42

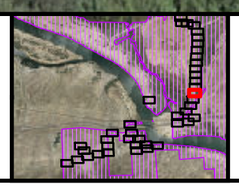
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 26 of 42



- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 27 of 42

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 28 of 42

60

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet

30
29
28

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 29 of 42

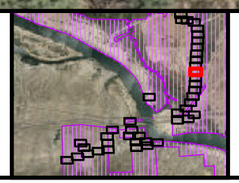
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

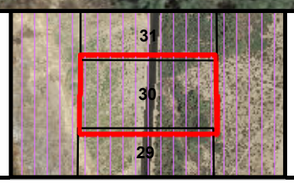
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 30 of 42

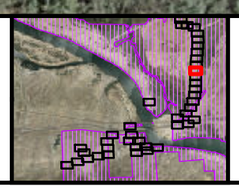
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

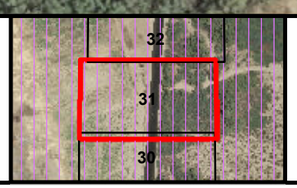
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 31 of 42

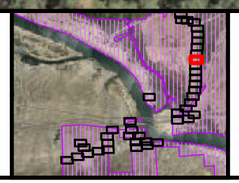
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 32 of 42

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 33 of 42

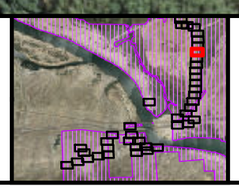
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet

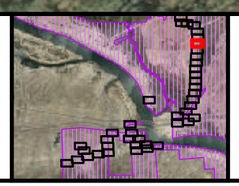


Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 34 of 42

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 35 of 42

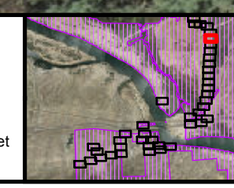
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

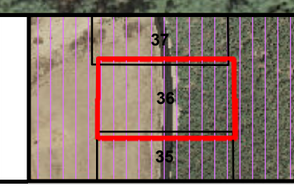
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 36 of 42

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 37 of 42

This area is now a gravel access road

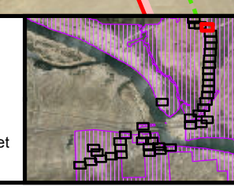
61

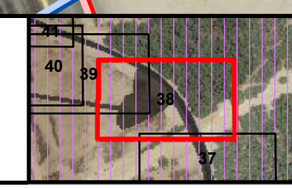
62

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet





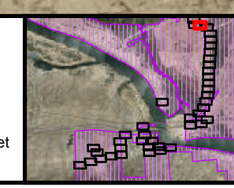
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 38 of 42

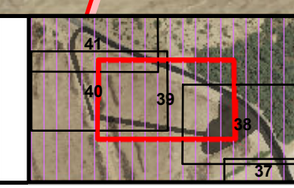
This area is now a gravel access road

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 39 of 42

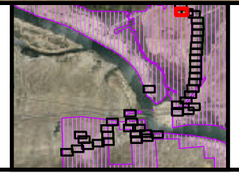
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet

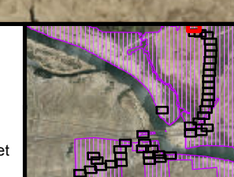


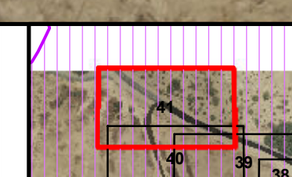
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 40 of 42

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- Havasu National Wildlife Refuge
- CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 41 of 42

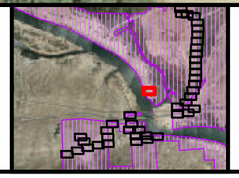
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction

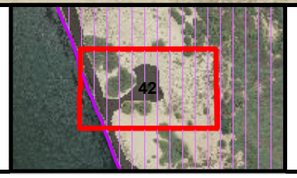
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet





Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 42 of 42

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 1

Photo 2

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 3

Photo 4

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 5

Photo 6

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 7

Photo 8

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 9

Photo 10

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 11

Photo 12

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 13

Photo 14

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 15

Photo 16

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 17

Photo 18

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 19

Photo 20

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 21

Photo 22

Photo 23

Photo 24

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 25

Photo 26

Photo 27

Photo 28

Photo 29

Photo 30

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 31

Photo 32

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 33

Photo 34

Photo 35

Photo 36

Photo 37

Photo 38

Photo 39 (April 9, 2014)

Photo 40

Photo 41

Photo 42

Photo 43

Photo 44

Photo 45

Photo 46

Photo 47

Photo 48

Photo 49

Photo 50

Photo 51 (April 7, 2014)

Photo 52 (April 7, 2014)

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 53 (April 7, 2014)

Photo 54 (April 7, 2014)

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 55 (April 7, 2014)

Photo 56 (April 7, 2014)

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 57 (April 7, 2014)

Photo 58 (April 7, 2014)

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 59

Photo 60

Photo 61 (April 7, 2014)

Photo 62 (April 7, 2014)

Appendix B
Commercial Nurseries that Grow Native Mojave Desert Plants

Ahakhav Native Plants Nursery
Colorado River Indian Reservation
25401 Rodeo Road
Parker AZ 85344
(928) 669-2664

El Nativo Growers
200 South Peckham Road
Azusa, CA 91702
(626) 969-8449
www.elnativogrowers.com
sales@elnativogrowers.com

High Country Gardens
2902 Rufina Street
Santa Fe, NM 87507
1-800-925-9387
www.highcountrygardens.com

LandscapeMart
8028 West Thunderbird Road
Peoria, AZ 85381-4612
623-298-6800
http://www.landscapemart.com/

Larners Seeds
P. O. Box 407
235 Grove Rd.
Bolinas, CA 94924
415.868.9407
info@larnerseeds.com
http://www.larnerseeds.com/_pages/wildflower_annual.html

Las Pilitas Nursery
8331 Nelson Way
Escondido, CA 92026
760-749-5930
www.laspilitas.com

Mountain States Wholesale Nursery
Litchfield Park, AZ 85340-2600
Phone: (623) 247-8509
Fax: (623) 247-6354
http://www.mswn.com/

Mountain Valley Growers
38325 Pepperweed Road
Squaw Valley, CA 93675
559-338-2775
http://www.mountainvalleygrowers.com

Misty Meadows Nursery
43601 Mesa Street
Banning, CA 92220
951 765-7542 or 951-897-1585
mistymeadows@live.com
http://www.mistymeadowsnursery.com/601.html

Native American Seed
3791 North US Highway 377
Junction, TX 76849
800-728-0403
info@seedsource.com
http://www.seedsource.com/catalog/index.asp

Oak Hills Nursery
13874 Ranchero Road
Oak Hills, CA 92345
760-947-6261
oakhillsnursery@hotmail.com
http://www.oakhillsnursery.com
http://www.mojavedesertplants.com

Seedland, Inc.
9895 Adams Road
Wellborn, FL 32094
386-963-2080
sales@seedland.com
http://www.seedland.com/

S & S Seeds
P. O. Box 1275
Carpenteria, CA 93014
805-684-0436

San Marcos Growers
125 South San Marcos Road, P. O. Box 6827
Santa Barbara, CA 93160
805-683-1561
http://www.smgrowers.com

Sheldon Nursery
4999 N. Sabino Canyon Rd.
Tucson, AZ 85750
520-529-0609
http://www.sheldonnursery.com
sheldonnursery1@yahoo.com

White Tank Nursery
P. O. Box 810
Waddell, AZ 85355
623-935-4276
info@whitetankpalms.com
http://www.whitetanknursery.com/index.html

Comstock Seed
917 Highway 88
Gardnerville, NV 89460
777-265-0090
sales@comstockseed.com
http://www.comstockseed.com

Appendix C
Photo Point Monitoring Datasheet

Pacific Gas and Electric Company
Topock Compressor Station
Photo Point Monitoring Data Sheet

Photo Point Station:_____ Date:_____

Observer:_____

Coordinates:_____ Datum:_____

Location Description:_____

_____

_____

_____

_____

_____

_____

Photo Direction: N NE E SE S SW W NW Compass Bearing:_____ Mag. or True North

Description of Setting (Including any vegetation, substrate and disturbance):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix H
Cultural Impact Mitigation Program
(*on CD-ROM only*)

Topock Project Executive Abstract

Document Title: Cultural Impact Mitigation Program for the Topock Remediation Project, Mohave County, Arizona, and San Bernardino County, California

Submitting Agency/Authored by: PG&E

Final Document? ☒ Yes ☐ No

Date of Document: May 1, 2013

Who Created this Document?: (i.e. PG&E, DTSC, DOI, Other)

PG&E

Document ID: PGE20140501A

Priority Status: ☐ **HIGH** ☒ **MED** ☐ **LOW**

Is this time critical? ☒ Yes ☐ No

Type of Document:

☐ Draft ☒ Report ☐ Letter ☐ Memo

☐ Other / Explain:

Action Required:

☐ Information Only ☒ Review & Comment

Return to: _____

By Date:_____

☐ Other / Explain:

What does this information pertain to?

☐ Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)/Preliminary Assessment (PA)

☐ RCRA Facility Investigation (RFI)/Remedial Investigation (RI) (including Risk Assessment)

☐ Corrective Measures Study (CMS)/Feasibility Study (FS)

☐ Corrective Measures Implementation (CMI)/Remedial Action

☐ California Environmental Quality Act (CEQA)/Environmental Impact Report (EIR)

☐ Interim Measures

☒ Other / Explain: MMRP Requirement (CUL-1a-8)

Is this a Regulatory Requirement?

☒ Yes

☐ No

If no, why is the document needed?

What is the consequence of NOT doing this item? What is the consequence of DOING this item?

This satisfies the Environmental Impact Report (EIR) Mitigation Measure CUL-1a-8

Other Justification/s:

☐ Permit ☐ Other / Explain:

Brief Summary of attached document:

This Cultural Impact Mitigation Program (CIMP) is responsible as part of the mitigation measures that were part of the Environmental Impact Report (EIR). The CIMP has been developed in coordination with the Interested Tribes as defined in the EIR.

Written by: PG&E

Recommendations:

Not applicable.

How is this information related to the Final Remedy or Regulatory Requirements:

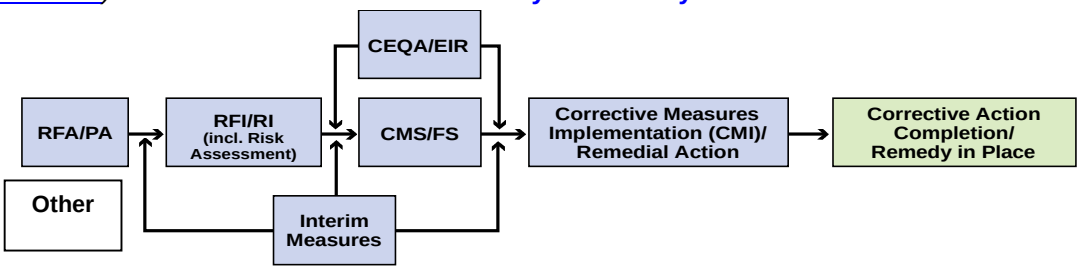
This report was prepared in response to mitigation measure CUL-1a-8.

Other requirements of this information?

None.

Related Reports and Documents:

Click any boxes in the Regulatory Road Map (below) to be linked to the Documents Library on the DTSC Topock Web Site (www.dtsc-topock.com). **The link to the Documents Library is currently UNDER CONSTRUCTION.**



Version 8

Legend
RFA/PA – RCRA Facility Assessment/Preliminary Assessment
RFI/RI – RCRA Facility Investigation/CERCLA Remedial Investigation (including Risk Assessment)
CMS/FS – RCRA Corrective Measure Study/CERCLA Feasibility Study
CEQA/EIR – California Environmental Quality Act/Environmental Impact Report

Cultural Impact Mitigation Program

Pacific Gas and Electric Company
77 Beale Street
San Francisco, CA 94105

May 2014

Cultural Impact Mitigation Program

Prepared for:
Pacific Gas and Electric Company

Date:
May 2014

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Appendices

A Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants

B IM-3 Decommissioning Plan

C Displaced Soil Protocol

Acronyms and Abbreviations

AIRFA	American Indian Religious Freedom Act
APE	Area of Potential Effect
ARARs	Applicable or Relevant and Appropriate Requirements
ARMR	Archaeological Resource Management Reports
ARPA	Archaeological Resources Protection Act
ASM	Arizona State Museum
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe Railway
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHPMP	Cultural and Historic Properties Management Plan
CHRIS	California Historical Resources Information System
CIMP	Cultural Impact Mitigation Program
CMI	Corrective Measures Implementation
CRIT	Colorado River Indian Tribes
CTF	Clearinghouse Task Force
CWA	Clean Water Act
CWG	Consultative Work Group
dBA	decibels adjusted
DOI	U.S. Department of the Interior

DTSC	Department of Toxic Substances Control
EIR	Environmental Impact Report
ESA	Environmentally Sensitive Area
EZ	Exclusion Zone
FMIT	Fort Mojave Indian Tribe
GIS	Geographic Information System
IM	Interim Measures
MMRP	Mitigation Monitoring and Reporting Program
MOU	Memoranda of Understanding
NAGPRA	Native American Graves Protection and Repatriation Act
NHPA	National Historic Preservation Act
PA	Programmatic Agreement
PG&E	Pacific Gas and Electric Company
POA	Plan of Action
PQS	Professional Qualifications Standards
Project	Topock Compressor Station Groundwater Remediation Project
RFRA	Religious Freedom Restoration Act
SOW	Scope of Work
SHPO	State Historic Preservation Office
TCP	Traditional Cultural Property
TWG	Technical Work Group
USACE	U.S. Army Corps of Engineers

USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service

1. Background

The Topock Compressor Station Final Groundwater Remedy EIR (EIR) states that "[e]stablishment of a cultural impact mitigation program and a Corrective Measures Implementation Workplan, with specific activities stipulated for each phase of the project, will reduce the potential for impacts on historical resources within the project area, and will help preserve the values of and access to the Topock Cultural Area for local Tribal users." The specific requirements of this Cultural Impact Mitigation Program (CIMP), prepared per the EIR Mitigation Monitoring and Reporting Program (MMRP) for the Topock Compressor Station Groundwater Remediation Project (Project), are described in CUL-1a-8, which states: "Prior to commencement of construction, Pacific Gas & Electric (PG&E) shall submit as part of the final Remedial Design, a CIMP developed in coordination with Interested Tribes for California Department of Toxic Substances Control's (DTSC) review and approval. The CIMP may be developed in coordination with the Federal Agencies with land management responsibilities in the project area (e.g., Bureau of Land Management [BLM] and U.S. Fish and Wildlife Service [USFWS, or collectively with DTSC, the Agencies]) in accordance with the Programmatic Agreement (Appendix PA)." CUL-1a-8a further specifies that the CIMP should include protocols for compliance with CUL-1a-8a through CUL-1a-8p, to DTSC's satisfaction. Because this CIMP has been prepared to comply with CUL-1a-8a through CUL-1a-8p, it is intended to address categories of Tribally important areas identified by the EIR, including archaeological and historical resources.

PG&E, in coordination with Applied Earthworks, Inc., ARCADIS/Parus Consulting, Inc., and the Interested Tribes prepared this CIMP. The Interested Tribes[1] include the Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes (CRIT), Fort Mojave Indian Tribe (FMIT), Fort Yuma-Quechan Indian Tribe, and Hualapai Indian Tribe. This CIMP is part of the final Groundwater Remedial Design submitted to DTSC for review and approval. The CIMP will be implemented in a manner consistent with the BLM's Programmatic Agreement (PA) for the Topock Remediation Project and the BLM's Cultural and Historic Properties Management Plan (CHPMP).

---

[1] For purposes of this CIMP, the "Interested Tribes" is defined to have the same meaning as in the EIR and refers to the six Tribes that have substantially participated in the various administrative processes surrounding remediation of the Topock Cultural Area with the DTSC, PG&E, and the U.S. Department of the Interior (DOI), including throughout development of the final remedy.

1.1 Tribal coordination

PG&E developed the CIMP protocols included in this document in coordination with the Interested Tribes during face-to-face meetings or teleconferences held once a month from November 2011 – June 2013. During development of the CIMP protocols (CUL 1a-8a through CUL-1a-8p), PG&E sent draft protocols to Tribes for their review two weeks prior to monthly meetings. During the meetings, PG&E presented the draft protocols to the Tribes. Tribes had the opportunity to ask questions about the protocol language or express their concerns and provide comments on the draft protocol. Tribes were then given additional time after the monthly meetings to develop written comments on the protocols and submit them to PG&E at any time after a meeting. PG&E reviewed and considered all Tribal comments. The Tribes were afforded a subsequent review of the CIMP document as a whole (protocols and introductory sections of the CIMP (i.e., Sections 1 and 2), excluding the Interim Measures-3 (IM-3) Decommissioning Plan (Section 2.6)). Three Tribes provided written comments on that document, which were reviewed and considered for changes to the document.

1.2 Coordination with the Federal Agencies

PG&E will implement the CIMP in a manner consistent with BLM's Programmatic Agreement and the Cultural and Historic Properties Management Plan (January 19, 2012). Additionally, the groundwater remedy will comply with the substantive requirements of the Applicable or Relevant and Appropriate Requirements (ARARs) set forth in the U.S. Department of Interior's 2011 Record of Decision. Compliance with the ARARs for the groundwater remedy will be documented in the relevant design documents and work plans (e.g., 90% Basis of Design Report and Construction/Remedial Action Work Plan).

2. CIMP Protocols

CUL-1a-8: Prior to commencement of construction, PG&E shall submit as part of the final Remedial Design, a CIMP developed in coordination with Interested Tribes for DTSC's review and approval. The CIMP may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the Programmatic Agreement (Appendix PA) (DTSC, 2011a).

In the following sections, the CIMP will discuss the protocols to implement the EIR mitigation measures. The full text of each mitigation measure is listed in the section providing the protocol.

- CUL-1a-8a: Protocols for continued communication (§ 2.1).
- CUL-1a-8b: Protocols for the appropriate treatment of archaeological materials that may be disturbed or discovered during implementation of the final remedy (§ 2.2).
- CUL-1a-8c: Protocols for the review of cultural resource-related documents throughout the design, construction, and operational phases (§ 2.3).
- CUL-1a-8d: Protocols for the review of project design documents before the beginning of construction (§ 2.4).
- CUL-1a-8e: Protocols for the appropriate methods to be used to restore the environment to its preconstruction condition upon decommissioning of individual groundwater remedy facilities (§ 2.5).
- CUL-1a-8f: A plan for the decommissioning and removal of the Interim Measures-3 (IM-3) Facility and proposed restoration of the site (§ 2.6).
- CUL-1a-8g: Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases (§ 2.7).
- CUL-1a-8h: Protocols for the appropriate methods, consistent with Mitigation Measure NOISE-3, to reduce auditory impacts (§ 2.8).
- CUL-1a-8i: Protocols for the appropriate methods, consistent with Mitigation Measures AES-1 and AES-2, to reduce visual intrusions (§ 2.9).
- CUL-1a-8j: Protocols for Tribal notification in advance of project-related activities (§ 2.10).

- CUL-1a-8k: Protocols to be followed by project personnel to accommodate, if feasible as determined by DTSC, key Tribal ceremonies that involve the Topock Cultural Area (§ 2.11).

- CUL-1a-8l: Provisions affording sufficient Tribal monitors to observe ground-disturbing activities and/or other scientific surveying (§ 2.12).

- CUL-1a-8m: Provisions of reasonable compensation for Tribal monitors consistent with historic rates (§ 2.13).

- CUL-1a-8n: Locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction (§ 2.14).

- CUL-1a-8o: Protocols for the reporting of discoveries of cultural importance consistent with existing statutes and regulations (§ 2.15).

- CUL-1a-8p: Protocols for the inspection of remediation facilities and/or staging areas throughout the construction phase (§ 2.16).

2.1 CUL-1a-8a: PROTOCOLS FOR CONTINUED TRIBAL COMMUNICATION

CUL-1a-8a: Protocols for continued communication. Consistent with past practices and the communication processes previously entered into by PG&E with Interested Tribes, the company shall continue to communicate with Interested Tribes during the design, construction, operation, and decommissioning of the project. Prior to implementation of construction, PG&E shall communicate with Interested Tribes that place cultural significance on the Topock Cultural Area. Outreach efforts between the Tribes and PG&E shall be communicated by PG&E to DTSC quarterly during the design and construction phase for review and input, and annually during project operations (DTSC, 2011a).

Apart from ongoing Tribal consultation by Federal Agencies, as described in the Bureau of Land Management (BLM) Programmatic Agreement (PA) Appendix B (Consultation Protocol) and the Cultural and Historic Properties Management Plan (CHPMP, BLM, 2012), Pacific Gas & Electric (PG&E) has communicated with the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) and will continue to communicate with them during all phases of the Project from design and construction through operation and maintenance as well as decommissioning. It should be made clear that open communication is favored and this protocol is not the only way to communicate; nor does it preclude other methods of communication.

PG&E currently holds monthly meetings with Tribes to address current issues and provide a forecast of upcoming activities. The additional protocols required by this Cultural Impact Mitigation Program (CIMP) and additional protocols under communication-related Mitigation Monitoring and Reporting Programs (MMRP) will be consistent with, and expand upon, the existing processes of communication; specifically:

- PG&E will document the Tribes' preferences for method of communication (e.g., face-to-face meetings, conference calls, WebEx, e-mail, etc.) and for transmitting large documents (e.g., hardcopy, e-mail attachment, CD, ftp site, etc.).

- Protocols for Tribal notification in advance of Project-related activities are set forth in the CIMP as required by CUL-1a-8j.

- Communications with the Tribes during project design are described in the CIMP as required by CUL-1a-8d.

- Outreach efforts between the Tribes and PG&E shall be communicated by PG&E to Department of Toxic Substances Control (DTSC) quarterly during the design and construction phase for review and input, and annually during project operations. In deference to the Tribes expressed preference that this remain an internal reporting of activities, PG&E and DTSC will no longer post this information

on the website. PG&E will use the information only as an internal reporting/compliance mechanism to DTSC.

- Communication related to Tribal monitoring during ground-disturbing activities are described in the CIMP protocols drafted under CUL-1a-8l.

- Requests and accommodations for Tribal ceremonies before and after ground-disturbing activities will be as stipulated by CUL-1a-8k and CUL-1a-12.

- Avoidance of the Topock Maze and Tribal communications related thereto will be as provided by CUL-1a-10.

- Notification of and communication with Tribes pertaining to any discovery and treatment of Native American human remains will be as summarized under CUL-4h and CUL-4j.

- Measures will be implemented for maintaining Tribal access during design, construction, operation, and decommissioning activities, as appropriate, per CUL-1a. Additionally, per CUL-1a-2, a written access plan to preserve Tribal members' access to, and use of, the project area for religious, spiritual, or other cultural purposes will be addressed in the Corrective Measures Implementation (CMI) Workplan. The CMI Workplan will be developed in accordance with the PA (General Principle I.C) and PG&E will demonstrate good faith effort to coordinate with Tribes by including communication logs as part of the CMI Workplan.

- PG&E will also continue to work with the representative members of Tribes through the Technical Review Committee during final design and remedy construction per CUL-1a-4.

- PG&E will continue to communicate with Tribes regarding the design and specific locations for physical remediation facilities per CUL-1a-9.

- PG&E will continue communications with Tribes on development of a worker cultural sensitivity education program per CUL-1a-13, which will be implemented before construction, during construction, and during operation of the remedial facility.

See also:

- PA: *General Principle* I(E) and I(G); *Remediating Groundwater Contamination*: Stipulation III(B)(2)(b), Stipulation III(B)(3)(a); Appendix B (Consultation Protocol).

- CHPMP: Section 6.4 “Respect for Tribal Concerns”, Section 6.5 “Taking into Account Tribal and Other Cultural Values”, Section 6.7 “Protocols for Tribal Notification and Consultation in Advance of Certain Activities.”

2.2 CUL-1a-8b: PROTOCOLS FOR APPROPRIATE TREATMENT OF ARCHAEOLOGICAL MATERIALS

CUL-1a-8b: Protocols for the appropriate treatment of archaeological materials that may be disturbed or discovered during implementation of the final remedy, including protocols for the repatriation of significant items of cultural patrimony that may be recovered during the project, and protocols for the curation of cultural materials recovered during the project. Treatment of archaeological sites may include data recovery or capping. If data recovery is proposed, a Research Design following California Office of Historic Preservation guidelines or federal guidelines, as applicable, shall be prepared and reviewed and approved by DTSC (DTSC, 2011a).

Protocols for the treatment of archaeological materials that may be found during implementation of the Final Remedy will be as described in the Programmatic Agreement (PA; Bureau of Land Management [BLM] et al., 2011), Cultural and Historical Preservation Management Plan (CHPMP), (BLM, 2012) and this Cultural Impact Mitigation Program (CIMP), and will comply fully with all applicable laws and regulations. To the extent feasible, the protocols and treatment measures described in Chapter 6 (General Treatment Measures) and Chapter 7 (Cultural Property-Specific Treatment Measures) of the CHPMP will be followed with respect to known cultural properties, and the protocols and measures set forth in Chapter 8 (Discoveries) and Appendix C (Discovery Plan) of the CHPMP will be followed when archaeological materials are discovered during Project activities (BLM, 2012:63-84).

The Interested Tribes (Tribes) as defined in the Environmental Impact Report (EIR) have indicated that "[a]voidance is the preference of the Tribes with regard to discoveries made in this area." They have also stated, "Data recovery and or capping would cause a severe negative impact." Pacific Gas & Electric (PG&E) has collaborated, and will continue to collaborate, with the Tribes, and respects their preferences regarding avoidance and other treatment of archaeological materials that may be found during Project activities. In the event that such materials are discovered, the consultation procedures related to unanticipated discoveries, as summarized in Stipulation IX (Discoveries) of the PA (BLM et al,. 2011) and Section 8.3 (Consultation Procedures Related to Unanticipated Discoveries) of the CHPMP (BLM, 2012:84) will be followed.

The FMIT, Hualapai, CRIT, Chemehuevi, and Cocopah Tribes have also stated: "We emphasize that discoveries made here are not merely archaeological sites of interest only to archaeologists. They are deeply rooted and essential to the Cultural and Religious lives of the Tribes affiliated to these sacred Sites."[1] PG&E acknowledges and respects the Tribes' beliefs and will work to collaborate with Tribes in the implementation of the measures described below.

2.2.1 Measures to Avoid Archaeological Discoveries

Section 15126.4(b)(3) of the California Environmental Quality Act (CEQA) Guidelines specifies that avoidance of cultural resources is the preferred option. PG&E will therefore utilize its Geographic Information System (GIS) database of archaeological and historical sites to help ensure avoidance. Prior to any ground disturbance (see exclusions in PA/CHPMP), proposed impacted areas will be reexamined and Tribal monitors will be invited to participate. Archaeological materials will not be collected unless there is no feasible and prudent alternative to earth disturbance and artifacts or other archaeological materials would be damaged as a result. When archaeological materials are discovered, PG&E will implement the steps described in Section IX (Discoveries) of the PA (BLM et al,. 2011), and Section 8.1 (Steps To Be Taken if Previously Unrecorded Properties Are Found) and Appendix C (Discovery Plan) of the CHPMP (BLM, 2012:79-80; C-1 – C-6). Consistent with CHPMP Section 8.1, (Steps to be Taken if Previously Unrecorded Properties are Found), PG&E will suspend all earth-disturbing work within an area extending not less than 5 or more than 50 meters from the find and immediately notify BLM, Department of Toxic Substances Control (DTSC), and the Tribes of the discovery and solicit the Tribes' input. PG&E's qualified professional archaeologist, in coordination with the Tribal Monitor, will perform an initial inspection of the find to ascertain its nature, extent, cultural ascription (i.e., Native American or other), and whether or not human remains are present. (See Section 2.3.4 below for professional qualification standards.) PG&E will recommend to the Agencies whether avoidance of an archaeological discovery is feasible; the Agencies will make final determinations regarding the feasibility of avoidance. If the find can be avoided, then steps will be taken to identify and mark the boundaries of the discovery as an Environmentally Sensitive Area (ESA) and to record, stabilize, protect, and secure the find in accordance with Chapter 8 (Discoveries) and Appendix C (Discovery Plan) of the CHPMP (BLM, 2012). Once the stabilization and protective measures have been taken, project work may resume outside of the ESA boundary.

2.2.2 Measures for Treatment of Archaeological Discoveries

As stated above, avoidance is the preferred option for treatment of archaeological and historical sites, and PG&E understands that this is the Tribes' preference. In those instances when PG&E recommends that avoidance of an archaeological discovery is not feasible, PG&E will notify the Agencies and the Tribes if the find is Native American and solicit the Tribes' input. The Agencies will make final determinations regarding significance and feasibility of avoidance. If the Agencies determine that avoidance is not feasible, then measures to resolve adverse effects will be undertaken in accordance with the procedures outlined in Appendix C (Discovery Plan) of the CHPMP.

If archaeological materials are collected, their treatment will depend on several factors, including ownership of the land (i.e., Federal, Tribal, state, or private) on which the discovery occurs, whether or not the archaeological materials are associated with human remains, and whether they are of Native American origin or not (such as the segments of historical Route 66). Native American human remains and/or archaeological materials from Federal or Tribal land that are funerary objects, or ceremonial objects, or objects of cultural patrimony will be treated as prescribed in the Native American Graves Protection and Repatriation Act (NAGPRA) and its implementing regulations (43 Code of Federal Regulations [CFR] 10), and as discussed in Section 8.2 (Treatment of Any Human Remains, Funerary Objections, Ceremonial Objects and Items of Cultural Patrimony) and Appendix D (Plan of Action) of the CHPMP (BLM, 2012). The treatment of other Native American archaeological materials (i.e. those that are not funerary objects, ceremonial objects, or objects of cultural patrimony) discovered on Federal land will be prescribed, in consultation with the Tribes, in accordance with the CHPMP. Archaeological collections from Federal and/or Tribal land that are governed by the Archaeological Resources Protection Act (ARPA), but are not subject to NAGPRA, will be curated in a facility that meets the standards set forth at 36 Code of Federal Regulations (CFR) 79. PG&E will work with Tribes to identify a local Tribal center of curation expertise if there are collections to curate. PG&E recognizes the Tribes preference for resources to remain near the point of origin and the Tribes who have a unique spiritual connection to them. The Agencies will make the final decision regarding an appropriate curation facility.Any archaeological materials, including those associated with human remains, collected on non-Tribal and non-Federal land will be processed in compliance with state (Arizona or California) law at the landowner's request. PG&E and the Agencies will work with the landowners and Tribes regarding the treatment of such materials in a culturally appropriate manner.

2.2.3 Measures Involving Data Recovery Efforts

In the event that a Project activity will disturb an archaeological or historical site, and following consultation between and among PG&E, the Agencies, and Interested Tribes, an archaeological data-recovery effort may be proposed and implemented. In such event, PG&E, in consultation with appropriate Agencies and Tribes, will take the following steps:

- Determine the spatial extent and depth of anticipated disturbance and the nature of potential adverse impacts to the site.

- Task the Cultural Resources Consultant to prepare an archaeological research design and sampling plan proportional to the nature and scale of potential impacts.

- Review and comment on the draft research design, and prepare an acceptable final iteration.

- Establish in advance the procedure to be followed if human remains are encountered during archaeological excavation.

- Ensure that a sufficient number of qualified archaeologists and Tribal monitors are retained, briefed on the data-collection objectives and methods, properly equipped, and familiar with safety and emergency procedures prior to the start of data recovery.

- Authorize performance of the data-recovery investigations and concomitant Tribal monitoring.

- Fund the analysis of collected archaeological specimens and data, per the research design, and the preparation of draft and final versions of a professional report of findings.

- Ensure the proper curation and/or repatriation of archaeological materials, data, and any human remains, and distribution of the final report to Agencies, Tribes, the California Historical Resources Information System (CHRIS) regional information center, university libraries, and interested professional archaeologists. The research design, sampling plan, and subsequent analysis will consider Tribal input regarding Tribal cultural values and views.

See also:

- PA: *Cultural and Historic Properties Management Plan*: Stipulation VII(E), Stipulation VII(G), Stipulation VII(H); *Discoveries*: Stipulation IX(A), Stipulation IX(B), Stipulation IX(C), Stipulation IX(D); *Curation*: Stipulation XIII(A), Stipulation XIII(B), Stipulation XIII(C), Stipulation XIII(D), Stipulation XIII(E), Stipulation XIII(F)

- CHPMP: Section 6.11 “Curation Procedures,” Section 7 “Cultural Property Specific Treatment Measures,” Section 8 “Discoveries,” see also Appendix C (Discovery Plan) and Appendix D (Plan of Action)

2.3 CUL-1a-8c: PROTOCOLS FOR THE REVIEW OF CULTURAL RESOURCE-RELATED DOCUMENTS

CUL-1a-8c: Protocols for the review of cultural resource-related documents throughout the design, construction, and operational phases (DTSC, 2011a).

2.3.1 Introduction

Various cultural resource-related documents may be prepared and reviewed during the course of the Project. Beyond the present Cultural Impact Mitigation Program (CIMP), such documents may include, but are not limited to, reports of archaeological/historical and other cultural resource field surveys; plans for and reports of archaeological testing/significance evaluation and assessment of effects/impacts; cultural resource treatment and data-recovery plans and reports; reports of any discovery and treatment of human remains; and annual reports of archaeological monitoring. This protocol governs review of such cultural resource-related documents relating to the Topock Compressor Station Groundwater Remediation Project as described in the Environmental Impact Report (EIR). This protocol is not intended to duplicate or otherwise replace the consultation process under the Programmatic Agreement (PA) and referenced in the Cultural and Historic Properties Management Plan (CHPMP) (BLM, 2012). Specifically, to the extent that Bureau of Land Management (BLM) consults with the Interested Tribes (Tribes) as defined by the EIR, Signatories and Invited Signatories to the PA under the PA's Consultation Protocol regarding a cultural resource related document, the procedures for review of such documents contained within this protocol shall not be followed. Pacific Gas & Electric (PG&E) has discussed review of cultural resource-related documents with the Tribes, and understands the Tribes' concerns regarding their participation in the review of cultural resource-related documents.

2.3.2 General Procedures

When a document pertaining to cultural resources has been completed in draft, PG&E will circulate it first for review and comment internally and then to the Department of Toxic Substances Control (DTSC), BLM, and the Tribes. The State Historic Preservation Officer(s) (SHPO(s)) will be provided review as specified in the PA, CHPMP or by other BLM/DTSC guidance or direction. Reviewers will have 30 calendar days to provide written comments to DTSC, BLM and PG&E. Thereafter, PG&E, in consultation with DTSC and/or BLM, will have up to 15 calendar days to revise the document, taking into account the substance of comments received, and produce a final draft of the document. PG&E will ensure that all comments received and responses thereto are recorded and retained. If PG&E, DTSC or BLM require additional time for evaluation of the comments and/or revision of the document, PG&E, DTSC or BLM shall notify all parties involved in the comment process. If any reviewing

party requires additional time to review and comment, the party shall request an extension of up to 30 calendar days from the relevant Agency (DTSC, BLM or both), who shall determine whether to grant the request for extension.

2.3.3 Tribal Review and Contributions to Cultural Documents

PG&E will afford the Tribes an opportunity to review and comment on Project cultural resource-related documents, including the following: reports of archaeological/historical and other cultural resource field surveys; plans for and reports of archaeological testing/significance evaluation and assessment of effects/impacts; cultural resource treatment and data-recovery plans and reports; reports of any discovery and treatment of human remains; and annual reports of archaeological monitoring, which BLM does not otherwise consult with Tribes, Signatories and Invited Signatories to the PA on, in accordance with PA's Consultation Protocol. In addition, Tribes will be invited to participate in the review of Project Design Documents, as discussed in CUL-1a-8d: Protocols for the Review of Project Design Documents.

Tribal review of documents is intended to meet several objectives. By reviewing draft documents, the Tribes will be able to present their suggestions and requests, as well as to correct any errant text. The Tribes will also be able to offer their unique perspectives on the cultural significance of the Topock Cultural Area, including its natural resources and the interrelationship of the cultural and natural landscapes in Tribal beliefs, religion, customs, and current practices, both tangible and intangible. Finally, the review process will allow PG&E to request additional information from Tribes to supplement existing documentation and support preservation efforts.

2.3.4 Standards

The standards included in PA Stipulation XI, included below, also apply to those reviewing and contributing to Project cultural resource-related documents.

XI. STANDARDS

A. *All actions prescribed by this PA that involve the identification, evaluation, analysis, recordation, treatment, archaeological monitoring, and disposition of historic properties and that involve the reporting and documentation of such actions in the form of reports, forms, or other records, shall be carried out by or under the direct supervision of a person or persons meeting, at a minimum, the Secretary of the Interior's Professional Qualifications Standards (PQS) for archaeology, history, or architectural history, as appropriate (48 FR 44739). However, nothing in this stipulation may be interpreted to preclude any party qualified under the terms of this paragraph from using the services of properly supervised persons who do not meet the PQS.*

B. *When documentation of non-archaeological cultural and historic properties, Traditional Cultural Property (TCP(s)), or other types of evidence is deemed necessary by the BLM in order to further document the effects of any proposed Undertaking, the guidelines found in National Register Bulletin 38, Appendix G: Professional Qualifications: Ethnography should be followed to extent practicable, as determined by the BLM.*

C. *Tribal Qualifications: Tribal experts on their cultures and religions shall not be subject to Stipulation XI (A). Qualified Tribal Monitors shall be an authorized representative of the Tribe with the qualifications the Tribe deems necessary.*

D. *Consistent with paragraphs A, B, and C above, reporting on and documenting the actions cited in paragraph A. of this stipulation shall conform to BLM 8100 Manual guidance as stipulated in the BLM Cultural Resources Use Permit and Field Authorizations for this Undertaking, and to every reasonable extent with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-44740), as well as the California Office of Historic Preservation's Preservation Planning Bulletin Number 4(a), December 1989, Archaeological Resource Management Reports (ARMR); Recommended Contents and Format (ARMR Guidelines) for the Preparation and Review of Archaeological Reports, and the Arizona State Historic Preservation Office's Standards for Conducting and Reporting Cultural Resources Surveys, the Guidance Point Series, and Recommended Standards for Monitoring, Testing, and Data Recovery (Arizona State Museum), and any specific county or local requirements or report formats as necessary.*

See also:

- PA: *General Principle* Stipulation I(E); *Remediating Groundwater Contamination*: Stipulation III(B)(2)(b), Stipulation III(B)(3)(a); Appendix B (Consultation Protocol)
- CHPMP: Section 6.7 "Protocols for Tribal Notification and Consultation in Advance of Certain Activities"

2.4 CUL-1a-8d: PROTOCOLS FOR THE REVIEW OF PROJECT DESIGN DOCUMENTS

CUL-1a-8d: Protocols for the review of project design documents before the beginning of construction, including reviews of project design documents throughout the design process (e.g., Preliminary [approximately 30% completed], Intermediate [approximately 60% completed], and Pre-final design) (DTSC, 2011a).

Mitigation Measure CUL-1a-8d requires establishing protocols for the review of the Topock Compressor Station Groundwater Remediation Project (Project) Design Documents at the Preliminary, Intermediate, and Pre-final phases. The term "Project Design Documents" refers to all plans, specifications, drawings, and maps that describe and/or depict proposed earth-disturbing activities such as, but not limited to, grading (leveling, cutting, filling, etc.), trenching, well drilling, construction and demolition of facilities, and environmental restoration prepared by PG&E. This protocol does not apply to documents created by the Agencies (e.g., Department of Toxic Substances Control (DTSC) California Environmental Quality Act (CEQA) evaluations). Participants in the review process include the DTSC, U.S. Department of the Interior (DOI), Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR), and the State Historic Preservation Offices (SHPO(s)) of Arizona and/or California. Pacific Gas & Electric (PG&E) has collaborated with and will continue to collaborate with the Tribes regarding the review of Project design documents. A flow chart of the design-review process is shown in Figure 2-1.

In general, at the preliminary phase of each design, PG&E will submit the design document to DTSC/DOI who will then submit to reviewers and invite their initial comments. Subsequently, PG&E will submit the intermediate Project Design Document (60%), and will schedule a briefing and/or field visit to describe and answer questions about the proposed activity. It is anticipated that the most thorough document reviews, including review by the Tribes and the SHPO(s), will be prepared at the intermediate phase. Any major concerns not previously identified should be set forth during the intermediate review period. Thereafter, when preparing the pre-final Project Design Document (90%), PG&E, in consultation with DTSC and BLM, will take into account all comments that have been received. A third opportunity to comment will occur when the pre-final Project Design Document is provided to reviewers.

The process begins (see Box A) when PG&E prepares a preliminary draft design and submits it to DTSC and DOI for review (Box B). The BLM, as lead Federal Agency, then will initiate consultation as stipulated by the PA (Box C) and may hold face-to-face

consultation meetings with Interested Tribes, if requested (Box C.1). Simultaneously, DTSC will distribute the preliminary draft design to Tribes and other stakeholders (Box D) and follow up by consulting with those parties (Box D.1). To enhance the consultation process, PG&E may conduct a field review of the preliminary draft design for Tribes and other stakeholders (Box E) and may host additional follow-up field visits and discussions (Box E.1), as needed.

Following consultation, the Tribes and other stakeholders have the opportunity to provide written comments to DTSC and DOI (Box F) and, as required by the Programmatic Agreement (PA) in compliance with Sec. 106, to the BLM (Box G). DTSC, DOI, BLM, and PG&E will then review all comments received and respond to the Tribes and other stakeholders (Box H). Received comments, together with Agency responses, will guide preparation of the subsequent (i.e., intermediate and then pre-final) drafts of the design (Boxes I and J). Throughout the process, communications among the parties will be maintained by monthly-update calls and/or meetings and such additional contacts as may be deemed appropriate by any of the parties involved ("Ongoing" box).

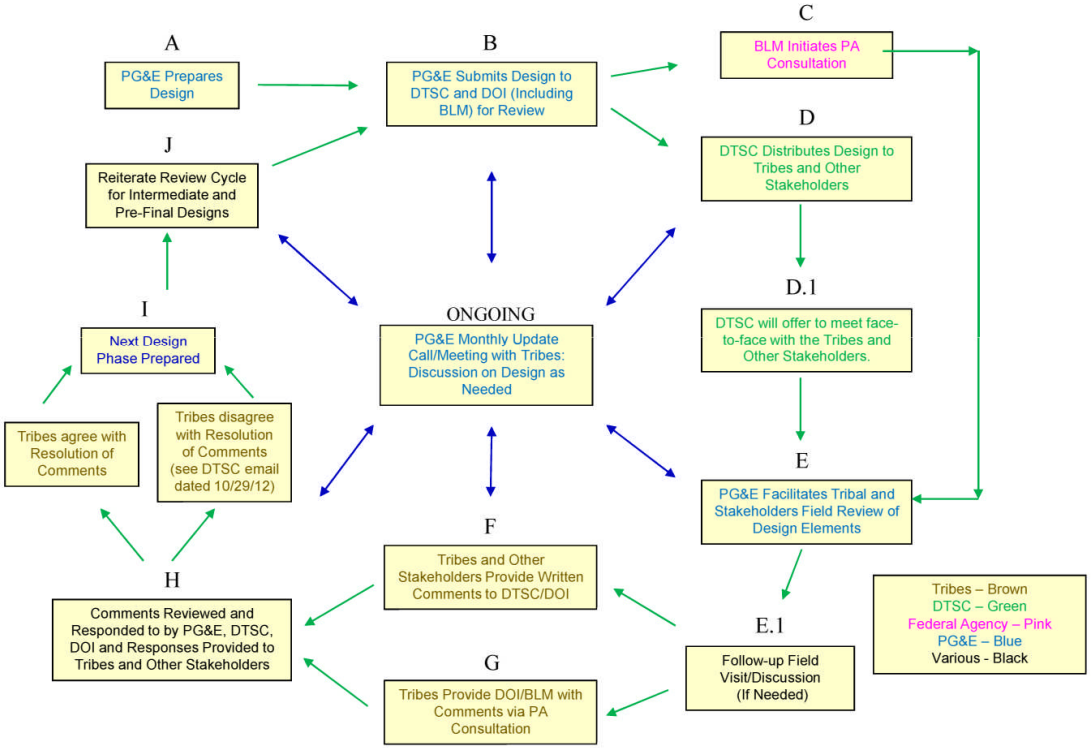
See also:

- PA: *General Principle* Stipulation I(E), *Remediating Groundwater Contamination*: Stipulation III(B)(2)(b) and III(B)(3)(a), and Appendix B (Consultation Protocol)

- CHPMP: Section 6.7 "Protocols for Tribal Notification and Consultation in Advance of Certain Activities"

Figure 2-1

Figure 2-1 MMRP CUL-1a-8d
Design Review Protocol Flow Chart



2.5 CUL-1a-8e: PROTOCOLS FOR RESTORING THE ENVIRONMENT TO ITS PRECONSTRUCTION CONDITIONS UPON DECOMMISSIONING

CUL-1a-8e: Protocols for the appropriate methods to be used to restore the environment to its preconstruction condition upon decommissioning of individual groundwater remedy facilities (DTSC, 2011a).

2.5.1 General Restoration Approach

The restoration approach will be informed by documentation of the pre-construction condition (e.g., ground photographic records, topographic/aerial maps, disturbed area map, archaeological surveys, historical resource surveys, and biological surveys). Pacific Gas and Electric Company (PG&E) will seek ways to restore the affected areas to the conditions prior to construction, as closely as possible. Discussions will take place with the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) to develop an understanding of the different restoration techniques and expectations for different environments.

This protocol presents the general approach for restoration of the areas affected by the groundwater remediation facilities. A site-specific Groundwater Remediation Restoration Plan (Restoration Plan) will be completed within 120 days of the Department of the Interior's (DOI) certification of completion of the remediation and a determination by DOI that removal of such facilities is protective of human health and the environment. This Restoration Plan will be developed in consultation with the land owners and managers, including Fort Mojave Indian Tribe (FMIT), U.S. Bureau of Reclamation (USBR), and Bureau of Land Management (BLM). The BLM will consult with Signatories, Tribes, and Invited Signatories to the Programmatic Agreement (PA) on the Restoration Plan. Pacific Gas & Electric (PG&E) will implement the Restoration Plan to restore the site to conditions existing prior to the construction of the groundwater remediation facilities to the maximum extent practicable. Restoration activities include grading, contouring, and revegetating the site. The Restoration Plan will meet the requirements of the Topock Compressor Station Groundwater Remediation Project EIR Mitigation Monitoring and Reporting Program (MMRP) (BIO-2c and CUL-1a-5) (see Appendix A for Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants); the PA (Stipulation V); the 2006 Settlement Agreement between PG&E and FMIT (Section VII); the Consent Decree between the Federal Government and PG&E; and other applicable requirements. A separate Habitat Restoration Plan will be developed for the Havasu National Wildlife Refuge in accordance with the Consent Decree (Scope of Work [SOW], Section 3.6).

2.5.2 Restoration Areas

Areas to be restored are those that were disturbed by the construction, operation, or decommissioning of the groundwater remediation facilities. The pre-construction condition of these areas will be documented using various tools, including aerial photographs, ground-level photographs, topographical surveys, disturbed area mapping, archaeological surveys, historical resource surveys, and biological surveys.

2.5.3 Restoration Guidelines

After the groundwater remedy infrastructure and components have been decommissioned, soil sampling and analysis may be required at some locations to ensure that backfill and restoration can proceed. After sampling, excavations and trenches will be backfilled with displaced material or foreign fill and compacted for safety reasons. PG&E understands that the use of foreign fill is a concern for some Tribes; therefore PG&E will discuss import of foreign fill with Tribes prior to its use. PG&E agrees to review any on-site borrow areas with the Tribes. Furthermore, PG&E commits to providing a similar level of review as that followed for on-site borrow areas for any non-commercial off-site borrow areas. Displaced material is defined as material removed from the earth as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The handling and disposition of displaced material will be in accordance with the Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California. Suitable foreign fill may be used if there is not enough displaced site material to backfill the excavated area or if the displaced material is not suitable for backfilling a particular area.

Following backfill and compaction, light grading may be required to provide proper drainage and to control erosion. Grading, contouring, drainage, and erosion control plans for the identified areas to be restored will be designed and included in the Restoration Plan. Final grading and contouring will occur prior to revegetating the identified restoration areas.

The following general steps will be conducted during restoration:

- Verify that the above- and below-grade components have been decommissioned.
- Verify soil sampling is complete, if required in the area being restored and that any associated remedial actions are implemented.

- Backfill holes or trenches created during the removal of groundwater remedy or components with either displaced materials or with suitable foreign fill.

- Grade, contour, and compact the soil.

- Revegetate the area in accordance with the Restoration Plan.

- PG&E will accommodate reasonable requests from affected Tribes for blessings or other ceremonies before, during, and after physical restoration activities.

The following section describes a habitat restoration and revegetation approach and procedure for the areas to be restored.

2.5.4 Habitat Restoration and Revegetation

Restoration in the floodplain and other habitats subject to the jurisdiction of U.S. Army Corps of Engineers (USACE) and California Department of Fish and Wildlife (CDFW) will be accomplished in compliance with EIR measure BIO-1 as well as the substantive requirements of the Clean Water Act (CWA), Section 404 and Fish & Game Code Section 1602. Restoration in upland areas will be accomplished in compliance with EIR measure BIO-2c and CUL-1a-5. Restoration of the habitat, including transplantations and plantings, would be implemented as a result of decommissioning activities. Elements of the restoration of habitat within these areas will be as follows:

- **Transplantation**–A qualified botanist will prepare a plant transplantation/monitoring plan for transplanting indigenous plants to an onsite location, or provide a 2:1 ratio replacement to another location agreed upon between PG&E and members of the Interested Tribes, as required by CUL-1a-5 and described in Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants. If special-status plants are found within the restoration area, transplantation will follow guidelines presented in Topock Groundwater Remediation Project Floristic Survey Report. Mature plants within Key Views 5 and 11 that are affected by restoration activities and cannot be protected in place will need to be transplanted according to the Mature Plant Revegetation and Monitoring Plan (which a biologist is preparing) per EIR measures AES-1 and AES-2.

- **Planting**–A qualified botanist will prepare a planting/monitoring plan as part of the Restoration Plan that describes the planting of native bare root stock or container seedlings for restoring the site. Planting guidelines from Topock Groundwater Remediation Project Ethnobotany Survey Report, Topock Groundwater

Remediation Project Floristic Survey Report, and the Mature Plant Revegetation and Monitoring Plan will be referenced in the Restoration Plan.

- **Seed mix**–If reseeding is used for restoration, a generalized seed mix for the vegetation community will be developed based on plant species observed in the general area. The community-specific seed mix will be developed with specified seed quantities and application rates per acre prior to completion of the decommissioning. The seed mix will be developed to be comparable to species diversity in similar undisturbed habitats adjacent to the restoration area.

- **Performance criteria**–The performance standards/success criteria will focus on quantifiable cover attributes, including percent bare ground, percent cover, and overall species diversity based on non-disturbed, native habitat occurring adjacent or nearby areas proposed for restoration. EIR measure CUL-1a-5 requires a minimum 75 percent survivorship for indigenous plant species transplanted or replaced within the restoration area. Details of the performance criteria will be developed in the Restoration Plan.

- **Maintenance**–The restoration area will be maintained and monitored for a minimum of 5 years or until the Agencies, Tribes, and landowners agree that the restoration is complete. A specific schedule of pre and post-planting maintenance, monitoring, and reporting activities will be included in the Restoration Plan.

- **Monitoring**–Monitoring frequency will be included in a schedule in the Restoration Plan. The monitoring will include maintenance and a performance evaluation. A qualified biologist or restoration specialist will conduct the monitoring to determine the effectiveness of maintenance activities at the restoration area and prescribe additional maintenance activities that may be required to meet performance criteria.

- **Reporting**–The data collected in a given year will be compiled and included in an annual monitoring report. Annual monitoring reports will be submitted to DTSC, DOI, Tribes, and affected landowners. The performance reports will describe the existing conditions of the restoration area and compare annual success criteria with field conditions, identify problems, and recommend remedial measures necessary for successfully restoring the site.

- **Adaptive management**–Adaptive management is a flexible, iterative approach to the long-term management of the site in the event of unforeseen circumstances. Adaptive management will use regular quantitative assessments and rapid qualitative assessment data to assess the health of vegetation communities at the

restoration site. In the event of damage to any part of the site, these data will be used to assist with repairing the affected areas.

See also:

- PA: *General Principle* Stipulation I(D), *Remediating Groundwater Contamination*: Stipulation III(B)(3)(c) and *Removal of Existing Treatment Plant and Other Remediation Facilities* Stipulation V(D).
- CHPMP: Section 6.3, "Environmental Restoration."

2.6 CUL-1a-8f – IM-3 Decommissioning Plan

CUL-1a-8f: A plan for the decommissioning and removal of the IM-3 Facility and proposed restoration of the site (to be an appendix to the CIMP)

See Appendix B (to be provided with the 90% Basis of Design).

See also:

- PA: *Removal of Existing Treatment Plant and Other Remediation Facilities*: Stipulation V(A)-(E)
- CHPMP: Section 6.2.3 “Removal of Existing IM-3 Treatment Plant and Other Remediation Facilities”; Section 6.3 “Environmental Restoration”

2.7 CUL-1a-8g: PROTOCOLS FOR REPATRIATION OF CLEAN SOILS DURING CONSTRUCTION

CUL-1a-8g: Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site (DTSC, 2011a).

The Disturbed Soil Subgroup was convened in early 2011 and is led by the Department of Toxic Substances Control (DTSC). The subgroup includes members from DTSC, the U.S. Department of the Interior (DOI), Tribal members and their consultants, and Pacific Gas & Electric (PG&E). The subgroup has been working to establish the general approach and management protocol required for the handling and disposition of soil and/or rock (collectively called "material") that is displaced as a result of past (as practical), present, and future activities associated with the Topock Remediation Project. The general approach and management protocol has been documented in a technical memorandum titled "Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, CA." The approach established in this technical memorandum is intended to minimize the amount of displaced material that leaves the site and instead, provide for eventual return, reuse, or restoration of the material onto the lands from which it was displaced. Specifically, the management protocol requires work plans that involve activities that displace site material (and that are finalized subsequent to the development of the protocol) to include the following information:

1. The process for soliciting and considering the inputs of Tribe(s) regarding the management of the material that is displaced as a result of the work.
2. Details on material handling and short-term/long-term storage (including an inventory of materials displaced by the work).
3. Process for assessing contamination.
4. Final disposition alternatives for displaced material.

Through the application of this protocol and its incorporation into future work plans involving material displacement, it is anticipated that the goal of careful and respectful handling of soil material will be fulfilled.

PG&E intends to use the management protocol set forth in the above technical memorandum to comply with this mitigation measure (see Appendix C).

2.8 CUL-1a-8h: NOISE PROTOCOL FOR CUL-1a-8h

CUL-1a-8h: Protocols for the appropriate methods, consistent with Mitigation Measure NOISE-3, to reduce auditory impacts (DTSC, 2011a).

NOISE-3: Land use Compatibility of Future Project Noise Levels with Places of Worship and the Topock Cultural Area. Provided that the proposed project would be required to achieve the normally acceptable exterior noise level standard for placed of worship, the following mitigation measure shall be incorporated in the project design:

a) Implement all of the mitigation measures outlined for Impact NOISE-1 and Impact NOISE-2;

b) Upon completion of detailed project design, the determination of remediation activities and the schedule established to achieve these activities shall be communicated to Native American tribes. PG&E shall maintain a liaison with requesting Tribes to alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis.

2.8.1 Introduction

Construction, operation, maintenance, and decommissioning of the Topock Compressor Station Groundwater Remediation Project (Project) may cause short-term increases in ambient noise levels. Project-generated noise has the potential to impact nearby noise sensitive receptors including residents, recreationists along the Colorado River or using the Havasu National Wildlife Refuge, and Tribal members engaging in cultural and spiritual activities. Pacific Gas & Electric (PG&E) has collaborated with and will continue to collaborate with the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) and respects the Tribal concerns regarding Project-related sound levels within the Topock Cultural Area that would occur whether Tribal members are physically present or not present. PG&E will take steps to address Tribal concerns and should a concern about the actual noise generated by the Project arise, PG&E will work with the Tribes to thoroughly investigate and resolve the issue.

Project-generated noise at certain locations within the Topock Cultural Area will be diminished by the shielding effects of intervening topographic features (mesas) in the project area. Similarly, vegetation along the Colorado River floodplain will help diminish Project-generated noise. Meteorological conditions (wind direction) may also affect the

noise levels. In addition, non-Project noise generated by pipeline facilities and highway, railroad, and boat traffic may sometimes mask the Project-generated noise.

Engineering controls have been identified in the remedy design to minimize operational noise through placement of potential noise-generation equipment within buildings or underground, to the extent feasible. The majority of pumps and motors will be located either underground, inside a well, or inside an enclosure (e.g., building). Power supply equipment also will be located inside enclosures and utilize mufflers. These design features will effectively reduce the sound emissions. The remaining non-emergency above-ground equipment is limited to transformers, which are similar in size to the one already operating at the Interim Measures-3 (IM-3) Facility, and communication/control panels. Further, the design goal will be that the operational sound levels are 3-5 dBA less than the design criteria for noise. That is, as the Project proceeds through detailed design, it will not be designed right up to the design criteria. Selection of above-ground equipment will be reviewed by the Project Noise Engineer for conformance with the noise design criteria (60% Basis of Design Report, Section C.11).

As a result, operation and maintenance of the Project components are predicted to generate relatively low noise levels, except when new wells are constructed or wells need to be replaced. Construction, maintenance, decommissioning, and well construction or replacement are considered temporary activities.

The protocols (listed in Section 2.8.5) have been developed to guide the Project such that noise impacts to existing land uses are reduced, including the sensitive land use of the Topock Cultural Area by Tribal members. In addition, Section 7.2 of the Cultural and Historic Properties Management Plan (CHPMP) states the Bureau of Land Management (BLM) will continue to work with Tribes to develop treatment measures for identified Tribal activities and ceremonies associated with the Topock Traditional Cultural Property (TCP) that may address scheduling of Project work to accommodate ceremonial activities and to mitigate audible impacts.

The proper implementation of these protocols, which have been developed to reduce the auditory impacts of the Project, will ensure compliance with mitigation measure CUL-1a-8h by PG&E and all contractors during the construction, operations and maintenance, and decommissioning phases (DTSC, 2011b). However, implementation of these protocols would not reduce noise impacts to a less than significant level in the Topock Cultural Area, as the EIR found noise impacts in that area would be significant and unavoidable.

2.8.2 Background

2.8.2.1 Existing Noise

Based on the EIR, the existing noise environment within the project area is influenced primarily by transportation noise emanating from vehicular traffic along I-40 and train operations on the Burlington Northern Santa Fe Railway (BNSF). The majority of vehicular traffic noise occurs along I-40 and to a lesser extent along Park Moabi Road and National Trails Highway. Noise associated with the operation of the compressor station is audible within the vicinity of the compressor station and the Interim Measures-3 (IM-3) Facility; however, because of the existing topography, nearby mobile home park residents and recreationists along the Colorado River or using the Havasu National Wildlife Refuge do not have direct exposure to these noise sources. Additional existing noise sources are occasional aircraft overflights and recreational activities (watercraft operations) at regional nearby parks (DTSC, 2011b: Section 4.9.1.5).

2.8.2.2 Noise Levels from Project Implementation

Implementation of the Project will result in intermittent construction activities associated with the installation, operation, and maintenance of new wells, access roads, water conveyance, utilities, and facilities. Project-generated noise levels would fluctuate depending on the particular type, number, and duration of usage for the varying construction equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to residents, recreationists, or Tribal members engaging in cultural and spiritual activities, and the existing ambient noise environment in the vicinity. Construction generally occurs in several discrete stages, each phase requiring a specific complement of equipment with varying equipment type, quantity, and intensity. It is expected that the primary sources of Project-generated noise during construction may include drill rigs, backhoes, compressors, bulldozers, excavators, and other related equipment.

Noise from operation and maintenance activities are anticipated to generate relatively low noise levels, except when new wells are constructed or wells need to be replaced.

2.8.2.3 Mitigation Measures Noise-1, Noise-2 and Noise-3

The EIR requires the Project to achieve the County's normally acceptable exterior noise level standard for places of worship under mitigation measure Noise-3. Implementation of Noise-3 also requires implementation of mitigation measures Noise-

1 and Noise-2. The general requirements of mitigation measures Noise-1 and Noise-2 are included as part of the protocols presented in Section 2.8.5 (Procedures). Mitigation measures Noise-1 relates to the construction of new wells within 45 feet from vibration-sensitive receptors. Mitigation measure Noise-2 relates to construction activities conducted within 1,850 feet (daytime) and 5,830 feet (nighttime) of noise-sensitive receptors in California and construction activities conducted within 330 feet (daytime) and 735 feet (nighttime) of noise-sensitive receptors in Arizona. Mitigation measure Noise-3 also requires PG&E to alert requesting Tribes to Project activities that will generate new noise in the Topock Cultural Area on at least an annual basis.

2.8.3 Regulatory Requirements

2.8.3.1 County of San Bernardino General Plan

The Noise Element of the County of San Bernardino 2007 General Plan, as amended in 2012, provides specific goals and policies to ensure an acceptable noise environment for each land use, and for the preservation of the quiet environment of the desert region (San Bernardino County, 2012:VII).

Goal N 1. Abate and avoid excessive noise exposures through noise mitigation measures incorporated into the design of new noise-generating and new noise-sensitive land uses, while protecting areas within the County where the present noise environment is within acceptable limits.

- Policy N 1.3: When industrial, commercial, or other land uses, including locally regulated noise sources, are proposed for areas containing noise-sensitive land uses, noise levels generated by the proposed use will not exceed the performance standards of Table N-2 within outdoor activity areas. If outdoor activity areas have not yet been determined, noise levels shall not exceed the performance standards listed in Chapter 83.01 of the Development Code at the boundary of areas planned or zoned for residential or other noise-sensitive land uses.

- Policy N 1.6. Enforce the hourly noise-level performance standards for stationary and other locally regulated sources, such as industrial, recreational, and construction activities as well as mechanical and electrical equipment.

Goal N 2: Strive to preserve and maintain the quiet environment of mountain, desert and other rural areas.

- Policy N 2.1: Require appropriate and feasible on-site noise attenuating measures that may include noise walls, enclosure of noise generating equipment, site

planning to locate noise sources away from sensitive receptors, and other comparable features.

- Policy N 2.2: Continue to work aggressively with Federal Agencies, including the branches of the military, the U.S. Forest Service, Bureau of Land Management (BLM), and other Agencies to identify and work cooperatively to reduce potential conflicts arising from noise generated on Federal lands and facilities affecting nearby land uses in unincorporated County areas.

2.8.4 Protocols

- Pre-Construction

a) Establish a disturbance coordinator, who will coordinate both noise and vibration concerns that may arise during construction.

b) Identify and coordinate activities where Noise-2 requires noise monitoring. Noise-2 states that noise monitoring will be conducted when construction activities are conducted within 1,850 feet and 5,830 feet from noise-sensitive receptors in California and 330 feet and 735 feet from noise-sensitive receptors in Arizona for daytime and nighttime noise, respectively.

c) If noise monitoring during construction is required, noise monitoring locations will be selected in coordination with the Tribes. The EIR MMRP requires that noise measurements be conducted at the nearest noise-sensitive land use relative to the construction activities.

d) Examples of noise barriers that could be used during construction to mitigate noise concerns (e.g., berms, stockpiles, dumpsters, bins, and engineered acoustical barriers), and approaches for implementation, will be included in the Construction/ Remedial Action Work Plan for review and comment by Tribes and Agencies. In the unlikely event that engineered acoustical barriers are required during construction, they will comply with requirements of the EIR.

- Construction

e) If noise monitoring finds that the relevant noise thresholds are exceeded, temporary noise barriers will be erected.

f) Maintain all construction equipment according to manufacturer guidelines. Equipment will be fitted with the best available noise suppression devices. All impact

tools will be shrouded or shielded, and all intake or exhaust ports on power equipment will be muffled or shielded.

g) Construction equipment will not be allowed to idle for extended periods of time (more than 15 minutes) when not being used for construction.

h) Should a concern about the actual noise generated by remedy construction arise, PG&E disturbance coordinator will thoroughly investigate and resolve the issue. A qualified acoustical consultant (Institute of Noise Control Engineering [INCE] Board Certified or Professional Engineer in Acoustics) will evaluate all reoccurring disturbances for compliance with applicable standards. Noise measurements will be in accordance with the Topock Sound Measurement Protocol in the Basis of Design Report and the forthcoming Remedial Action Work Plan. All noise complaints and resolutions will be recorded, tracked, and reported to DTSC in the quarterly compliance reports.

- Operations and Maintenance

i) Should a concern about the actual noise generated by remedy operation arise, PG&E disturbance coordinator will thoroughly investigate and resolve the issue. A qualified acoustical consultant will evaluate all reoccurring disturbances for compliance with applicable standards. Noise measurements will be in accordance with the Topock Project Sound Measurement Protocol. All noise complaints and their resolutions will be recorded, tracked, and reported to DTSC in the quarterly compliance reports.

j) If a new well needs to be installed or an existing well has to rebuilt during the operation phase, these activities are considered short-term construction activities and all noise protocols for pre-construction and construction phases will apply.

- Decommissioning

k) Decommissioning activities are considered short-term construction activities. All noise protocols for pre-construction and construction phases will also apply to the decommissioning phase.

2.8.5 Communication

All Project construction activities shall be communicated to nearby noise-sensitive receptors and Interested Tribes. Elements of this communication include:

- A detailed project schedule is established and published for all stakeholders.

- Monthly notification to Agencies and Tribes of scheduled field activities. During periods of extensive construction activity, these notifications will be issued more frequently – weekly and/or daily, as appropriate.

- After issuing these notifications, notify the nearby noise-sensitive receptors and Tribes of any schedule changes.

- Provide an open-communication process for Tribal representatives to seek more information about Project noise-generating activities. PG&E welcomes Tribal input on timing of Project noise-generating activities and on potential noise-reducing methods.

- The contact information for the disturbance coordinator will be posted in a conspicuous location near the construction areas. This information will also be mailed to all nearby noise-sensitive receptors and Interested Tribes.

- In addition to the communication methods described above, PG&E will consider posting construction schedule information at the information kiosk (CUL-1a-3c). PG&E also will consider and may decide to use other communication processes.

See also:

- San Bernardino County. 2012 (May). *County of San Bernardino 2007 General Plan*. Adopted March 13, 2007 and Amended May 22, 2012. San Bernardino, CA. Available at: http://cms.sbcounty.gov/lus/Planning/GeneralPlan.aspx.

2.9 CUL-1a-8i: PROTOCOLS FOR THE APPROPRIATE METHODS, CONSISTENT WITH MITIGATION MEASURES AES-1 AND AES-2, TO REDUCE VISUAL INTRUSIONS.

2.9.1 Introduction

Pacific Gas and Electric Company (PG&E) will employ various methods to reduce visual intrusions caused by the Project design. The methods will be consistent with, but not limited by, the content of Mitigation Measures AES-1 and AES-2. Agencies (Department of Toxic Substances Control [DTSC] and U.S. Department of the Interior [DOI]), Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR), and other stakeholders will have the opportunity to review, evaluate, and comment on the visual aspects of the Topock Compressor Station Groundwater Remediation Project (Project) Design Documents during the 30%, 60%, and 90% design review process (as described in CUL-1a-8d).

Methods to reduce visual intrusions as listed in AES-1 and AES-2:

> a) *A minimum setback requirement of 20 feet from the water (ordinary high water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank (DTSC, 2011a).*
>
> *b) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation consistent with CUL1a-5 (DTSC, 2011a).*
>
> *c) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist (DTSC, 2011a).*

d) Plant material shall be consistent with surrounding native vegetation (DTSC, 2011a).

e) The color of the wells, pipelines, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete (DTSC, 2011a).

f) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation (DTSC, 2011a).

2.9.2 Additional Design Protocols that PG&E May Employ to Reduce Visual Intrusions

In addition to the specific requirements identified in AES-1 and AES-2, PG&E may employ various design concepts identified by PG&E, Tribes, or other interested parties prior to implementation of a Project activity to reduce visual intrusions of the Project if feasible. Potential design concepts include:

- Construction of aboveground facilities within existing facilities, when appropriate.
- Building designs that are harmonious with existing buildings and nearby landforms, including low profiles when available.
- Flush-mount or below-ground installations whenever feasible.
- Construction within existing transportation corridors.
- Working only within previously-disturbed sites, whenever possible.
- Placing aboveground facilities away from traffic, where feasible (i.e., areas where the introduction of the facilities would not create safety issues or visual impacts), to reduce the need for traffic barricades.
- Design the lighting associated with above ground facilities to minimize glare and to focus lighting within a facility (e.g., using shields on lighting to reflect light downward and focused within a facility).

In addition, PG&E will comply with applicable codes, laws, and Applicable or Relevant and Appropriate Requirements (ARARS).

2.9.3 Opportunity for Agency, Tribal, and Other Stakeholder Input on the Visual Nature of Project Design

PG&E will submit proposed Project design packages as part of the 30%, 60%, and 90% design review process. Within the design packages, PG&E will include visualizations of various design features described within the text and drawings in the package. Although the visualizations will not be comprehensive of the entire Project, they will include many of the aboveground facilities that may be visible to stakeholders after construction. The design review process described in CUL-1a-8d provides the opportunity for Agencies, Tribes, and other stakeholders to comment upon the visual impact of PG&E's proposed design. Reviewing parties can also ask for PG&E to provide additional key views and/or create additional visualizations of Project components and their context in the landscape (i.e., the view shed associated with Project components highlighting their location in the landscape and their potential relationship to culturally sensitive features of the landscape), if that would aid that parties' review of the design package, and/or enhance collaboration with a Tribe or other stakeholder to better address their issues/concerns.

2.9.4 Potential Temporary Visual Intrusions Identified During Project Implementation

During the course of Project implementation, if Agencies, Tribes, or other stakeholders identify temporary visual intrusions that should be addressed by PG&E, they should notify the Project Disturbance Coordinator(s), who will be responsible for resolving the issue or coordinating resolution of the issue with the Tribes, DTSC, other Agencies, and/or stakeholders.

See also:

- PA: *General Principle* Stipulation I(B).
- CHPMP: Section 7.1 "Treatment of Topock Maze/TCP and Any Associated Contributing Properties," and Section 7.2 "Accommodation of Tribal Activities and Ceremonies Involving the Topock Maze/TCP"
- MMRP CUL-1a-5 and CUL-1a-8d.

2.10 CUL-1a-8j: PROTOCOLS FOR TRIBAL NOTIFICATION IN ADVANCE OF PROJECT-RELATED ACTIVITIES

CUL-1-8j: Protocols for tribal notification in advance of project-related activities that the Interested Tribes may feel have the potential to cause adverse impacts to sensitive cultural resources (DTSC, 2011a).

Pacific Gas and Electric Company (PG&E) will continue to provide Tribal notification in advance of Project-related activities that the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) may feel have the potential to cause adverse impacts to sensitive cultural resources. PG&E will take care in these advance notifications to identify the field activities that have the potential to be ground-disturbing. Examples of field activities which may include potentially ground-disturbing aspects include grading, trenching, boring, drilling, or other excavation for new injection, extraction or monitoring wells. In addition, construction of new pipelines, new treatment facilities, new access roads, new staging areas, other new transportation facilities, or other new Project components may include ground-disturbing aspects.

PG&E will use multiple communication methods to communicate to Tribes in advance of ground-disturbing field activities. These methods may include one or more of the following:

- Workplans and project schedules.
- Formal presentations and announcements at meetings – including Consultative Work Group (CWG), Technical Work Group (TWG), Clearinghouse Task Force (CTF), etc.
- Posting Project activity schedules and other information on a Project website and/or e-mail notifications of specific activities.
- Telephone calls to key Tribal representatives, when activity is imminent and advance notification was not possible.
- Monthly schedules of project-related field activities.
- Weekly look-ahead schedules of project-related field activities during times of intensive activity, e.g. construction.
- Daily information sheets for site visitors, during times of intensive activity, e.g. construction.

- Other communications tools, as they are developed.

Whenever possible, PG&E will provide the Tribes with at least two weeks advance notice of all such covered activities.

See also:

- PA: *General Principle* I(E); *Remediating Groundwater Contamination*: Stipulation III(B)(2)(b), Stipulation III(B)(3)(a); Appendix B (Consultation Protocol) and Appendix C (Monitoring Protocol)

- CHPMP: Section 6.7 "Protocols for Tribal Notification and Consultation in Advance of Certain Activities"

2.11 CUL-1a-8k: PROTOCOLS TO ACCOMMODATE TRIBAL CEREMONIES OR ACTIVITIES INVOLVING TOPOCK CULTURAL AREA

CUL-1a-8k: Protocols to be followed by project personnel to accommodate, if feasible as determined by DTSC, key tribal ceremonies that involve the Topock Cultural Area (DTSC, 2011a).

Pacific Gas and Electric Company (PG&E) has collaborated with and will continue to collaborate with the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR), and understands the need to accommodate Tribal ceremonies. Under Mitigation Measure CUL-1a-8k, Tribal ceremonies involving the Topock Cultural Area will be accommodated if feasible as determined by Department of Toxic Substances Control (DTSC). Any Tribe(s) wishing to perform such a ceremony may contact PG&E's Site Manager at the Topock Compressor Station by telephone, email, or in writing to discuss the specific request. The request should include the following basic information:

- Proposed date and time of the ceremony.
- Proposed location of the activity.
- The estimated number of participants and attendees.
- Whether the Tribe desires the ceremony to be public or private (i.e. potential invitation of PG&E or other members of the public).
- Any special work accommodation requests and transportation, equipment, or law-enforcement needs (e.g. traffic restriction or control, noise suppression, logistical support, worker presence, power supply).

For the purposes of this protocol, key Tribal ceremonies will include any ceremonies or activities for which the Tribes choose to notify and/or ask for assistance. It is not necessary for the Tribal representatives to discuss the nature, purpose, or significance of the Tribal ceremonial activities. PG&E will consider the information shared in this initial conversation to be confidential and will commit to a time frame for responding to the request. During this discussion, PG&E and Tribal representatives will identify other impacted landowners. The Tribal representative will be responsible for further discussion of the ceremonial activities with these landowners, if necessary.

PG&E will consider Tribal requests in order to allow the Tribe(s) to conduct ceremonial activities in the requested timeframe. If the request requires a modification to PG&E's work schedule or processes, PG&E will evaluate the potential to accommodate this modification. Potential outcomes of this assessment are:

- The accommodations can be accomplished by the PG&E team as requested, without modifications.

- The accommodations can be accomplished by the PG&E team as requested, but only if some of the details are modified.

- The accommodations cannot be accomplished by PG&E.

PG&E will communicate directly with the requester (by telephone or in person) as soon as the request has been evaluated. PG&E will indicate if all of the requests can be accommodated and, if not, suggest alternatives that PG&E can accommodate. The requestor and PG&E will also discuss the details of other services that PG&E may agree to provide for the benefit of the ceremonial activity, including, power, water, parking, signage, or other support. PG&E will also identify any reasonable and necessary stipulations regarding health and safety, logistical, communication, or site access procedures to be followed in the Topock Compressor Station Groundwater Remediation Project (Project) Area. One stipulation will clearly state that the Topock Compressor Station is excluded, and that access to it cannot be provided.

PG&E must comply with all their obligations as agreed to in the previous steps of this protocol. In the event of an unforeseen emergency schedule change, PG&E will notify the Tribes immediately if the emergency would unduly interfere with the requested Tribal activity

Prior to any Tribal activity in the Project area, PG&E will inform employees, consultants, contractors, and subcontractors about the appropriate onsite behavior. As emphasized during the training received by each individual under the Worker Cultural Sensitivity Education Program (CUL-1a-13), all employees, consultants, contractors, and subcontractors shall respect Tribal rights and treat Tribal representatives with respect. PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers or contractors who do not comply.

Participation in the requested activities may be limited to Tribal members only. If PG&E staff, consultants, contractors or subcontractors are invited to participate, they will watch respectfully, turn off cell phones and other electronic devices, refrain from

photographing the activity without permission, and adhere to any instructions from Tribal members, subject to safety considerations.

Access to the Project area by Tribal religious practitioners for the purpose of conducting Tribal ceremonies will be consistent with Federal and state laws, regulations, and agreements governing the property within the Project area. Such access will also be consistent with the Access Plan prepared under Mitigation Monitoring and Reporting Program (MMRP) CUL-1a-2 and General Principle I.C contained in the Bureau of Land Management (BLM) Programmatic Agreement (BLM PA)[4]. *See* BLM's PG&E Topock Remediation Project Tribal Access Plan for Federal Properties. Several other key regulatory requirements promote the protection and preservation of Native American religious practices and support this protocol. Federal laws and regulations that apply to Federally owned or managed land include the American Indian Religious Freedom Act (AIRFA) of 1978 (42 USC Sections 1996 ad 1996a); Religious Freedom Restoration Act of 1993 (RFRA) (42 USC Sections 2000bb and 2000bb-4); and Executive Order 13007 (61 Federal Register 26771–26772). California Public Resources Code sections 5097.9 and 5097.97 are also relevant in this regard.

PG&E agrees to maintain the confidentiality of documents to the maximum extent allowed by law throughout the process described above. Sensitive information regarding the location, nature, practices, and use of cultural resources will not be

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[4] BLM PA General Principle I.C: "Respect Tribes' rights to express their traditional cultural values, including those associated with their religions, and their right to access Federally-managed lands to conduct cultural and religious practices, as variously specified in E.O. 13007, the Religious Freedom Restoration Act (RFRA), and the American Indian Religious Freedom Act. Additionally, the BLM, U.S. Fish and Wildlife Service (USFWS), U.S. Bureau of Reclamation (USBR), and PG&E shall consult with the Tribes that attach cultural significance to the Traditional Cultural Property (TCP) within the Area of Potential Effect (APE) to develop a plan to ensure Tribal access to areas within the APE for traditional religious, cultural, or spiritual purposes. Access shall be consistent with applicable laws, regulations, and agreements governing property within the APE and may not impede the Topock Remediation Project, may not create health and safety concerns, and shall exclude the Topock Compressor Station and related facilities."

disclosed to the general public or unauthorized persons. This policy is consistent with Section 304 of the National Historic Preservation Act (NHPA), Section 9 of the Archaeological Resources Protection Act (ARPA), and California Government Code Section 6254.10.

See also:

- PA: *General Principles* I(C).

- CHPMP: Section 7.2, "Accommodation of Tribal Activities and Ceremonies Involving the Topock Maze/TCP."BLM's PG&E Topock Remediation Tribal Access Plan for Federal Properties (Nov. 26, 2011).MMRP CUL-1a-13 and MMRP CUL-1a-2.

2.12 CUL-1a-8l: PROTOCOLS FOR TRIBAL MONITORS TO OBSERVE GROUND-DISTURBING ACTIVITIES

CUL-1a-8l: Provisions affording sufficient tribal monitors to observe ground-disturbing activities and/or other scientific surveying (e.g., biological surveys) that may occur in preparation for construction activities. Ground-disturbing activities include trenching, excavation, grading, well excavation/drilling, decommissioning the IM-3 Facility and subsurface pipeline, or other construction-related activities (DTSC, 2011a).

2.12.1 Covered Activities and General Principles

Pacific Gas and Electric Company (PG&E) will notify the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) of planned ground-disturbing activities and other scientific surveying that is conducted in anticipation of construction activities. This provides the opportunity for Tribes to send Tribal monitors to the site to observe these activities, if they wish. While on site, Tribal monitors will have the opportunity to discuss their concerns directly with the PG&E project team while the activities are proceeding, as well as reporting their observations and any issues of concern directly to the Tribe(s) that they represent. The types of activities to be listed in these notifications include, but are not limited to:

- Biological and geotechnical field surveys.
- Archaeological and historical surveys.
- Construction-related ground-disturbing activities including, but not limited to non-maintenance grading, trenching, excavation, auger boring, and well drilling.

PG&E will ensure that the Tribes are informed in advance whenever any of the above activities is proposed, and of the date(s) and time of such activities. The PG&E notification will also identify circumstances where more than one applicable activity is being conducted simultaneously. Sufficient time (a minimum of 1 week notice) will be allowed between the notification and the beginning of the field activity that the Tribe(s) will be able to prepare adequately without undue haste and arrange for one or more monitors. After a firm schedule for field activities is established and communicated, it will be the designated Tribal monitor's (or monitors') responsibility to be at the work site on time and properly attired for safety. Scheduled Project activities will not be delayed

if a notified monitor fails to report to work at the designated time. If the field activity schedule changes, the Tribes will be notified.

It is the responsibility of monitors to report to and maintain ongoing communication with their respective Tribe(s). Each Tribal monitor will prepare a Daily Monitoring Log, which will be signed by the monitor and the designated site supervisor and/or PG&E's onsite project manager (or designee), and submitted to PG&E at the end of each day.

Monitoring of the Project's ground-disturbing activities will be in accordance with this protocol, as well as with the "Tribal and Archaeological Monitoring Protocol" of the Programmatic Agreement (PA) (BLM et al., 2010: Appendix C). The safety requirements identified in Appendix C will apply at all times, as well as the requirement for all monitors to check in to the designated location at the start of work each day.

See also:

- PA: *Standards:* Stipulation XI(C) and Appendix C (Tribal and Archaeological Monitoring Protocol).

- CHPMP: Section 6.6.4 "Construction Monitoring," Section 6.6.5 "Periodic Site Monitoring," and Section 6.8 "Protocols for Tribal and Archaeological Monitoring."

2.13 CUL-1a-8m: PROVISION OF REASONABLE COMPENSATION FOR TRIBAL MONITORS

CUL-1a-8m: Provisions of reasonable compensation for tribal monitors consistent with historic rates (DTSC, 2011a).

Pacific Gas and Electric Company (PG&E) has collaborated with and will continue to collaborate with the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) regarding the Tribes' concern that Tribal monitors be reasonably compensated. PG&E has entered into various Memoranda of Understanding (MOUs) and agreements with various Tribes, and the terms and stipulations set forth in those MOUs may affect the types and rates of compensation to be provided.

PG&E will provide reasonable compensation for Tribal monitors who work on the Project. PG&E will negotiate with Tribes, taking into account the requirements of any pertinent MOUs or other legal agreements, to establish pay rates for monitors consistent with historic rates. The negotiated compensation rates will then be formalized in a separate MOU, or in amendments to an existing MOU, with each Tribe that will be supplying the services of one or more monitors.

See also:

- MOUs with Tribes providing reasonable compensation for Tribal monitors

2.14 CUL-1a-8n: PROTOCOLS FOR PROTECTIVE MEASURES FOR ARCHAEOLOGICAL/ HISTORICAL SITES DURING CONSTRUCTION

CUL-1a-8n: Locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction (DTSC, 2011a).

2.14.1 Pre-Construction Measures to Identify Sites Requiring Protection

To the extent feasible, archaeological, historical, and other cultural sites that may require protective measures during construction will be identified during pre-construction planning. Pre-construction planning efforts will: (1) identify the location and boundaries of any archaeological, historical, and other cultural sites requiring protective measures during construction; and (2) establish zones within which construction may proceed. Multiple techniques will be used to identify sites needing protection, including: checking the existing site inventory and geographic information system (GIS) database; using maps to compare planned construction areas with known culturally sensitive site locations, and pinpointing the sites that may need protection; considering the boundaries of proposed work areas relative to the location of known archaeological and historical sites; coordinating with Bureau of Land Management (BLM) if Federal or Tribal lands are involved; and conducting a field visit, or visits, to critical sites/areas to determine if protective measures are needed and to assess what type of protective devices would be most suitable at each location. Pacific Gas and Electric Company (PG&E) and BLM will consult with the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) during this process.

2.14.2 Identification of Protective Measures Prior to Construction

Project-related impacts on archaeological and historical shall be avoided to the maximum extent practicable. Avoidance of known cultural sites/sensitive areas may be accomplished by using existing or approved routes of travel, and by carefully avoiding archaeological and historical sites when selecting laydown, access, and temporary work areas appurtenant to construction activities. Moreover, when establishing construction zones, PG&E will take into account the results of the identification efforts described in the preceding section.

2.14.3 Measures to Identify New Sites Requiring Protection during Construction

PG&E has retained a qualified archaeologist in compliance with CUL-1a-3a, Applied EarthWorks, Inc., to inspect and evaluate any previously unidentified or suspected archaeological or historical resources found during construction, operation, or decommissioning of the Project. Should any such resources be discovered, earth-disturbing activities will be temporarily suspended at the location of the find. The find will then be treated by modifying the extent of the construction zone to avoid and protect the resource(s). Thereafter, earth-moving activities may resume within the modified construction zone. Tribal notification will occur per requirements of the Cultural and Historic Properties Management Plan (CHPMP) and the Programmatic Agreement (PA).

2.14.4 Implementation of Protective Measures

If warranted, protective measures may be employed on or around the archaeological or historical site to protect the resource from disturbance. These measures may include, but are not limited to, protective coverings of soil or riprap, onsite personnel to prevent access to sensitive areas, use of flagging, blaze orange mesh fencing secured to steel posts, bollards, natural barriers of rocks or piled brush, cables suspended between secure posts, and/or signage (e.g., “This Area Closed” or “Exclusion Zone: Keep Out”). Any such measures will be temporary (only as needed during construction), and will, to the extent practicable, not call undue attention to the nature of the resource being protected.

Ongoing work within the established construction zone may continue. PG&E, in consultation with Department of Toxic Substances Control (DTSC) (and with Bureau of Land Management [BLM] if Federal and/or Tribal land is involved) and the Tribes, will determine the appropriate protective measures on a case-by- case basis, and may increase or reduce the size of the Environmentally Sensitive Area (ESA) or Exclusion Zone (EZ) if agreed to by representatives of these parties in the field.

Finally, the protective measures set forth in this section will be thoroughly covered in the Worker Education Program. Construction workers will be explicitly advised that: fenced, barricaded, or closed locations are to be completely avoided; all equipment and personnel are to stay within designated routes; and employees are not to wander into excluded areas during their free time.

2.14.5 Installation and Inspection of Protective Measures during Construction

Applied EarthWorks, Inc's qualified archaeologists will monitor the installation of all protective measures discussed in Subsection 14.4, above, and their removal after construction. Similarly, Tribal Monitors will be notified and invited to monitor the installation of all protective measures and their removal after construction. PG&E construction inspectors will conduct and document systematic inspections of the integrity of protective measures during the entire period of construction activity.

2.14.6 Protection of New Sites Discovered during Construction

Qualified archaeologists representing Applied EarthWorks, Inc. will inspect and evaluate any new sites that may be discovered during construction and will notify Tribal Monitors of the discovery. Tribal Monitors will then inspect and evaluate the new site(s). Every effort will be made to avoid adverse effects on the discovered site(s) to the maximum extent practicable. During the initial inspection, the archaeologist will use simple visual observation to record information on the content, structure, stratigraphic integrity, approximate date of deposition, and range and quantity of artifacts present. For historic-period deposits, the archaeologist may gauge the approximate depth of refuse-filled pits by probing with a steel rod or using other low-impact methods to better define data potentials without excavation. Artifact collection will be minimized during this phase of work, thereby reducing the need for laboratory processing and analysis. During the initial inspection, the archaeologist will complete a Primary Record, Archaeological Site Record, and/or other forms necessary to document the discovery and obtain a registration number from the California Historical Resources Information System or the Arizona State Museum, depending on location of discovery. Tribal monitors will be invited to provide input on these forms.

If protective measures are indicated for sites discovered during construction, they will be implemented in accordance with Subsections 14.4 and 14.5, above, and with Section 8.1 of the CHPMP (BLM, 2012).

2.14.7 Restoration After Removal of Protective Measures

After removal of protective measures (e.g., fencing, poles), the areas will be restored to pre-construction conditions. The pre-construction condition of these areas will be documented using various tools, including aerial photographs, ground-level photographs, topographical surveys, disturbed area mapping, archaeological surveys, historical resource surveys, and biological surveys (see Section 2.5.2, CUL-1a-8n). Post-restoration condition will be photo documented.

See also:

- PA: *Remediating Groundwater Contamination*: Stipulation II(B)(2)(e); *Discoveries*: Stipulation IX(A)

- CHPMP: Section 6.6.3 “Avoidance Measures/Management Thresholds,” Section 6.6.5 “Periodic Site Monitoring,” and Section 7.1 “Treatment of the Topock Maze/TCP and any Associated Contributing Properties.”

- MMRP CUL-1a-3a.

2.15 CUL-1a-8o: PROTOCOLS FOR REPORTING DISCOVERIES OF CULTURAL IMPORTANCE

CUL-1a-8o: Protocols for the reporting of discoveries of cultural importance consistent with existing statutes and regulations (DTSC, 2011a).

In the event that any previously unidentified or suspected historic or archeological resource, such as human remains and/or associated funerary objects or graves, is discovered during construction, Pacific Gas and Electric Company (PG&E) will immediately notify the Department of Toxic Substances Control (DTSC), Bureau of Land Management (BLM), and Tribal representatives if the resource is Native American, as required in the Cultural and Historic Properties Management Plan (CHPMP) (BLM, 2012) and consistent with the mitigation measures prescribed in Environmental Impact Report (EIR) Chapter 5.1.1. Consistent with CHPMP Section 8.1 (Steps to be Taken if Previously Unrecorded Properties are Found), no further work will be undertaken in the vicinity of the discovery (an area not to exceed fifty (50) meters from the approximate center point of the discovery) until the BLM, in consultation with the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) and PG&E in the field, have determined the nature of the discovery and developed appropriate measures for its evaluation and/or treatment, including documentation. As specified in the CHPMP, ongoing work not within fifty (50) meters of the discovery (or a smaller area if determined appropriate by parties in the field) may continue. Use of exclusionary fencing, flagging, or other physical barriers should be considered as prescribed in EIR Chapter 5.1.1, Mitigation Measure CUL-1b and CUL-1c.

PG&E has received Tribal input that: "The tribes feel strongly that Cultural and Religious sensitivity in handling human remains, items of cultural patrimony or funerary objects that may be found, is paramount to this process."[5] Human remains, items of cultural patrimony, or funerary objects that may be found shall be handled with utmost cultural and religious sensitivity. The Tribes have also stated: "Being that avoidance is the preferred method, excavation, removal or further disturbance of any of these types of objects is not really favored by the Tribes."[1] As specified in Section 2.2.1, avoidance of cultural resources is preferred over excavation, removal, or further disturbance, particularly in discoveries involving human remains, items of cultural patrimony, or funerary objects. Where human remains and funerary objects, ceremonial items, and items of cultural patrimony are discovered, PG&E will implement the reporting

[5] Email dated April 4, 2014 from Edgar Castillo (Cocopah) to Glenn Caruso (PG&E)

protocols provided in Appendix D (Plan of Action [POA]) of the CHPMP and consistent with Mitigation Measure CUL-4 in EIR Chapter 5.1.1. The POA states that decisions on reporting will be made based on a consultative process, during which BLM will take into account the recommendation(s) of the appropriate Native American lineal descendant or Tribe, or Most Likely Descendant, or group with cultural affinity.

During initial inspection, PG&E's qualified Cultural Resources Consultant (as specified in CUL-1a-3(a)) will document the discovery. Tribal monitors will be invited to assist in the preparation of the documentation and identification of Tribal cultural values. Discoveries identified as having cultural importance will be documented in a culturally sensitive manner acceptable to the Interested Tribe(s). PG&E will consult with the BLM, and BLM will consult with the Tribal representatives if the resource is Native American in nature, to define the nature and extent of any further studies that may be required.

Discoveries of cultural importance containing archaeological or historical remains will be reported in the reasonable and customary documents (see Section 2.2). Among these are cultural resource survey reports, archaeological site records, historical site studies, archaeological testing and data-recovery reports, daily monitor's logs, and reports of archaeological and Native American monitoring. Except for daily logs and field notes, each type of document will be made available in draft for review by BLM, and, if the subject resource is Native American, by the Tribes. Final documentation will be distributed to DTSC, BLM, the Tribes, and PG&E, and to the Arizona State Museum (ASM) or California Historical Resources Information System (CHRIS) regional information center as appropriate.

See also:

- PA: *Discoveries*: Stipulation IX(A), Stipulation IX(B), Stipulation IX(C), Stipulation IX(D).
- CHPMP: Section 8 "Discoveries," see also Appendix C (Discovery Plan) and Appendix D (Plan of Action).
- Environmental Impact Report for the Topock Compressor Station Groundwater Remediation Project, California Department of Toxic Substances Control, January 2011, Chapter 5.1.1, Unavoidable Significant Impacts, Cultural Resources.

2.16 CUL-1a-8p: PROTOCOLS FOR INSPECTING REMEDIATION FACILITIES AND/OR STAGING AREAS DURING CONSTRUCTION

CUL-1a-8p: Protocols for the inspection of remediation facilities and/or staging areas throughout the construction phase (DTSC, 2011a).

The locations of remediation facilities and staging areas will be examined for cultural resources throughout the construction phase. The first steps in this process will be advance notification of interested parties, including Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) as required by CUL-1a-8j and implementation of procedures for the review of Project design documents per CUL-1a-8d. In addition, to avoid or minimize significant impacts in accordance with CUL-1a-1 and consistent with the priorities in land and facilities use for remediation activities stipulated by CUL-1a-9, previously impacted land will be selected wherever feasible for re-use as staging areas and/or for the siting of remediation facilities. Direct physical impacts to the Topock Maze as it is manifested archaeologically will be completely avoided, per CUL-1a-10, when siting any staging area or remediation facility.

Pacific Gas and Electric Company's (PG&E) qualified archaeologist, in coordination with the Tribes, will perform background research and field verification to identify and evaluate any cultural, historical, or archaeological resources within the location of remediation facilities and/or staging areas. Any resources present will be avoided to the extent feasible during construction and use of staging areas and/or remediation facilities pursuant to CUL-1b/c and CUL-2. Further, construction monitoring and treatment of any unanticipated discoveries will be as specified in CUL-1b/c-4 and CUL-1a-8o. Accordingly, archaeological and Native American monitors will be invited to observe all earth-disturbing activities at remediation facilities and/or staging areas during construction. These monitors will at all times comply with Project-wide and job site-specific safety requirements.

See also:

- MMRPs: CUL-1a-1, CUL-1a-8d, CUL-1a-8j, CUL-1a-8o, CUL-1a-9, CUL-1a-10, CUL-1b/c, CUL-1b/c-4, CUL-2.

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MOUs with Tribes providing reasonable compensation

Appendix A

Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants

Final

Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants

Prepared for

Pacific Gas and Electric Company

April 2014

Prepared by

E2 Consulting Engineers, Inc.

Garcia and Associates (GANDA)

and

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Appendix

A Commercial Nurseries that Grow Native Mojave Desert Plants

Acronyms and Abbreviations

BNSF	Burlington Northern Santa Fe
CIMP	Cultural Impact Mitigation Program
DTSC	California Department of Toxic Substances Control
FEIR	Final Environmental Impact Report
GPS	global positioning system
ISA	International Society of Arboriculture
PG&E	Pacific Gas and Electric Company
Project Area	Topock Groundwater Remediation Project Area
TCS	Topock Compressor Station

SECTION 1

Introduction

In December 1951, the Topock Compressor Station (TCS) began operations to compress natural gas supplied from the southwestern U.S. for transport through pipelines to Pacific Gas and Electric Company's (PG&E's) service territory in central and northern California. The compressor station is still active and is anticipated to remain active into the foreseeable future. The operations at the compressor station consist of six major activities: water conditioning; compressing natural gas; cooling compressed natural gas and compressor lubricating oil; wastewater treatment; facility and equipment maintenance; and miscellaneous operations.

In 1996, PG&E entered into a Corrective Action Consent Agreement with the California Department of Toxic Substances Control (DTSC) to oversee the investigation and remediation of the TCS under California state law. DTSC is the California state lead agency charged with directing investigative activities in the action area in accordance with the Resource Conservation and Recovery Act. In July 2005, PG&E and the Federal Agencies entered into a Consent Agreement that outlined the process by which PG&E would comply with the Comprehensive Environmental Response, Compensation, and Liability Act requirements during the investigation and remediation of the action area, which included coordinating response actions with the requirements of the DTSC to the extent practicable. DTSC issued a Final Environmental Impact Report (FEIR) for the project in January 2011. In January 2013, PG&E and the Federal Agencies entered into a Consent Decree on the Remedial Design and Remedial Action.

Mitigation Measure CUL-1a-5 included in the FEIR and in the adopted Mitigation Monitoring and Reporting Program states: *Should any indigenous plants of traditional cultural significance and listed in Appendix PLA of this FEIR be identified within the project area, PG&E shall avoid, protect, and encourage the natural regeneration of the identified plants when developing the remediation design, final restoration plan, and IM-3 decommission plan. In the event that impacts on the identified plants cannot be avoided and such plants will be displaced, PG&E shall retain a qualified botanist who shall prepare a plant transplantation /monitoring plan which can be included as part of the Cultural Impact Mitigation Program (CIMP) referenced in CUL-1a-8 either by (1) transplanting such indigenous plants to an on-site location, or (2) providing a 2:1 ratio replacement to another location decided upon between PG&E and members of the Interested Tribes. Plans to transplant or replace such plants shall be approved by DTSC. In coordination with the qualified botanist, PG&E shall monitor all replanted and replacement plants for at least 3-5 years, and shall ensure at least a 75 percent survivorship during that time. This mitigation measure is not meant to replace or subsume any actions required by state or federal entities with regard to the protection of species listed as rare, threatened, or endangered.*

The purpose of this plan is to provide detailed information on salvage, relocation and transplantation methods, and replacement planting for culturally significant species as required by FEIR mitigation measure CUL-1a-5. This report also includes proposed monitoring methods, survival criteria and a discussion of adaptive management. This plan does not address mitigation for threatened, endangered or rare plant species.

1.1 Goals and Objectives

The goal of the plant mitigation and monitoring plan is to protect and preserve culturally significant plants in the Topock Groundwater Remediation Project Area (Project Area). The Project Area includes the area studied in the FEIR (DTSC, 2011) as well as the potential Soil Stockpile and the proposed Freshwater Source Evaluation Locations.

The primary objective is to avoid and minimize disturbance of these plants and, where this is not possible, to mitigate for disturbance through salvage or restoration planting.

1.2 Description of Existing Conditions

General vegetation mapping and habitat characterizations surveys were conducted in August 2011 (PG&E 2013a). There are ten primary terrestrial plant community types and three major wetland communities in the Project Area. The primary terrestrial plant community types are creosote bush scrub, tamarisk thickets, arrow weed

thickets, blue palo verde woodlands, cat-claw acacia thorn scrub, hillside palo verde scrub, allscale scrub, quailbush scrub, western honey mesquite bosque, and screwbean mesquite bosque (Sawyer et al. 2009). The primary wetland communities include California bulrush marshes, cattail marshes, and common reed marshes. Descriptions of these primary plant communities are provided in the following sections.

1.2.1 Terrestrial Communities

Creosote Bush Scrub

The most common and widespread plant community in the Project Area is creosote bush scrub. This vegetation type is characterized by widely-spaced creosote bush (*Larrea tridentata*) with associated species such as white bursage (*Ambrosia dumosa*), white rhatany (*Krameria bicolor*), brittlebush (*Encelia farinosa*), beavertail cactus (*Opuntia basilaris* var*. basilaris*), and silver cholla (*Cylindropuntia echinocarpa*).

Tamarisk Thicket

Tamarisk thicket is found primarily on the low sandy terraces adjacent to the Colorado River Park Moabi Slough. This vegetation type is also found near the terminus of the larger ephemeral washes associated with the dissected terraces south of the Colorado River. Vegetation is characterized by open to dense stands of the non-native and invasive salt cedar (*Tamarix ramosissima*). In many locations salt cedar trees and shrubs occur as monospecific stands; in other areas associated trees or shrubs include athel (*Tamarix aphylla*), western honey mesquite (*Prosopis glandulosa* var*. torreyana*), screwbean mesquite (*Prosopis pubescens*), blue palo verde (*Parkinsonia florida*) and arrow weed (*Pluchea sericea*). Herbaceous vegetation is absent within dense thickets of salt cedar, but occurs in openings between such thickets where scattered individuals of fanleaf crinklemat (*Tiquilia plicata*), Spanish needle (*Palafoxia arida*) and *Cryptantha* spp. may be present.

Arrow Weed Thicket

Arrow weed thicket is also found on the low sandy terraces along the Colorado River and Park Moabi Slough. Arrow weed is the sole dominant shrub species occurring in the sandy terraces, with individuals widely scattered or aggregated into dense, nearly impenetrable stands. This community is often intermixed with tamarisk thickets and mesquite bosque on the low terraces along the river. Associated species include salt cedar, smoke tree (*Psorothamnus spinosus*), western honey mesquite, brittlebush, and broom baccharis (*Baccharis sarothroides*). Scattered herbaceous vegetation in the more open areas includes fanleaf crinklemat, Spanish needle, *Cryptantha* spp., and Mediterranean grass (*Schismus barbatus*).

Blue Palo Verde Woodland

Blue palo verde woodland is restricted to the edges and channel bottoms of the ephemeral washes in the dissected alluvial terraces that characterize the largest portion of the Project Area south of the Colorado River. Total vegetation cover is generally low, but species diversity is relatively high compared to the other vegetation types in the Project Area. Blue palo verde is the dominant tree with scattered individuals of salt cedar, athel, and smoke tree also present in some areas. Associated shrubs include cat-claw acacia (*Senegalia greggi*), Anderson's desert-thorn (*Lycium andersonii*), brittlebush, sweetbush (*Bebbia juncea* var*. aspera*), cheesebush (*Hymenoclea salsola*), climbing milkweed (*Funastrum hirtellum*), desert lavender (*Hyptis emoryi*), whitebursage, white rhatany, and creosote bush. Common herbaceous species include small-seeded spurge (*Chamaesyce* spp.), small-flowered California poppy (*Eschscholzia minutiflora*), Emory rock daisy (*Perityle emoryi*), Spanish needle, and Arizona lupine (*Lupinus arizonicus*).

Cat-Claw Acacia Thorn Scrub

In the Project Area cat-claw acacia thorn scrub is limited to the bottoms of moderate-sized ephemeral washes in the dissected terraces south of the Colorado River. This vegetation type is characterized by widely scattered shrubs dominated by cat-claw acacia. Common associated species include Anderson's desert-thorn, brittlebush, sweetbush, cheesebush, desert lavender, white bursage, white rhatany and creosote bush. Herbaceous species include small-seeded spurge, Arizona lupine, and Spanish needle.

Hillside Palo Verde Scrub

Hillside palo verde scrub is restricted to a small area east of the compressor station along the slopes of the Chemehuevi Mountains. Vegetation in this area is characterized by scattered hillside palo verde (*Parkinsonia microphylla*). Associated species in this area include creosote bush, pygmy-cedar (*Peucephyllum schottii*), brittlebush, white rhatany, beavertail cactus, buckhorn cholla, California barrel cactus (*Ferocactus cylindraceus* var*. cylindraceus*) and desert trumpet (*Eriogonum inflatum*).

Quailbush Scrub

Quailbush scrub is dominated by big saltbush (=quailbush) (*Atriplex lentiformis*) and occurs on low-lying alkaline or saline soils (Sawyer et al. 2009). In the Project Area, it is most common along Arizona County Road 10 (formerly Route 66). On the north side of the road, it occurs in nearly monospecific stands on sandy saline/alkaline soils north of the Topock Marsh on the Havasu National Wildlife Refuge. Common associated species include bush seepweed (*Suaeda moquinii*) and Russian thistle (*Salsola tragus*). Quailbush scrub also occurs in scattered patches in disturbed areas near the Colorado River around Park Moabi and on the edge of arrow weed thickets at the foot of the southernmost gas line bridge over the Colorado River.

Allscale Scrub

Allscale scrub is dominated by cattle saltbush (=allscale) (*Atriplex polycarpa*) and is the most common alkaline tolerant shrubland alliance in the Project Area, although it only occurs in a few patchy locations. In the Project Area, allscale scrub occurs in scattered locations along the access road to the compressor station (formerly part of Route 66) and on the north side of Interstate 40 in Arizona.

Western Honey Mesquite Bosque

In the Project Area, western honey mesquite bosque is restricted to the low sandy terraces along the Colorado River. This community is dominated by western honey mesquite and often includes salt cedar and arrow weed as associates.

Screwbean Mesquite Bosque

Screwbean mesquite bosque is also restricted to the low sandy terraces along the Colorado River in the Project Area, but is concentrated in relatively small areas. This community is dominated by screwbean mesquite and is most abundant where the outlet from the Topock Marsh enters the Colorado River across from the Topock Marina. It is also a principal component of the screwbean/tamarisk thicket vegetation that covers the southern portion of the Park Moabi peninsula and is common near the Burlington Northern Santa Fe (BNSF) railroad bridge on the east side of the National Trails Highway.

1.2.2 Wetland Communities

Along the Colorado River and its inlets are patches of wetlands with various marsh plants forming three principal wetland communities, from the mostly submerged cattail (*Typha latifolia*) marshes and California bulrush (*Schoenoplectus californicus*) marshes, to the adjacent but somewhat drier common reed (*Phragmites australis*) marshes. The common reed marshes are concentrated and most extensive at the River's edge south of the I-40 bridge, whereas the bulrush marshes occur in scattered locations along the Colorado River and Park Moabi Slough throughout the Project Area. It is likely that the common reed species in the Project Area is an invasive, non-indigenous form of *Phragmites australis*.

1.2.3 Segments of the Project Area

The study area was divided into the following 11 segments to further localize plant occurrences. Project area segments are shown in Figure 1.

Segment A: The western portion of Segment A north of National Trails Highway is developed and landscaped, and is entirely within the boundary of the Moabi Regional Park. The developed portion of Moabi Regional Park includes offices, a mobile home park, RV storage lots, parking areas, camping areas, - a boat launch, a marina, a

store, a restaurant, vacation housing, and paved and unpaved parking lots. The landscaped areas of Moabi Regional Park is planted primarily with Mexican fan palms (*Washingtonia robusta*), but they also include California fan palms (*Washingtonia filifera*), western honey mesquite, Fremont's cottonwood (*Populus fremontii*), eucalyptus (*Eucalyptus* spp.), and other native and exotic landscape plants. Undeveloped areas with natural vegetation are restricted primarily to areas to the south of National Trails Highway, with the exception of the sewage disposal ponds on the southwest corner of Park Moabi Road and National Trails Highway. On the south side of National Trails Highway, there is a broad dry wash that is partially channelized and includes blue palo verde, smoke trees, and creosote bushes. This wash drains into a low-lying area covered with blue palo verde woodland, and tamarisk and athel thickets. The flat-topped hill to the south and west of the wash is covered with desert pavement on top and steep gravely slopes on the sides. This hill is covered with creosote bush scrub that is dominated almost exclusively by creosote bush and beavertail cactus.

The eastern portion of Segment A resembles a pan handle (Figure 1) and is covered primarily in creosote bush scrub on the rocky hills. On the adjacent flats are small patches of a variety of other vegetation types including wetlands with California bulrush, common reed, and giant reed (*Arundo donax*) along the edge of the cove. Away from the water's edge are tamarisk thickets, mixed western honey mesquite/tamarisk thickets, screwbean mesquite thickets, arrow weed thickets, a cattail marsh, and creosote bush and allscale scrub. On the south side of National Trails Highway are hills covered in creosote bush scrub with the low areas characterized by tamarisk thickets or tamarisk/western honey mesquite thickets.

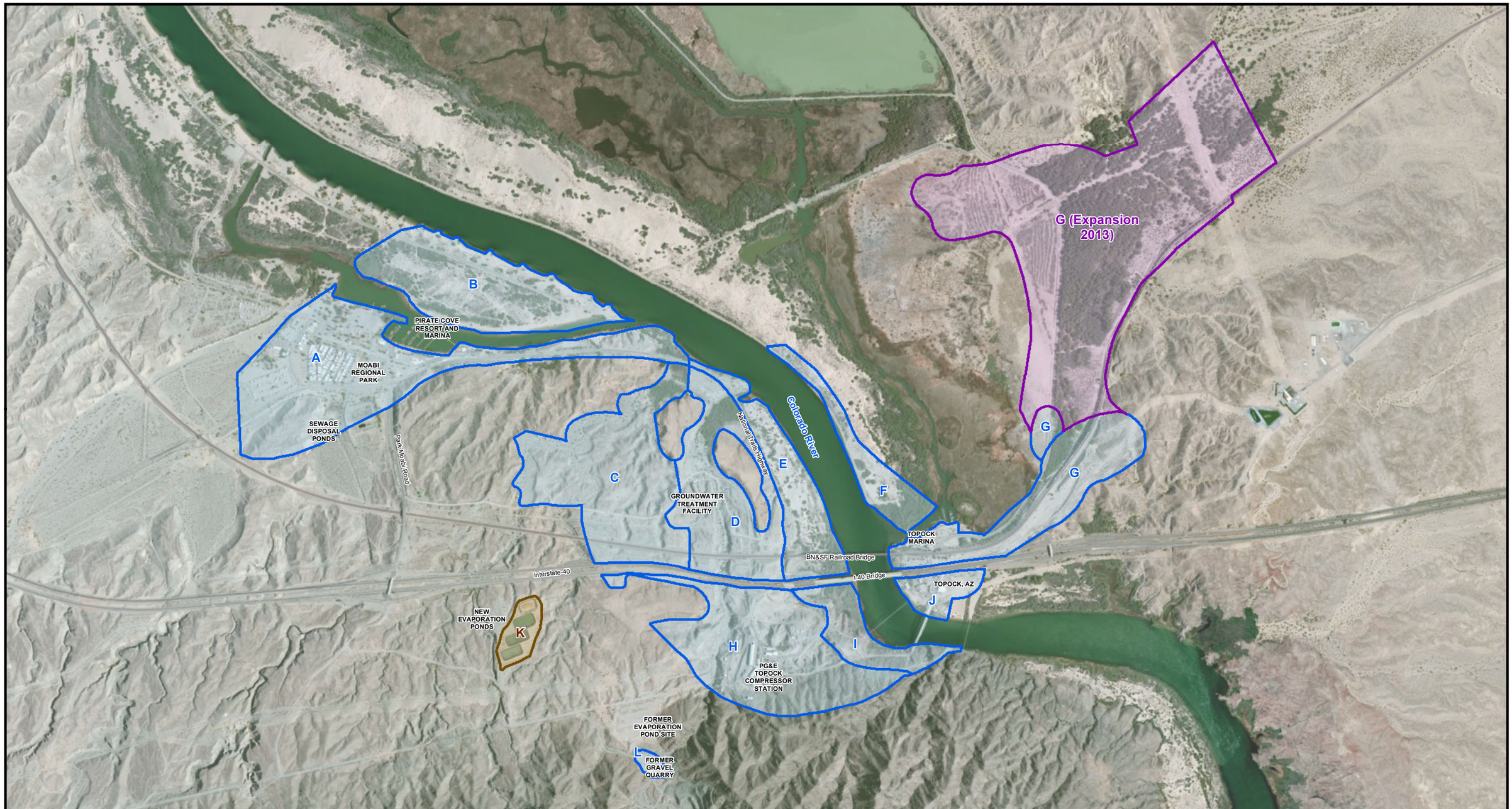
Segment B: This Segment is a peninsula that includes a significant amount of dredge sands from the Colorado River. The central portion of the peninsula is dominated by arrow weed thickets, tamarisk thickets, with scattered individuals of western honey mesquite, smoke tree, and creosote bush and one individual of Gooding's Willow. The river's edge is mostly disturbed with a series of RV camping pads and restrooms. Plantings in this area include Fremont's cottonwood, eucalyptus, and athel. On the cove side is a small wetland area dominated by California bulrush, cattails, geniculate spike rush (*Eleocharis geniculata*), rough-glume bushy blue stem (*Andropogon glomeratus* ssp. *scabriglumis*) and other wetland plants, as well as an artificially cleared and maintained beach along the north side of Park Moabi Slough.

Segment C: This Segment consists of alluvial terraces dissected by small drainage channels that converge on a single broad sandy wash. The wash is occupied primarily by blue palo verde woodland with cat-claw acacia scrub, and an area of creosote bush mixed with cattle salt bush. There is also a large area containing tamarisk thickets near the National Trails Highway. The surrounding rocky hills are covered with creosote bush scrub dominated by creosote bush and white bursage. The tops of the hills are mostly flat and rocky with desert pavement.

Segment D: This Segment is similar to Segment C and dominated by one major wash system, Bat Cave Wash. Most of this wash is dominated by blue palo verde woodland with occasional smoke trees, but it ends in an extensive dense tamarisk and mesquite bosque thicket just before the wash passes under the road and empties into the Colorado River.

Segment E: This Segment is mostly a sandy flood plain extending from the I-40 bridge to just beyond the outlet for Bat Cave Wash into the Colorado River. The sandy nature of the flood plain is due to dredge sands deposited during the channelization of the Colorado River. The major vegetation types in this Segment are arrow weed and tamarisk thickets. There are also some rocky upland slopes dominated by creosote bush scrub with scattered individuals of blue palo verde and western honey mesquite extending up to the National Trails Highway along the western edge of the Segment. There is a small area of creosote bush scrub with a narrow strip of tamarisk thickets on the northwest of the Bat Cave Wash inlet.

Segment F: This Segment is in Arizona, directly across the Colorado River from Segment E. Similar to Segment E, it consists mainly of dredge sands dominated by arrow weed thickets, tamarisk thickets and tamarisk thickets mixed with athel or screw bean mesquite. However, unlike Segment E, there are no areas of upland rocky hills with creosote bush scrub vegetation. Instead, this Segment has a lowland area at its southern tip that includes



LEGEND

- Survey Segments
- Survey Segment G (Expansion)
- Survey Segement K (Removed From Projecct Study Area)

N

0 600 1,200 2,400 Feet

FIGURE 1
PROJECT AREA WITH BOTANICAL SURVEY SEGMENTS

ETHNOBOTANICAL SURVEYS
PG&E TOPOCK GROUNDWATER REMEDIATION PROJECT, NEEDLES, CALIFORNIA

CH2MHILL

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screwbean mesquite and tamarisk thickets, as well as a small wetland along the southern edge across from the Topock Marina. This wetland is dominated by California bulrush, common reed, sand-bar willow (*Salix exigua*), with some marsh fleabane (*Pluchea odorata*), geniculate spikerush and other wetland species.

Segment G: This Segment in Arizona is bisected by the BN&SF railroad tracks. On the north side of the tracks at the western end is the Topock Marina with a mobile home park and associated parking areas. On the northwest side of the road at the eastern end is a small portion of the Topock marsh that is dominated by California bulrush. Between the road and the railroad tracks is a strip of tamarisk/western honey mesquite/blue palo verde thicket that grades into a denser stand of salt cedar as one progresses northeastward. Further along County Road 10, (formerly Route 66), there is a sandy alkaline/saline area dominated by big saltbush with scattered shrubs of bush seepweed and patches of Russian thistle. There is also a section of quailbush scrub on the southeast side of the road. The largest portion of Segment G, however, consists of upland hills dominated by creosote bush scrub in the northeast portion of the Segment. Most of this area is accessed from a gravel road that goes to a small PG&E facility. The western part of this area is sandy and flat and although disturbed by roads at its western end, is relatively rich in annuals and allscale scrub at the eastern end.

Segment H: This Segment is botanically interesting and diverse because it encompasses two areas of different geologic history that profoundly influence soils and vegetation. The northern two-thirds of the Segment consist of alluvial terraces primarily of tertiary origin, whereas the southern one-third consists of pre-tertiary metamorphic/igneous bedrock that forms the northernmost extension of the Chemehuevi Mountains. The TCS, its auxiliary structures and landscaping, are built on the alluvial terraces. The slopes around and just below the compressor station are disturbed, highly eroded and mostly devoid of natural vegetation. Segment H also includes part of Bat Cave Wash, a major dry wash system that starts in Segment L and finishes in Segment E. The rocky north-facing slopes composed of metadiorite, gneiss, and granitic rocks provide a rich substrate for succulents, including California barrel cactus, buckhorn cholla, and corkseed mammillaria (*Mammillaria tetrancistra*). These rocky slopes also provide habitat for hillside palo verde, and Pima rhatany (*Krameria erecta*); species that occur only on this rock formation.

Segment I: This Segment is similar to Segment H because it includes both the pre-tertiary bedrock of the Chemehuevi Mountains and the more recent tertiary alluvial terraces common in the more northerly Survey Segments (e.g., Segments A, C, D, G and E). Unlike Segment H, however, it includes a distinctive reddish Miocene conglomerate bedrock that is exposed below the Route 66 sign, as well as wetlands along the edge of the Colorado River that sit on recent (Quaternary) alluvial deposits. Segment I runs along the Colorado River from the I-40 bridge in the north to the southernmost gas transmission line bridge in the south. It includes many of the same species found in Segment H, and on the Miocene conglomerate includes the only known location for rock nettle (*Eucnide urens*) within the Project Area.

Segment J: This Segment is a small one that is developed and landscaped with private residences set back on the hills overlooking the Colorado River in Arizona. The slopes above the river are variously terraced and landscaped, yet there are a few patches of native vegetation that remain near the river's edge. These patches include common reed, arrow weed thickets, quailbush scrub and tamarisk thickets, as well as wetlands of California bulrush and cattail marshes. There is also landscaping with Mexican fan palms and a variety of other cultivated plants on the river's edge. Segment J contains a small area of partially degraded slopes above a wash at the east end of the Segment that is accessed from a road that drops down to the south from the frontage road next to I-40. These slopes are degraded creosote bush scrub, while the wash has remnants of blue palo verde woodland.

Segment L. This Segment is located next to a quarry site in a small valley approximately 0.3 mile southwest of the compressor station and consists mainly of a flat, but gently sloping (to the northeast) dry wash which is a portion of the Bat Cave Wash drainage system. The wash is characterized by scattered blue palo verde/cat-claw acacia, whereas the surrounding hills are covered with creosote bush scrub vegetation. The eastern portion of Segment L is covered by rocks from the gravel quarry and is devoid of vegetation. These rocks have been taken from the pre-tertiary bedrock that forms the northern extension of the Chemehuevi Mountains.

SECTION 2

Culturally Significant Plants in the Project Area

Protocol-level floristic surveys were conducted in the Fall of 2011 (October 31–Nov 8, 2011), in the Spring of 2012 (March 12–20, 2012) (PG&E 2013a) and in the Spring of 2013 (March 12-14). The primary goal for these surveys was to generate a comprehensive list of all plant species that occur in the Project Area and to census, map, photograph, and record habitat data for all special-status plant species, including those identified as culturally significant plants (Table 1).

Of the 53 plant species listed in Appendix PLA, Colorado River Culture Ethnobotany, of the FEIR, only about one-fourth (13 of 53) were found to occur in the EIR Project Area. Among the 13 species found on the Appendix PLA list are a variety of trees, shrubs, and herbs.

TABLE 1
Culturally Significant Plants in the Project Area from the Ethnoplant List in FEIR Appendix PLA

Common Name	Scientific Name	Flowering Period
Trees		
Blue palo verde	*Parkinsonia florida*	Apr–May
Hillside (Yellow) palo verde	*Parkinsonia microphylla*	Apr–May
Goodding's willow	*Salix gooddingii*	Mar–Apr
Screwbean mesquite	*Prosopis pubescens*	Apr–Sep
Western honey mesquite	*Prosopis glandulosa* var. *torreyana*	Apr–Aug
Shrubs		
Big saltbush (quailbush)	*Atriplex lentiformis*	Jul–Oct
Cattle saltbush (allscale)	*Atriplex polycarpa*	Jul–Oct
Desert tobacco	*Nicotiana obtusifolia* var. *obtusifolia*	Mar–Jun
Herbs		
Broadleaf cattail	*Typha latifolia*	Jun–Jul
Golden suncup	*Chylismia brevipes* subsp. *brevipes*	Mar–May
Chia	*Salvia columbariae*	Mar–Jun
Common reed	*Phragmites australis*	Jul–Nov
Desert lily	*Hesperocallis undulata*	Mar–May
Jimson weed	*Datura wrightii*	Jun–Oct

Source:
Appendix PLA of the Final Environmental Impact Report for the Topock Compressor Station Groundwater Remediation Project (DTSC, 2011).

Trees: Five of the nine tree species listed in Appendix PLA were found in the Project Area (Table 1). These included two palo verde species (hillside and blue), two mesquites (western honey and screwbean), and Goodding's willow (*Salix gooddingii*). Of the species that were not found in the Project Area, honey mesquite (*Prosopis glandulosa* var. *glandulosa*) doesn't occur in Arizona or California and pinyon pine (*Pinus monophylla*) occurs at higher elevations than those present in the Project Area. The other two species, ironwood (*Olneya tessota*) and velvet mesquite (*Prosopis velutina*), could conceivably occur in the Project Area, but have not been found. All species that have potential to occur in the Project Area are easily recognizable and would not have been missed during the surveys.

Shrubs: Three of the nineteen culturally significant shrubs listed in FEIR Appendix PLA including big saltbush, cattle saltbush and desert tobacco (*Nicotiana obtusifolia*) occur in the Project Area. Of the remaining listed shrubs, 10 have distributional ranges far removed from the Project Area, three (Parry's Agave, scrub live oak and candy barrel cactus) occur in habitats that do not occur in the Project Area and three, Mojave yucca (*Yucca schidigera*), mule's fat (*Baccharis salicifolia*), and iodine bush (*Allenrolfea occidentalis*) are absent despite the presence of suitable habitats. These latter species, if present, would have been found during the survey, because they are conspicuous and readily identifiable.

Herbs: Six of the 26 herbs listed in Appendix PLA were found in the Project Area. Eighteen species occur well outside of the Project Area or occur in habitats not present in the Project Area. Two species, fragrant flatsedge (*Cyperus odoratus*) and common sunflower (*Helianthus annus*) are annuals that could occur in the Project Area, but have not been found. Common sunflower is a common and conspicuous roadside weed that normally comes up even under dry conditions. Flatsedge, however, occurs in wet habitats and would have been identifiable during the spring 2012 surveys.

2.1 Distribution of Culturally Significant Plants within the Project Area

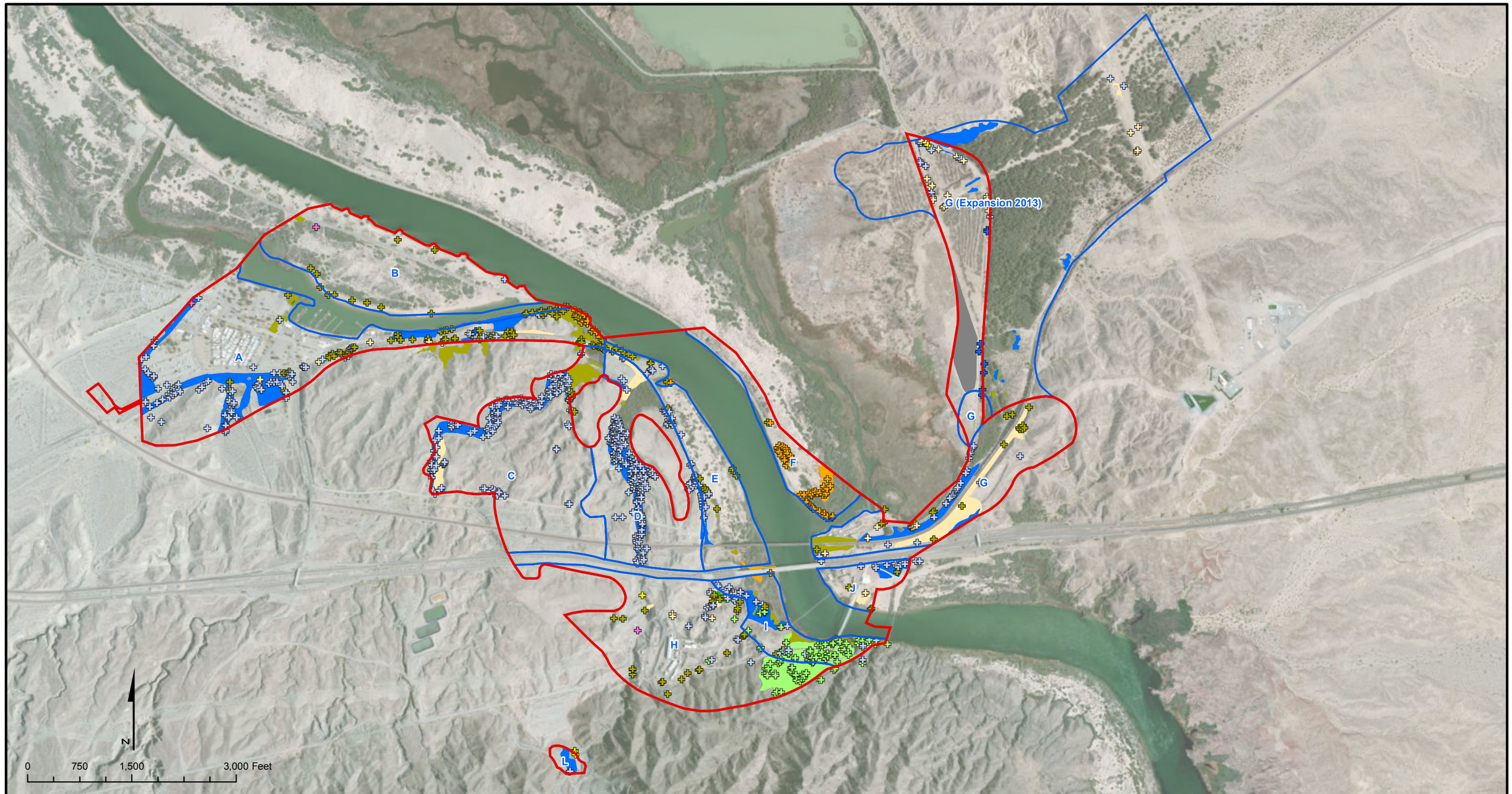
The distributions of several of the culturally significant plants (ethnoplants) in the Project Area and identified in the additional freshwater well survey areas are shown on Figure 2 and 3 as points or polygons. The locations of common, abundant and widely distributed species such as golden suncup (*Chylismia brevipes* subsp. *brevipes*) were mapped to show the general distribution of the species in the Project Area. Tree species distributions, in addition to distributions of desert tobacco, desert lily, Jimson weed and chia are based on Global Positioning System (GPS) point data. Distributions of the two saltbush shrubs as well as broad-leaved cattail and common reed are based on polygon data. Ethnoplants varied in their distribution across the Survey Segments in the Project Area. The average ethnoplant occurred in four different Survey Segments. Species such as blue palo verde, western honey mesquite, cattle saltbush, golden suncup and common reed were widespread and found in more than half of the Survey Segments. At the other extreme were species such as chia (*Salvia columbariae*) and desert lily (*Hesperocallis undulata*) that were found in only a few of the survey segments.

2.2 Avoidance, Minimization and Salvage/Replanting Measures

The following sections provide information on avoidance and minimization measures that will be implemented to reduce adverse effects on culturally significant plants and to provide information on plant salvage and replanting methods that will be used where impacts are unavoidable.

2.2.1 Design and Construction

During the design phases of the remediation activities efforts have been made to avoid impacts to special-status plants and animals, including those of cultural significance. To the extent possible, work activities have been designed to utilize existing roadways and previously disturbed areas. As the final design for the remedial action is developed, efforts to minimize disturbance to natural vegetation will continue to the extent possible. Preconstruction surveys of work areas, staging areas and access routes will identify species that could be adversely affected and determine which plants are to be salvaged or removed. Any culturally significant plants in the immediate vicinity of the work areas or access routes that are not directly impacted, but could be indirectly affected by project activities will be identified and clearly marked with flagging, fencing and or signage prior to the start of construction.



LEGEND

Project Area

Survey Segments

Common Name - Scientific Name

- Big Saltbush - Atriplex lentiformis
- Blue Palo Verde - Parkinsonia florida
- Cattle Saltbush - Atriplex polycarpa
- Desert Tobacco - Nicotiana obtusifolia
- Goodding's Willow - Salix gooddingii
- Hillside Palo Verde - Parkinsonia microphylla
- Honey Mesquite - Prosopis glandulosa
- Screwbean Mesquite - Prosopis pubescens

Common Name - Scientific Name

- Blue Palo Verde - Parkinsonia florida
- Blue Paloverde/Honey Mesquite - Mixed
- Cattle Saltbush - Atriplex polycarpa
- Hillside Palo Verde - Parkinsonia florida
- Honey Mesquite - Prosopis glandulosa
- Screwbean Mesquite - Prosopis pubescens
- Restoration Area

FIGURE 2
CULTURALLY SIGNIFICANT TREES IN THE PROJECT AREA

ETHNOBOTANY SURVEY
PG&E TOPOCK GROUNDWATER REMEDIATION PROJECT, NEEDLES, CALIFORNIA

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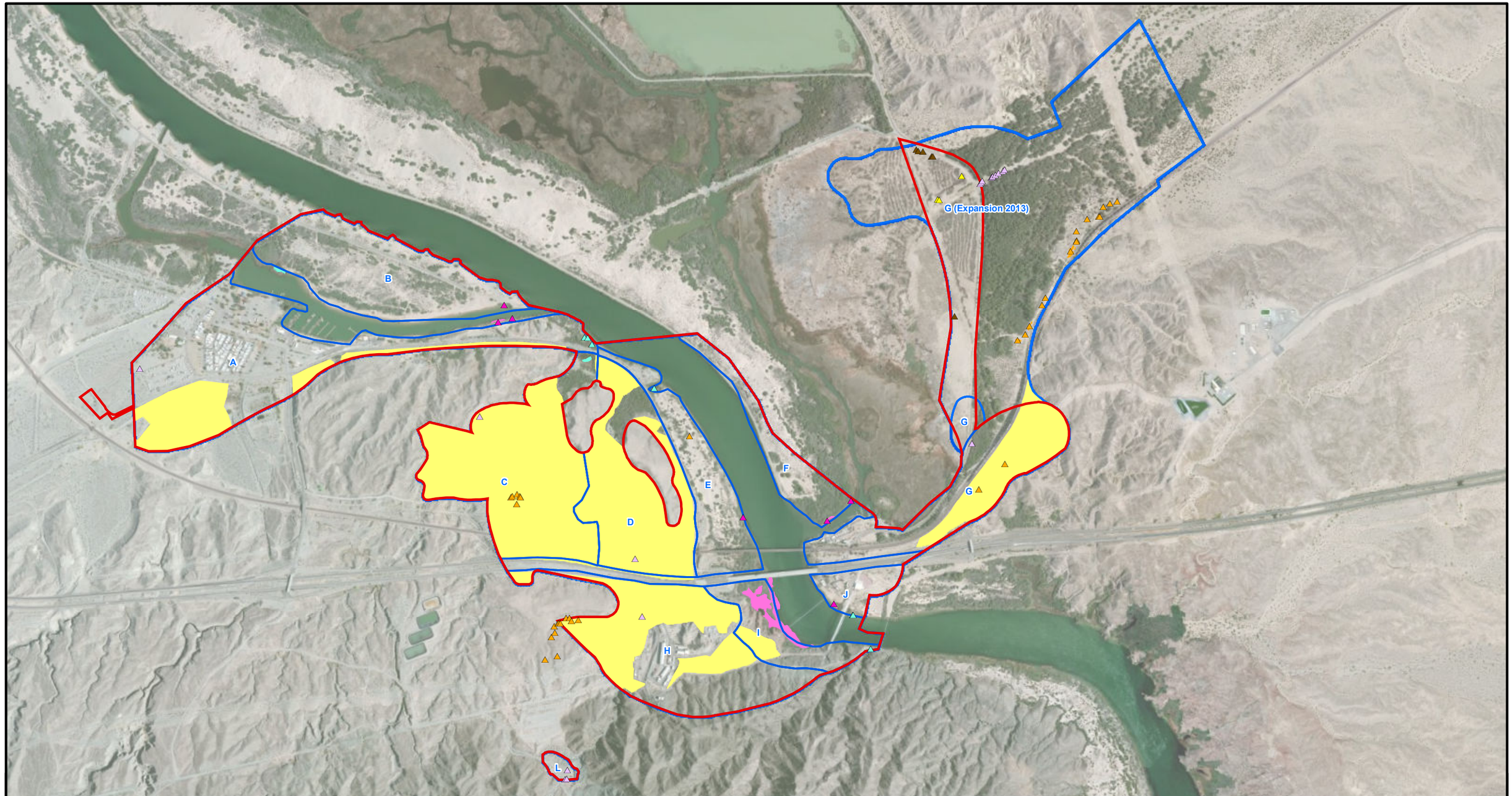

LEGEND

- Project Area
- Survey Segments

Herb

Common Name	Scientific Name
Broadleaf cattail	*Typha latifolia*
Chia	*Salvia columbariae*
Common reed	*Phragmites australis*
Desert lilly	*Hesperocallis undulata*
Golden suncup	*Camissonia brevipes* ssp. *brevipes*
Jimson weed	*Datura wrightii*

N

0 750 1,500 3,000 Feet

FIGURE 3
CULTURALLY SIGNIFICANT HERBS IN THE PROJECT AREA

ETHNOBOTANY SURVEY
PG&E TOPOCK GROUNDWATER REMEDIATION PROJECT, NEEDLES, CALIFORNIA

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2.2.2 Salvage/Replacement and Transplantation of Culturally Significant Tree Species

All culturally significant trees identified in the Project Area can form large (over 20 feet tall) individuals when mature. However, large individuals are unlikely to survive salvage and replanting due to “transplant shock” caused by extensive and unavoidable loss of roots. Therefore, salvage of culturally significant trees shall be limited to small individuals or saplings whose root systems are small enough to excavate and transport with minimal damage. Such individuals are more likely to recover and survive the physiological stress of transplanting. In general, trees most suitable for transplanting will be less than four inches in diameter at the base of the trunk and no more than 6 feet tall. Trees shall be transplanted between November and March, when temperatures are cooler, trees are dormant, and irrigation demands are less. Transplanting will occur prior to bud break to allow the roots time to recover and proliferate before they are required to withstand excessive transpirational loads caused by higher ambient temperatures. To the extent possible, young trees will be relocated to areas in the immediate vicinity of the work area that have similar soil types, exposure and drainage conditions, but distant enough that they will not be impacted by any future work activities. If there are no suitable transplantation areas in the vicinity of the work area, the trees will be relocated to other sites within the project area where the species is known to occur and will not be affected by work activities.

The following transplanting specifications follow general guidelines from the International Society of Arboriculture (ISA) (ISA 2013) and the American Standard for Nursery Stock (American Nursery and Landscape Association 2004).

To minimize the time that the transplanted tree is out of the ground, the new location shall be selected and a hole excavated prior to digging up the plant to be moved. The transplant hole needs to be large enough to accommodate the root system at the same depth or slightly shallower than the tree being moved. The initial hole shall be at least two to three times the width of the root ball near the surface and taper down to the size of the root ball at the bottom. The depth of the hole shall be no greater than the distance from the trunk flare[1] to the bottom of the root ball.

Where possible, pre-dig the perimeter of the root ball using a sharp spade or shovel to avoid breaking and tearing of the roots. Pre-digging the root ball can stimulate regeneration of roots and increase root density in the final root ball. If a backhoe is used to excavate the root ball, the initial hole shall be larger than the final root ball. The final root ball will be shaped by hand using loppers to cut the roots cleanly. Table 2 provides size guidelines for the minimum size of the root ball for transplanted trees.

TABLE 2
Size Guidelines for Root Balls when Transplanting Trees

Trees Height or Stem Diameter*	Minimum Root Ball Diameter (Inches)
Trees < 6 feet tall and/or stem < ¾ inch in diameter near the base	16
Trees > ¾ inch diameter and stem < 2 inches in diameter near the base	24
Trees 2-3 inches in diameter near the base	32
Trees 3 -4 inches in diameter near the base	42

Note:
*Stem diameter for trees less than 4 inches is measured at 6 inches above the ground surface

Depth of the root ball is variable depending on the size of the tree but generally will be between 24 and 36 inches deep. The root ball shall taper along the sides slanting inwards slightly towards the base. If the soil is hard and compact it may be necessary to add water prior to cutting the root ball. The final root ball shall stand on a pedestal before being undercut. Once the root ball has been cut and shaped, wrap the sides and top in burlap to

[1] The area at the base of the plants stem or trunk where the stem or trunk broadens to form roots

secure the roots and soil. A skirt shall be left hanging to cover the bottom of the root ball. Secure the burlap wrapping with rope or twine before lifting from the hole. If necessary secure any branches with burlap or ropes to prevent damage and breaking. Pruning of branches should generally not be required, but if some branches need to be trimmed it will be kept to a minimum with no more than 20 percent of the canopy removed. Once the root ball and any branches have been secured, lift the tree straight up from the root ball to remove from the hole; do not lift by the trunk as this can damage the trunk and roots.

Transport the excavated tree immediately to its new location and lower it (by holding the root ball not the trunk) into the hole. Remove the burlap from around the root ball and backfill around the roots with the soil that was removed from the planting hole. Do not add any additional soil amendments, fertilizer or mulch to the soil as these have been found to be unnecessary for desert trees and shrubs (Bainbridge et al. 2001). When backfilling, add water to minimize air pockets when backfilling. Be sure the soil is firmly packed around the bottom of the root ball to ensure the tree is vertical and well supported. The remaining soil shall be tamped down lightly around the roots, but not firmly compacted. Water thoroughly and slowly after the hole is completely filled.

Staking of the trees shall be avoided, as staking can often result in detrimental effects such as reduced trunk taper, smaller root system development, and greater instability once the stakes are removed (ISA 2013). If additional support is required, a single stake located upwind of the tree may be sufficient. The stake shall be driven into the ground outside of the newly planted root zone. Stabilize the tree as low on the trunk as possible, while still providing support with broad, slightly elastic, material that will not damage the tree. Any staking supports shall be removed within two years of the initial planting.

2.2.3 Habitat Requirements of Culturally Significant Trees

Each of the five culturally significant trees in the Project Area has different habitat requirements and ecological tolerances. These are reflected in the sites that they occupy. Blue palo verde is a relatively large tree associated with sandy areas and is widely distributed on the edges and bottoms of the ephemeral washes that dissect the upland alluvial terraces. It also occurs along sandy roadsides and is the most abundant culturally significant tree in the Project Area. In contrast, the related hillside palo verde is a tree of shorter stature that is restricted to rocky hillsides above the Colorado River in the southern portion of the Project Area. The two trees look similar, but hillside palo verde has a spine at the end of each branch and seed pods with a constriction around each seed, whereas blue palo verde has no spine at the end of each branch and no constrictions of the seed pod around the seed. Flowers of the two species also differ. The five petals of blue palo verde are all yellow, whereas the flowers of hillside palo verde consist of one white and four yellow petals. Two other related species, Western honey mesquite and screw bean mesquite typically grow in areas with root access to permanent underground water, but western honey mesquite is more likely to occur in somewhat drier habitats than screwbean mesquite. While both species are salt tolerant, screwbean has a higher tolerance level than western honey mesquite (Miyamoto et al. 2004), an important consideration when planting mitigation trees. Gooding's willow typically occurs along large rivers, in canyons, and rocky flood plains of intermittent streams and establishes after periodic winter or spring flooding. It is rare in the Project Area and known from only a few isolated individuals, principally in Park Moabi (Segments A and B). Segment B is an area that was formed with dredge sands from the Colorado River and the large Gooding's willow there was either planted or predates the spreading of dredge sands. To establish from seed, Gooding's willow requires large winter and spring floods and because of channelization and flow regulation of the Colorado River, these no longer occur in the Project Area. All individuals in the project area are too large to transplant, so re-establishment from container plants will be required for mitigation, if project impacts are unavoidable. Transplanting or replacement planting of any culturally significant tree will be located in areas where the species are currently growing (Figure 2) to ensure appropriate environmental conditions are present for the establishment and survival of the trees. The exact planting locations will be determined as part of the final design based on the number of transplants and/or mitigation plantings and the locations and extent of the work areas and access routes.

2.2.4 Shrubs

Big saltbush and cattle saltbush are common in the Project Area and could be impacted by construction related to the remediation project (Figure 2). There is little available information on transplanting of native shrubs, but both species are easily propagated by seed or nursery stock (Abella and Newton 2009; Clary and Slayback 1984). Salvage of these species shall therefore be focused on seed collection that can be used to establish new shrubs in selected mitigation planting areas at a 2:1 ratio as noted in FEIR mitigation measure CUL-1a-8. Seeds for these species must be collected in November or December.

2.2.5 Wetland Plants

Cattails and common reed can be salvaged by taking rhizome cuttings from any areas where site disturbance is unavoidable. Rhizomes shall be a minimum of 2 inches long and typically re-establish best if they are removed shortly after bud break, but before extensive shoot elongation. Cuttings will be kept cool and moist until they can be transplanted. Rhizome cuttings shall be planted in soils that are moist to saturated for most or all of the year. Planting should be sufficient to achieve a 2:1 ratio (based on disturbance area) of replacement wetland vegetation in the mitigation site.

2.2.6 Perennial Herbs

Desert lily grows from a perennial bulb that can be buried up to 20 inches below the soil surface. Bulbs may be transplanted, but only when they are dormant (i.e. the leaves have dried up and blown away). Therefore it is important to flag and/or GPS any plants that require transplanting when they are flowering or in leaf during the spring growing period. Bulbs shall be stored in a cool, dry, shaded area until they can be re-planted either immediately or in late summer or early fall. Plants can also be grown from seed, but this is more time consuming and would require nursery facilities.

Desert tobacco is a perennial herb or shrub with herbaceous stems and a woody base. This species is most common in Segment I, where it occurs in a gulley among the Miocene conglomerate rocks just above the Colorado River (PG&E 2013b). It also occurs in Segments H and L in rocky washes. Although it is unlikely to occur in the remediation area, mature plants could be salvaged by pruning stems back to about 12 inches above ground and transplanting to a new position away from the impacted area or directly into 1 gallon containers for temporary storage. However, due to the limited number of individuals in the Project Area and the relatively high potential mortality rate for transplanting mature plants, collection and storage of seeds during late spring or early summer is the recommended method followed by sowing of seed in early winter. Seed would be best sown directly into the soil in suitable habitat or germinated in containers and grown until plants are at least 12 inches tall. They will then be planted out in late winter or early spring.

2.2.7 Annuals

There are three annual species on the FEIR Appendix PLA list that are known to occur in the Project Area: chia, Jimson weed and golden suncup. During the 2011 and 2012 botanical surveys, the abundance and distribution was based almost entirely on the presence of persistent dead, woody stalks. During additional focused surveys in March 2013, golden suncup was very abundant due to good winter rains; however, very few Jimson weed or chia plants were observed in the Project Area (Figure 3). During the March 2013 surveys several seedlings and a few small plants were observed along the Arizona County Road 10 along the Sacramento Wash (Figure 3). Chia typically occurs in dry, disturbed habitats (Baldwin et al. 2012), thus small scale disturbance during construction activities would be more likely to promote than to hinder establishment and reproduction. Remediation for unavoidable impacts to this species shall include soil salvage and/or seed collection.

Live plants of golden suncup were observed during the fall survey of 2011 and spring survey of 2012, but individuals were very scattered and mostly on steep rocky slopes above the dry washes of survey segments A, C and D, but they may also be encountered in the washes. Dried stalks in 2012 indicated that these plants can be more common in a good rainfall year than we found in the poor rainfall year of 2012. This was confirmed by the abundance of flowering plants observed throughout much of the Project Area in March 2013. While some individuals of these plants may be disturbed as a result of remediation activities, given the abundance and wide

distribution of this species the project is unlikely to have a significant impact on the overall population. Impacts to this species can be remediated primarily by collection and storage of seed and replanting after construction is finished.

Chia and golden suncups generally do not occur in the sandy areas of the flood plain adjacent to the Colorado River, although a few widely scattered individual golden suncup plants were observed in this area during the March 2013 surveys. Given the absence or very low abundance of these species in these areas, seed salvage will not be necessary.

Jimson weed was not found in the FEIR Project Area, but was identified in the added study area of the Freshwater Source Evaluation study area on the Havasu National Wildlife Refuge (Figure 3). All of the plants were identified in areas where no work activities are currently planned and therefore the remedial activities are not expected to impact this species. In the event one or more plants are impacted this species can be remediated primarily by collection and storage of seed and replanting after construction is finished.

2.3 Replacement Planting and Seeding

Several methods for re-establishing plant populations will be implemented at the Project Area. The restoration method will be dependent on the site conditions as well as the duration of remediation activities at the site.

2.3.1 Soil Salvage

Since most desert annuals do not germinate and produce seed every year, the best way to mitigate for temporary, short-term disturbance is to salvage the topsoil where they are known to occur. The top two inches of desert soils generally contain the majority of seeds, nutrients, cryptogamic organisms, and organic matter (DeFalco and Scoles-Sciulla 2009), so topsoil salvage is an ideal method of mitigation for many annuals. Therefore, to facilitate plant reestablishment, the topsoil shall be salvaged and then applied to the surface where plant establishment is proposed as soon as possible. Topsoil and seed bank can be stored effectively up to one year without risk of losing live matter. The existing seed bank present in the topsoil has advantages over subsequently sown seed in that it is preconditioned and protected within the soil's environment.

The topsoil (3-4 inches) in areas that will be subjected to excavation, trenching or road building will be carefully removed by an experienced operator using a dragline, excavator, scraper, or dozer and be stockpiled in uncompacted piles less than 3 feet high. Salvaged topsoil will then be stabilized or covered with a fiber erosion cloth to prevent loss during storage and then re-spread during site rehabilitation as an initial procedure following construction. If a work site is graded to a depth less than 4 inches, topsoil will not be stockpiled separately from subsoil. However, at sites where grading or trenching will be deeper than 6 inches, topsoil will be separated from the subsoil in order to ensure that seeds of desirable native plants will remain near the soil surface where they can germinate once the topsoil is replaced.

Exact locations where annuals are to be mitigated will be determined later in time when the Groundwater Remediation Project is further along in design.

2.3.2 Seed Collection

Where transplanting of shrubs and herbaceous plants is not possible, seed shall be collected from the site for mitigation. Rainfall is variable in the project site and any year can be too dry for annuals such as chia and suncup to flower and set seed. Therefore, seed collection must occur during "good" years with sufficient rainfall to stimulate germination and abundant flowering of annuals. The specific number and distribution of collection sites will vary according to size, density, continuity of populations, as well as the desired quantity of seed to be obtained. A general rule of thumb is to collect from a minimum of five collection sites at least 0.5-1.0 mile apart, and from no more than 20 percent of an individual's seed crop. Collection from multiple populations in the Project Area may not be possible, since for some species the number of known populations is limited. Seed that is not used to grow container plants shall be stored in a cool, dry place if needed until mitigation sites can be prepared. Temporarily disturbed sites will be sown by hand in fall or early winter after completion of construction unless the disturbance area is greater than 0.5 acre.

2.3.3 Hand Seeding

Hand seeding will be used where imprinting is deemed infeasible because of substrate, location, or disturbance area size. In general, application of hand-broadcasted seed will be reserved for areas generally 0.5 acre or less. Hand seeded sites will be raked or harrowed before seeding to break up the surface and after to allow seeds to fall into crevices. Raking or other post-seeding treatment to lightly cover seed will also be completed to enhance germination likelihood and reduce losses to granivores. This will also help retain moisture for germination. The seed material may be broadcast by hand or using a seed spreader. Hand seeding will be timed to occur in the late fall or early winter prior to rains. Sites should not be seeded in midwinter or later, due to risk of germination and subsequent desiccation and die-off.

2.4 Replacement by Container Grown Plant

Impacts to shrub species as well as larger trees (over 4 inches in diameter) will likely require replacement plantings using container grown materials. Trees and shrubs including paloverde, western honey mesquite, screwbean mesquite, cattle saltbush, and big saltbush are all relatively easy to propagate in a nursery and well adapted to transplanting with a minimal amount of care and maintenance (Bainbridge and Virginia 1990, Bainbridge 2007, Romney and Wallace 1989). There are a number of commercial nurseries that grow native plants from the Mojave Desert (see Appendix A).

Depending on the number of trees and shrubs that require removal PG&E will consider contracting with a nursery that specializes in desert plant propagation to collect local seed and establish trees and shrubs from on-site material prior to mitigation planting. This would ensure that replacement plants are suitable for local environmental conditions. Appropriate available nursery stock may also be used.

Replacement planting for trees including blue paloverde, hillside paloverde, western honey mesquite and screwbean mesquite will consist of container grown plants. Containers shall be long and narrow to encourage deep root growth such as Tall One Tree Pots ™ (Steuewe & Sons, Inc. 4.5 inches wide by 14 Inches deep). Seedlings/saplings shall be at least 12 months old when transplanted. Replacement planting of shrubs such as cattle saltbush, big saltbush and desert tobacco shall be grown in 4-6 inch tube packs and transplanted when 9-12 months old.

Mitigation measure CUL-1a-5 requires a 2:1 ratio replacement ratio for impacts to culturally sensitive species that are unable to be salvaged. Based on experimental results from the Mojave Desert, the median survival rate for species such as western honey mesquite is around 50 percent (Edwards et al. 2000, Grantz et al. 1998). Therefore to achieve the desired compensation ratio of 2:1 a total of four container grown trees will be planted for each tree that is directly impacted. Shrub survival can be typically somewhat greater than trees, but is also variable, therefore a 4:1 planting ratio is also recommended for replacement planting of container grown shrubs.

2.4.1 Timing and Methods of Planting for Container Grown Trees and Shrubs

Transplanting of container grown trees and shrubs is typically done in the late winter to early spring between February and April (Romney et al. 1989, Edwards et al. 2000). Planting holes shall be excavated using an 8 to 10 inch diameter power auger to a depth equal or just slightly more than the depth of the container (Grantz et al. 1998). Carefully remove the saplings from the container and place in the planting hole, using excavated soils to backfill around the roots. Do not add any additional soil amendments, fertilizer or mulch to the soil as these have been found to be unnecessary for desert trees and shrubs (Bainbridge et al. 2001, Romney et al. 1989). When backfilling, add water simultaneously to minimize air pockets. Be sure the soil is firmly packed around the roots, but not firmly compacted. Water thoroughly and slowly after the hole is completely filled.

2.4.2 Spacing and Locations

Trees will be spaced to maintain a density similar to the area from which they are removed, but no closer than 8 feet apart. Shrubs will be spaced in a density similar to the density in the undisturbed surrounding vegetation, but no closer than 3 feet apart. To ensure that soil and other environmental factors are most favorable for

establishment, replacement plants will be planted in areas where individuals of the same species are healthy and growing well. Exact locations will be determined as part of the final design once the impacted areas are defined.

2.4.3 Grazing Protection

Some type of initial grazing protection (such as wire mesh or tree shelters placed around the seedlings) is necessary to ensure good survival and growth of transplanted trees and shrubs (Romney et al, 1989, Grantz et al. 1998). Plastic tree shelters such as Tree-Pee (Bailey's Inc.) have been found to result in significantly higher survivorship than using wire mesh (Grantz et al. 1998). Grazing protection shall be removed after the first year of growth.

2.4.4 Irrigation for Salvaged and Transplanted Trees and Shrubs

Transplanted trees and shrubs will be watered using deep irrigation pipes (Bainbridge 2006, Bainbridge et al. 2001). Deep pipe irrigation has been shown to produce much better survival rates and to require less water than other irrigation methods (Bainbridge et al. 2001). Bainbridge et al. (2001) had an establishment success rate of 71 percent for seedlings of western honey mesquite, by using only 5.3 gallons over 3.5 years with deep pipe irrigation when trees were planted with tubular tree protectors to minimize herbivory.

The method for using deep irrigation is described in Bainbridge (2006). For each transplanted tree or shrub, a hole is drilled to a depth of 20-30 inches with an auger. A PVC pipe (2 inches in diameter and 20 inches long with a series of 1/16 inch holes drilled 2-3 inches down one side beginning 7 inches below the top) is inserted to the bottom of the hole such that the side with holes faces the seedling or shrub with about 4 inches protruding above the ground surface for easy filling. The pipe shall be situated about 3-4 inches away from the seedling. Two or three pipes can be situated around the root ball for transplanting shrubs or small trees.

Water (1 quart) will be directly applied to seedlings once every week for the first eight weeks. Then irrigation pipes will be filled with 2 quarts every other week for 3 months after the initial watering.

For relatively small areas where a large number of replacement trees may be needed, a gravity feed drip irrigation system from a large 4,000 to 5,000-gallon storage tank shall be used as an alternative watering method. This method will depend on the ability to situate the tank in an area accessible to a water truck for periodic re-filling. This method was used successfully for the screwbean mesquite restoration project under the freeway bridge next to the Colorado River from 2006–2009 at TCS (C. Smith, personal communication). For that project, newly planted trees were watered three times per week for about 3-4 hours/day for the first year and once per week in the subsequent two years.

2.4.5 Mulch and Inoculation

There is generally no evidence that additional mulching enhances long term of survival and plant growth and some indication that it may do more harm than good (Bainbridge et al. 2001). Therefore no additional mulching is recommended. If tree seedlings or shrubs are planted from containers, inoculation of soil biota can be done by backfilling with excavated soil. In general, inoculation of soil biota is only required for severely degraded sites where the natural soil biota has been significantly depleted or is absent (Bainbridge and Virginia 1990).

SECTION 3

Monitoring and Adaptive Management

Trees and shrubs will be monitored for a minimum of 3 years and up to 5 years. If survivorship of tree and shrub transplants falls below 75 percent survival, additional plants will be added until survivorship and plant vigor goals are reached and maintained for at least one year. Monitoring will be done once a year during the active growing season (March through August). During the initial planting, photo points will be established and recorded with a GPS. Compass bearing, camera height, and lens focal length will also be recorded. Site photographs will be taken at the time of the initial planting and during each subsequent monitoring event from the same locations. During each monitoring event trees and shrubs will be assessed for overall health and vigor.

3.1 Tree and Shrub Assessment

Assessment of trees and shrubs will utilize a modified index initially developed by Bainbridge et al. 2001:

0 = dead, stems brown brittle with no green or purple
1 = barely alive, stems still flexible with some green or purple;
2 = some green or purple on stem, a few green leaves;
3 = green or purple stem and a number of green leaves;
4 = green or purple stem and green leaves, vigorous.

3.2 Wetland Plants

Monitoring in areas where rhizomes of wetland plants were relocated will include initial photo points immediately after transplanting and annual photographs from the same location. During the annual monitoring the cover of wetland plants will be visually estimated to determine if the mitigation ratio of 2:1 has been achieved in the transplant area. In addition the overall condition of the plants will be evaluated relative to the condition of plants in undisturbed areas.

3.3 Herbaceous Annuals and Perennials

Response of herbaceous plants can be highly variable depending on the amount and timing of rainfall. Therefore monitoring of transplanted bulbs (desert lily) as well as seeded areas will need to assess conditions relative to undisturbed areas. In years with good rainfall and an abundance of flowering annuals and good perennial plant growth in the Project Area, mitigated areas should exhibit similar abundances of the seeded annuals and transplanted perennial herbs. Annual monitoring will include both reference areas (undisturbed sites) and revegetation areas and will consist of representative photographs of each area as well as a qualitative description of each site.

3.4 Maintenance and Adaptive Management

Adaptive management involves learning from experience and modifying subsequent behavior in light of that experience. Data may be collected and analyzed throughout the duration of the monitoring period and the results used to modify restoration techniques as a component of the adaptive management approach as appropriate to ensure successful establishment of transplanted trees and the required replacement ratio of 2:1 for unavoidable impacts. Maintenance and adaptive management will focus on the following areas.

Weed control: Weedy species such as Russian thistle can significantly affect growth and survival of transplants. Transplant and seeding sites should be relatively weed-free and should be monitored on a regular basis for weed infestations. It is much easier to prevent the establishment of weeds in an area than it is to eradicate weed populations once they have become established. Monitoring for weed seedlings of Russian thistle and Sahara mustard (*Brassica tournefortii*) early in the growing season (March-April) allows for treatment and removal of weedy species prior to flowering and seed dispersal. In addition young seedlings can be easily removed by hand avoiding the need for more intensive mechanical or chemical treatment.

Irrigation modification: As the objective is to obtain the maximum survival rate of transplanted individuals, it may be necessary to modify the irrigation schedule and or amount of water during the restoration process. While irrigation will only be used during the initial establishment phase, the condition of the plants will be monitored throughout the monitoring period. If after the initial watering plants show a notable decline in vigor, it may be necessary to increase the amount and or timing of irrigation to prevent mortality and reduced vigor. Care will be taken not to overwater the plants and irrigation shall be discontinued after the first season.

Grazing protection: Tree and shrub protectors will be maintained throughout the first year of monitoring, after which time tree protection shall be removed.

Mortality Rates: The initial plantings will experience some level of mortality; however, they will be monitored on an annual basis to prevent this from exceeding 25 percent. If survivorship drops below target levels of 75 percent, additional plantings will be required. To prevent further mortality, adjustments to the watering regime and/or herbivore protection will be necessary, depending on the most probable cause for the increased mortality.

SECTION 4

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APPENDIX A

Commercial Nurseries that Grow Native Mojave Desert Plants

Ahakhav Native Plants Nursery
Colorado River Indian Reservation
25401 Rodeo Road
Parker AZ 85344
(928) 669-2664

El Nativo Growers
200 South Peckham Road
Azusa, CA 91702
(626) 969-8449
www.elnativogrowers.com
sales@elnativogrowers.com

High Country Gardens
2902 Rufina Street
Santa Fe, NM 87507
(800) 925-9387
www.highcountrygardens.com

LandscapeMart
8028 West Thunderbird Road
Peoria, AZ 85381-4612
(623) 298-6800
http://www.landscapemart.com/

Larners Seeds
P. O. Box 407
235 Grove Rd.
Bolinas, CA 94924
(415) 868-9407
info@larnerseeds.com
http://www.larnerseeds.com/_pages/wildflower_annual.html

Las Pilitas Nursery
8331 Nelson Way
Escondido, CA 92026
(760) 749-5930
www.laspilitas.com

Mountain States Wholesale Nursery
Litchfield Park, AZ 85340-2600
Phone: (623) 247-8509
Fax: (623) 247-6354
http://www.mswn.com/

Mountain Valley Growers
38325 Pepperweed Road
Squaw Valley, CA 93675
(559) 338-2775
http://www.mountainvalleygrowers.com

Misty Meadows Nursery
43601 Mesa Street
Banning, CA 92220
(951) 765-7542 or (951) 897-1585
mistymeadows@live.com
http://www.mistymeadowsnursery.com/601.html

Native American Seed
3791 North US Highway 377
Junction, TX 76849
(800) 728-0403
info@seedsource.com
http://www.seedsource.com/catalog/index.asp

Oak Hills Nursery
13874 Ranchero Road
Oak Hills, CA 92345
(760) 947-6261
oakhillsnursery@hotmail.com
http://www.oakhillsnursery.com , http://www.mojavedesertplants.com

Seedland, Inc.
9895 Adams Road
Wellborn, FL 32094
(386) 963-2080
sales@seedland.com
http://www.seedland.com/

S & S Seeds
P. O. Box 1275
Carpenteria, CA 93014
(805) 684-0436

San Marcos Growers
125 South San Marcos Road, P. O. Box 6827
Santa Barbara, CA 93160
(805) 683-1561
http://www.smgrowers.com

Sheldon Nursery
4999 N. Sabino Canyon Rd.
Tucson, AZ 85750
(520) 529-0609
http://www.sheldonnursery.com
sheldonnursery1@yahoo.com

White Tank Nursery
P. O. Box 810
Waddell, AZ 85355
(623) 935-4276
info@whitetankpalms.com
http://www.whitetanknursery.com/index.html

Comstock Seed
917 Highway 88
Gardnerville, NV 89460
(777) 265-0090
sales@comstockseed.com
http://www.comstockseed.com

Appendix B

IM-3 Decommissioning Plan

Revised Report

Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan, Topock Compressor Station, Needles, California

Prepared for

Pacific Gas & Electric Company

September 2014

CH2MHILL®
155 Grand Avenue
Suite 800
Oakland, CA 94612

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Acronyms and Abbreviations

AOC	area of concern
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
BLM	U.S. Bureau of Land Management
BMP	best management practice
CACA	Corrective Action Consent Agreement
Cal-OSHA	California Occupational Safety and Health Administration
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife (formerly California Department of Fish and Game [CDFG])
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CESA	California Endangered Species Act
CFR	*Code of Federal Regulations*
CHPMP	Cultural and Historic Properties Management Plan
CHSC	California Health and Safety Code
CIMP	Cultural Impact Mitigation Program
CIP	clean-in-place
CMI	corrective measures implementation
CMS/FS	RCRA Corrective Measure Study/CERCLA Feasibility Study
Compressor Station	Topock Compressor Station
Cr	chromium
CRHR	California Register of Historical Resources
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EIR	Environmental Impact Report
ESA	federal Endangered Species Act
Final Remedy	final groundwater remedy
FMIT	Fort Mojave Indian Tribe
ft	foot/feet

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General Permit	NPDES General Permit No. CAS00001
gpm	gallons per minute
HCl	hydrochloric acid
HDPE	high-density polyethylene
HHRA	Human Health Risk Assessment
HMBP	Hazardous Materials Business Plan
HNO_3	nitric acid
HSP	Health and Safety Plan
IM	Interim Measure
IM-3	Interim Measure No. 3
IM-3 system	IM-3 Treatment Plant, extraction, injection, and conveyance system components and infrastructure
MDAQMD	Mojave Desert Air Quality Management District
mg/kg	milligrams per kilogram
ml	milliliter
MLD	most likely descendent
MMRP	Mitigation Monitoring and Reporting Program
MW	monitoring well
NOT	Notice of Termination
NH_4OH	ammonium hydroxide
$(NH_4)_2SO_4$	ammonium sulfate
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OSHA	U.S. Occupational Safety and Health Administration
oz.	ounce
PA	Programmatic Agreement
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PBA	*Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions*
PG&E	Pacific Gas and Electric Company
PLC	programmable logic controller
PPE	personal protective equipment
PRG	preliminary remediation goal
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act

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Regional Water Board	Colorado River Basin Regional Water Quality Control Board
RFI	Resource Conservation and Recovery Act facility investigation
RI	remedial investigation
RO	reverse osmosis
SOB	Statement of Basis
SOP	standard operating procedure
STLC	soluble threshold limit concentration
SVOC	semivolatile organic compound
SWRCB	State Water Resources Control Board
SWPPP	Stormwater Pollution Prevention Plan
SWMU	Solid Waste Management Unit
TC	toxicity characteristic
TCLP	toxicity characteristic leaching procedure
TCP	Traditional Cultural Property
TCS	Topock Compressor Station
TLC	Teflon-lined closure
TPH	total petroleum hydrocarbon
TRC	Technical Review Committee
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WDR	waste discharge requirement
WET	waste extraction test
Work Plan	IM-3 Decommissioning, Removal, and Restoration Work Plan
XRF	X-ray fluorescence

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SECTION 1

Introduction

1.1 Purpose and Scope

Pacific Gas and Electric Company (PG&E) is implementing a final groundwater remedy (Final Remedy) to address chromium in groundwater at Solid Waste Management Unit (SWMU) 1/area of concern (AOC) 1 and 10 located near PG&E's Topock Compressor Station (TCS or the Compressor Station) in San Bernardino County, California. PG&E is required to prepare a work plan for decommissioning and removal of the Interim Measure No. 3 (IM-3) Groundwater Extraction and Treatment System, and the restoration of the areas affected by IM-3 operations, and to submit the work plan as part of PG&E's pre-final/final design submission and Construction/Remedial Action Work Plan.

This IM-3 Decommissioning, Removal, and Restoration Work Plan (Work Plan) was prepared in compliance with the following agreements, decree, plans, and directives, and defines the scope of work and the requirements on which the scope of work is based for the decommissioning, removal, and restoration of the IM-3 Treatment Plant and extraction, injection, and conveyance system components and infrastructure (IM-3 system):

- The 2006 and 2012 Settlement Agreements between PG&E and the Fort Mojave Indian Tribe (FMIT) and the 2012 Settlement Agreement between the California Department of Toxic Substances Control (DTSC) and the FMIT
- The Remedial Design/Remedial Action Consent Decree (CD) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) between PG&E and the United States[1]
- The Programmatic Agreement (PA) among the U.S. Bureau of Land Management (BLM), Arizona State Historic Preservation Officer, California State Historic Preservation Officer, and the Advisory Council on Historic Preservation for the Topock Remediation Project
  - The Cultural and Historic Properties Management Plan (CHPMP), which is a document prepared under the PA
- The Mitigation Monitoring and Reporting Program (MMRP), part of the certified Environmental Impact Report (EIR) for the groundwater remedy (DTSC, 2011b)

PG&E will decommission and remove the IM-3 system in accordance with this Work Plan after receipt of approval for IM-3 decommissioning by DTSC, with concurrence from the U.S. Department of the Interior (DOI). The procedures and criteria for DTSC's determination, with DOI's concurrence, that IM-3 decommissioning can be approved is presented in the Basis of Design Report for the Final Remedy (part of the 90% design documents [CH2M HILL 2014a]) and the Construction/Remedial Action Work Plan (CH2M HILL 2014b) for review. Section 7 of the Basis of Design Report for the Final Remedy presents the transition plan from Interim Measure (IM) to Final Remedy, which specifies that the IM-3 system (extraction, treatment, and injection) will be shut down prior to the startup of the Final Remedy.

During the time period between the shutdown and the decommissioning and removal, the IM-3 system will be in a lay-up condition. A lay-up condition means that the IM-3 system will be left in place in a safe, secure, and preserved state. After the IM-3 system is in a lay-up condition, it is not expected to operate again because it will have met the goals of the IM and associated design parameters. The lay-up period will end, and the decommissioning, removal, and restoration work will begin after agency approval is received. Following the IM-3 system decommission and removal, the land originally affected by IM-3 operations will be restored to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities.

[1] PG&E and the United States executed the CD in 2012, and it approved by the United States District Court for the Central District of California in November 2013.

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This Work Plan includes procedures for IM-3 system lay-up, procedures for decommissioning and removing IM-3 system, waste management procedures, best management practices and mitigation measures compliance, soil confirmation sampling, a general approach for restoring areas originally affected by IM-3 operations, approvals and reporting requirements during the phases of IM-3 system closure, and a proposed schedule for this work.

In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes.[2] The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. As stated in the responses to comments on the 60% design (response to comment [RTC] #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.

1.2 Background and Requirements

1.2.1 Background

The Compressor Station is located in San Bernardino County, approximately 15 miles southeast of Needles, California, as shown on Figure 1-1 (figures are located at the end of each section). Investigative and remedial activities at the Compressor Station have included the following:

- **Conduct multiple phases of the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI)/ Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial investigation (RI) to identify and evaluate the nature and extent of hazardous waste and constituent releases at the Compressor Station.** The RFI/RI for groundwater at the Compressor Station is complete; however, the RFI/RI for soil is ongoing. Two areas associated with the IM have been identified for inclusion in the RFI/RI for soil. The IM-3 Treatment Plant and Monitoring Well (MW)-20 Bench Facility areas are identified as AOC 29 and AOC 30, respectively. In addition, the RCRA Corrective Measure Study/CERCLA Feasibility Study (CMS/FS) for groundwater at SWMU1/AOC1 and AOC10 was completed.
- **Implement an IM to stabilize the groundwater contamination by hydraulic control until the Final Remedy is in operation.** PG&E has implemented an IM at the site since March 2004. Initially, PG&E commenced pumping, transport, and disposal of groundwater from the MW-20 Bench location in March 2004 (IM-2). Batch treatment on the MW-20 Bench was added later in 2004. Because of space and treatment capacity limitations to manage higher groundwater flows at the MW-20 Bench, the IM-3 system includes a groundwater extraction, conveyance, treatment, and injection system. The IM-3 system began treating groundwater in July 2005, and has been in continuous operation since that time. In 2005, IM-2 was turned off, and in 2009, it was decommissioned. Following decommissioning of IM-2, the IM-3 brine storage and loading facilities were relocated and upgraded on the MW-20 Bench.
- **Select a Final Remedy**. In a coordinated effort, DOI and DTSC selected the Final Remedy. The DOI decision is presented in the Record of Decision (DOI, 2011), and the DTSC decision is presented in a decision package that includes the certification of the final EIR, the Final Statement of Basis (SOB), the Statement of Decision, and the Resolution of Approval (DTSC, 2011a). The IM-3 system is not part of the selected Final Remedy; therefore, the IM-3 system will be decommissioned and removed after DOI and DTSC determine that the Final Remedy is operating properly and successfully.

[2] PG&E has provided a proposed draft schedule to the Tribes and once the Tribes have commented on the schedule, PG&E will provide it to DTSC and DOI.

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1.2.2 Requirements for Work Plan

Several documents require PG&E to prepare this Work Plan or impose requirements that apply to the activities within the scope of this plan. This section presents the exact language in each of the documents requiring this Work Plan or applicable to this Work Plan.

Programmatic Agreement (BLM, 2010). Stipulation V of the PA states the following:

A. *All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. All such removal will be planned in consultation with the Signatories, Tribes, and Invited Signatories following the guidelines in Appendix B.*

B. *The removal of such facilities shall be monitored following the monitoring guidelines in Appendix C.*

C. *The removal of such facilities shall take place along existing graded roads to the maximum extent practicable.*

D. *Prior to decommissioning of any remediation facility, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the development of the closure plan to determine how to best restore the areas affected by the Topock Remediation Project, including, but not limited to, the site of the existing treatment plant and related facilities, but excluding the Topock Compressor Station and related facilities, to ensure that environmental restoration of conditions existing prior to the construction of the Project is achieved to the extent practicable.*

E. *PG&E will draft a plan for decommissioning, removal and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes and Invited Signatories.*

General Principle D states that,

> The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to . . . Ensure that PG&E shall, to the extent practicable, restore the areas affected by the Topock Remediation Project within the APE including, but not limited to, the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities to the conditions existing prior to the construction of the PG&E investigation and remediation related appurtenances and facilities.

Stipulation III(B)(3)(c) also states that,

> Whatever the selected alternative, the Federal Agencies will consult with Signatories, Tribes, and Invited Signatories during design, implementation, and monitoring activities to determine how best to restore the areas affected by the Topock Remediation Project. These areas will include, but not be limited to, the site of the existing treatment plant and related facilities but will exclude the Topock Compressor Station and related facilities. The Federal Agencies will ensure that environmental restoration to the conditions existing prior to the construction of the Project is planned and conducted to the extent practicable.

CHPMP (BLM, 2012). Section 6.2.3 states the following:

> *The IM-3 treatment plant is not part of the Selected Remedy for groundwater. The IM-3 treatment plant and other IM infrastructure that are not used for the groundwater remedy are expected to be decommissioned following determination by DOI and DTSC that the groundwater remedy is operating properly and successfully and that IM-3 is no longer needed for the*

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protection of human health and the environment. In conformance with PA Stipulation V(E) and PG&E's Settlement Agreement (PG&E 2006), a plan will be prepared for decommissioning, removal and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes and Invited Signatories [BLM et al. 2010:13].

PG&E will remove all other remediation facilities and appurtenances related to the Topock Remediation Project as soon as practicable following the attainment of cleanup standards and a determination by DOI that the removal of these facilities is protective of human health and the environment (BLM et al. 2010:13).

The CHPMP also refers to Stipulation V of the PA, as previously outlined.

EIR Mitigation Monitoring and Reporting Program (DTSC, 2011b). EIR mitigation measure CUL-1a-8 describes the requirements of the Cultural Impact Mitigation Program (CIMP). Within the CIMP, CUL-1a-8(f) requires the following to be included as an appendix to the CIMP:

A plan for the decommissioning and removal of the IM-3 Facility and proposed restoration of the site (to be an appendix to the CIMP).

Settlement Agreement between PG&E and the FMIT (PG&E, 2006). Article VII, Decommissioning, Restoration and Title Transfer of the IM-3 Site; Future Use of the Topock Compressor Station, states the following:

A. Development and Implementation of a Removal and Restoration Plan

1. Upon decommissioning of the IM-3 treatment plant, PG&E will work in consultation with the Tribe to restore the IM-3 Site to pre-existing conditions to the maximum extent practicable, subject to the continued use of remedial facilities, including but not limited to injection wells and related equipment on the site, as set forth above, consistent with Section VI.B.2. Restoration plans will be developed and implemented in consultation with the Tribe for removal of the IM-3 treatment plant and related facilities and the restoration of disturbed areas.

2. PG&E also will negotiate in good faith with the Tribe and with appropriate federal agencies, including BLM, to identify near-term restoration activities, e.g., around existing wells or access, that might be undertaken to accelerate the return of federal lands to natural conditions, to remove all IM-3 facilities on federal lands and to restore federal lands affected by IM-3 activities. Such removal and restoration activities will be undertaken, subject to any necessary approval of the agencies that own or control the affected properties, as soon as practicable after the facilities or affected properties are no longer needed for IM-3 related facilities, or earlier as may be otherwise mutually agreed upon by the Settlement Parties.

B. Additional Restoration

1. PG&E also will undertake additional restoration efforts requested by the Tribe to address impacts that predate PG&E's ownership, so long as such requests are reasonable and consistent with PG&E's legal obligations (e.g. under the National Historic Preservation Act) and, where regulatory approval is necessary, to the extent approved by relevant State and Federal regulatory agencies.

2. PG&E and the Tribe will negotiate in good faith to identify near-term restoration activities, e.g., around existing wells or access, that might be undertaken to accelerate the return of the IM-3 Site to natural conditions.

Settlement Agreement between PG&E and the FMIT (PG&E, 2012). Article V(B), IM3 Decommissioning, states the following:

B. PG&E shall not advocate with either federal agencies or DTSC for the retention of the IM-3 as a contingency measure for the Groundwater Remedy, or for any other purpose, and will decommission and remove the IM-3 Facilities, not expressly included as part of Alternative E, as soon as reasonably practicable after DTSC has

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approved the decommissioning. PG&E and Tribe shall use their best efforts to get DTSC to establish criteria to allow the removal of the IM-3 Facilities as soon as reasonably practicable once DTSC has certified that the Groundwater Remedy has reached operational status.

Settlement Agreement between DTSC and the FMIT (DTSC, 2012). Article 9(a) , Decommissioning of Interim Measure 3, states the following:

a. DTSC shall comply with "Additional Settlement Terms – Criteria for Decommissioning of IM-3," as is set forth in Exhibit A hereto, which exhibit is incorporated as if set forth in full.

Exhibit A to that Agreement ("Additional Settlement Terms – Criteria for Decommissioning of IM-3") states the following:

1. **Plume Control and IM-3 Decommissioning.** DTSC agrees that when the groundwater remedy is determined by DTSC to have achieved Plume Control as set forth below, then DTSC will approve decommissioning of the Interim Measure 3 wastewater treatment facility (IM-3) as long as that determination is consistent with any required decision to decommission IM-3 (including any related facilities to be decommissioned) by the DOI. DTSC's determination of Plume Control shall be consistent with the ability to achieve the criteria for DTSC's determination that the overall groundwater remedy is operating properly and successfully (OPS), and must be made concurrent with or after DTSC's OPS determination, unless DTSC in its lawful discretion, decides that decommissioning of IM-3 can occur prior to DTSC's OPS determination; and DOI must concur with DTSC's decision to decommission IM-3.
2. **Definition of Plume Control.** Plume Control is defined as a determination, based upon verified monitoring data, that the Cr(VI) plume is generally stable within its baseline footprint and that the remedy is limiting plume migration consistent with the approved remedy design. The baseline footprint shall be defined as the area of groundwater at the time of remedy start-up delineated by concentrations of Cr(VI) in excess of 32 micrograms per liter. In addition, Plume Control means maintaining remedy by-products (such as Mn and As resulting from dosing and groundwater movement) within the limits projected in the approved remedy design.
3. **Definition of OPS as to Remedy.** "Operating properly and successfully" for purposes of the overall groundwater remedy is defined as follows: a) the remedy is operating as designed; b) the information obtained from remedy operation indicates that the remedy is protective of human health and the environment; and c) the remedy is likely to be able to achieve the cleanup levels or performance goals delineated in the DTSC Statement of Basis and the DOI Record of Decision for the groundwater remedy at the PG&E Topock Site.
4. **Consistency with Applicable Laws.** DTSC's approval of decommissioning IM-3 shall be in accordance with any applicable requirements of the Resource Conservation and Recovery Act (RCRA), the Corrective Action Consent Agreement (CACA), the Comprehensive Environmental Response, Cleanup and Liability Act (CERCLA), the National Contingency Plan, and the California Hazardous Waste Control Law (HWCL).
5. **Criteria for Plume Control and IM-3 Decommissioning Approval.** The procedures and criteria set forth below shall apply to DTSC's determination that the remedy is maintaining Plume Control and that IM-3 decommissioning can be approved. The timelines set forth below are estimates based on the conceptual design of the remedy, and the parties understand that the substantive criteria, and not the estimated timelines projected as part of the remedial design, shall govern DTSC's decisions regarding the determination of Plume Control by the remedy and approval of IM-3 decommissioning.
    a. **Plume Control Criteria.** The criteria set forth below shall apply to DTSC's determination that the remedy is maintaining Plume Control. As part of the Remedial Design for the groundwater remedy, PG&E shall include a list of criteria for demonstrated Plume Control ("Plume Control Criteria") for review by project stakeholders and tribes during the remedial design phases, and approval by DTSC as part of the Construction/Remedial Action work plan. The Plume Control Criteria shall be made a part of the 60 and

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90% design packages and finally submitted with the Construction/Remedial Action work plan. Plume Control Criteria that shall be considered include, but are not limited to, the following factors:

i. Delivery and circulation of reagent within the National Trails Highway (NTH) in situ reactive zone (IRZ) treatment zone has successfully established a reducing zone adequate to limit Cr(VI) plume migration;

ii. Successful demonstration of hydraulic movement within the FEIR project area, as defined in FEIR and as shown in FEIR Exhibit 3-2, consistent with the approved remedy design resulting from operation of hydraulic extraction along the river with reinjection in the upland area and fresh water injection in the upland area;

iii. Verified monitoring data will be used to establish that the Cr(VI) plume is generally stable within its baseline footprint, as defined above;

iv. Verified monitoring data demonstrates control of remedy by-products (such as Mn and As resulting from dosing and groundwater movement) within the limits projected in the approved remedy design;

v. Successful Cr(VI) and by-product migration control will be projected using the groundwater flow and transport model used for remedial design only after a demonstration of consistency of model projections of the groundwater flow with transport model and field data.

b. **IM-3 Shutdown and Remedy Startup.** The IM-3 system shall be turned off when the groundwater remedy equipment and facilities are in place, and ready to begin start-up. The remedy equipment and facilities may include: the wells for the IRZ along the NTH, the riverbank wells, the freshwater wells, monitoring wells, the East Ravine/TCS wells, and the pipelines, controls, and electrical and mechanical systems needed to operate these wells. PG&E shall notify DTSC and the Tribe when the IM-3 system is ready to be turned off per the above-stated conditions. Upon DTSC concurrence that the system is ready to be turned off, PG&E shall turn off the IM-3 system, and this date will be the “start-up date.”

c. **Remedy Start-up Steps.** Once IM-3 has been turned off, the groundwater remedy will be started up. Start-up of the remedy may include the following steps: the NTH IRZ wells will begin operation, NTH IRZ carbon substrate injection will begin, the NTH IRZ cut-off line will be established, the freshwater injection system will be brought on line, the operation of the Inner Recirculation Loop of wells will be initiated, and the East Ravine and TCS extraction wells will engage and deliver water to the TCS IRZ wells. *These steps are anticipated to be completed within 12 to 24 months following the start-up date.*

d. **Full Operational Status.** When the remedy start-up steps have been completed, the groundwater remedy will have reached full operational status. At this time, PG&E shall provide DTSC and the Tribe with written notice that the remedy has reached full operational status. The date of this notice will be the “full operational status date.”

e. **Remedy Review for Plume Control.** At the end of each calendar quarter following the full operational status date, PG&E will prepare and submit to DTSC quarterly progress reports on the extent to which the data regarding remedy performance are adequate to make a determination of Plume Control, for the purpose of making a determination that IM-3 may be decommissioned. These reports will at the same time be made available to all stakeholders for evaluation and comment. At the end of the second calendar quarter, and each quarter thereafter as needed, PG&E will provide data and analysis for DTSC review and determination of Plume Control. Based on PG&E’s data and performance evaluation against the approved Plume Control Criteria, DTSC will determine, as soon as practicable, whether conditions have been satisfied to authorize PG&E to decommission IM-3.

f. **Decommissioning and Removal of IM-3.** Not later than thirty (30) days after all of the following have occurred: (a) DTSC determines that the groundwater remedy is achieving Plume Control; (b) DTSC has determined that the groundwater remedy is operating properly and successfully (unless DTSC determines, in its lawful discretion, that decommissioning can occur prior to DTSC’s OPS determination); and (c) DOI

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concurs with the decommissioning of IM-3, DTSC shall issue to PG&E a written approval of the decommissioning of IM-3 directing PG&E to implement the DTSC and DOI-approved IM-3 decommissioning plan. PG&E will then begin decommissioning and removal of the IM-3 facilities as soon as is reasonably practicable after DTSC issues its written approval to proceed.

Additionally, with respect to step (b) above, DOI must concurrently determine the remedy to be functioning properly and performing as designed for DOI to consider the remedy "operational and functional" in accordance with the NCP 300.435(f)(2).

Consent Decree and Appendix C, Scope of Work to Consent Decree (DOI, 2013), Section 2.2.8 states the following:

> *PG&E shall submit an IM-3 Decommission Plan as part of the pre final/final design that describes procedures for the removal and decommissioning of the IM-3 treatment plant and other infrastructure associated with the Interim Measures at Topock that are not incorporated into the groundwater remedy. This Plan will also describe the restoration of the site of the existing treatment plant and related facilities to the conditions existing prior to the construction of the investigation and remediation-related appurtenances and facilities, to the extent practicable and in conformance with the Programmatic Agreement ("PA") and the Settlement Agreement between PG&E and the Fort Mojave Indian Tribe dated November 9, 2006.*

See also Consent Decree Paragraph 12(f) and 13(b). Section 3.3 of the Scope of Work also describes the IM-3 Decommissioning Plan, similar to Section 2.2.8, as part of the Remedial Action Work Plan.

Closure performance standard for a facility operated under Conditional Authorization, as specified in California Health and Safety Code Section 25200.3(g), Revised (California State Board of Equalization, 2012):

> *(1) Upon terminating operation of any treatment process or unit conditionally authorized pursuant to this section, the generator conducting treatment pursuant to this section shall remove or decontaminate all waste residues, containment system components, soils, and structures or equipment contaminated with hazardous waste from the unit. The removal of the unit from service shall be conducted in a manner that does both of the following:*
>
> *(A) Minimizes the need for further maintenance.*
>
> *(B) Eliminates the escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or waste decomposition products to the environment after the treatment process is no longer in operation.*
>
> *(2) Any generator conducting treatment pursuant to this section who permanently ceases operation of a treatment process or unit that is conditionally authorized pursuant to this section shall, upon completion of all activities required under this subdivision, provide written notification, in person or by certified mail, with return receipt requested, to the department and to one of the following:*
>
> *(A) The CUPA, if the generator is under the jurisdiction of a CUPA.*
>
> *(B) If the generator is not under the jurisdiction of a CUPA, the notification shall be submitted to the officer or agency authorized, pursuant to subdivision (f) of Section 25404.3, to implement and enforce the requirements of this chapter listed in paragraph (1) of subdivision (c) of Section 25404.*

1.3 IM-3 System

This Work Plan addresses decommissioning and removal or abandonment in place of the following IM-3 system components:

- Three extraction wells in the MW-20 Bench area of the site (TW-2S, TW-2D, and TW-3D) and one extraction well in the floodplain (PE-1), as well as ancillary well equipment and vaults

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- Underground piping and vaults between the extraction wells and the treatment plant
- Entire treatment plant, including equipment, pipelines, valves, instrumentation, utilities, and infrastructure underneath the sunshade, the sunshade, mobile warehouse units, trailer, treatment plant foundation and secondary containment areas, underground pipelines and utilities within the footprint of the treatment plant fence line, and security fence and gate
- Underground and aboveground pipelines, and instrumentation conduit between treatment plant and injection well field
- Two injection wells in the East Mesa area of the site (IW-2 and IW-3) and power supply structure located at this site
- Support facilities on the MW-20 Bench, including Valve Vault #1, pumps, valves, pipelines, electrical, and instrumentation associated with the extraction wells, parking areas, security fence and gates, security system, lighting, and other ancillary equipment.

Existing MWs and their instrumentation that are currently used to monitor IM-3 performance will be reused as part of the monitoring network associated with the Final Remedy, and therefore will not be decommissioned as part of this Work Plan. Figure 1-2 shows the locations of these monitoring wells. Decommissioning of these existing MWs and their instrumentation will be addressed as part of the decommissioning of the groundwater remedy. The general approach for decommissioning wells has been developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes, and incorporated into the Groundwater Remedy O&M Manual, Volume 1, Section 4 (Well Maintenance and Decommissioning).

No aboveground component of the existing IM-3 system located within the footprint of the existing IM-3 Treatment Plant building, or within the IM-3 Treatment Plant fence line will be reused in its current location as part of the Final Remedy. The brine storage and loading facility (three tanks, the truck lane, and associated pumps and piping) will be reused by the Final Remedy in its existing location at the MW-20 Bench. Decommissioning procedures for the IM-3 system, except for the brine storage and loading facility, are included in this Work Plan. Some of these procedures may not be applicable during implementation of this Work Plan if a particular IM-3 component or portion of IM-3 infrastructure will be reused in a different location as part of the Final Remedy.

Appendix A presents site photographs, and Appendix B presents the Decommissioning Quality Assurance and Quality Control Plan that will be executed to verify the quality of the work and conformance with the requirements of this Work Plan.

Evaluation of existing IM-3 piping/conduits and injection wells use for groundwater remedy

This discussion was added at the request of the Hualapai Tribe in its comment letter on a previous draft of the Work Plan. The Tribe inquired whether left-in-place portions of the IM-3 underground pipelines and conduits could be used for the final groundwater remedy, for example, if there would be less ground disturbance using a combination of IM-3 underground facilities and new above-ground infrastructure. In addition, the Tribe asked about the potential use the existing IM-3 injection wells IW-2 and IW-3 for freshwater injection in the upland.

As discussed in 60% response to comment (RTC) #857, the piping and electrical conduit connecting the IM3 injection and extraction wells are needed to convey water to the IM3 treatment plant or from the treatment plant for re-injection. The extracted groundwater cannot be re-injected without treatment and therefore these IM3 components must be retained until the groundwater remedy is operating properly and successfully, consistent with the 2012 Settlement Agreement between the California Department of Toxic Substances Control and the Fort Mojave Indian Tribe. For this reason, the same components cannot be used for the groundwater remedy.

Further, as directed by DTSC and DOI in the April 4, 2014 direction letter (DTSC and DOI, 2014), PG&E will be removing the IM-3 underground pipelines and conduits to the extent practicable, and not leaving them in place.

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As for the existing IM3 injection wells, PG&E has evaluated and determined that they cannot be used for freshwater injection because their construction is not suitable for use in freshwater injection in the uplands (e.g., well too small, well screen not ideally located).

1.4 Work Plan Organization

This Work Plan is organized as follows:

- Section 1.0 presents the project background, Work Plan requirements, and scope of work.
- Section 2.0 presents IM-3 lay-up requirements and describes lay-up period activities.
- Section 3.0 presents pre-decommissioning activities that will commence after agency approval is received for the decommissioning and removal of the IM-3 system.
- Section 4.0 presents decommissioning procedures for IM-3 system included in this Work Plan that are not already incorporated into the Final Remedy design.
- Section 5.0 presents the waste management plan and identifies IM-3 components and materials that will be reused or recycled from IM-3 decommissioning.
- Section 6.0 presents the best management practices and mitigation measures that apply to the work described in this plan.
- Section 7.0 presents the soil confirmation sampling plan.
- Section 8.0 presents the general approach for restoration of the areas originally affected by IM-3 operations. (In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.)
- Section 9.0 presents permit and authorization requirements for IM-3 system decommissioning and closure, reporting requirements, and an anticipated project schedule.
- Section 10.0 provides a list of references used in this Work Plan.

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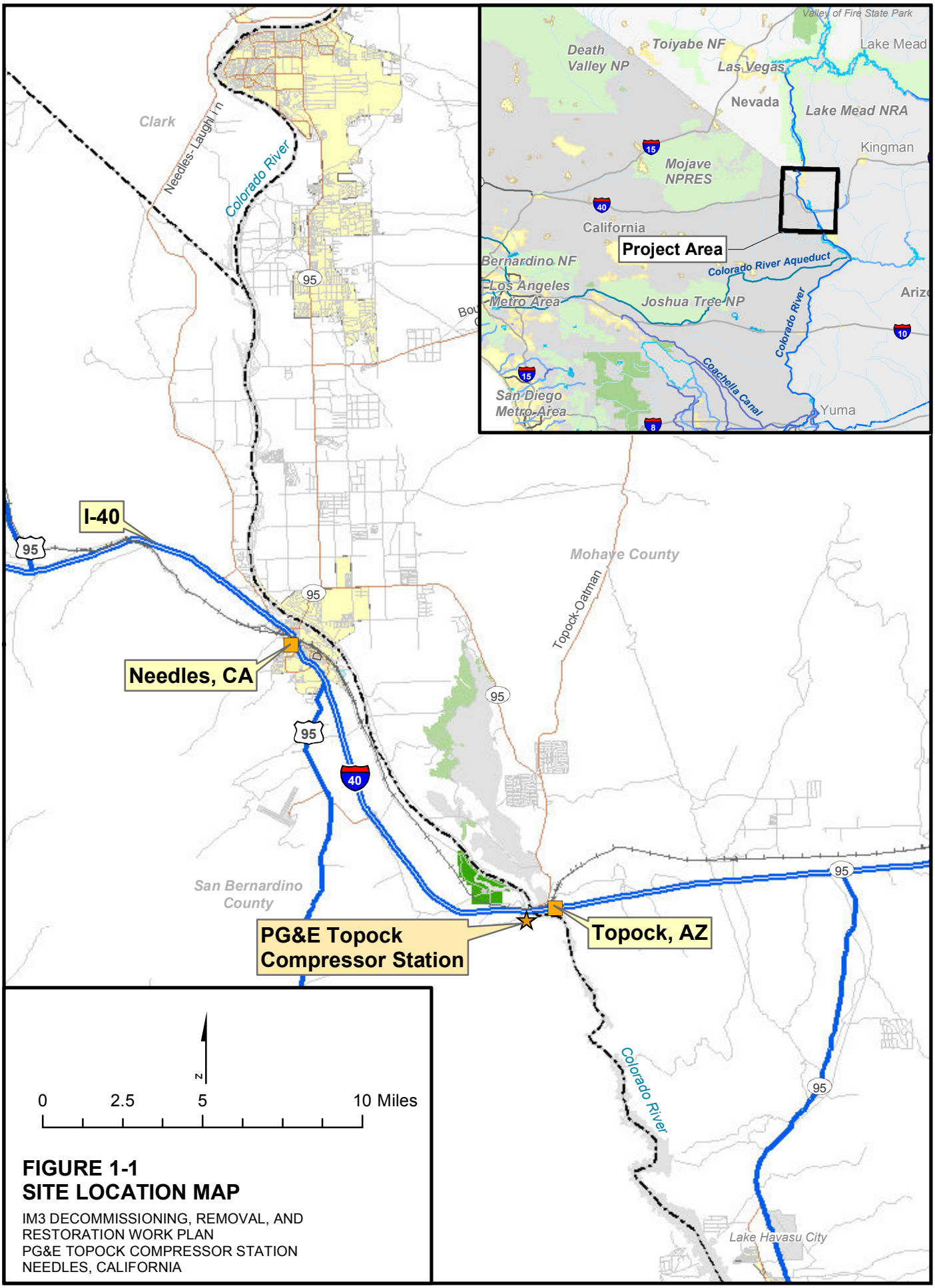
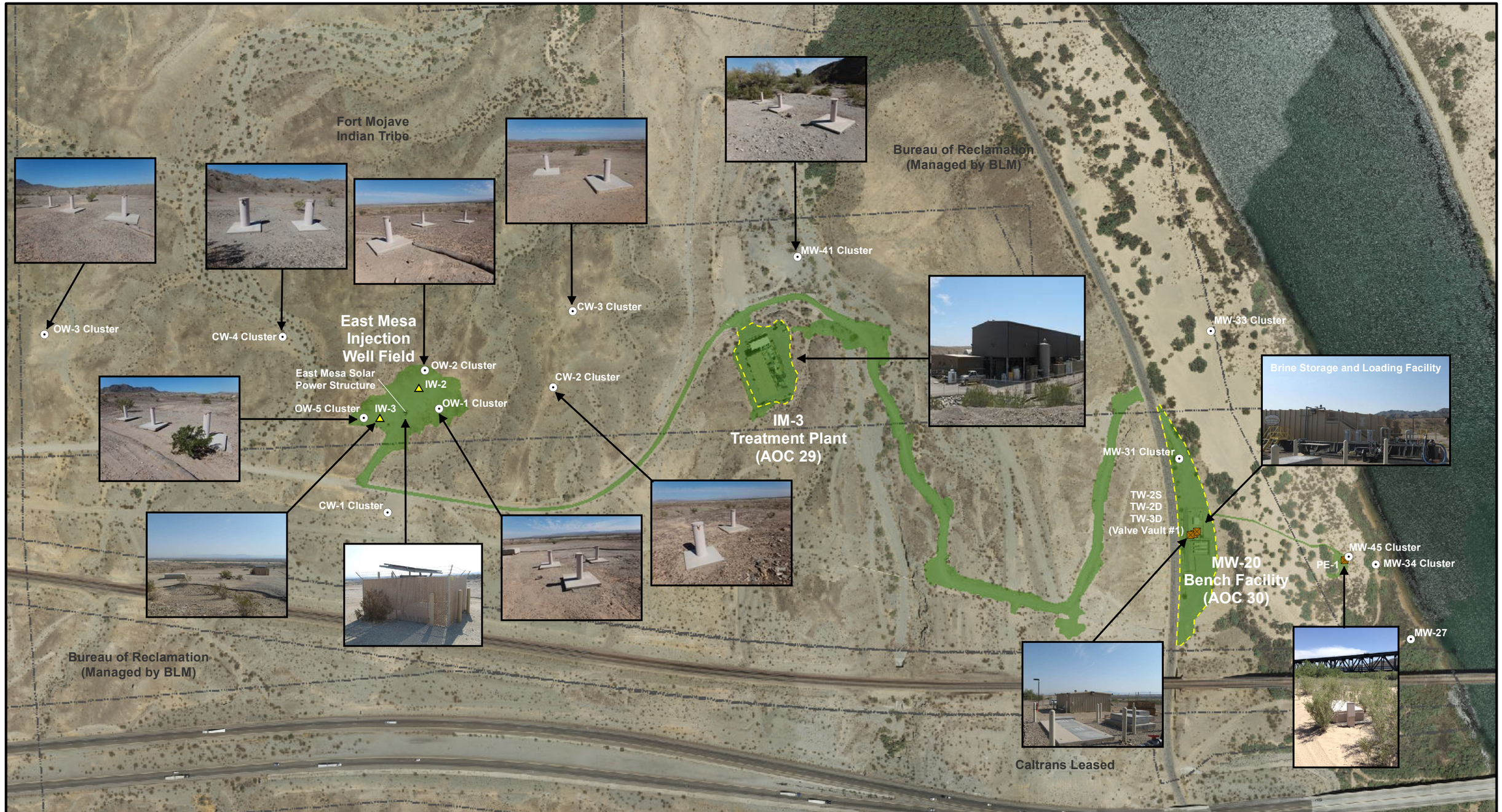


FIGURE 1-1
SITE LOCATION MAP

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Path: D:\Projects\Topock\MapFiles\2012\IM3_Decom\SiteLocation.mxd



LEGEND

- Monitoring Well
- Extraction Well
- Injection Well
- Area of Concern (AOC) Boundary
- Property Boundary
- Primary Work Zone

Notes:

1. All monitoring wells shown are used to monitor IM-3 performance. All monitoring wells have been incorporated in the Final Remedy and will not decommissioned as part of IM-3 decommissioning.
2. MW-13 is located on FMIT property but is not shown on this map because it is not associated with IM-3. This well was installed in 1997 prior to the conceptualization of IM-3.
3. Three tanks, truck lane, and associated pumps and piping (existing Brine Storage and Loading Facility) on MW-20 Bench has been incorporated in the Final Remedy and will not be decommissioned as part of IM-3 decommissioning.

N

0 150 300 600 Feet

FIGURE 1-2
IM-3 SYSTEM LOCATIONS

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

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SECTION 2

IM-3 Lay-up Preparation and Activities during Lay-up Period

2.1 IM-3 Lay-up Preparation

Prior to startup of the Final Remedy, the IM-3 system will be shut down and prepared for lay-up. When the IM-3 system is in a lay-up condition, the system will be left in a safe, secure, and preserved state and will not operate again until agency approval is received for decommissioning and removal of the system. Procedures for shutting down IM-3 are included in the existing IM-3 Treatment and Extraction System Operations and Maintenance Plan (O&M) (CH2M HILL, 2006). Procedures for Lockout/Tagout of pipelines and mechanical and electrical equipment will be in accordance with existing IM-3 Treatment and Extraction System standard operating procedures (SOPs). Wastes generated during IM-3 lay-up will be handled in accordance with the Waste Management Plan under the IM-3 Treatment and Extraction System O&M Plan (CH2M HILL, 2006).

IM-3 lay-up preparation will include the following general activities:

1. Notify DOI and DTSC that the IM-3 system (extraction, conveyance, treatment, and injection) will be shut down and prepared for lay-up.
2. Turn off the extraction well system. Drain the active extraction pipeline. (There is a redundant extraction pipeline that to date (July 2013) has never been used. If this pipeline has never been used at the time of decommissioning, then flushing of this pipeline is not required). Flush the active extraction pipeline(s), and collect the flush water for proper treatment at IM-3 or injection into the IRZ injection wells, or offsite disposal. If the pipeline will not drain completely by gravity, then compressed air may be used to clear the pipeline. Prepare the extraction well system equipment and instrumentation for long-term storage in accordance with manufacturer's requirements.
3. Isolate the IM-3 Treatment Plant from the extraction well system by closing manual isolation valves at the raw water storage tank, T-100, and MW-20 Bench Facility. Disconnect each extraction pipeline from each extraction well head, and blind flange the pipeline segments to physically isolate the wells from the rest of the IM-3 system. Lockout/Tagout extraction well-pump motors and valves associated with extraction wells TW-2S, TW-2D, TW-3D, and PE-1.
4. Treat as much process water within the IM-3 Treatment Plant as possible. Inject treated water. After all treated water has been injected, turn off the injection well system. Drain the injection well pipeline. If the pipeline will not drain completely by gravity, then compressed air may be used to clear the pipeline. Prepare the injection well system equipment for long-term storage in accordance with manufacturer's requirements. Protect the aboveground injection well pipeline and conduit as required.
5. Clear chemical lines and collect chemical waste for treatment or proper disposal. Isolate chemical storage totes or day tanks at feed pumps. Remove and return totes with any unused chemicals to the chemical supplier.
6. Isolate the injection wells from the IM-3 Treatment Plant by closing manual isolation valves at the treated water storage tank, T-700. Disconnect each injection pipeline from each injection well head and blind flange the pipeline segments to physically isolate the wells from the rest of the IM-3 system. Lockout/Tagout valves and electrical equipment associated with injection wells IW-2 and IW-3.
7. Transfer brine in the reverse osmosis (RO) concentrate storage tank, T-701, to brine storage tanks on the MW-20 Bench Facility.
8. Drain any remaining process water in the IM-3 Treatment Plant tanks and treatment pipes by pumping process water to the T-701 tank and then pumping the contents of this tank through the active brine pipeline to the brine storage tanks on the MW-20 Bench Facility. Fill T-701 with enough fresh water to flush the brine

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pipeline(s) and then pump this flush water through the brine pipeline to the brine tanks to flush the brine pipeline(s). (There is a redundant brine pipeline that to date [July 2013] has never been used. If this pipeline has never been used at the time of decommissioning, then flushing of this pipeline is not required). Lockout/Tagout all motors and valves associated with the brine transfer at the IM-3 Treatment Plant after completing this task.

9. Clean treatment tanks/pipes using Vactor truck (see Figure 4-18 at the end of Section 4) or drain treatment tanks/pipes of any residual process water that was not removed in the previous step. Collect process water. Then, clean tanks and pipes by water-blasting all equipment and pipes that handled process water and brine, especially metal parts. Collect cleaning water. Temporary filters may be used to remove particulate matter generated during tank and equipment cleaning. Transfer collected process water and cleaning water to brine storage tanks, or transport to either the TCS evaporation ponds or to a permitted offsite facility(ies).
10. Treat the liquid contents (brine from Step 6 and process/cleaning water from Steps 7 & 8) of the brine storage tanks by either injecting the liquid contents into the in situ system, transporting the liquid contents to the TCS evaporation ponds, or arranging for offsite disposal to a permitted offsite facility(ies).
11. Transport sludge to permitted offsite facility(ies). Return rented phase separators. After the brine storage tanks are drained, rinse the brine storage tanks, brine transfer pumps, and brine pipelines with a clean water flush, and prepare the brine transfer pumps for long-term storage in accordance with manufacturer's recommendations. Lockout/Tagout the pump motors and valves associated with brine transfer.
12. Prepare IM-3 process equipment for lay-up in accordance with manufacturer's requirements. Lockout/Tagout motorized process equipment.
13. Remove in-line pH and conductivity elements from the tanks and pipelines. Disconnect these elements from their electrical and control wires, so they can be stored in a temperature–controlled, secure environment. Properly terminate wires from elements and leave wires in a safe condition. Prepare pH and conductivity elements/instruments for lay-up in accordance with manufacturers' requirements.
14. Preserve the microfilter membranes and the primary and secondary reverse osmosis membranes in storage solution in accordance with manufacturer's recommendations. Store membranes and filters in a temperature–controlled, secure environment.
15. Keep fans running within local microfilter and primary and secondary RO programmable logic controller (PLC) panels, because these units will be stored in place.
16. Remove any unused chemicals not contained in totes from the IM-3 Treatment Plant. This step will include removing flammable liquids from the flammable liquid storage cabinet located at the IM-3 Treatment Plant.
17. Lockout/Tagout air compressor system. Lay up system in accordance with manufacturer's requirements and pressure vessel permit, regulations, and code.
18. Verify emergency shower and eye wash station are in good condition and operable. Continue to maintain water supply and conditioning equipment to support emergency shower and eye wash stations.
19. Remove and properly dispose of the batteries at the solar power structure.
20. Verify fire water tank is at high-level point.
21. Verify potable water tank is at high-level point and that eyewash cooling system is operable.
22. Return generator to the rental company if DTSC approves removal during the lay-up period. Otherwise, return generator during decommissioning period after receipt of DTSC approval. Transfer diesel fuel stored onsite to PG&E for use at the Compressor Station.
23. Backup data saved on the Data Historian. Verify current PLC programs are saved to backup drive. Turn human machine interface and Data Historian off, unplug the uninterruptible power supply, and unplug computers. Lockout/Tagout the PLC panel.

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24. Verify lab equipment is clean and the laboratory is left in a clean and safe condition. Laboratory waste will be managed in accordance with state and federal regulations.
25. Notify DOI and DTSC that IM-3 lay-up is complete.

IM-3 shutdown and lay-up preparation will take up to 3 months. After the IM-3 system is in a lay-up condition, it is not expected to operate again because it will have met the goals of the IM and associated design parameters. The IM-3 system will remain in a lay-up condition until PG&E receives approval for closure and decommissioning of IM-3.

2.2 General Equipment and Site Maintenance

Maintenance during the IM-3 lay-up period will include the equipment and site maintenance described in this subsection.

2.2.1 General Equipment Maintenance

Equipment maintenance is required to keep the equipment in good condition and under active equipment warranties, because most major equipment will likely be recovered for reuse. Motorized equipment at the IM-3 Treatment Plant will require the most maintenance. Table 2-1 shows a general maintenance schedule for motorized equipment and plant safety features (tables are located at the end of each section). A more detailed maintenance schedule for IM-3 equipment during the lay-up period will be developed in accordance with (1) the equipment manufacturer's requirements for maintenance as well as short- and long-term storage, and (2) the existing IM-3 Groundwater Treatment and Extraction System O&M Plan (CH2M HILL, 2006). The more detailed maintenance schedule will be included as an appendix to the existing IM-3 Groundwater Treatment and Extraction System O&M Plan.

Electricity will be required for equipment maintenance during the lay-up period. The IM-3 control system will likely not be required for equipment maintenance.

Other features of the IM-3 system that will require weekly checks include the following:

- Storage tanks that formerly contained hazardous materials.
- Pressurized (compressed air) tank.
- Onsite chemical storage areas. (Excess chemicals will be removed from site during lay-up preparation.)
- Emergency shower and eye wash station and potable water cooling system.
- Fire water tank.
- Aboveground injection well pipeline and instrumentation conduit.

2.2.2 Site Maintenance

Site maintenance will include continued maintenance of the access road to the IM-3 Treatment Plant and injection wells as well as watering the road for dust control pursuant to the EIR mitigation measures. Periodic filling of the potable water tank, and possibly the fire water tank at the IM-3 Treatment Plant, will also be required. Regular pest control will be required. Vehicles used for site and IM-3 system maintenance include utility vehicles, cars, trucks, forklift, and backhoe.

2.2.3 Support Requirements for General Equipment and Site Maintenance

2.2.3.1 Site Security

During the lay-up period, PG&E's security system will continue to provide security monitoring of the IM-3 system facilities. During nighttime hours, existing lighting will continue to be used at the IM-3 Treatment Plant and at the MW-20 Bench Facility for security and safety. Even though the facility will not be routinely staffed at night, minimum lighting during nighttime hours is still required for safety in case PG&E personnel need to enter the facilities during these hours. Minimum lighting or minimum illumination intensities are defined by OSHA. For activities and areas not included under the OSHA standard, the American National Standards Institute has established recommended illumination levels under Recommended Practice RP-07-01.

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2.2.3.2 Communications

Telecommunications and plant communications will continue to be maintained for safety, security, and maintenance requirements.

2.2.3.3 Utilities

Water. Because personnel will be onsite during work days, the potable water system at the IM-3 Treatment Plant will stay in service to provide water to the sinks and toilet in the IM-3 Treatment Plant trailer.

Sewer. Because personnel will be onsite during work days, the sewage holding tank for the IM-3 Treatment Plant trailer will stay in service. The sewage holding tank will need to be serviced; the service frequency will be on an as-needed basis.

Power. Electricity to the IM-3 system is required for maintaining some equipment and to power the IM-3 Treatment Plant security gate and lights. The sole power source during the IM-3 lay-up period will be provided by City of Needles power.

2.3 Regulatory Compliance and Reporting

Required compliance field activities and notifications during the IM-3 lay-up period will include the following:

- Industrial stormwater monitoring in accordance with the IM-3 site–specific Industrial Stormwater Pollution Prevention Plan (SWPPP) (CH2M HILL, 2011)
- Emergency notifications in accordance with the Hazardous Materials Business Plan (HMBP) for IM-3 and the General Communications Framework during O&M of the Groundwater Remedy.

The following letters and reports are required and will need to be submitted during the IM-3 lay-up period:

- PG&E will submit an annual HMBP update to the Certified Unified Program Agency (CUPA) by March 1, pursuant to the requirements of California Health and Safety Code, section 25503, facilities that handle hazardous materials (including hazardous waste) in threshold amounts of 55 gallons, 500 pounds, or 200 cubic feet. If IM-3 has onsite hazardous materials or handles them in the threshold amounts, then PG&E will submit an annual HMBP update to the CUPA by March 1. Additionally, if IM-3 decommissioning makes significant changes to the onsite hazardous materials inventory, then PG&E will submit an HMBP update to the CUPA within 30 days. Hazardous waste tank management procedures during lay-up will be implemented.
- Pursuant to the IM-3 ARARs, PG&E will submit quarterly letters to DOI and the Regional Water Board (due annually on January 15, April 15, July 15, and October 15) stating no operation and no discharge occurred during the previous quarter, until DTSC directs PG&E that it is no longer required to operate IM-3, at which point PG&E's compliance obligations with the IM-3 ARARs are complete.
- Pursuant to the requirements of the California State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS00001 (General Permit), and the IM-3 site-specific Industrial SWPPP, PG&E has been and will continue to conduct monitoring (including visual inspections and stormwater sampling) and submit an annual report (due by July 1). PG&E will submit a Notice of Termination (NOT) to end its coverage when it determines that IM-3 is no longer subject to the General Permit. PG&E will continue to comply with the requirements of the General Permit and the SWPPP until the Regional Water Board approves the NOT.
- Pursuant to the MMRP, PG&E has been submitting and will continue to submit quarterly reports to DTSC to document compliance with the mitigation measures set forth in the certified EIR (DTSC, 2011b).

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TABLE 2-1
General Equipment Maintenance Schedule for IM-3 System During IM-3 Lay-up Period
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Equipment and Plant Safety Features	Maintenance Requirement
Pumps (All types, except for diaphragm)	Every 4 months, manually rotate pump shafts several times. Relubricate bearings once annually.
Valves	Every month, exercise pneumatically and electrically actuated valves to prevent valves from freezing. Periodically exercise manual valves. Pneumatically actuated valves will require the air compressor to be operational. Inspect valves for corrosion or damage to seals.
Mixers	Every 4 months, rotate mixers several times. Relubricate bearings once annually. Power is required to rotate the mixers.
Clarifier Rakes	Every 4 months, rotate rakes several times. Relubricate bearings once annually. Power and control is required to rotate the clarifier rakes.
Blower	Every month, rotate blower motor shaft several times. Relubricate the bearings once annually.
Air Compressor	Perform a weekly safety check of system, because it will be needed for valve operation and other equipment maintenance. Check desiccant every 6 months.
Leak Detection System	Perform a monthly check of system only if untreated water was unable to be cleared from the extraction pipelines when preparing the IM-3 system for lay-up.
Emergency Shower and Eye Wash Station, and Potable Water Cooling System	Perform weekly checks of safety equipment. Be sure water is supplied to system.

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SECTION 3

Pre-decommissioning Activities

3.1 Site-specific Orientation and Project Initiation Meeting

Consistent with current site practice, PG&E will invite agency representatives, interested Tribes, and stakeholders to the site for a project initiation meeting. A project initiation meeting will be conducted after notification to proceed with IM-3 decommissioning and removal activities is obtained from DTSC (with concurrence from DOI) and prior to the start of decommissioning and removal activities. Limited site preparation activities, such as underground utility location, are anticipated to be conducted prior to this meeting. Site preparation activities are summarized in the following section.

During the meeting, PG&E will present an overview of the activities that will be conducted as part of this Work Plan; discuss health and safety requirements, and cultural and biological sensitivities associated with the project; introduce key project team members; identify protective measures for site visitors and monitors; describe applicable site safety and communication protocols; and review plans for project communications with the agencies, interested Tribes, and stakeholders during work. PG&E will invite interested Tribes to participate in cultural sensitivity training for workers.

Required safety training for site workers is included in the Construction Health and Safety Plan (HSP) prepared by PG&E. The HSP also includes details on personal protective equipment (PPE) required for entry into the controlled portion of the site. Safety training and PPE requirements may be different based on the level of risk in the different work areas. PPE may be modified or downgraded as work is completed and hazards are mitigated. The Construction HSP is included as an appendix of the Construction/Remedial Action Work Plan.

Because PG&E anticipates that tribal monitors and agency observers are likely to be onsite to observe much of this work, PG&E will arrange appropriate safe viewing locations for site observers. PG&E will establish a protocol for observers to communicate and check in with PG&E's decommissioning team.

3.2 Site Preparation and Demarcation

The majority of site preparation activities and demarcation of the primary work zone boundaries will occur after the project initiation meeting is held. Figure 3-1 shows the primary work zones, staging areas, access and haul routes, and waste management areas that comprise the project area. The following site preparation and demarcation activities will be conducted prior to the decommissioning and removal of IM-3 system:

- Mobilize required personnel, equipment, and materials to the site for mobilization and site preparation activities.
- Delineate access/haul routes between primary work areas and staging areas.
- Establish initial staging and loading areas. (Because of the large area where decommissioning and removal activities will occur, the active boundaries of these areas will change as the work progresses.)
- Locate and mark underground utilities prior to intrusive soil excavation or other subsurface activities. Protect existing utilities in the work and staging areas as necessary according to the utility owner's specifications.
- Set up temporary facilities and utilities for temporary facilities in a selected staging area for use by the onsite personnel.
- Establish equipment and materials storage areas in designated staging areas.
- Demarcate the first primary work zone boundary. Within the first primary work zone, the exclusion zones and contaminant reduction zones will be demarcated. The support zone will be located and established outside of this primary work zone.

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- Set up temporary hazardous waste storage with secondary containment within the exclusion zone boundary for use during decommissioning and removal activities. Set up temporary non-hazardous waste storage within designated waste management staging areas. Stage and label empty roll-off bins and other empty waste containers in a staging area.
- Set up perimeter air monitoring equipment (see Section 3.2.5).
- Set up health and safety equipment required by the HSP for work in the designated areas, such as locating an emergency eyewash station, fire extinguisher, spill kit, and first aid kit in the decontamination area.

3.2.1 Mobilization and Temporary Facilities

Mobilization activities will include arranging for mobilization of temporary facilities, demolition equipment, and materials (e.g., plastic, sand bags, straw wattles, silt fencing, and empty waste containers) to designated staging areas. Temporary facilities will include an office trailer with electric and phone service, restroom facilities, safety and security lighting, equipment storage area, and parking area. The office trailer will be mobilized approximately 2 weeks prior to setting up electric and phone service. Equipment and materials mobilization will be initiated with site preparation activities that require equipment and materials to complete the activity. Equipment and materials will be mobilized to the site as needed to minimize onsite storage requirements.

Project mobilization will include completion of the following tasks:

1. Given that the CERCLA permit exemption under Section 121(e)(1) applies to this work, determine substantive requirements with which PG&E must comply (see Section 9).
2. Install erosion and sediment controls and other temporary environmental controls. Install appropriate runoff controls to meet the requirements of the SWPPP (see Section 6).
3. Set up temporary facilities, electric, phone, water, restroom facilities, and safety and security lighting for the temporary facilities.
4. Designate parking area and equipment and materials storage area.
5. Set up secondary containment and spill response equipment at established equipment storage area where vehicle/equipment idling or refueling may occur.
6. Verify required health and safety equipment and supplies are in position for use.
7. Deploy heavy equipment, required to carry out the decommissioning and removal activities, to the first primary work zone.
8. Establish water source and set-up temporary water storage. Deploy water trucks for dust control, equipment decontamination, and other activities. Stage fresh water storage tanks in designated staging areas.

3.2.2 Primary Work Zones

A primary work zone is the area where decommissioning and removal activities will take place. There are several primary work zones. Primary work zones include (1) the area around the IM-3 Treatment Plant, (2) the area around the MW-20 Bench Facilities, and (3) the areas around extraction/injection well and pipeline vaults. Figures 3-2 through 3-4 present a close up view of the three types of primary work zones. Primary work zones will be demarcated with fencing or other barriers and signage to prevent unauthorized access. Within each primary work zone that includes the decommissioning and removal of potentially contaminated IM-3 components or infrastructure, one or more contaminant reduction zones will be demarcated with highly visible fencing so that work is conducted in accordance with California Occupational Safety and Health Administration (Cal-OSHA) regulations set forth in Title 8, California Code of Regulations (CCR), Section 5192, and this Work Plan's HSP. Support zones will be located near, but outside, the exclusion zones and contaminant reduction zones. Each zone will provide sufficient area for equipment traffic and decommissioning wastes. Figure 3-2 shows the approximate IM-3 Treatment Plant primary work zone boundary, as well as the boundaries of the exclusion zone, contaminant reduction zone, support zone, and waste management areas within or near the IM-3 Treatment Plant primary work zone. The boundary of the primary work zone and contaminant reduction zone will be delineated and

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demarcated prior to commencing work in that primary work zone. Air monitoring requirements and the requirements of the work may cause the boundaries shown on Figures 3-2 through 3-4 to change.

The IM-3 Treatment Plant primary work zone and the MW-20 Bench Facility primary work zone will also be waste management areas. Each primary work zone will provide sufficient area for decommissioning and removal activities, equipment traffic and truck loading, equipment and personnel contaminant reduction, and management of decommissioning wastes if the zone is also a waste management area. Two of the staging areas, the staging area directly across from the IM-3 Treatment Plant and the staging area located at the old rock quarry will also be waste management areas. Waste management areas are depicted on Figure 3-1. The work to be performed in the exclusion zones, contaminant reduction zones, support zones, and waste management areas is discussed in the following subsections.

3.2.2.1 Exclusion Zones

Exclusion zones will include areas of decommissioning, removal (demolition), and truck loading. Decommissioning and removal activities, decontamination, waste characterization, waste containerization, waste management, and truck loading will occur in the exclusion zones. Silt fences, hay bales, berms, sand bags, and wattles or drainage sumps will be constructed in the exclusion zones to manage and collect runoff as necessary.

Exclusion zones will be accessed through contaminant reduction zones. Personnel requiring access to exclusion zones must have the safety training required by the HSP, be qualified and trained for the PPE as determined by the HSP, and must have reviewed and signed the HSP. The Cal-OSHA Hazardous Waste Operations and Emergency Response standard located at 8 CCR 5192 (Federal OSHA 29 *Code of Federal Regulations* [CFR] 1910.120) in Section (g) (1) (A) states the following:

> *Engineering controls and work practices shall be instituted to reduce and maintain employee exposure to or below the permissible exposure levels (PELs) of substances regulated by 8 CCR 5155, except to the extent that such controls and practices are not feasible. Work practices which may be feasible include removing non-essential employees from potential exposure.*

Therefore, access to exclusion zones will be limited to those essential for the safe completion of project goals, and donning PPE to enter exclusion zones will be the last option after the use of engineering controls and administrative controls are evaluated.

3.2.2.2 Contaminant Reduction Zones

Contaminant reduction zones will be located immediately adjacent to the exclusion zones for purposes of decontaminating personnel, equipment, and vehicles exiting the exclusion zones and entering the support zones. Separate contaminant reduction zones may be established for other areas of the site not accessible through the primary contaminant reduction zones. Workers leaving the exclusion zones will go through decontamination in the contaminant reduction zones consisting of boot washes, PPE removal areas, personal decontamination, and clean clothing area. The equipment and vehicle decontamination areas will be equipped with pressure-washing equipment and a sump to collect decontamination wastewater.

3.2.2.3 Support Zones

Support zones will be located adjacent to or near a primary work zone and will be outside of the exclusion zones and contaminant reduction zones. Equipment and materials staging areas will be within the support zones. Support zones will be used to temporarily store equipment, vehicles, and personnel. Most active equipment staging will take place in the support zones. Support zones may also be used for temporary stockpiling (less than 90 days) of non-hazardous decommissioning wastes and for storing containerized, labeled decommissioning wastes. Break areas, portable toilets, and other support facilities, if needed, will be set up in the support zones. Daily planning and health and safety meetings will be held in the support zones prior to commencing work. Support zones will also serve as the communication and coordination center for emergency situations.

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3.2.2.4 Waste Management Areas

Waste management areas include areas where waste is cleaned, decontaminated, temporarily stockpiled, or staged prior to disposal. Waste management areas will be considered to be exclusion zones, unless waste materials are nonhazardous or characterized, containerized, and labeled (see Section 5).

3.2.3 Staging Areas

Figure 3-1 shows the proposed equipment and material staging areas. Staging areas will be established for location of temporary facilities, lay-down of demolition equipment (including heavy equipment), refueling of vehicles or equipment, concrete crusher, materials, supplies, and demolition tools. Staging of empty containers, containerized, labeled non-hazardous decommissioning wastes, temporary stockpiling of non-hazardous waste for sizing and segregation of waste prior to allow containerization, and staging of recoverable materials for recycle or reuse will occur in staging areas that are also designated as waste management areas. Smaller, temporary equipment and materials staging areas will be set up at each primary work area as necessary.

3.2.3.1 Fuel Storage and Fueling Practices

Offsite fueling or onsite re-fueling at TCS are the primary vehicle or equipment fueling practices by PG&E for mobile equipment. Onsite fueling may be used for fixed decommissioning heavy equipment following the accepted site protocol for onsite fueling. Types of fuel anticipated to be used onsite include the following:

- **Diesel Fuel** – meets California low-sulfur standards and regulations. A bulk diesel fuel tank is in place at the TCS that can be used by PG&E and its contractors conducting decommissioning activities for refueling mobile vehicles and equipment.
- **Gasoline** – meets California's reformulated gasoline program standards and regulations. There will be no bulk storage of gasoline onsite; however, it is anticipated that truck-mounted gasoline storage tanks will be used to transport fuel to the site and refuel equipment onsite.

The project will comply with local, state, and federal regulations related to the bulk storage and management of fuels. Appendix C includes a safe fueling and fuel handling policy for activities during implementation of this Work Plan.

3.2.4 Access and Haul Routes

Access to project area will be via designated access and haul routes. Access and haul route options between primary work areas and staging areas are shown on Figure 3-1. Existing roads should be sufficient for the work covered in this plan; therefore, no new road construction is planned. Appropriate signs will be posted along the access and haul roads to indicate traffic patterns (see Appendix D, Transportation Plan).

3.2.5 Perimeter Air Monitoring

Perimeter air monitoring will be conducted to measure the ongoing effectiveness of the dust control measures, guide modifications to field activities if necessary, and document that adequate measures are being used to prevent the distribution of dust beyond the boundaries of the work zone during the decommissioning and removal of the IM-3 treatment plant. A perimeter air monitoring plan (PAMP) has been developed to accomplish the stated objectives, and is included in Appendix I.

The PAMP has been written in such a manner as to allow field personnel to implement the plan and take the appropriate actions to prevent dust from leaving the work zone during the decommissioning of the IM-3 treatment plant. The PG&E Site Manager and the Project Air Monitoring Officer (AMO) have the primary responsibility for implementing the PAMP. The PG&E Site Manager is responsible for directing and controlling all site activities and is responsible for enforcing on-site compliance with the provisions of the PAMP. The designated Project Air Monitoring Officer (AMO) will implement the PAMP under the direction of the PG&E Site Manager.

3.3 Underground Feature Survey and Utility Isolation

Underground utilities within the project area will be located and marked prior to intrusive site preparation or decommissioning and removal activities that require soil excavation or utility isolation. Underground Service Alert

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or “Dig Alert” will be contacted to identify public utilities that operate within the work areas. Independent utility-locating providers will also be employed to identify underground utilities that are not part of the public utility system. Utility locations will be marked with paint on the ground surface overlying areas that will be disturbed by excavation. Utility clearance operations will be coordinated with facility personnel who will be responsible for utility identification.

Proposed locations of intrusive work will be reviewed with PG&E and IM-3 treatment system personnel knowledgeable in the locations of the existing utilities. These locations will be checked against information from the utility mark-out service. Existing underground utility surveys of the project area and IM-3 Groundwater Extraction and Treatment System record drawings will also be reviewed. In April 2012, an underground utility survey was performed at the project site by Subtronic. Utilities were identified using ground-penetrating radar and marked with paint. Utilities identified include water, sewer, gas, phone, and power lines. The marked utilities were located by Global Positioning System and plotted on utility drawings (see Appendix E). If there is uncertainty about utility locations, excavation will be performed manually or with air knife and vacuum techniques. Those utility services that will require Lockout/Tagout, shut off, or relocation to carry out the work will be identified in cooperation with the utility owner. All Lockout/Tagout will be performed only by qualified personnel.

Portions of the located utilities that service only IM-3 Groundwater Extraction and Treatment System will be decommissioned and removed as a part of this work. The utility will be isolated and disconnected by the utility provider prior to decommissioning and removing portions of a utility. The portions of utilities to be removed and decommissioning procedures for these utilities are described in the following subsections and are shown on Figures 3-5 and 3-6.

3.3.1 Water

The domestic water supply for the IM-3 Treatment Plant trailer sinks and toilet comes from the PG&E Compressor Station. Domestic water is hauled to the site as needed and is transferred into an aboveground tank located inside the IM-3 Treatment Plant sunshade. The domestic water line that feeds the IM-3 Treatment Plant trailer from the tank will be removed when the IM-3 Treatment Plant foundation and underground sewage holding tank is removed. The domestic water tank and pumping system is non-hazardous and can be salvaged or disposed of as non-hazardous waste. Decommissioning procedures for the potable water tank system are listed in Section 4.3.10.1.

3.3.2 Sewer

Sanitary waste is stored in an onsite underground sewage holding tank, which is pumped as necessary. This tank is fed directly from the IM-3 Treatment Plant trailer. The sewage holding tank and line between the trailer and tank will be cleaned prior to isolation. After cleaning, the tank and line will be removed. The sewage holding tank system is non-hazardous and will be disposed of offsite. The location of the former tank will be backfilled and compacted to leave the area in a safe condition. Decommissioning procedures for sewage holding tank system are listed in Section 4.3.7.1.

3.3.3 Natural Gas

No natural gas lines will be removed as a part of this work; however, natural gas lines are located near the boundary of some primary work areas. The location of natural gas lines near the primary work zones will be marked. The lines will be sufficiently protected from the decommissioning and removal activities.

3.3.4 Phone

The phone line to the IM-3 Treatment Plant trailer will be decommissioned from the trailer back to the main vault along National Trails Highway. The actual isolation of the communications feed line to the IM-3 Treatment Plant will be performed by the communication provider. Following isolation completion, the underground conduits that house the communication lines within and outside of the fence line of the IM-3 Treatment Plant will be excavated and removed. The exception is, for the purpose of slope stability and erosion control the short portion of these underground conduits that are on a steep slope, just outside of the IM-3 Treatment Plant fence line to the east

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will be cut and capped at both ends at a location below grade. The location of both capped ends will be identified on an as-built drawing.

3.3.5 Power

The aboveground and underground power lines to the IM-3 Treatment Plant trailer will be removed from the trailer back to the first utility pole located outside of the IM-3 Treatment Plant fence line. The utility pole within the IM-3 Treatment Plant fence line will be removed. The actual isolation of the electrical feed line to the IM-3 Treatment Plant will be performed by the electricity provider. Following isolation completion, the power lines will be removed from the utility pole outside the IM-3 Treatment Plant to the IM-3 Treatment Plant trailer, then the utility power pole within the fence line will be removed. The transformer located within the fence line will also be decommissioned and removed. Similar to the phone line, the underground conduits that is located on a steep slope, just outside of the IM-3 Treatment Plant fence line to the east will be cut and capped at both ends at a location below grade. The location of both capped ends will be identified on an as-built drawing.

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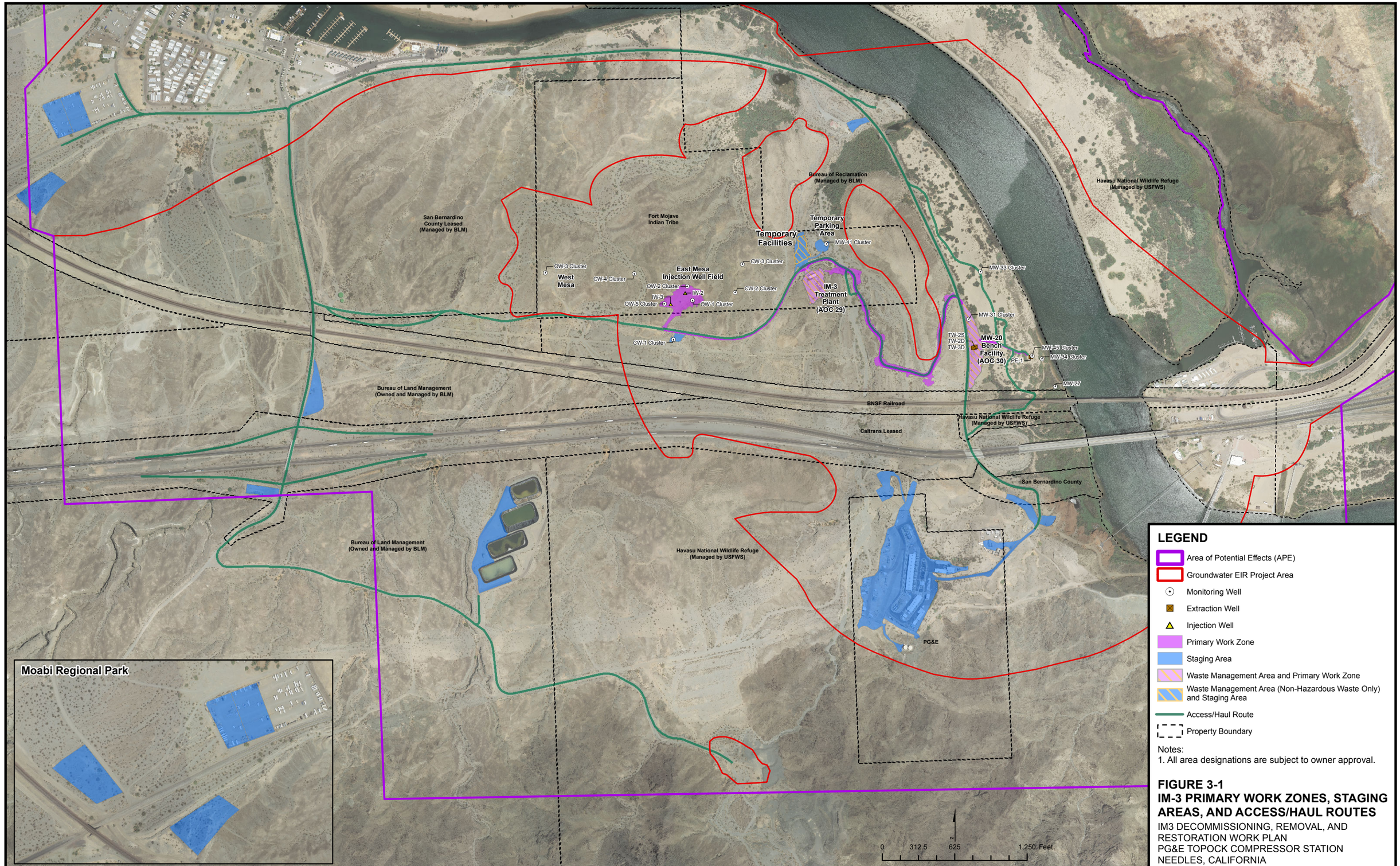

Notes:
1. All area designations are subject to owner approval.

FIGURE 3-1
IM-3 PRIMARY WORK ZONES, STAGING AREAS, AND ACCESS/HAUL ROUTES
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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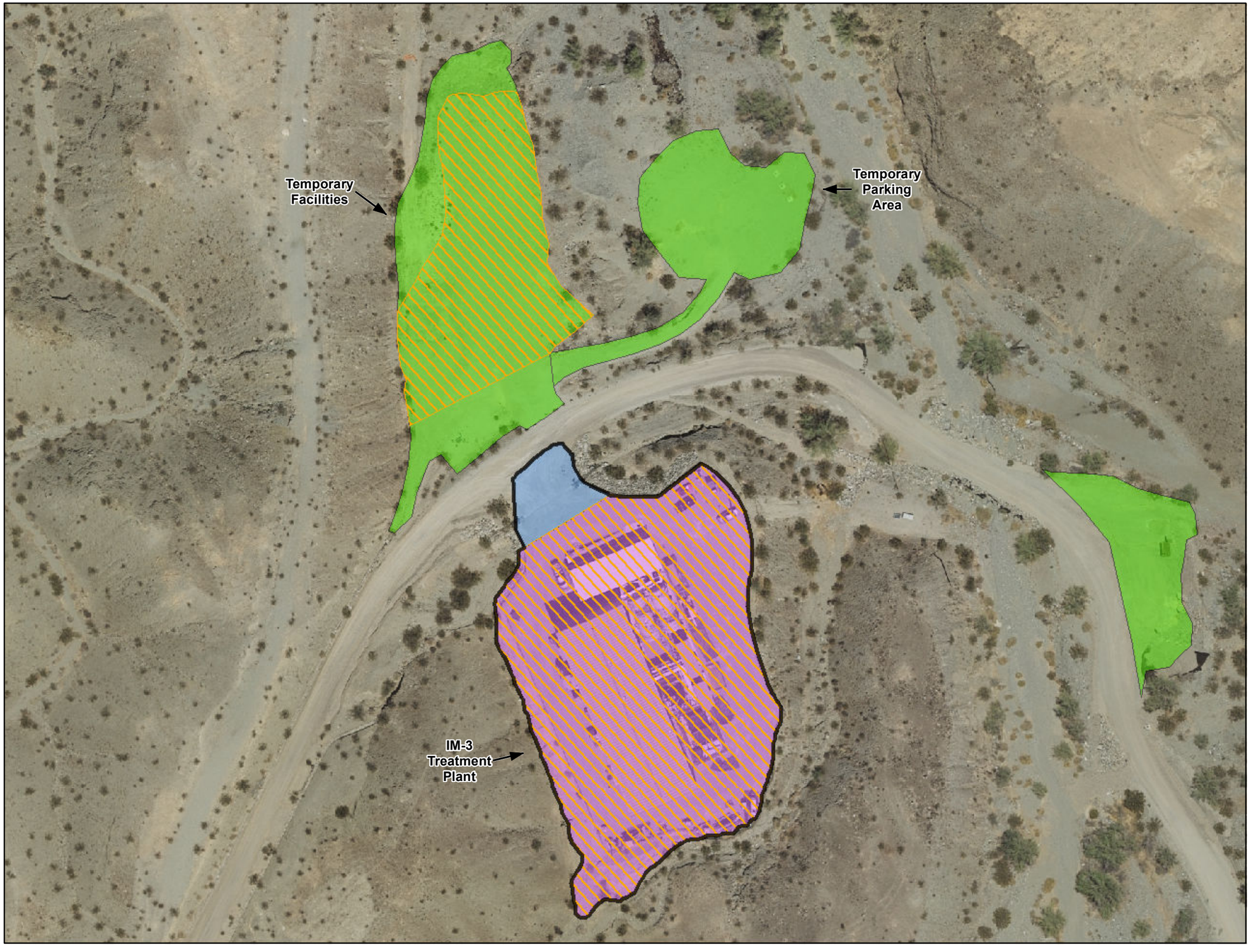
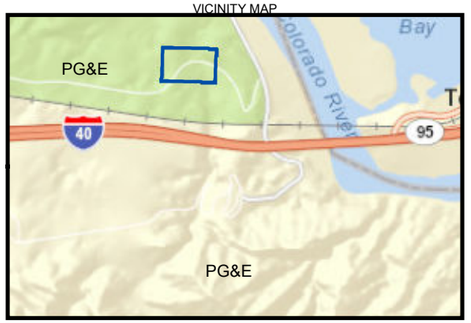


VICINITY MAP



LEGEND

- Primary Work Zone Boundary
- Exclusion Zone
- Support Zone
- Contaminant Reduction Zone
- Exclusion Zone and Waste Management Area
- Support Zone and Waste Management Area

Note

1. This primary work zone boundary is approximate and is estimated based on site history and observations. Air monitoring requirements and the requirements of the work may cause the boundary shown on this figure to change.

N

0 25 50 100 150
Feet

FIGURE 3-2
IM-3 TREATMENT PLANT PRIMARY WORK ZONE

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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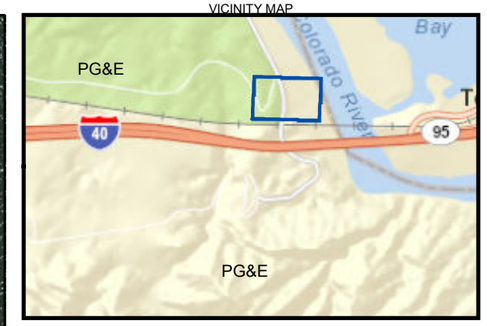
VICINITY MAP



LEGEND

Primary Work Zone Boundary

Note:
The primary work zone boundary is approximate and is estimated based on site history and observations. Air monitoring requirements and the requirements of the work may cause the boundary shown on this figure to change.

N

0 25 50 100 150 200
Feet

FIGURE 3-3
MW-20 BENCH FACILITY
PRIMARY WORK ZONE
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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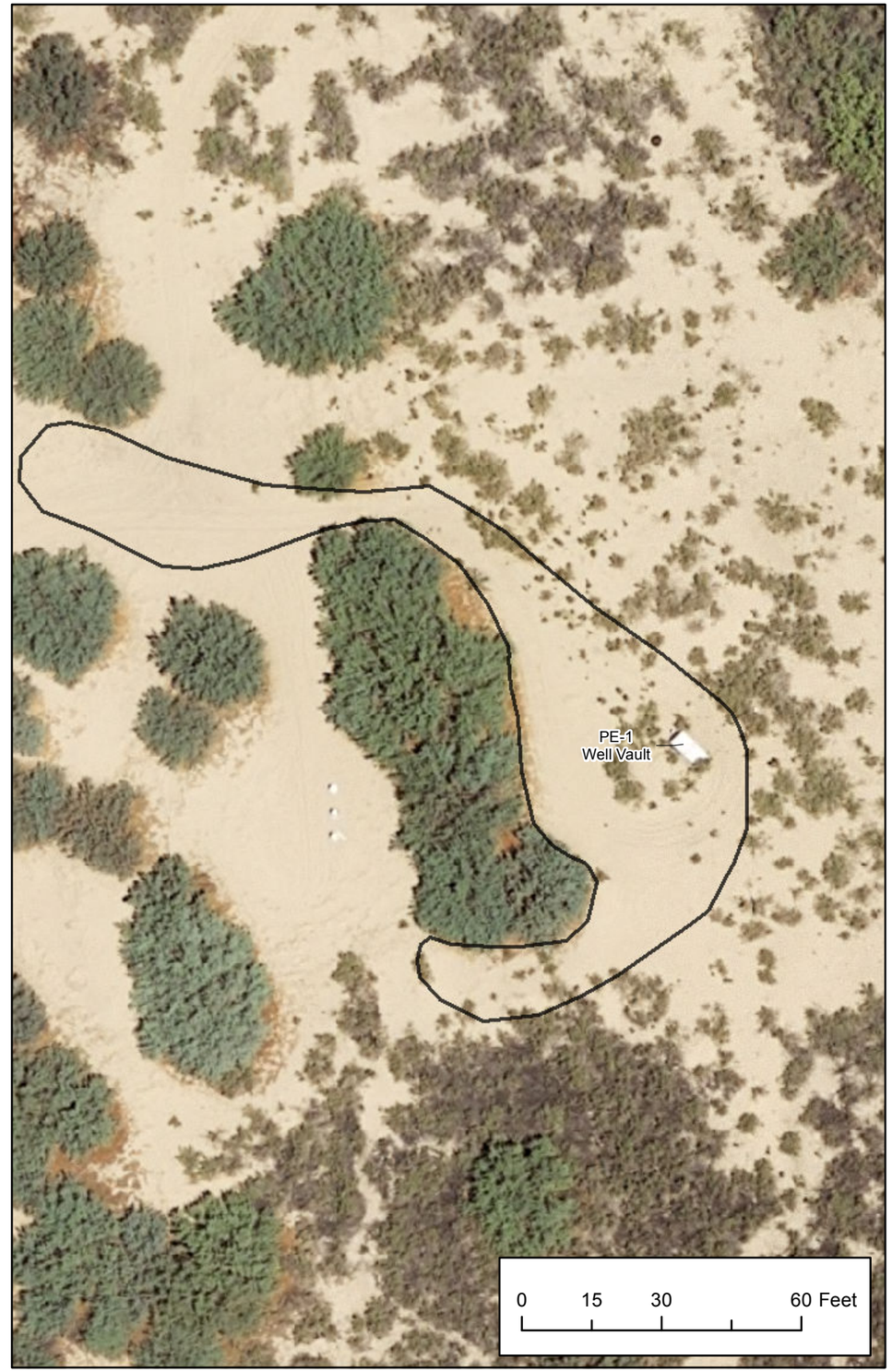

VICINITY MAP

LEGEND

Primary Work Zone Boundary

Notes:

1. Several valve vaults along the conveyance pipeline will be decommissioned and removed. The primary work zone shown on the left is typical for valve vaults.
2. Several well vaults will be decommissioned and removed at extraction wells TW-2S, TW-2D, TW-3D and PE-1, and at injection wells ,IW-2 and IW-3. The primary work zone shown on the right is typical for well vaults.
3. These primary work zone boundaries are approximate and are estimated based on site history and observations. Air monitoring requirements and the requirements of the work may cause the boundaries shown on this figure to change.

N

FIGURE 3-4
WELL AND PIPELINE VAULTS, TYPICAL PRIMARY WORK ZONE
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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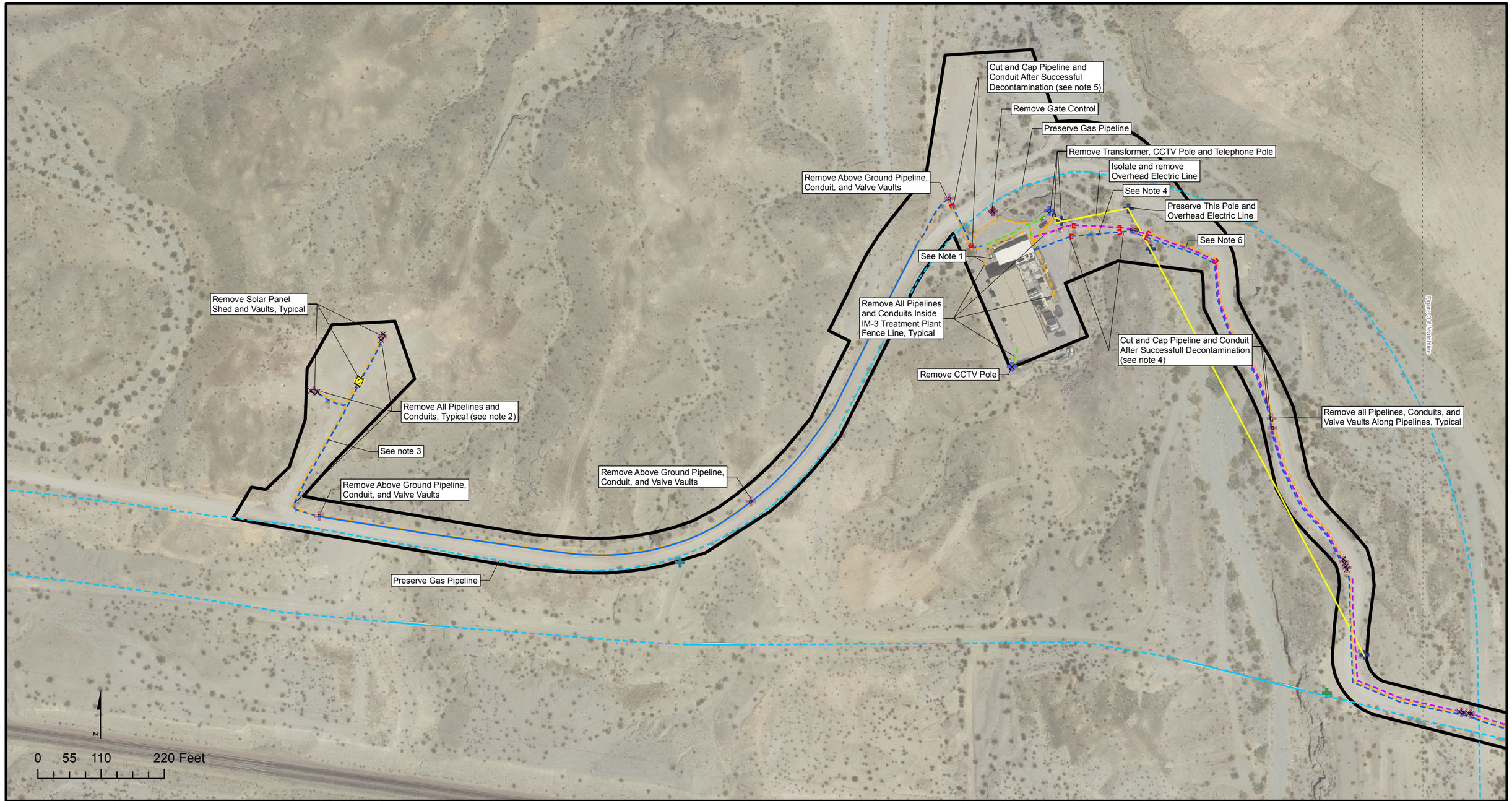

LEGEND

- Survey Corridor
- Cut and Cap Point
- Remove Pipeline,Conduit, Well Vault, or Valve Vault as Indicated

Above Ground Point Features

- CCTV Pole
- Gas Pipe Warning Sign
- Gate
- Gate Control
- Solar Panel/Shed
- Street Sign
- Telephone Pole
- Vault

Line Features (Underground)

- CCTV
- Electric Line
- Gas Pipe
- Telephone Line
- Water Line

Line Features (Aboveground)

- Electric Line
- Gas Pipe
- Overhead Electric
- Water Line

Notes:

1. Approximate locations of potable water and sewer pipelines.
2. Underground pipelines and conduits outside of IM-3 fence line will be removed, unless otherwise noted. Coordination with foreign utilities is required when in/near their right-of-ways.
3. To avoid conflict with remedy pipes and potential damage to existing IM3 infrastructure, these pipe and conduits are to be replaced with aboveground jumper pipes during remedy construction. The jumper pipes are to be removed as part of IM3 decommissioning.
4. All pipes on this slope are to be abandoned in place as shown in order to reduce erosion and improve slope stability.
5. Remove all process piping and conduits and grout shut the casing pipe.
6. There are four water pipelines and multiple conduits in this shared trench under Bat Cave Wash. All pipelinesand conduits in the shared trench are to be abandoned in place as shown to avoid disturbance to sensitive habitat.

FIGURE 3-5
IM-3 UTILITY ISOLATION AND DECOMMISSIONING PLAN

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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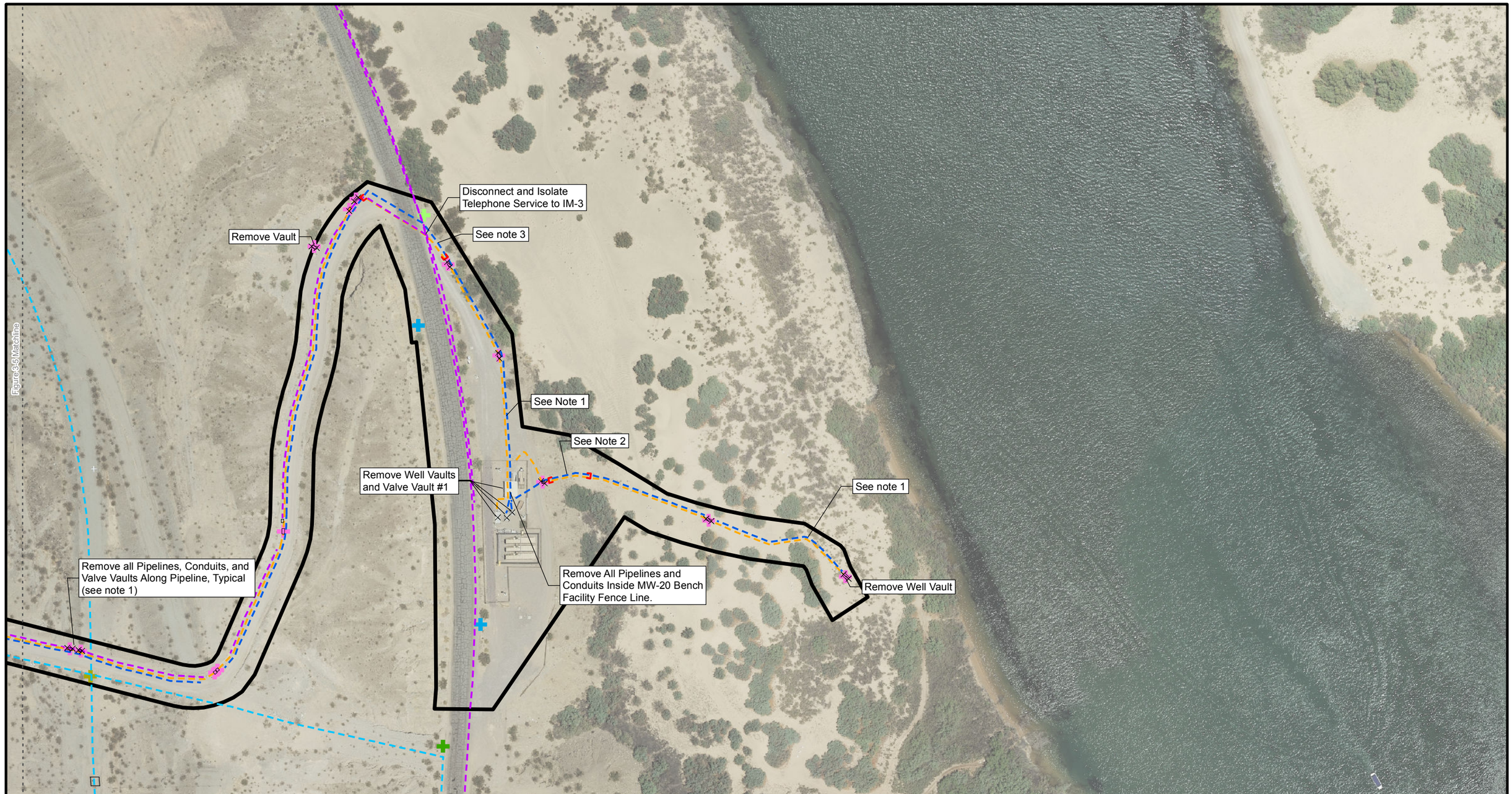

LEGEND

- Survey Corridor
- Cut and Cap Point
- Remove Pipeline,Conduit, Well Vault, or Valve Vault as Indicated

Above Ground Point Features

- Anode
- Gas Pipe Warning Sign
- Gate
- Street Sign
- Telephone Box
- Vault

Line Features (Underground)

- Electric Line
- Gas Pipe
- Telephone Line
- Water Line

N

0 50 100 200 Feet

Notes:

1. Underground pipelines and conduits outside of MW-20 Bench Facility fence line will be removed, unless otherwise noted. Coordinate with foreign utilities when in/near their right-of-ways.
2. All pipes on this slope are to be abandoned in place as shown in order to reduce erosion and improve slope stability.
3. All pipes and conduits in/on the shoulder of NTH are to be abandoned in place to avoid breaking pavement on NTH (Potential O&M issue for county).

FIGURE 3-6
IM-3 UTILITY ISOLATION AND DECOMMISSIONING PLAN 2
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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SECTION 4

Decommissioning Procedures

Decommissioning and removal activities will commence when site preparation, demarcation, and utility isolation activities are complete. For the purpose of this Work Plan, decommissioning is defined as rendering the IM-3 Groundwater Extraction and Treatment System permanently out of service; decontaminating identified system components; removing (demolishing or recovering) identified IM-3 system; characterizing waste; and properly handling, transporting, and disposing of waste streams.

Table 4-1 presents an overview of IM-3 system to be decommissioned and categorizes these components as one of the following waste streams (note: if the component or structure is non-hazardous or is characterized as non-hazardous following successful decontamination, then it can be recovered for reuse or recycle; Section 5.2 presents IM-3 components and structures that have recovery value):

1. Non-hazardous solid waste, which may be recovered or disposed of:
   a. Requiring zero to minimal cleaning (e.g., water rinse).
   b. Requiring extensive cleaning (e.g., pressure washing with surfactant solution).
2. Cleaning liquid and solid waste generated from cleaning components/materials in Category 1.
3. Hazardous solid waste, which will likely not be decontaminated prior to disposal. (Classification of RCRA or Non-RCRA will be determined by analysis prior to disposal.)
4. Components or materials that will be decontaminated and managed as non-hazardous if decontamination is successful, which may be recovered or disposed of.
5. Decontamination liquid or solid waste generated from decontaminating components, or materials in Category 4.

For the purpose of this Work Plan, presumed non-hazardous tank system components, equipment, and materials are defined as items that have only handled non-hazardous waste or non-hazardous materials, or have previously been determined to not exhibit hazardous waste characteristics. Conversely, presumed hazardous tank system components, equipment, and materials are defined as items that have handled hazardous waste or have previously been determined to exhibit hazardous waste characteristics. Figure 4-1 shows the IM-3 treatment process flow diagram and indicates which portions of the treatment system handled hazardous waste and materials. Figure 4-2 presents areas in the IM-3 Treatment Plant that are considered potentially hazardous areas, because the tanks, equipment, and pipelines in these areas have handled hazardous waste. Figure 4-3 presents areas in the MW-20 Bench Facility that are considered potentially hazardous areas, because the equipment and pipelines in these areas have handled hazardous waste. Some of the upstream components of the IM-3 treatment system from the extraction wells to the clarifier, sludge holding tank to the phase separators, and process drains tank have handled hazardous waste and materials.

IM-3 components that are classified as hazardous waste tank systems must meet the closure performance standard for a facility operated under conditional authorization as specified in California Health and Safety Code (CHSC) Section 25200.3(g)(1). Hazardous waste tank systems will also be decommissioned in compliance with 22 CCR Division 4.5, Chapter 32. To decrease the amount of hazardous waste to be transported offsite, most tanks and equipment that contained hazardous waste will be decontaminated to the standards specified in 22 CCR 67383.3(e). By demonstrating that tank system components are no longer hazardous, they can be disposed of as non-hazardous waste or can be recovered if approved by PG&E.

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Various decontamination methods are available for potential use during implementation of this Work Plan and include the following:

- Pressurized water blasting for the removal of light- to heavy-residual product, sludge, scale, and debris from tank, equipment, and a variety of other material surfaces, such as concrete floors and walls.
- Abrasive blasting with various materials accelerated in a pressurized air stream.
- Mechanical removal with equipment such as scabblers. Mechanical removal is typically used for thin veneers of contaminants on relatively small horizontal or vertical affected areas.
- Chemical washing using a combination of an aqueous solution with bleach, acid, surfactant, or other industrial cleaning products, and a clean water rinse.
- Chemical extraction to remove contaminants that may migrate into the pores and microscopic voids of a material.

Non-hazardous IM-3 components will be decommissioned and removed and cleaned if required. Various cleaning methods are available for potential use during the implementation of this Work Plan and include low- and high-pressure water blasting and chemical washing as previously described.

Following decontamination or cleaning, these IM-3 components and material surfaces will be removed from their existing location and containerized and staged for disposal as a waste or for reuse or recycle (see Section 5). Table 4-2 lists common removal (demolition) equipment and methods that may be used during the decommissioning of IM-3 system. This table provides information on typical equipment and methods used for removal and is not meant to be an all-inclusive list or used to dictate means and methods that will be implemented as a part of this work.

Figures 4-4 through 4-23 show photographs of typical removal (demolition) equipment that could be used during the decommissioning and removal of the IM-3 Groundwater Extraction and Treatment System. Note that this is not intended as an exhaustive compilation of potential equipment that could be onsite; equipment could be added to or removed from this list as appropriate at the time of implementation. In addition, photos are for illustration purposes only, and are not intended as exact images of equipment that could be onsite.

The following sections describe decommissioning procedures for the IM-3 system included in this Work Plan. Section 6 describes best management practices and mitigation measures.

4.1 Wells

The four extraction wells, TW-2S, TW-2D, TW-3D, and PE-1, and the two injection wells, IW-2 and IW-3, will be decommissioned as part of the IM-3 system decommissioning. The general approach for decommissioning wells has been developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes, and is included as Standard Operating Procedure (SOP) Well-SOP-01 in Appendix B of the Operation and Maintenance (O&M) Plan (Volume 1 of the O&M Manual (CH2M HILL 2014c). The technical specifications and procedures for decommissioning the above six wells were developed in accordance with this SOP.

Well-head construction includes subsurface concrete vaults equipped with pumps (extraction wells only), instrumentation, valves, and other pipe appurtenances. Appendix A, Photographs 1 and 2 show the extraction well locations and vaults, and Photograph 58 to view the injection well vaults. Underground piping and electrical conduits are connected to the well heads to convey water and provide power and control for equipment, valves, and instrumentation. Appendix A, Photographs 3 and 59 show the typical interior of an extraction well vault and injection well vault, respectively.

4.1.1 Identification of Decommissioning Materials and Placement Requirements

The SOP defines the various materials that can be used during the well decommissioning process. This section identifies the specific materials that will be used during the decommissioning of the IM-3 system wells based on the assumption that the well will be decommissioned in place and that they are located in an area of known or potential soil or groundwater contamination. PG&E anticipates reviewing these plans and assumptions with the

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DTSC, DOI, responsible agency (San Bernardino County), affected land owner, Tribes, and other stakeholders after the well evaluation is complete and before backfilling the wells (see Section 4.1.2).

4.1.1.1 Sealing Material

The wells associated with the IM-3 system are considered Type 2 wells (as identified in the SOP) because they are located in an area of contaminated groundwater (injection wells IW-2 and IW-3 are outside of the groundwater plume, but are in an area planned for active groundwater remediation). Further, wells TW-2S, TW-2D, TW-3D and PE-1 are located on the flood plain of the Colorado River, which represents an area of increased potential for surface water infiltration relative to nearby upland areas. For these reasons, and in accordance with the California Well Standards, sealing material will be used to fill the well casing from total depth to a within 5 feet of ground surface. Neat cement grout has been selected as the preferred sealing material because it has the capacity to infiltrate and seal the annular filter pack behind the well screen.

The neat cement will be composed entirely of Type II/V Portland cement grout with up to 6% bentonite powder. Water used to prepare the cement will be obtained from the freshwater supply associated with the TCS or the groundwater remedy. All manufacturers' specifications for mixture volumes and curing times must be strictly followed (typically, ASTM C150, Standard Specification for Portland cement). Further, the use of any additives will comply with the requirements of ASTM C494 (Standard Specification for Chemical Admixtures for Concrete).

The neat cement will be placed in the well casing in one continuous operation using a tremie pipe with positive displacement pumping (pumped under pressure), beginning at the bottom of well with the end of the tremie pipe submerged two feet or more below the surface of the cement during placement. During this operation, static water is either displaced out of the top of the well by the injected column of material, or is forced into the formation. Water that is displaced out of the top of the well will be contained and managed in accordance with the Waste Management Plan (see Section 5). The cement level in the well will be monitored for settlement during emplacement and approximately 24 hours after and the volume of neat cement will be measured against the anticipated volume of the well (including the annular borehole area) to verify adequate filling. Additional cement will be added as necessary to compensate for grout settlement and bring the level of grout in the well casing approximately 5 feet below the existing ground surface.

4.1.1.2 Filler Material

In accordance with the California Well Standards, filler material will not be used to decommission IM-3 system wells because they are located in an area of contaminated soil and groundwater; however, this assumption will be confirmed with DTSC, DOI, responsible agency (San Bernardino County), affected land owner, Tribes, and other stakeholders before backfilling the wells.

4.1.1.3 Displaced Site Material

Displaced site material will be used to backfill the portion of the excavation above the sealed well casing, including the void created when the existing well vaults are removed. If any soils are displaced during the removal of the well vault, it will be temporarily staged in the work area and replaced into the excavation once the decommissioning process is complete. Additional material needed to backfill the vault excavation will be sourced from an existing, onsite stockpile of displaced site material reserved for this type of use.

4.1.2 Well Decommissioning Procedure

Based on review of the SOP and the assumption that the results of the evaluation conducted within each well prior to decommissioning will indicate that the wells are in good condition, each well will be decommissioned using the procedure for "decommission in place". As identified in the SOP, decommissioning wells in place, when acceptable to the regulatory agencies, is the preferred method as it represents the field procedure which is least intrusive and which creates the least amount of disturbance. In accordance with the SOP, each well will be decommissioned by the following procedure:

1. **Remove all in well infrastructure** to facilitate well evaluation. Prior to decommissioning the wells, submersible pumps in the extraction wells, air-lift tubing in the injection wells, and pipes, valves, and instruments in both the extraction and injection well vaults will be removed. Conduit, electrical panels, and

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other features within a well vault will also be removed. Underground pipelines and conduits exiting a well vault within the MW-20 Bench Facility fence line will be removed. After successful decontamination or cleaning, underground pipelines and conduits exiting PE-1, IW-2, and IW-3 well vaults will be removed.

2. **Well evaluation and consultation with lead agencies, responsible agency (San Bernardino County), affected land owner, and other stakeholders.** Review drilling and well construction records for the given well and compare to information collected during the well evaluation. Conduct an evaluation of each IM-3 system well by measuring total depth and surveying well screen and casing condition with an in-well video camera. Prior to implementation of well decommissioning activities, consult with DTSC, DOI, responsible agency (San Bernardino County), affected land owner, Tribes, and other stakeholders to confirm that the well should be decommissioned in place without modification, and confirm the proper use of backfilling materials (i.e., sealing material versus filler material, if applicable).
3. **Place sealing material.** Once it is confirmed that the well is free of blockages and that well casing and screen condition are acceptable, the sealing material will be placed via tremie pipe as detailed in Section 4.1.1.1. Sealing material placement will begin with the tremie pipe near the bottom of the well and will be placed in one continuous operation. Subsequent lifts of sealing material, if required due to settlement, will be added in the same manner if the material level is below the water table, or the material can be added from the surface if the material level is above the water table. If it is determined that filler material should be used for portions of the well backfill, then the material will be placed in accordance with the methods identified in Section 2.2.2 of the SOP.
4. **Decommissioning the well head.** In addition to the removal of well head infrastructure identified in Step 1, the well head will be decommissioned by removing the existing well vaults and cutting off the well at a depth of approximately 5 feet below ground surface (bgs) (if the well casing is already at a level of 5 feet bgs, or lower, it will be left at the existing depth). The cut-off casing will be encapsulated within a “mushroom cap” composed of neat cement grout that sits above and extends beyond the diameter of the well casing so that fluids drain away from the well. Once the well head cap has cured, the remainder of the excavation will be backfilled using the same material that was displaced during vault removal, as applicable, or with additional displaced site material as identified in Section 4.1.1.3.

4.2 Pipelines and Valve Vaults

IM-3 pipelines run from extraction well PE-1 to the MW-20 Bench Facility, from the MW-20 Bench Facility to and from the IM-3 Treatment Plant, and from the IM-3 Treatment Plant to the injection well field in the East Mesa. Pipelines from the MW-20 Bench Facility to the IM-3 Treatment Plant and on to the injection well field follow the existing access road and a short section of historic Route 66. Underground and aboveground pipelines are present. Pipelines conveying untreated groundwater are constructed of double-walled, high-density polyethylene (HDPE) pipe; treated effluent lines and brine lines are constructed of single-walled HDPE pipe for underground lines and epoxy-lined carbon steel pipe for aboveground lines. Valve vaults are installed along these pipelines, and in some cases, multiple pipelines pass through a single-valve vault. Underground pipelines outside of the IM-3 Treatment Plant and MW-20 Bench Facility will be abandoned in place or removed following cleaning or decontamination. Aboveground pipelines will be removed following cleaning (if necessary). Figures 3-5 and 3-6 show where pipelines are to be cut and capped or removed and the location of vaults that are to be removed. Pipeline and valve vault details and general decommissioning procedures are presented in the following subsections.

4.2.1 Underground Pipelines

Underground pipelines include the following:

- Four double-walled extraction pipelines from the four extraction wells, TW-2S, TW-2D, TW-3D, and PE-1, to Valve Vault No.1 on the MW-20 Bench Facility.
- Two double-walled extraction pipelines from Valve Vault No. 1 on the MW-20 Bench to the IM-3 Treatment Plant (see Appendix A, Photograph 8 to view these pipelines in an open trench). Appendix A, Photograph 9

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shows these pipelines and several conduits in the same shared trench along the road from the MW-20 Bench Facility to the IM-3 Treatment Plant.

- Two brine pipelines from the IM-3 Treatment Plant to the brine storage tanks on the MW-20 Bench Facility (see Appendix A, Photograph 8 to view these pipelines in an open trench). Appendix A, Photograph 9 shows these pipelines and several conduits in the same shared trench along the road from the MW-20 Bench Facility to the IM-3 Treatment Plant.
- Portion of the injection pipeline from the IM-3 Treatment Plant to the point where it bends up above ground at the road across from the IM-3 Treatment Plant.
- One injection pipeline where the portion of the aboveground injection line bends down below grade and splits off into two separate pipelines to the two injection wells, IW-2 and IW-3, at the injection well field in the East Mesa.

The following general steps will be required to decommission the underground pipelines outside of the IM-3 Treatment Plant and MW-20 Bench Facility fence lines:

1. Completely drain pipeline if necessary, collecting the waste stream. If pipeline will not drain completely by gravity, then compressed air may be used to clear the pipeline. The containment vessel for waste stream collection shall be sized to completely contain the maximum amount of waste from a pipeline plus 20 percent freeboard. Refer to Section 6 for best management practices related to spill prevention and response.
2. In accordance with Table 4-1, clean the pipeline if non-hazardous, or decontaminate pipeline if considered potentially hazardous, and collect cleaning or decontamination water. The containment vessel for waste stream collection shall be sized to completely contain the maximum amount of waste from a pipeline plus 20 percent freeboard. Refer to Section 6 for best management practices related to spill prevention and response. (To date, a leak from the interior extraction pipelines to the exterior pipeline has never been detected. If no leaks have been detected at the time of IM-3 decommissioning, then only the interior pipe of the double-contained extraction pipelines will need to be decontaminated. If a leak is detected in the extraction pipelines, then the interior and exterior pipelines will need to be decontaminated.)
3. Dry the pipeline with compressed air after the final freshwater flush.

Remove the valve vaults and the pipelines Underground pipelines within the IM-3 Treatment Plant fence line and within the MW-20 Bench fence line will be excavated and completely removed. The ground within the fence line of these areas will be disturbed for IM-3 Treatment Plant foundation, Valve Vault No. 1, and TW-2S, TW-2D, and TW-3D well vault removal and soil sampling. Invasive procedures are already required in these areas; therefore, pipelines within these areas will be removed when the IM-3 Treatment Plant foundation and vaults are removed, prior to soil sampling.

4.2.2 Aboveground Pipelines

Aboveground pipelines include the following:

- Injection pipeline from the IM-3 Treatment Plant to the entrance to the injection well field in the East Mesa (see Appendix A, Photograph 56 to view the aboveground injection pipeline).

The following general steps will be required to decommission these pipelines:

1. Completely drain pipeline at low points in the line if necessary, collecting the waste stream.
2. Clean pipeline and collect cleaning water in accordance with Table 4-1.
3. Remove pipeline in sections, and contain material for disposal or salvage for recycle.

4.2.3 Valve Vaults

Several valve vaults are installed along the underground and aboveground pipelines. The valve vaults along the extraction and brine pipelines are partially buried, and the valve vaults along the injection pipeline are aboveground. Valve vaults are precast concrete vaults. Pipelines will be decommissioned first or with the valve vaults (see Appendix A, Photographs 10 and 57 to view a valve vault along the extraction and brine pipelines and a

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valve vault along the injection pipeline, respectively). The following general steps will be required to decommission these valve vaults:

1. Verify pipelines, valves, and instrumentation are removed from the valve vault.
2. Completely remove vault (as one unit when possible). Salvage vault for reuse or recycle, or contain waste material for disposal.

4.3 IM-3 Treatment Plant

The IM-3 Treatment Plant includes the trailer, shade structure, concrete plant foundation, equipment pads, secondary containment areas, mobile warehouse units, security gate and fence, gravel base around the plant, and equipment and treatment pipelines underneath the sunshade. Decommissioning and removal of the IM-3 Treatment Plant will not occur until utilities servicing the treatment plant are disconnected and isolated (see Section 3.4 for details on utilities servicing IM-3 facilities). IM-3 Treatment Plant details and general decommissioning procedures for IM-3 Treatment Plant infrastructure and components are presented in the following subsections.

4.3.1 IM-3 Treatment Plant Trailer

The IM-3 Treatment Plant trailer consists of a control room, office, electrical room, bathroom and locker room, and a lab (see Appendix A, Photographs 13 and 14 to view the IM-3 Treatment Plant and IM-3 Treatment Plant Trailer). Prior to decommissioning this trailer, Lockout/Tagout of electrical systems will be completed to verify systems are de-energized. The following subsections describe general decommissioning procedures for each room within the trailer. After room decommissioning is complete, the trailer will either be recovered for reuse or demolished for disposal. If the trailer is kept for reuse onsite in another location or sold for reuse at an offsite location, the trailer will be prepared for over-the-road transport and removed from the site under the appropriate transportation permit for wide loads. If the trailer is demolished, the building materials will either be recovered for recycle or disposed of as a waste. Recoverable materials will be removed prior to demolition of the trailer to the extent possible. Materials that cannot be recycled will be segregated and containerized for transport and disposal. Universal wastes, including light bulbs, ballasts, smoke detectors, exit signs, and batteries, will be removed prior to demolition.

4.3.1.1 Control Room and Office

The control room and office will be decommissioned by removing furniture, appliances, computer, monitors, instrumentation, and other electrical equipment. These materials will be segregated and recovered for recycle or reuse, or will be disposed of as a waste.

4.3.1.2 Electrical Room

The electrical room will be decommissioned by removing the motor control center, PLC, electrical panels, instrumentation, and other electrical equipment and conduits. These materials will be segregated and recovered for recycle or reuse, or will be disposed of as a waste.

4.3.1.3 Bathroom and Locker Room

The bathroom and locker room will be decommissioned by first removing loose items stored in the room. If the trailer is to be demolished, then the light fixtures and plumbing fixtures will be removed and segregated for recycling or disposed of as a waste. If the trailer is to be reused, only the loose items will be removed, leaving the lighting and plumbing fixtures secured for transportation offsite. Lockers will be decontaminated prior to recovery or disposal.

4.3.1.4 Lab

The lab will be decommissioned by first removing loose furniture, appliances, computers, electrical equipment, and lab equipment from the room. Lab sinks and cabinets will then be removed. The lab drain tank outside of the trailer will also be removed (see Appendix A, Photograph 15 to view the lab drain tank). Lab equipment, such as ovens, balances, and fume hoods will be reused or recovered and sold for reuse. Materials removed from the lab

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that cannot be re-tasked will be segregated and recovered for recycle or will be disposed of as a waste. If the trailer is to be reused and retaining the lab sinks and cabinets is desirable, then these features will be preserved.

4.3.2 Facility Shade Structure

The facility shade structure will either be sold for reuse or will be demolished and segregated for recycling. If the structure is sold for reuse, the area around and below the structure will be secured for the disassembly of the structure with the individual components segregated and loaded onto trucks for transport offsite. If the structure is to be demolished, the structure will be demolished from the top of the structure to the ground level using an excavator with shears. The excavator with shears will allow the structure to be safely demolished in pieces. Shears and cutting torches will be used at the ground level to size the pieces to fit in containers for transport and recycle.

4.3.3 Mobile Warehouse Units

Materials will be removed from mobile warehouse units and the floors swept of loose debris. The majority of materials in these units are spare parts for the IM-3 system. Spare parts may be recovered with the equipment they accompany or disposed of as waste. The units may be cleaned with a water rinse. Cleaning water will be collected for disposal as waste. The units will be inspected and either reused at a different onsite location, sold for reuse, or demolished for recycling. If the units are sold for reuse, they will be loaded onto trucks and secured for offsite transport (see Appendix A, Photograph 54).

4.3.4 Flammable Liquid Storage Cabinet

Flammable liquids will be removed from the project site during preparation for IM-3 system lay-up. The empty flammable liquid storage tank can be recovered for reuse, or the cabinet material could be prepared for recycle. (Appendix A, Photograph 49 shows the flammable liquid storage cabinet.)

4.3.5 Security Gate and Fence

The security gate and fence will remain in place during the decommissioning and removal of the IM-3 Treatment Plant and components to provide security and safety until the facility is in a safe and secure condition (Appendix A, Photograph 50 shows a portion of the security fence and gate). The gate will be manually operated during decommissioning then removed and recovered for reuse or recycling. Aboveground electrical conduits and controls will be removed and segregated for recycling or disposal as waste. Wires will be pulled from the underground electrical conduit from the trailer to the gate. For the purpose of slope stability and erosion control, the underground conduits that is located on a steep slope, just outside of the IM-3 Treatment Plant fence line to the east will be cut and capped at both ends at a location below grade. Locations of the capped lines will be surveyed and shown on as-built drawings.

The security fencing will be removed by first removing the fencing from the individual posts. The posts will then be removed by pulling them from the ground using equipment. The fencing and posts will be segregated and staged for offsite reuse or recycling. The remaining holes will be backfilled to leave the area in a safe condition.

4.3.6 Gravel Base around IM-3 Treatment Plant and Pipe Culvert

After IM-3 Treatment Plant components, structure, and security gate and fence are removed from the IM-3 Treatment Plant primary work zone, any gravel that is visibly stained will be removed and disposed of. Remaining gravel inside of the IM-3 Treatment Plant primary work zone will then be temporarily stockpiled to allow access to soil for soil confirmation sampling (see Section 7 for soil confirmation sampling procedures). After results from soil sampling are received, the stockpiled gravel may be used within the IM-3 Treatment Plant boundary to maintain the area and keep it safe during the time period between completion of IM-3 Treatment Plant decommissioning and removal and implementation of the Site-Specific IM-3 Restoration Plan. The forthcoming Site-Specific IM-3 Restoration Plan will address final disposition of the remaining gravel in this area.

When removing stained gravel from the site, the pipe culvert at the entrance to the IM-3 Treatment Plant should also be removed. The pipe culvert will be recovered for reuse or material cut to size and recycled. The pipe culvert on the road at Bat Cave Wash will be preserved.

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4.3.7 Treatment Equipment and Piping

Aboveground treatment equipment, treatment pipelines, electrical, instrumentation underneath the facility shade structure and within the footprint of the IM-3 Treatment Plant will be decommissioned and removed. Prior to decommissioning these IM-3 components, the shade structure will be removed and the treatment plant isolated from the extraction and injection wells and pipelines by decommissioning the pipelines entering and leaving these areas first. The following subsections detail general decommissioning procedures for tanks systems, other major equipment, and treatment pipelines.

4.3.7.1 Tank Systems

The IM-3 Treatment Plant includes several process tanks, potable water tank, fire water storage tank, and sewage holding tank. Pipes, pumps, valves, instrumentation, other miscellaneous equipment, and appurtenances attached to a particular tank are considered to be a part of the tank system. The following general steps will be required to decommission each tank system.

1. Completely drain tank in place if necessary, collecting the waste stream.
2. Clean or decontaminate tank in place if necessary, in accordance with Table 4-1, collecting the waste stream.
3. After the tank system is characterized, remove ancillary equipment installed in the tank such as mixers, air headers, and submersible pumps. Disconnect and remove associated piping, valves, and instruments from tank that were not decommissioned as a part of another piece of treatment equipment. Recover components and materials for reuse or recycle, or prepare them for offsite disposal as waste.
4. Remove the tank with a crane, and direct load onto a truck for offsite transport or for transport to a designated waste management area.
5. Remove the tank support system, such as saddle, tank legs, base plates, and anchors.

Entry into these tanks requires a confined space permit. The following subsections present unique features to each tank system and decommissioning sequencing recommendations.

Raw Water Storage Tank. Table 4-3 describes the raw water storage tank. To allow for easy removal of the raw water storage tank, the treated water storage tank should be decommissioned and removed prior to decommissioning this tank.

Chromium Reduction Reactor Tank. Table 4-4 describes the chromium reduction reactor tank. This tank includes a removable mixer. To allow for easy removal of the chromium reduction reactor tank, the raw water storage tank and the pipe reactor should be decommissioned and removed prior to decommissioning this tank.

Iron Oxidation Tanks. Three identical iron oxidation tanks are onsite; table 4-5 describes these. The oxidation tanks include a removable mixer and a polyvinyl chloride or fiberglass air header. To allow for easy removal of the iron oxidation tanks, the raw water storage tank should be decommissioned and removed prior to decommissioning these tanks.

Sludge Holding Tank. Table 4-6 describes the sludge holding tank that includes a removable mixer and decanter piping.

Pretreated Water Tank. Table 4-7 describes the pretreated water tank. To allow for easy removal of the pretreated water tank, the microfilter package system and microfilter clean-in-place system should be decommissioned and removed prior to decommissioning this tank.

Microfilter Waste Tank and Clean-in-Place System. Table 4-8 describes the microfilter waste tank, which is part of the microfilter clean-in-place (CIP) system. The CIP system includes two pumps, a bag filter, several pipes, valves, a microfilter CIP plastic tote, and chemical addition connections.

Primary Reverse-osmosis Feed Tank. Table 4-9 describes the primary reverse-osmosis feed tank.

Secondary Reverse-osmosis Feed Tank. Table 4-10 describes the secondary RO feed tank.

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Reverse-osmosis Permeate Tank. Table 4-11 describes the RO permeate tank. To allow for easy removal of the RO permeate tank, the mobile warehouse units should be decommissioned and removed prior to decommissioning this tank.

Reverse-osmosis Concentrate Storage Tank. Table 4-12 describes the RO concentrate storage tank. To allow for easy removal of the RO concentrate storage tank, the mobile warehouse units should be decommissioned and removed prior to decommissioning this tank.

Treated Water Storage Tank. Table 4-13 describes the treated water storage tank. Removal of this tank will allow for other tank systems to be easily removed.

Process Drains Tank. Table 4-14 describes the process drains tank. A removable, vertical-submersible pump is located in this tank. This tank system should be decommissioned and removed last, because it collects wastewater from floor drains within the IM-3 Treatment Plant footprint. Water within the phase separator secondary containment area collected in the area sump can also be pumped to this tank.

Domestic Water Tank and Distribution System. Table 4-15 describes the domestic water tank.

Fire Water Storage Tank. Table 4-15 describes the fire water storage tank. This tank is located outside of the facility shade structure. It could be used for fire protection during the decommissioning and removal of IM-3 system at the IM-3 Treatment Plant location.

Sewage Holding Tank. Table 4-17 describes the sewage holding tank that is located underground adjacent to the west side of the IM-3 Treatment Plant trailer. It will be decommissioned when the IM-3 utilities are disconnected and isolated and IM-3 Treatment Plant is decommissioned and removed.

4.3.7.2 Package Systems

The IM-3 treatment system includes five package systems. The decommissioning of each package system requires a different procedure. The following sections describe these procedures, unique features of the package system, and decommissioning sequencing recommendations.

Clarifier. Table 4-18 describes the clarifier. The clarifier and associated sludge pipelines, sludge conveyance pumps, valves, and instrumentation are considered a hazardous waste tank system. The following general steps will be required to decommission the clarifier:

1. Completely drain the clarifier if necessary, collecting waste stream.
2. Remove rake drives and motors on top of clarifier. Disconnect associated piping, valves, and instruments from the tank that were not decommissioned as a part of another piece of treatment equipment. Decontaminate these components in accordance with Table 4-1 (same decontamination procedures for the clarifier tank is required for these components).
3. Decontaminate the clarifier in place in accordance with Table 4-1.
4. Disassemble and remove flocculator mix tank assembly (small mix tank with small rake inside) from the sludge holding tank portion of the clarifier with a crane, and direct load onto a truck for offsite transport or for transport to a designated waste management area.
5. Disassemble and remove the lamella tank assembly (inclined plate portion of clarifier) from the sludge holding tank portion of the clarifier with a crane, and direct load onto a truck for offsite transport or for transport to a designated waste management area.
6. Remove the sludge holding tank with crane, and direct load onto a truck for offsite transport or for transport to a designated waste management area.
7. Remove the remaining clarifier support system components.

If decontamination is successful, then the clarifier should be recovered for recycling as scrap steel metal, rather than recovering it for reuse as a clarifier, because it may be near the end of its useful life at the time of decommissioning.

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Microfilter. Table 4-19 describes the microfiltration package system (microfilter). The following general steps will be required to decommission the microfilter:

1. Completely drain the microfilter tanks if necessary, collecting waste stream.
2. If not already removed, remove and dispose the microfilter modules.
3. Clean the microfilter system in accordance with Table 4-1.
4. The microfilter system has a recovery value for reuse. If the system is reused, disassemble skids as required for transport offsite or to an onsite staging area for temporary storage. Package off-skid components as required for offsite transport or to an onsite staging area for temporary storage.
5. Clean the microfilter in place in accordance with Table 4-1.
6. Remove the remaining microfilter support system components.

Primary and Secondary Reverse-osmosis System. Table 4-20 describes the primary and secondary RO systems. The following general steps will be required to decommission the primary and secondary RO systems:

1. Completely drain the reverse osmosis feed tanks and associated pipelines if necessary, collecting waste stream.
2. If not already removed, remove and dispose the reverse osmosis membranes.
3. Clean the RO systems in accordance with Table 4-1.
4. The RO system has a recovery value for reuse. If the system is reused, disassemble the skids as required for offsite transport or to an onsite staging area for temporary storage. Package the off-skid components as required for offsite transport or to an onsite staging area for temporary storage.
5. Clean the RO vessels and equipment in place in accordance with Table 4-1.
6. Remove the remaining RO support system components.

Air Compressor and Dryer. Table 4-21 describes the air compressor and dryer. The following general steps will be required to decommission the air compressor and dryer:

1. Relieve pressure from the compressed air tank by releasing it into the atmosphere.
2. The compressed air system has a recovery value for reuse. If the system is reused, disassemble the skids as required for offsite transport or to an onsite staging area for temporary storage. Package the off-skid components as required for offsite transport or to an onsite staging area for temporary storage.
3. Remove the remaining support system components.

Blower. Table 4-22 describes the blower. The following general steps will be required to decommission the blower:

1. Relieve the pressure from the air tank by releasing it into the atmosphere.
2. The blower has a recovery value for reuse. If the system is reused, disassemble the skids as required for offsite transport or to an onsite staging area for temporary storage. Package the off-skid components as required for offsite transport or to an onsite staging area for temporary storage.
3. Remove the remaining support system components.

4.3.7.3 Phase Separators

The phase separators are rented units and will be removed from the site during the IM-3 lay-up period. Only the phase separators secondary containment area should be demolished and removed.

4.3.7.4 Chemical Storage and Feed Systems

The following five chemical storage and feed systems are at the IM-3 Treatment Plant:

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2. Sodium hydroxide storage and feed system
3. Hydrochloric acid storage and feed system
4. Polymer makeup storage and feed system
5. Anti-scalant storage and feed system

Appendix A, Photographs 42 through 48, present the onsite chemical systems. The ferrous chloride, sodium hydroxide, and hydrochloric acid systems will be managed as hazardous waste systems. The polymer and anti-scalant used onsite do not exhibit hazardous waste properties; therefore, these systems can be managed as non-hazardous waste. During decommissioning, when handling equipment or pipelines that contain or contained these chemicals, appropriate PPE will be worn as required by the particular chemical's material safety data sheet and as required by the site HSP. The following general procedures apply when decommissioning these feed systems:

1. Empty the chemical totes or tanks if necessary, collecting waste stream.
2. Disconnect the feed pumps from totes or tanks if still connected in field.
3. Handle the chemical storage and feed equipment and chemical pipelines in accordance with Table 4-1. Most chemical pumps and piping do not have a high-reuse value; therefore, it is recommended that these components be disposed of. The polymer makeup system could have reuse value at the time of decommissioning, depending on the condition.
4. Remove the remaining chemical support system components.

Some chemical pipes are heat traced. The heat trace electrical panel is located near the chemical storage area. Decommission the heat trace wires and panel according to Section 4.3.7.9 or similar to other electrical components decommissioned at the site.

4.3.7.5 Pumps, Mixers, Valves, and Miscellaneous Equipment

Installed pumps, valves (both automated and manual), and miscellaneous in-line mechanical equipment are a part of a tank or package system previously described. Handle pumps, valves, and miscellaneous mechanical equipment in accordance with Table 4-1 and Figure 4-2.

4.3.7.6 Pipe Reactor and Treatment Pipe

The serpentine pipe reactor and chemical mix loop are located between the raw water storage tank and the chromium reduction reactor tank. The pipe reactor is nominally 12 inches in diameter and consists of three serpentine loops. This pipe may require a crane for disassembly and removal (see Appendix A, Photo 17). The chemical mix loops are nominally 6 inches in diameter and located within the raw water feed pipe to the pipe reactor. Treatment pipelines are considered a part of a tank or package system in which the pipelines are connected. Tank systems and package systems are previously described. Fittings and appurtenances in the treatment pipe being decommissioned should be handled in accordance with the tank or package system in which they are connected, Table 4-1, and Figure 4-2.

4.3.7.7 General Pipe

Other pipelines in the IM-3 Treatment Plant will be handled according to the area classification in which they originate. Figure 4-2 shows the boundaries of the area classification. Decommission, remove, and handle pipelines in accordance with Table 4-1 and Figure 4-2.

4.3.7.8 Safety Shower, Eye wash, and Chiller System

Two safety eye washes and showers and a chiller system for cold water supply to the eye washes and showers are onsite. The chiller system is located at the domestic water tank equipment pad. The following general procedures apply when decommissioning the safety equipment:

1. Drain the chiller system if required, collecting waste stream.
2. The safety shower and eye wash units and chiller system have recovery value for reuse. If the units and chiller system are reused, disassemble the units and skid as required for offsite transport or to an onsite staging area

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for temporary storage. Package off-skid components as required for offsite transport or to an onsite staging area for temporary storage.

3. Remove the remaining support system components.

4.3.7.9 Plant Instrumentation and Control System, Including Security and Communications Equipment

Several field instruments are installed in treatment pipes and tanks within the IM-3 Treatment Plant. Field instruments include pH, conductivity, flow, pressure, level, and vibration instruments. The IM-3 control system includes the main control panel LCP-100, two WonderWare human-machine interface operator consoles running on personal computers, motor control center, power panels, and a leak detection panel system located in the control room of the IM-3 Treatment Plant trailer as well as local equipment hand switches and panels in the plant. The field instruments and control system components should be decommissioned and handled in accordance with Table 4-1 and Figure 4-2. Most control components will not likely have reuse value at the time of decommissioning, but the materials that compose the components can be recovered for recycle.

The security and communications system is provided and is monitored by PG&E Security. The decommissioning of this system will be coordinated with PG&E Security.

4.3.8 Concrete Foundation, Equipment Pads, and Secondary Containment Areas

The concrete treatment plant foundation, equipment pads located on top of the foundation, containment area around the phase separator, and containment areas around the chemical storage area will be decommissioned and removed after the facility shade structure and equipment and materials underneath the shade structure are decommissioned. These concrete areas will be decommissioned by first sampling the concrete in representative areas to determine if the concrete is contaminated. If only surface contamination is present, then the surface will be removed by scarification equipment and disposed of as a waste and the nonhazardous concrete will be broken using an excavator with a hydraulic breaker. The rebar and grating will be separated from the concrete. The nonhazardous concrete, rebar, and grating material will be recovered for recycle. Section 5.2.2 further describes concrete recycling. Soil confirmation sampling will occur after all subsurface features at the IM-3 Treatment Plant have been excavated and removed. Section 7 describes soil confirmation sampling procedures, and Figure 7-1 shows the proposed sample locations. After soil confirmation test results are received and it is determined that the soil is uncontaminated, then the holes created by removing the plant foundation and secondary containment areas will be backfilled with displaced material or foreign fill and compacted to leave the area in a safe condition. Excess displaced material from the Final Remedy and displaced material from IM-3 Decommissioning activities may be used for backfill after the materials are tested and proven to be suitable for this use. Displaced material is defined as material removed from the earth as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The handling and disposition of displaced material will be in accordance with *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (see Appendix F).

4.4 MW-20 Bench Facility

Figure 3-3 shows the MW-20 Bench Facility primary work zone. The MW-20 Bench Facility includes components of the extraction and conveyance portion of the IM-3 system as well as the brine storage and loading facility. Figure 4-3 shows the boundaries of the area classification within the MW-20 Bench fence line. Section 4.1 describes decommissioning procedures for the extraction wells and well vaults located at the MW-20 Bench Facility.

The MW-20 Bench fence and gates have been incorporated into the Final Remedy and are planned to be reused in the same location. The fence and gates should be preserved while conducting work in this area. If this plan changes in the future, the fence and gates will need to be removed. The fence and gates will likely have recovery value for reuse.

4.4.1 Valve Vault No. 1

Extraction well pipelines pass through the partially buried building referred to as Valve Vault No. 1. This building should be decommissioned and removed as a part of the IM-3 decommissioning (Appendix A, Photographs 4

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through 7, show the well vaults and Valve Vault No. 1). Underground pipelines that pass through this vault will be removed within the vault. Electrical and instrumentation inside this building will also be removed. Untreated water (i.e., extraction) pipelines inside of the MW-20 Bench Facility fence line will be removed. With one exception, pipelines outside of the MW-20 fence line will be removed. The exception is the pipe and conduit that are on the steep slope just east of the MW-20 Bench area; for the purpose of slope stability and erosion control, they will be cut and capped at both ends at a location below grade. Locations of the capped lines will be surveyed and shown on as-built drawings.

4.4.2 Brine Storage and Loading

The MW-20 Bench Facility contains three brine storage tanks that store RO concentrate (i.e., brine or high-salinity treated water for offsite disposal). A secondary containment area made from a liner, gravel, and k-rails surrounds the brine storage tanks. A small pump station located off the brine storage tank area is connected to the tanks to allow for transferring brine into the brine storage tanks, into tanker trucks for offsite disposal. A lined, gravel truck lane runs through the MW-20 Bench Facility to the west side of the brine tank area. The brine storage and loading component of the MW-20 Bench Facility (three tanks, truck lane, and associated pumps and piping) has been incorporated into the Final Remedy and is planned to be reused in the same location. If this plan changes in the future, the brine storage and loading component will be decommissioned in accordance with the following general procedures:

1. Drain the brine tanks and brine pipelines if necessary, collecting waste stream.
2. Decommission and remove the brine pump station and aboveground brine pipelines. Handle equipment and pipelines in accordance with Table 4-1.
3. Remove the k-rails to allow for removal of brine storage tanks.
4. Return the brine storage tanks to the rental company.
5. Demolish and remove the secondary containment area.
6. Remove the underground brine lines within the fence line of the MW-20 Bench Facility.
7. Remove the gravel and liner from the truck lane.

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TABLE 4-1
Expected Wastes Generated from the Decommissioningof IM-3 Components and Infrastructure
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

	Presumed Waste Category						Test Waste? (Y/N)
	Non-hazardous Waste			Hazardous Solid Waste (Likely Will Not Be Decontaminated Prior to Disposal) *Classification of RCRA or Non RCRA will be determined by analysis prior to disposal.*	Components and Materials that will be Decontaminated and Managed as Non-Hazardous if Decontamination is Successful (Option to Recover Component or Structure)	Decontamination Liquid and Solid Wastes Generated? (Y/N)	*Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
Expected Wastes **[Note: If the component or structure is non-hazardous or is characterized non-hazardous following successful decontamination, then it can be recovered for reuse or recycle.]**	Non-hazardous Solid Waste No to Minimal Cleaning Required (Option to Recover Component or Structure in this Category)	Non-hazardous Solid Waste Extensive Cleaning Required (Option to Recover Component or Structure in this Category)	Cleaning Liquid and Solid Wastes Generated? (Y/N)				
Utilities							
Potable water pipelines	X		N			N	N
Sewage pipelines		X	Y			N	Y
Phone lines	X		N			N	N
Power lines	X		N			N	N
Transformer (Purchased from City of Needles)	X		N			N	N
Wells and Well Vaults							
Valves, Instruments, and Appurtenances in Extraction Wells			N		X	Y	Y
TW-2S Extraction Pump, P-100			N		X	Y	Y
TW-2D Extraction Pump, P-101			N		X	Y	Y
TW-3D Extraction Pump, P-102			N		X	Y	Y
PE-1 Extraction Pump, P-103			N		X	Y	Y
Extraction Well Vaults			N		X	Y	Y
Valves, Instruments, and Appurtenances in Extraction Wells		X	Y			N	Y
Injection Well Vaults	X		N			N	N
Pipelines and Valve Vaults							
Underground Pipelines and Vaults							
Extraction pipelines			N		X	Y	Y
Brine pipelines		X	Y			N	Y
Injection pipelines	X		Y			N	Y
Extraction Pipeline Vaults			N		X	Y	Y
Above Ground Pipelines and Vaults							
Injection pipelines	X		Y			N	Y
Injection Pipeline Vaults	X		N			N	N
IM-3 Treatment Plant							
IM-3 Treatment Plant Trailer	X		Y			N	Y
Facility Shade Structure	X		N			N	N
Concrete Foundation, Equipment Pads, and Secondary Containment Areas							
In Hazardous Area - Refer to Figure 4-2					X	Y	Y
Outside of Hazardous Area - Refer to Figure 4-2	X		N			N	N
Mobile Warehouse Units	X		N			N	N
Flammable Liquid Storage Cabinet	X		N			N	N
Security Gate and Fence	X		N			N	N
Treatmentand Plant Support Equipment and Piping							
Tank Systems							
Raw Water Storage Tank, T-100			N		X	Y	Y
Chromium Reduction Reactor Tank, T-300			N		X	Y	Y
Iron Oxidation Tank, T-301A			N		X	Y	Y
Iron Oxidation Tank, T-301B			N		X	Y	Y
Iron Oxidation Tank, T-301C			N		X	Y	Y
Sludge Holding Tank, T-402			N		X	Y	Y
Pretreated Water Tank, T-500		X	Y			N	Y
Microfilter Waste Tank, T-503, and Clean-in-Place System			N		X	Y	Y
Primary RO Feed Tank, T-600		X	Y			N	Y

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TABLE 4-1
Expected Wastes Generated from the Decommissioningof IM-3 Components and Infrastructure
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

	Presumed Waste Category						Test Waste? (Y/N)
	Non-hazardous Waste			Hazardous Solid Waste (Likely Will Not Be Decontaminated Prior to Disposal) *Classification of RCRA or Non RCRA will be determined by analysis prior to disposal.*	Components and Materials that will be Decontaminated and Managed as Non-Hazardous if Decontamination is Successful (Option to Recover Component or Structure)	Decontamination Liquid and Solid Wastes Generated? (Y/N)	*Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
Expected Wastes **[Note: If the component or structure is non-hazardous or is characterized non-hazardous following successful decontamination, then it can be recovered for reuse or recycle.]**	**Non-hazardous Solid Waste No to Minimal Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Non-hazardous Solid Waste Extensive Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Cleaning Liquid and Solid Wastes Generated? (Y/N)**				
Secondary RO Feed Tank, T-2601		X	Y			N	Y
RO Clean-in-Place System, T-601					X	Y	Y
RO Permeate Tank, T-603	X		Y			N	Y
RO Concentrate Tank, T-701		X	Y			N	Y
Treated Water Tank, T-700	X		Y			N	Y
Process Drain Tank, T-900			N		X	Y	Y
Potable Water Tank & Distribution System	X		N			N	N
Fire Water Storage Tank	X		N			N	N
Sewage Holding Tank		X	Y			N	Y
Package Systems							
Clarifier, CL-400			N		X	Y	Y
Microfiltration System		X	Y			N	Y
Primary and Secondary RO System		X	Y			N	Y
Air Compressor and Dryer System, CMP-1000	X		N			N	N
Blower, B-300	X		N			N	N
Chemical Storage & Feed Systems							
Ferrous Chloride							
Ferrous chloride pump, P-800			N		X	Y	Y
Ferrous chlroide tote(s)			N		X	Y	Y
Sodium Hydroxide							
Sodium hydroxide pump - Iron Ox, P-802A			N		X	Y	Y
Sodium hydroxide pump - Iron Ox, P-802B			N		X	Y	Y
Sodium hydroxide pump - Iron Ox, P-802C			N		X	Y	Y
Sodium hydroxide pump - RO Permeate, P-802D			N		X	Y	Y
Sodium hydroxide tote(s)			N		X	Y	Y
Hydrochloric Acid							
Hydrochloric acid pump, P-801			N		X	Y	Y
Hydrocholoric acid tote(s)			N		X	Y	Y
Polymer							
Polymer makedown system, M-804 (to include day tanks)		X	Y			N	Y
Pump to clarifier		X	Y			N	Y
Pump to dewatering system		X	Y			N	Y
Anti-scalant							
Primary RO Anti-Scalant Feed Pump		X	Y			N	Y
Secondary RO Anti-Scalant Feed Pump		X	Y			N	Y
Anti-scalant Day Tanks		X	Y			N	Y
Pumps, Mixers, Valves, and Miscellaneous Mechanical Equipment*							
Pumps*							
Raw Water Feed Pump, P-200			N	X		N	N
Chemical Mixing Pump, P-201			N	X		N	N
Clarifier Feed Pump, P-400			N		X	N	N
Sludge Withdrawal Pump, P-401			N		X	N	N
Phase Separator Feed Pump, P-403			N		X	N	N
Sludge Recycle Pump, P-404			N		X	N	N

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TABLE 4-1
Expected Wastes Generated from the Decommissioningof IM-3 Components and Infrastructure
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

	Presumed Waste Category						Test Waste? (Y/N)
	Non-hazardous Waste			Hazardous Solid Waste (Likely Will Not Be Decontaminated Prior to Disposal) *Classification of RCRA or Non RCRA will be determined by analysis prior to disposal.*	Components and Materials that will be Decontaminated and Managed as Non-Hazardous if Decontamination is Successful (Option to Recover Component or Structure)	Decontamination Liquid and Solid Wastes Generated? (Y/N)	*Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
Expected Wastes **[Note: If the component or structure is non-hazardous or is characterized non-hazardous following successful decontamination, then it can be recovered for reuse or recycle.]**	**Non-hazardous Solid Waste No to Minimal Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Non-hazardous Solid Waste Extensive Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Cleaning Liquid and Solid Wastes Generated? (Y/N)**				
Phase Separator Sump Pump, P-405			N		X	N	N
Pre-treated Water Transfer Pump, P-500		X	Y			N	Y
MF CIP Waste Storage Tank Transfer Pump, P-503			N		X	N	N
RO Booster Pumps, P-601A and P-601B		X	Y			N	Y
Permeate Pumps, P-605A and P-605B	X		Y			N	Y
RO Filtered Water Transfer Pump, P-620		X	Y			N	Y
Secondary RO Booster Pump, P-2701		X	Y			N	Y
Treated Water Pump, P-700	X		Y			N	Y
RO Concentrate Transfer Pump, P-701		X	Y			N	Y
Process Drain Pump, P-900			N		X	N	N
Seal Water Pump, P-1100	X		N			N	N
Potable Water Pump, P-1300	X		N			N	N
Mixers							
Chromium Reduction Tank Mixer, M-300			N		X	Y	Y
Iron Oxidation Tank 301A Mixer, M-301A			N		X	Y	Y
Iron Oxidation Tank 301B Mixer, M-301B			N		X	Y	Y
Iron Oxidation Tank 301C Mixer, M-301C			N		X	Y	Y
Clarifier Flash Mixer, M-400A			N		X	Y	Y
Clarifier Flocculator, M-400B			N		X	Y	Y
Clarifier Sludge Rake, M-400C			N		X	Y	Y
Automated and Manual Valves							
In Hazardous Area - Refer to Figure 4-2			N	X		N	N
Outside of Hazardous Area - Refer to Figure 4-2	X		N			N	N
Miscellaneous Equipment							
PS-RW-111-01 (In-line strainer)			N	X		N	N
PS-WS-111-01 (Strainer)			N	X		N	N
Air Diffuser Rings in Iron Oxidation Tanks			N	X		N	N
Treatment Pipe							
Pipe Reactor			N	X		N	N
Ferrous chloride, sodium hydroxide, and hydrochloric acid feed pipelines			N	X		N	N
All Other Pipes in Hazardous Area - Refer to Figure 4-2			N	X		N	N
All Other Pipes Outside of Hazardous Area - Refer to Figure 4-2	X		Y			N	Y
Safety Shower, Eye wash, and Chiller	X		N			N	N
Plant Instrumentation and Control (I&C) System*							
I&C Components (pH, temperature, flow, pressure, conductivity, level, vibration meters and switches, etc)							
In Hazardous Area - Refer to Figure 4-2			N	X		N	N
Outside of Hazardous Area - Refer to Figure 4-2	X		N			N	N
Control System							
LCP-100 (Main control panel)	X		N			N	N
ICP-100 (Injection well control panel)	X		N			N	N
Wonderware Software (SCADA and touch screen)	X		N			N	N
Computer (Dell workstation, software, printer)	X		N			N	N
Automation Software (PLC software)	X		N			N	N
Motor Control Center (Plus enclosed breakers)	X		N			N	N

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TABLE 4-1
Expected Wastes Generated from the Decommissioningof IM-3 Components and Infrastructure
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

	Presumed Waste Category						Test Waste? (Y/N)
	Non-hazardous Waste			Hazardous Solid Waste (Likely Will Not Be Decontaminated Prior to Disposal) *Classification of RCRA or Non RCRA will be determined by analysis prior to disposal.*	Components and Materials that will be Decontaminated and Managed as Non-Hazardous if Decontamination is Successful (Option to Recover Component or Structure)	Decontamination Liquid and Solid Wastes Generated? (Y/N)	*Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
Expected Wastes **[Note: If the component or structure is non-hazardous or is characterized non-hazardous following successful decontamination, then it can be recovered for reuse or recycle.]**	**Non-hazardous Solid Waste No to Minimal Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Non-hazardous Solid Waste Extensive Cleaning Required** **(Option to Recover Component or Structure in this Category)**	**Cleaning Liquid and Solid Wastes Generated? (Y/N)**				
Leak Detection Panel - 003 (Leak detection control panel)	X		N			N	N
Security and Communications Equipment	X		N			N	N
MW-20 Bench Facilities (Note: Extraction well vaults are categorized under the "Wells" section presented at the top of the table).							
Valve Vault #1			N		X	Y	Y
Brine Storage and Loading (Only if removed from Final Remedy)							
Brine Pumping System		X	Y			N	Y
Gravel Road	X		N			N	N
K-Rail and Secondary Containment Gravel and Liner	X		N			N	N
Solar panels (preference is to recycle these panels, otherwise handle as a waste as categorized)			N	X		N	N
Solar batteries (to be managed according to the lead acid battery rules and to be recycled)	-	-	-	-	-	-	-
Incidental Trash	X		N			N	N
Universal Waste (to be managed according to the universal waste rules)	-	-	-	-	-	-	-

Notes:
* If there is a recent replacement of the equipment, then the equipment should be considered for decontamination and recovery.
** Pump body and pump motor can be managed in a different manner.

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TABLE 4-2
Typical Demolition Equipment and Methods of Demolition
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Category of Work	Sub-Category	Typical Methods of Demolition/Equipment
Structures	Above grade - structural concrete and steel frame	For concrete removal, excavator with pulverizer; metal removal, excavator with shear or bucket and thumb; and crane, welding torch, Portaband saws, excavator breaker
Light Steel Frame		Excavator with bucket and thumb, front-end crawler loader, reachfork, scissor lifts, and boom lifts
Heavy Concrete (i.e., Building Foundations or Equipment Pads)		Excavator with breaker, concrete saw, compressor with hammer,
Equipment	Large or heavy equipment and elevated items, such as a canopy	Crane with rigging crew Personnel lifts for access
General Equipment	Tanks, skid-mounted package systems	Large forklift, crane, rigging crew, and scissor and boom lifts, backhoe, dump truck
Recycle Demolition Materials	Structural steel, pipe, and miscellaneous materials	Excavator with shear, welding torch
Concrete		Excavator with a pulverizer, compressor with hammer, concrete saw, dump truck, portable crushers to make road base
Overhead Structures		Crane with rigging crew and personnel lift, and excavator with shear
Dust Control		Water trucks, pull behind water buffalo, fresh water storage tanks
Decontamination		Water trucks, Vactor trucks, hoses, pumps
Material Management		Mechanical hand cutting tools (may include a torch), roll off bin trucks, 18 wheel flatbed trucks (to haul tanks offsite)
Waste management		Trucks to transport liquid waste and solid waste
Earthwork	Removal of Underground Pipe, Backfill and revegetation	Excavator, GradeAll, Loader, 18 wheeler, compactor

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TABLE 4-3
Raw Water Storage Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-100
Photo Number	16 (Appendix A)
Size/Orientation	12–foot (ft) diameter by 32-ft length/horizontal
Approximate Capacity	28,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide hydraulic separation between groundwater extraction pumps and the treatment system

TABLE 4-4
Chromium Reduction Reactor Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-300
Photo Number	18 (Appendix A)
Size/Orientation	6-ft diameter by 10.5-ft height/vertical with conical bottom
Approximate Capacity	2,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide additional residence time for hexavalent chromium to convert to trivalent chromium

TABLE 4-5
Iron Oxidation Tanks Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-301A, T-301B, and T-301C
Photo Number	19 (Appendix A)
Size/Orientation	9-ft diameter by 16-ft height/vertical
Approximate Capacity	7,500 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To oxidize soluble Fe(II) to insoluble Fe (III) by air addition and pH adjustment

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TABLE 4-6
Sludge Holding Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-402
Photo Number	24 (Appendix A)
Size/Orientation	9-ft diameter by 12-ft height/vertical with conical bottom
Approximate Capacity	5,500 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To accumulate sludge prior to dewatering

TABLE 4-7
Pretreated Water Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-500
Photo Number	25 (Appendix A)
Approximate Capacity	10-ft diameter by 16-ft height/vertical
Capacity	9,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide hydraulic separation between the chromium reduction process and the microfilter

TABLE 4-8
Microfilter Waste Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-503
Photo Number	27 (Appendix A)
Approximate Capacity	6-ft diameter by 15-ft height/vertical
Capacity	3,200 gallons
Material of Construction	Fiberglass (Hetron 922 with C-Veil Liner)
Original Purpose of Tank	To store microfilter clean-in-place waste and allow for some equalization prior to reintroducing waste stream back to the front of the process for treatment

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TABLE 4-9
Primary Reverse-osmosis Feed Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-600
Photo Number	28 (Appendix A)
Size/Orientation	10-ft diameter by 16-ft height/vertical
Approximate Capacity	9,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To store microfilter effluent for further dissolved solids removal by the primary RO system and for blending RO permeate to obtain a targeted effluent total dissolved solids concentration

TABLE 4-10
Secondary Reverse-osmosis Feed Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-2601
Photo Number	30 (Appendix A)
Size/Orientation	4-ft diameter by 6–ft, 8-inch height/vertical
Approximate Capacity	600 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To store primary RO permeate for further dissolved solids removal by the secondary RO system

TABLE 4-11
Reverse-osmosis Permeate Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-603
Photo Number	32 (Appendix A)
Size/Orientation	8-ft diameter by 8-ft height/vertical
Approximate Capacity	3,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To store permeate from the primary and secondary RO systems for utility water use prior to conveying water to the treated water storage tank

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TABLE 4-12
Reverse-osmosis Concentrate (Brine) Storage Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-701
Photo Number	33 (Appendix A)
Size/Orientation	10-ft diameter by 14-ft height/vertical
Approximate Capacity	8,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To store RO concentrate prior to pumping it to the brine storage tanks located on the MW-20 Bench

TABLE 4-13
Treated Water Storage Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-700
Photo Number	36 (Appendix A)
Size/Orientation	12-ft diameter by 32-ft length/horizontal
Approximate Capacity	28,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide hydraulic separation between the treatment system and the injection wells

TABLE 4-14
Process Drains Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-900
Photo Number	38 (Appendix A)
Size/Orientation	8-ft diameter by 12-ft length/horizontal
Approximate Capacity	5,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To collect small incidental flows from floor drains and various process equipment for return to the raw water storage tank for reprocessing

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TABLE 4-15
Domestic Water Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-1300
Photo Number	39 (Appendix A)
Size/Orientation	Approximately 7.5-ft diameter by 6-ft height/vertical
Approximate Capacity	2,000 gallons
Material of Construction	Fiberglass
Original Purpose of Tank	To provide domestic water to the IM-3 Treatment Plant trailer

TABLE 4-16
Fire Water Storage Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	T-1200
Photo Number	40 (Appendix A)
Size/Orientation	10-ft diameter by 17.5-ft height/vertical
Approximate Capacity	11,750 gallons
Material of Construction	A-36 steel (American Water Works Association D100, 1996 Tank), painted
Original Purpose of Tank	To provide a water source for firefighting measures in the event of a fire

TABLE 4-17
Sewage Holding Tank Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	No tag
Photo Number	35 (Appendix A)
Size/Orientation	No data available
Approximate Capacity	No data available
Material of Construction	Fiberglass
Original Purpose of Tank	To store sewage from IM-3 Treatment Plant trailer

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TABLE 4-18
Clarifier Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	CL-400
Photo Number	22 (Appendix A)
Size/Type	Approximately 19-ft wide by 26-ft height/inclined plate, lamella type
Material of Construction	Steel, painted
Original Purpose of Tank	To provide liquid/solid separation from the process stream, removing the majority of chromium hydroxide and iron hydroxide precipitates formed in the upstream reaction

TABLE 4-19
Microfiltration Package System Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	Microfiltration Package System, individual 500 series equipment tags for package system components
Photo Number	26 (Appendix A)
Size/Type	Pall Aria AP3 Microfiltration System
Materials of Construction	Stainless steel, acrylic, polypropylene, and ethylene-propylene-diene monomer
Original Purpose of Tank	To remove remaining solids larger than a nominal diameter of 0.1 micron from the clarified water

TABLE 4-20
Primary and Secondary Reverse-osmosis System Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	Primary and Secondary RO Package System
Photo Numbers	29 and 31, (Appendix A)
Size/Type	Crown Solutions/Veolia Water – primary RO is 60 gpm with 75% recovery, followed by a secondary RO that is 15 gpm with 50% recovery
Materials of Construction	Superduplex, stainless steel, plastic
Original Purpose of System	To reduce the naturally-occurring total dissolved solids in the treated water to match the total dissolved solids of the water in the injection field

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TABLE 4-21
Air Compressor and Dryer Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	CMP-1000 and T-1301 (compressed air tank)
Photo Number	41 (Appendix A)
Size/Type	32 inches by 32 inches by 61 inches, operating pressure 60 psi gauge/Gardner Denver Model DGH60
Materials of Construction	Steel, painted
Original Purpose	To provide compressed air to pneumatic instruments and valves

TABLE 4-22
Blower System Description
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Specification	Description
Equipment Tag	B-300
Photo Number	21 (Appendix A)
Size/Type	Rotary Lobe Gardner Denver Model GAEMCPA, catalog no. 5MP, 2850 RPM Max, Sutorbilt
Materials of Construction	Steel, painted
Original Purpose of Blower	To provide process air to iron oxidation tanks

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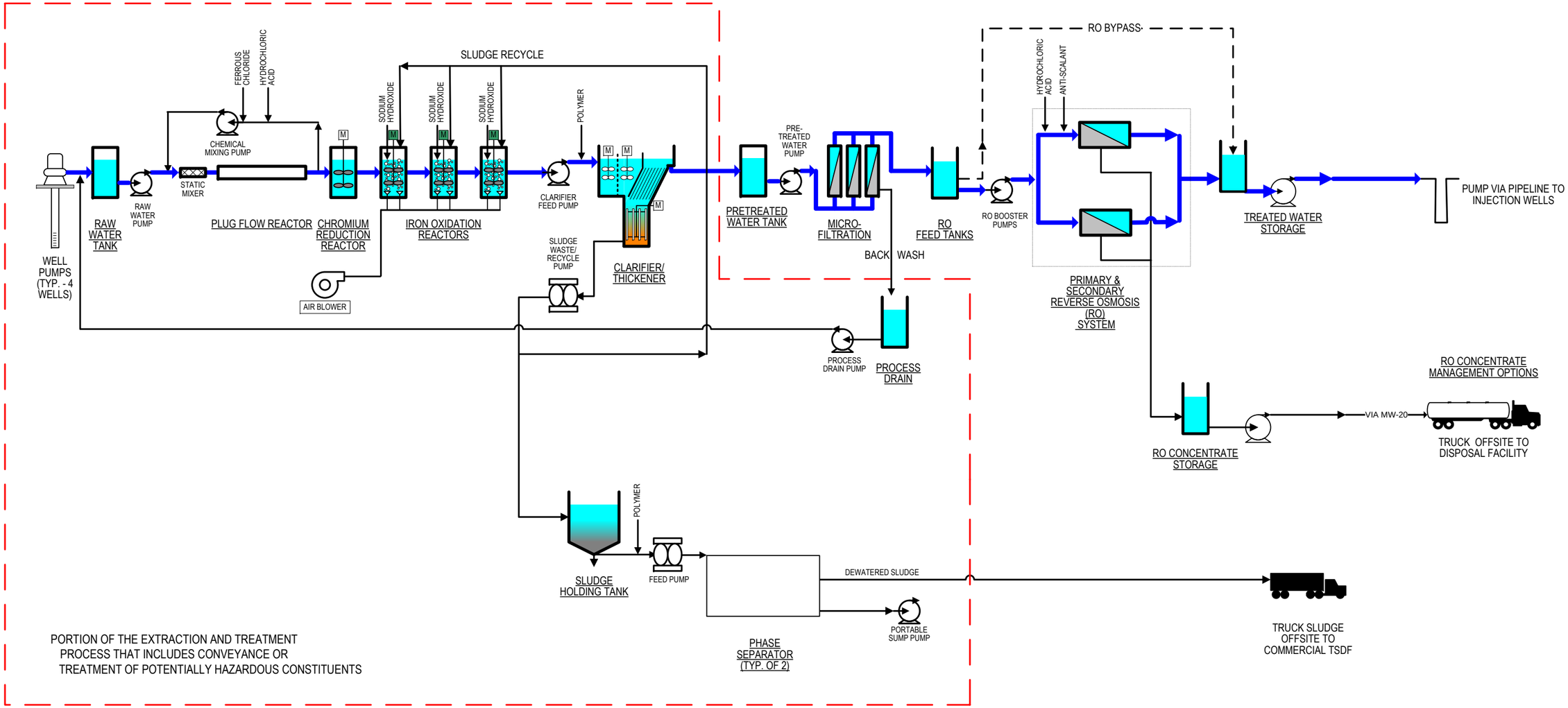

FIGURE 4-1
GROUNDWATER EXTRACTION AND TREATMENT SYSTEM PROCESS FLOW DIAGRAM
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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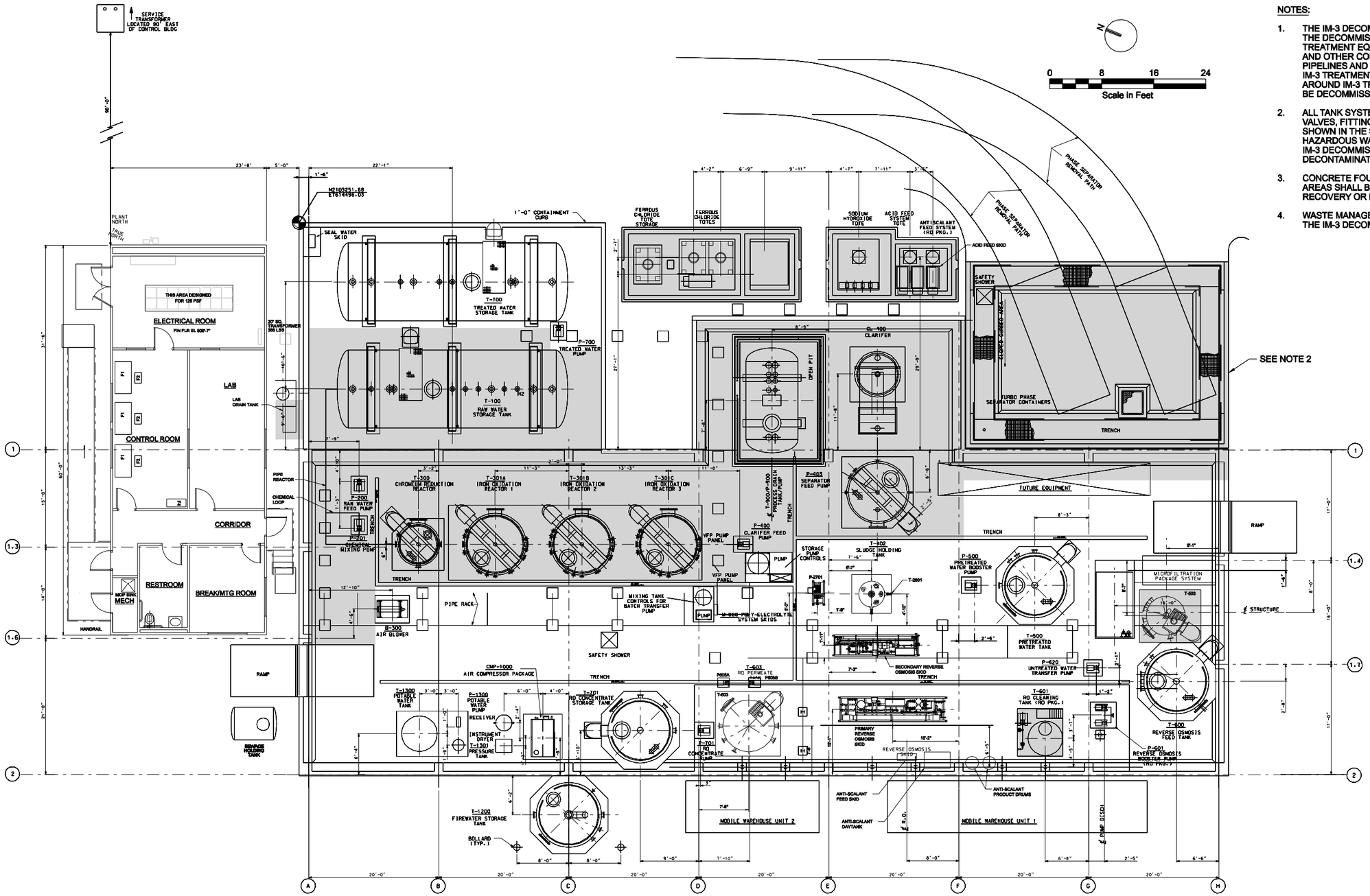

NOTES:

1. THE IM-3 DECOMMISSIONING WORK PLAN INCLUDES THE DECOMMISSIONING AND REMOVAL OF ALL INFRASTRUCTURE, TREATMENT EQUIPMENT, TREATMENT PIPELINES, AND OTHER COMPONENTS SHOWN ON THIS PLAN. UNDERGROUND PIPELINES AND CONDUITS, ABOVE GROUND ELECTRICAL, IM-3 TREATMENT PLANT FOUNDATION, SECURITY GATE, AND FENCE LINE AROUND IM-3 TREATMENT PLANT NOT SHOWN ON THIS PLAN SHALL ALSO BE DECOMMISSIONED AND REMOVED.
2. ALL TANK SYSTEMS, TREATMENT EQUIPMENT, TREATMENT PIPELINES, VALVES, FITTINGS, APPURTENANCES AND INFRASTRUCTURE MATERIALS SHOWN IN THE SHADED AREAS SHOULD BE MANAGED AS POTENTIALLY HAZARDOUS WASTE UNTIL PROVEN NON-HAZARDOUS. TABLE 4-1 OF THE IM-3 DECOMMISSIONING WORK PLAN INDICATES WHETHER OR NOT DECONTAMINATION IS REQUIRED.
3. CONCRETE FOUNDATION AND CONCRETE SECONDARY CONTAINMENT AREAS SHALL BE SAMPLED AND CHARACTERIZED PRIOR TO RECOVERY OR DISPOSAL.
4. WASTE MANAGEMENT PROCEDURES ARE INCLUDED IN SECTION 5 OF THE IM-3 DECOMMISSIONING WORK PLAN.

FIGURE 4-2
IM-3 TREATMENT PLANT DECOMMISSIONING PLAN

IM-3 Decomissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station
Needles, California

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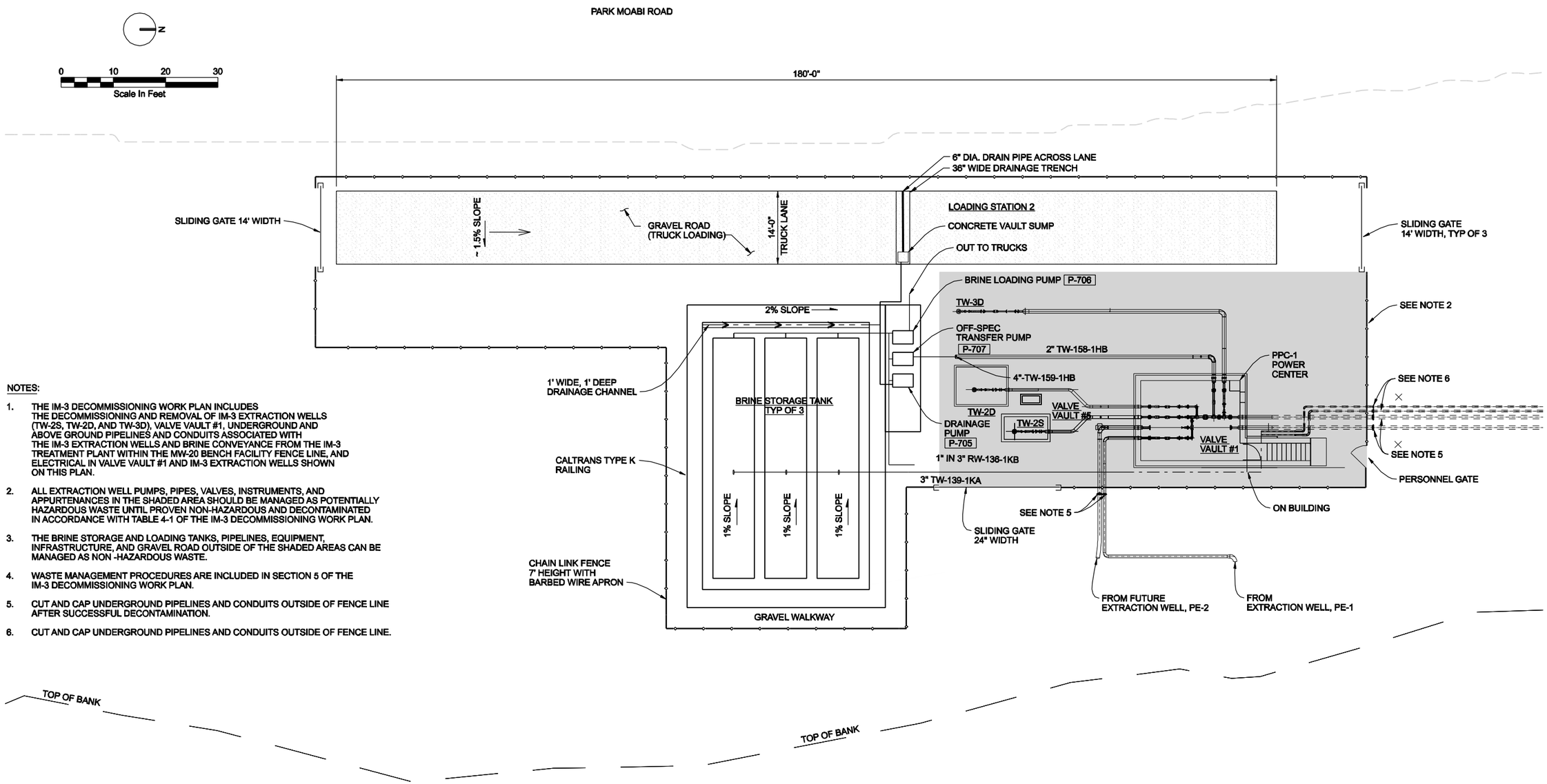
im-3 tpdp.dgn



NOTES:

1. THE IM-3 DECOMMISSIONING WORK PLAN INCLUDES THE DECOMMISSIONING AND REMOVAL OF IM-3 EXTRACTION WELLS (TW-2S, TW-2D, AND TW-3D), VALVE VAULT #1, UNDERGROUND AND ABOVE GROUND PIPELINES AND CONDUITS ASSOCIATED WITH THE IM-3 EXTRACTION WELLS AND BRINE CONVEYANCE FROM THE IM-3 TREATMENT PLANT WITHIN THE MW-20 BENCH FACILITY FENCE LINE, AND ELECTRICAL IN VALVE VAULT #1 AND IM-3 EXTRACTION WELLS SHOWN ON THIS PLAN.
2. ALL EXTRACTION WELL PUMPS, PIPES, VALVES, INSTRUMENTS, AND APPURTENANCES IN THE SHADED AREA SHOULD BE MANAGED AS POTENTIALLY HAZARDOUS WASTE UNTIL PROVEN NON-HAZARDOUS AND DECONTAMINATED IN ACCORDANCE WITH TABLE 4-1 OF THE IM-3 DECOMMISSIONING WORK PLAN.
3. THE BRINE STORAGE AND LOADING TANKS, PIPELINES, EQUIPMENT, INFRASTRUCTURE, AND GRAVEL ROAD OUTSIDE OF THE SHADED AREAS CAN BE MANAGED AS NON -HAZARDOUS WASTE.
4. WASTE MANAGEMENT PROCEDURES ARE INCLUDED IN SECTION 5 OF THE IM-3 DECOMMISSIONING WORK PLAN.
5. CUT AND CAP UNDERGROUND PIPELINES AND CONDUITS OUTSIDE OF FENCE LINE AFTER SUCCESSFUL DECONTAMINATION.
6. CUT AND CAP UNDERGROUND PIPELINES AND CONDUITS OUTSIDE OF FENCE LINE.

FIGURE 4-3
MW-20 BENCH FACILITY
DECOMMISSIONING PLAN

IM-3 Decomissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station
Needles, California

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im3 bfdp.dgn

FIGURE 4-4
Typical water truck (left) and typical excavator with thumb attachment (right)

FIGURE 4-5
18 Wheeler with flatbed trailer showing tank removal.

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FIGURE 4-6
Truck with typical pull behind water buffalo (front), typical crane (right).

FIGURE 4-7
Typical concrete crusher.

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FIGURE 4-8
Typical crane removing a typical tank.

FIGURE 4-9
Typical roll off bins for temporary material storage/management (right).

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FIGURE 4-10
Typical front end loader/backhoe.

FIGURE 4-11
Example of worker using typical welding torch (left). Example of worker using typical portaband saw (right).

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FIGURE 4-12
Example of worker with typical concrete saw (left). Example of Worker using typical compressor with Hammer (right).

FIGURE 4-13
Typical excavator with bucket (left), typical dump truck (right)

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FIGURE 4-14
Typical dump truck with second trailer.

FIGURE 4-15
Typical front end crawler loader.

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FIGURE 4-16
Typical Reachfork.

FIGURE 4-17
Typical excavator with pulverizer attachment.

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FIGURE 4-18
Typical vactor truck.

FIGURE 4-19
Typical compactor.

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FIGURE 4-20
Typical personnel lifts (left), scissor lift (right).

FIGURE 4-21
Typical excavator using shear attachment.

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FIGURE 4-22
Typical water storage tanks (for dust control).

FIGURE 4-23
Typical compact excavator with breaker attachment.

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SECTION 5

Waste Management Plan and Recoverable Materials

5.1 Waste Management Plan

This Waste Management Plan is intended to provide procedures for the proper collection, characterization, storage, transportation, and disposal of waste generated during the decommissioning, removal, and restoration of the site. Wastes from IM-3 decommissioning and removal work will be managed and disposed of in a manner consistent with applicable local, state, and federal laws and regulations at the time of management and disposal.

5.1.1 Expected Waste Streams

Expected waste streams and potentially recoverable components and materials are identified in Section 4 and presented in Table 4-1. As discussed in Section 4, each waste stream or recoverable component or material will fall into one of the following four categories:

1) Non-hazardous solid waste, which may be recovered or disposed of:
   a) Requiring zero to minimal cleaning (e.g., water rinse).
   b) Requiring extensive cleaning (e.g., pressure washing with surfactant solution).
2) Cleaning liquid and solid waste generated from cleaning components/materials in Category 1.
3) Hazardous solid waste, which will likely not be decontaminated prior to disposal. (Classification of RCRA or Non-RCRA will be determined by analysis prior to disposal.)
4) Components or materials that will be decontaminated and managed as non-hazardous if decontamination is successful, which may be recovered or disposed of.
5) Decontamination liquid or solid waste generated from decontaminating components, or materials in Category 4.
6) Universal Waste: Universal wastes are a category of hazardous wastes that are subject to less-stringent regulatory requirements. California's universal waste regulations apply to batteries, lamps, thermostats, aerosol cans, cathode ray tube (CRT) materials, universal waste electronic devices (such as computers, computer peripherals, telephones, answering machines, radios, calculators, and appliances), and a number of mercury-containing products. Some of the newly added mercury-containing products are listed as hazardous wastes in California when discarded, regardless of their mercury concentration. In California, automotive-type lead-acid batteries are not regulated as universal wastes but are instead subject to the requirements of 22 CCR 66266.80 and 22 CCR 66266.81. All other types of batteries (including small sealed lead-acid storage batteries) may be managed as universal waste. Aerosol cans that are empty are not subject to the universal waste requirements, but must be managed in accordance with the requirements for empty containers.

The amount of waste material that will be generated during the treatment plant decommissioning is estimated to be up to 5,000 cubic yards of solid waste and up to 2 million gallons of liquid waste, primarily water. With the removal of piping and conduits outside of the IM-3 treatment and MW-20 Bench, the additional amount of waste is estimated to be up to 650 cubic yards.

Appendix F, Soil Management Plan presents characterization and handling procedures for excavated soils.

5.1.2 Waste Characterization

Wastes generated from IM-3 decommissioning will need to be characterized prior to disposal. If the decommissioned IM-3 component or material from the IM-3 infrastructure is determined to be salvageable or recoverable, then the component or material can be managed as a recoverable material. Recoverable materials must be non-hazardous. PG&E will determine which IM-3 components or materials will be recovered for recycling or reuse prior to implementing this Work Plan. Section 5.2 describes recoverable materials. If the IM-3 component

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or material is classified as non-hazardous per Table 4-1, then it will be managed as a non-hazardous waste. Liquid and solid wastes generated from cleaning non-hazardous components and materials from the IM-3 infrastructure will be collected in separate containers from decontamination wastes and characterized in accordance with the procedures defined in this section. If the IM-3 component or material is classified as hazardous and will not be decontaminated prior to disposal per Table 4-1, then it will be managed as a hazardous waste and characterized as a RCRA or Non-RCRA hazardous waste in accordance with the procedures outlined below. If decontamination of the IM-3 component or material is required, then the waste material will be characterized as outlined below.

5.1.2.1 Hazardous Solid Waste

Representative samples of selected solid wastes which PG&E will presume to be hazardous will be tested using the toxicity characteristic leaching procedure (TCLP) and the results compared to the RCRA toxicity characteristic (TC) limits for metals, as specified in 22 CCR 66261.24(a)(1). If TC levels are exceeded, the waste will be classified as RCRA hazardous; otherwise, it will be classified as non-RCRA hazardous without additional analysis. This process will be limited to wastes deemed most likely to be RCRA hazardous, based on an evaluation of the process chemistry.

5.1.2.2 Concrete

Representative samples of concrete from the plant foundations, floor slabs, vaults, and containment areas will be collected by chipping or coring. Samples will be collected from locations most likely to have contacted hazardous waste or hazardous materials, such as the inside containment structures for process chemicals and other containment areas exposed to treatment system sludge. Samples will be analyzed individually and the results evaluated as follows:

1. If the total constituent concentration exceeds the total threshold limit concentration in 22 CCR 66261.24(a)(2), the concrete will be classified as a non-RCRA hazardous waste. Additional evaluation of the soluble threshold limit concentrations (STLC), as described in step 3 below, will not be performed.
2. If the total constituent concentration exceeds the numeric value of the RCRA TC level by 20 times or more, the TCLP will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the concrete will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3, will not be performed.
3. If the concrete has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by 10 times or more, the waste extraction test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the concrete will be classified as a non-RCRA hazardous waste. If the STLC is not exceeded, the concrete will be classified as non-hazardous.

5.1.2.3 Decontaminated IM-3 Components

Decontaminated IM-3 components will be visually inspected for conformance with the following criteria, as specified in 22 CCR 67383.3(e):

1. Piping and appurtenances will be free of product, sludge, rinseate, and debris to the extent that no material can be poured or drained from them when held in any orientation (e.g., tilted, inverted).
2. The tank, upon inspection, will be visually free of product, sludge, scale (thin, flaky residual of tank contents), rinseate and debris (except that residual staining caused by soil and waste consisting of light shadows, slight streaks, or minor discolorations), and soil and waste in cracks, crevices, and pits may be present.

In applying these criteria, rust-colored iron staining due to the use of ferrous chloride in the IM-3 treatment process will not be interpreted as indicating the presence of hazardous waste.

If the decontaminated component satisfies these criteria, it will be classified as non-hazardous.

5.1.2.4 Cleaning and Decontamination Liquid, and Solid Wastes

Wastes generated from cleaning non-hazardous IM-3 components and materials or decontaminated original hazardous IM-3 components or materials will be sampled and analyzed for metals and pH. Cleaning wastes and

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decontamination wastes will be collected in separate containers. Cleaning wastes will be managed as non-hazardous wastes, and decontamination wastes will be managed as potentially hazardous waste until proven non-hazardous after analysis.

Liquids will be classified as hazardous waste if they exhibit a pH of 2.0 or below, or 12.5 or above. Solids will be classified as hazardous waste if an equal weight mixture of the solid and water exhibits a pH in this range.

Samples will be evaluated for the presence of metals with hazardous waste TC levels specified in 22 CCR 66261.24 using the approach below.

Liquid wastes containing less than 0.5 percent filterable solids will be analyzed for total metals and the results compared with the RCRA TC limits in 22 CCR 66261.24(a)(1) and the STLCs in 22 CCR 66261.24(a)(2). If any constituent exceeds the RCRA TC limit, the waste will be classified as RCRA hazardous. If no constituents exceed the RCRA TC limit, but one or more constituent exceed the STLC, the waste will be classified as non-RCRA hazardous. If neither limit is exceeded, the waste will be classified as non-hazardous.

Liquid wastes containing 0.5 percent or more filterable solids will be analyzed using the TCLP and the results will be compared with the RCRA TC limits. If a TC limit is exceeded, the waste will be classified as RCRA hazardous. If no TC limits are exceeded, the waste will be analyzed using the California WET and the results compared with the STLCs. If one or more STLCs is exceeded, the waste will be classified as non-RCRA hazardous. If neither limit is exceeded, the waste will be classified as non-hazardous.

Solid wastes will be analyzed for total metals, expressed in milligrams per kilogram (mg/kg), and the results will be evaluated as follows:

1. If the total constituent concentration exceeds the total threshold limit concentration in 22 CCR 66261.24(a)(2), material will be classified as a non-RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.
2. If the total constituent concentration exceeds the numeric value of the RCRA TC level by 20 times or more, the TCLP will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the material will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3, will not be performed.
3. If the material has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by 10 times or more, the WET will be performed. If the constituent concentration in the WET exceeds the STLC, the material will be classified as a non-RCRA hazardous waste. If the STLC is not exceeded, the waste will be classified as non-hazardous.

If the material has not been classified as a hazardous waste in steps 1, 2, or 3, it will be classified as non-hazardous waste.

5.1.3 Onsite Management

Waste materials will be managed onsite in demarcated waste management areas. Section 3.2.2 identifies the waste management areas for this work. Within the waste management areas, hazardous wastes will be segregated from non-hazardous wastes. Additionally, incompatible hazardous wastes (e.g., flammable and corrosives wastes) will be segregated. Wastes of the same matrix, contamination, and source may be aggregated to facilitate accumulation and disposal.

Lined roll-off boxes, drums, or other suitable containers will be used to contain solid wastes. Liquid wastes will be contained in drums, totes, or portable tanks. Hazardous waste will be accumulated in U.S. Department of Transportation (DOT) specification containers, which will be kept closed except when adding or removing waste. Cleaning and decontamination wastewater will be contained in portable tanks within secondary containment near the point of origin while the water is characterized for offsite disposal.

Hazardous waste container storage areas will be equipped with secondary containment that is capable of containing 10% of the aggregate volume of liquids, or the volume of the single largest container holding liquids,

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plus the precipitation from a 24-hour, 25-year storm. The base of the storage areas will be sloped so that spilled liquids drain away from the containers, unless the containers are elevated. Run-on into the storage areas will be prevented. Spilled or leaked waste and accumulated precipitation will be removed from the storage area in a timely manner and disposed of as hazardous or non-hazardous based on test results.

Incidental trash, such as wooden pallets, food, and beverage containers will be contained in dumpsters located in support zones or staging areas near temporary facilities. Universal waste, such as batteries, electronic devices, cathode ray tubes, lamps, aerosol cans, and mercury-containing equipment, will be stored in containers or packages that will remain closed; are structurally sound; adequate to prevent breakage; compatible with contents of batteries, lamps, or thermostats; and lack evidence of leakage, spillage, or damage that could cause leakage under reasonable foreseeable conditions.

Temporary stockpiling may be required to facilitate container loading, because waste materials will likely need to be cut to size first to fit into the appropriate container. Temporary stockpiling may also be used to segregate materials and may be required to facilitate container loading by a second piece of equipment, if the removal equipment cannot efficiently or safely load containers directly. The types of wastes that may be managed in temporary stockpiles include metal from the canopy, concrete from vaults, plant foundation, secondary containment areas, pieces of equipment, metal and plastic pipelines, valves, and fittings. Temporary stock-piling may also be required if wastes are pending analyses. Temporary stockpiling will be done on a bermed-lined pad if the underlying material is clean. Temporary stockpiles will be in waste management areas within exclusion zones.

Hazardous wastes will be removed from the site within 90 days from the date of generation. The date of generation is the day that a waste is first placed in a container, tank, or stockpile. Accumulation start date for containers and tanks will be documented on the hazardous waste label. A log or other record will be used to document the accumulation start date for stockpiles and tanks. Labeling of waste containers and tanks will be in accordance with 22 CCR Division 4.5, Chapter 12 and 49 CFR 172, 173, and 178. Universal waste will be labeled as universal waste plus the type of universal waste (i.e., Universal Waste – Batteries); it will be accumulated onsite up to 1 year, and not more than 5000 kilograms will be accumulated at one time. Universal waste will be sent to a permitted recycling facility, and shipping papers will be retained for a minimum of 3 years. Waste accumulation and equipment storage areas will be inspected weekly for labeling, malfunctions, deterioration, discharges, and leaks that could result in a release. Hazardous waste tanks will be inspected daily. Deficiencies observed or noted during inspection will be corrected, and corrective measures will be documented and maintained onsite.

Once all hazardous waste has been removed from the site the hazardous waste storage areas will be decontaminated to remove any waste residue and the structures will be managed as described elsewhere in this decommissioning plan.

5.1.4 Waste Transportation and Disposal

Prior to offsite transportation the hazardous waste labels on all non-bulk containers will be verified to be accurate and complete, and all non-bulk containers will be labeled with the appropriate DOT hazard class label.

After the wastes are containerized and labeled, wastes ready for offsite disposal will be loaded onto trucks for transport to appropriate disposal facilities. PG&E will designate a transportation coordinator to be onsite during loading and transportation activities. This individual will be responsible for coordinating and overseeing these activities.

As truck loading is completed, the containers and trucks will be inspected and brushed as necessary to remove loose materials. Trucks or roll-offs that enter exclusion zones will pass through contaminant reduction zones to exit the site. Each load will be inspected to verify that it is secure and that the truck has been properly cleaned or decontaminated as required. Prior to loading hazardous waste, the driver's license of each driver will be checked to verify that it is the proper class and has the appropriate endorsements for the vehicle being driven. Appropriate DOT placards for the waste being transported will be provided to the driver, if necessary. Appropriate documentation, including waste manifests, will be completed and checked. In addition, a truck log will be maintained with loading and transportation information. The vehicle will proceed to the appropriate disposal

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facility in accordance with local, state, and federal transportation requirements. Appendix D presents further information about the transportation of wastes.

Based on the estimated volume of solid and liquid waste that will be generated from the IM-3 decommissioning, approximately 400 tanker trucks for liquid waste (assuming 5,000 gallons per truck) and roughly 280 trucks for solid waste (assuming 20 cubic yards per truck) are expected to be required to transport waste to disposal facilities.

5.1.5 Disposal Facilities

Disposal facilities receiving Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) waste (waste that contains CERCLA hazardous substances, pollutants, or contaminants) must be in compliance with 42 U.S.C § 9621 (d) (3) and 40 C.F.R. § 300.440. PG&E may ship waste material associated with the implementation of the Final Remedy from the Site to an offsite facility only if it demonstrates to DOI's satisfaction, prior to the first shipment, and annually thereafter, that USEPA has determined that the proposed receiving facility is operating in compliance with 42 U.S.C § 9621 (d) (3) and 40 C.F.R. § 300.440. If waste material is shipped to an out-of-state disposal facility, then PG&E will provide written notice of the disposal of waste to the appropriate state environmental official in each receiving facility's state and the DOI Project Manager prior to the first shipment of the waste material in accordance with the requirements of the Consent Decree. Wastes designated as RCRA or Non-RCRA hazardous wastes will be transported and disposed of in a pre-approved facility with the appropriate permits for the type of waste being accepted. Waste profiles will be established, and acceptance of the waste stream will be established prior to sending any waste material offsite. Receiving facilities for wastes designated as non-hazardous wastes will also be pre-approved. Facilities for the RCRA hazardous wastes, Non-RCRA hazardous and non-hazardous wastes will be identified just prior to implementing this Work Plan.

PG&E proposes use of the following potential disposal facilities for the project as well as others, subject to the communication and approval processes under the Consent Decree outlined above:

PSC Rancho Cordova – TSDF
11855 White Rock Road
Rancho Cordova, CA 95742

Chemical Waste Management – Kettleman Hills Facility – Landfill
35251 Old Skyline Road
Kettleman City, CA 93239

US Ecology Inc. - Landfill
Highway 95 (12 miles South of Beatty, NV)
Beatty, NV 89003

Clean Harbors Button Willow – Landfill
2500 West Lokern Road
Button Willow, CA 93206

5.1.6 Recordkeeping

Copies of all records related to waste management, including waste characterization test results, documentation of waste classification decisions, hazardous and non-hazardous waste manifests, and waste tracking logs, will be retained for at least three years.

5.2 Recoverable Materials

Several of the expected waste streams are potentially recoverable or salvageable for reuse or recycle during the decommissioning and removal of IM-3 system. The following subsections identify expected waste streams that have reuse or recycle value and describe recoverable material handling and staging at the project site.

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5.2.1 Reuse and Recycling Evaluation

Efforts will be made to recover IM-3 system materials for reuse or recycle to the extent feasible in accordance with PG&E's Programmatic Sustainable Remediation Guidance. Based on the IM-3 components and materials from IM-3 infrastructure to be decommissioned and removed, the following expected non-hazardous waste streams have been identified as providing reuse or recycling value:

- IM-3 Treatment Plant trailer
- Security fence and gate
- Mobile warehouse units
- Facility shade structure
- Precast concrete vaults
- Most equipment and tank systems
- Scrap steel and iron
- Non-ferrous copper and stainless steel
- Plastic
- Concrete
- Computers, monitors, telephones, radios, and other small electronic equipment

Scrap steel and iron will be generated during the removal of buildings, equipment, tanks, and piping. Copper will be generated during the removal of electrical utilities and lighting. Stainless steel will be generated during the removal of instruments, small diameter piping, fittings, and appurtenances. Plastic will be generated from the removal of pipes, valves, and appurtenances. Concrete will be generated from the removal of the IM-3 Treatment Plant foundation and secondary containment structures, and precast concrete vaults. Fiberglass will be generated from the removal of most tank systems and pumps.

5.2.2 Recoverable Materials Staging

Recoverable materials will be staged within the designated waste management areas for the project.

5.2.2.1 Salvageable IM-3 Infrastructure, Equipment, and Tank Systems

Salvageable IM-3 infrastructure, equipment, and tank systems may be sold for reuse or salvaged for future reuse by PG&E. If IM-3 infrastructure or components are selected to be reused by the Final Remedy, then the infrastructure or components will be reused in a different location than its existing location. IM-3 infrastructure, equipment, and tank systems will likely be directly loaded onto trucks at the point of removal for delivery to their offsite destination. If temporary onsite storage is required, then the storage area will be isolated from subsequent decommissioning and removal activities.

IM-3 infrastructure likely to be recovered includes the IM-3 treatment trailer, security fence and gate, mobile warehouse units, facility shade structure, and precast concrete vaults. Equipment and tank systems likely to be recovered include package systems, such as the microfilter and reverse osmosis package systems and tank systems downstream of the clarifier.

5.2.2.2 Scrap Steel and Iron

Scrap steel and iron will result from removal of structural beams, columns, decking, siding, piping, and other components. Scrap steel and iron will likely be accumulated and contained in dumpsters or roll off bins located in support zones or staging areas outside of exclusion zones, because it is non-hazardous and recyclable. In these areas, secondary processing will be completed to meet the requirements of the scrap buyer, such as cutting the material to size. The material will be cut to size with shears or torches in a controlled environment to allow for safe loading and offsite transportation. Temporary stockpiling of scrap steel and iron may be required for material segregation and sizing. The material will be segregated, sold for recycling, and transported offsite. When possible, materials will be directly loaded onto trucks at the point of removal for offsite delivery.

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5.2.2.3 Scrap Non-ferrous Metals

Copper and stainless steel are the primary non-ferrous metals that will be recovered from IM-3 decommissioning. Because of the high value of copper and other non-ferrous materials, these materials should be stored in a secure area and delivered as each load is accumulated. Secure material storage areas will be established within a designated staging area. Similar to scrap steel and iron materials, the non-ferrous materials will be cut to size using shears or torches in a controlled environment to allow for safe loading and offsite transportation. Materials will be segregated, sold for recycling, and transported offsite.

5.2.2.4 Plastic

The plastics associated with treatment piping and conveyance piping will be decontaminated as indicated on Table 4-1. If the plastic material is categorized as non-hazardous or decontaminated and proven non-hazardous, then it may be recycled. Plastic will be cut to size, stored in dumpsters or roll off bins, and segregated for either recycling or disposal depending on the volume, condition, and type.

5.2.2.5 Concrete

Representative samples of the IM-3 Treatment Plant foundation and secondary containment areas will be collected prior to demolition to determine waste characterization. Contaminated concrete will be scarified off, characterized, handled, and properly disposed of. Non-hazardous concrete will be broken up using a hydraulic breaker attached to an excavator or using a drop hammer. The rebar within the concrete will be removed and segregated for recycling as scrap steel. The concrete will either be broken into sizable pieces for transportation to an offsite recycler or disposal facility, or will be sized for transport to an onsite crusher that will pulverize the concrete into a material that may be used onsite as road base.

TABLE 5-1
Recoverable Materials
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station Needles, California

Recoverable Materials	Recycle Options Typical in the Industry
Useable Equipment	Sell directly, wholesale to third party, or otherwise used by PG&E
Useable Structural Steel and Piping	Sell directly, wholesale to third party, or otherwise used by PG&E
Scrap Steel, Re-bar, and Iron	Deliver and sell to third party
Non-ferrous Metals (copper, aluminum, titanium) and Stainless Steel	Deliver and sell to third party
Plastic	Deliver and sell to a third party
Concrete – Unprocessed	Deliver to outside crushing plant for processing and sell to third party

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SECTION 6

Best Management Practices and Mitigation Measures/ARARs Compliance

The PG&E remediation project team is committed to executing this project with zero safety incidents. Project protocols have been and will continue to be implemented and enforced to make certain project team members, site visitors, including Tribal Monitors, regulatory agencies, and interested stakeholders, are safe.

Contractors performing field work will be responsible for preparing and complying with the standards and procedures in the project-specific HSP. As required by the EIR mitigation measure HAZ-2c, the project-specific HSP was prepared and included in an appendix to the Construction/Remedial Action Work Plan

PG&E is committed to implementing the design and remedial action in a manner that is respectful of the sacredness and sensitivity of the resources at and near the project area. Therefore, PG&E and its contractors will fully comply with the mitigation measures set forth to minimize impacts on the sensitive resources as well as protocols and provisions that are in the CIMP and the CHPMP (BLM, 2012).

The EIR MMRP (DTSC, 2011b) includes 111 mitigation measures and sub-measures that address nine resource areas, including aesthetic, biological, air quality, cultural, geology and soils, hazardous materials, hydrology and water quality, noise, and water supply. Table 6-1 summarize the actions to be taken in compliance with the EIR mitigation measures for the decommissioning, removal, and restoration of the IM-3 Groundwater Extraction and Treatment System. For IM-3 decommissioning, removal and restoration, of the 111 mitigation measures and submeasures, 84 are classified as “actionable,” and 27 are classified as “no action.”

In addition, a summary of actions taken or that will be taken to comply with applicable stipulations in the PA (BLM, 2010) related to IM-3 decommissioning and removal activities is presented in Table 6-2, and a summary of actions taken or that will be taken to comply with applicable requirements in the CHPMP (BLM, 2012) is presented in Table 6-3. Table 6-4 presents actions taken or that will be taken to comply with ARARs.

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TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Aesthetics	AES-1	Impacts on Views from Topock Maze Locus B, a Scenic Vista (Key View 5) - The proposed project shall be designed and implemented to adhere to the design criteria presented below.			
Aesthetics	AES-1a	a) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases consistent with CUL-1a-5. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation.	Map of mature plant species, the Aesthetic and Visual Resources Protection and Revegetation Plan, and the Cultural Impact Minimization Program (CIMP)	Action	IM-3 decommissioning and removal activities will comply with the following: a) Methods and specifications for avoidance, protection, natural revegetation, and transplanting and planting of replacement species included in the Aesthetic and Visual Resources Protection and Revegetation Plan (appendix to the Construction/ Remedial Action Work Plan). b) Protocols to reduce visual intrusions included in the CIMP (CUL-1a-8i).
Aesthetics	AES-1b	b) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed and shall be implemented consistent with CUL-1a-5. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.	Future Site-Specific IM-3 Restoration Plan and the CIMP	Action	IM-3 decommissioning and removal activities will comply with the following: a) Methods and specifications for avoidance, protection, natural revegetation, and transplanting and planting of replacement species included in the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (appendix to the Construction/Remedial Action Work Plan). The Site-Specific IM-3 Restoration Plan will reference this revegetation plan. b) Protocols to reduce visual intrusions included in the CIMP (CUL-1a-8i).
Aesthetics	AES-1c	c) Plant material shall be consistent with surrounding native vegetation.	Future Site-Specific IM-3 Restoration Plan	Action	IM-3 decommissioning and removal activities will comply with the following: a) Methods and specifications for avoidance, protection, natural revegetation, and transplanting and planting of replacement species included in the Aesthetic and Visual Resources Protection and Revegetation Plan and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (appendices to the Construction/Remedial Action Work Plan). The Site-Specific IM-3 Restoration Plan will reference these plans. b) Protocols to reduce visual intrusions included in the CIMP (CUL-1a-8i).
Aesthetics	AES-1d	d) The color of the wells, pipelines, reagent storage tanks, control structures, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.	N/A	No Action	IM-3 decommissioning does not include construction of new structures, wells, pipelines, reagent storage tanks, control structures, or utilities.
Aesthetics	AES-1e	e) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.	Future Site-Specific IM-3 Restoration Plan	Action	IM-3 decommissioning and removal activities will comply with the following: a) Methods and specifications for avoidance, protection, natural revegetation, and transplanting and planting of replacement species are included in the Aesthetic and Visual Resources Protection and Revegetation Plan and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (appendices to the Construction/Remedial Action Work Plan). The IM-3 Restoration Plan will reference these revegetation plans. b) Protocols to reduce visual intrusions included in the CIMP (CUL-1a-8i).
Aesthetics	AES-2	Impacts on Views from Colorado River, a Scenic Resources Corridor (Key View 11) - The proposed project shall be designed and implemented to adhere to the design criteria presented below:			
Aesthetics	AES-2a	a) A minimum setback requirement of 20 feet from the water (ordinary high water mark or OHWM) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the river bank.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.

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Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Aesthetics	AES-2b	b) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation consistent with CUL-1a-5.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Aesthetics	AES-2c	c) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Aesthetics	AES-2d	d) Plant material shall be consistent with surrounding native vegetation.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Aesthetics	AES-2e	e) The color of the wells, pipelines, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.	N/A	No Action	IM-3 decommissioning does not include construction of new structures, wells, pipelines, reagent storage tanks, control structures, or utilities.
Aesthetics	AES-2f	f) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Aesthetics	AES-3	Impacts on Visual Quality and Character along the Colorado River (Key View 11) - Mitigation Measure AES-1 shall be implemented. Implementation of Mitigation Measures AES-1 would reduce the overall change to the visual character of the view corridor along the Colorado River. Although the proposed project would still be visible, incorporating a facilities design that is aesthetically sensitive and preserving the vegetation would blend the proposed project into their visual setting within the floodplain and would reduce the overall contrast of the proposed project.	N/A	No Action	IM-3 decommissioning activities are not anticipated to impact Key View 11.
Air Quality	AIR-1	Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors - PG&E shall implement the fugitive dust control measures below for any construction and/or demolition activities:			
Air Quality	AIR-1a	a) Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient;	This Work Plan	Action	This measure is addressed in Section 3 and Appendix D, Transportation Plan.
Air Quality	AIR-1b	b) Cover loaded haul vehicles while operating on publicly maintained paved surfaces;	This Work Plan	Action	This measure is addressed in Section 3 and Appendix D, Transportation Plan.
Air Quality	AIR-1c	c) Stabilize (using soil binders or establish vegetative cover) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions;	This Work Plan	Action	This measure is addressed in Section 3 and Appendix D, Transportation Plan.
Air Quality	AIR-1d	d) Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours; and	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Air Quality	AIR-1e	e) Curtail nonessential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.

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Biological Resources	BIO-1	Potential Fill of Wetlands and Other Waters of the United States and Disturbance or Removal of Riparian Habitat - Areas of sensitive habitat in the project area have been identified during project surveys. These areas include floodplain and riparian areas, wetlands, and waters of the United States. Habitats designated by CDFW as sensitive, including desert washes and desert riparian, are also included. To the extent feasible, elements of the project shall be designed to avoid direct effects on these sensitive areas. During the design process and before ground disturbing activities within such areas (not including East Ravine), a qualified biologist shall coordinate with PG&E to ensure that the footprints of construction zones, drill pads, staging areas, and access routes are designed to avoid disturbance of sensitive habitats to the extent feasible. DTSC shall be responsible for enforcing compliance with design and all preconstruction measures.	This Work Plan and CWA 404/CDFW avoidance and minimization measures	Action	Figures 3-1 through 3-3 of this Work Plan show the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint was selected to avoid disturbance of sensitive habitats to the extent feasible. The CWA 404/CDFW avoidance and minimization measures (included in an appendix to the Construction/Remedial Action Work Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities.
Biological Resources	BIO-1	If during the design process it is shown that complete avoidance of habitats under USACE jurisdiction is not feasible, the Section 404 permitting process shall be completed, or the substantive equivalent per CERCLA Section 121(e)(1). In either event, the acreage of affected jurisdictional habitat shall be replaced and/or rehabilitated to ensure "no-net-loss." Before any ground-disturbing project activities begin in areas that contain potentially jurisdictional wetlands, the wetland delineation findings shall be documented in a detailed report and submitted to USACE for verification as part of the formal Section 404 wetland delineation process and to DTSC. For all jurisdictional areas that cannot be avoided as described above, authorization for fill of wetlands and alteration of waters of the United States shall be secured from USACE through the Section 404 permitting process before project implementation. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods agreeable to USACE and consistent with applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. Alternately, if USACE declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the substantive equivalent of the Section 404 permitting process shall be complied with by ensuring that the acreage of jurisdictional wetland affected is be replaced on a "no-net-loss" basis in accordance with the substantive provisions of USACE regulations. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods consistent with USACE methods, and consistent with the purpose and intent of applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. In any event, a report shall be submitted to DTSC to document compliance with these mandates.	This Work Plan and CWA 404 avoidance and minimization measures	Action	Decommissioning and restoration in the floodplain and other habitats subject to the jurisdiction of the USACE and California Department of Fish and Wildlife (CDFW) will be accomplished according to the substantive requirements of the Clean Water Act (CWA), Section 404 (included an appendix to the Construction/Remedial Action Work Plan). Section 8 of this Work Plan includes restoration guidelines (steps to be followed during restoration), elements of the restoration of habitat and revegetation and demobilization, and a draft annotated outline of a future, more detailed Site-Specific IM-3 Restoration Plan. In response to the Tribes' comments on the 60% design (CH2M HILL 2014) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA, and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. As stated in the responses to comments on the 60% design (response to comment [RTC] #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.

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Biological Resources	BIO-1	If during the design process it is shown that complete avoidance of habitats under CDFW jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, a Section 1602 streambed alteration agreement shall be obtained from CDFW and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a no-net-loss basis in accordance with CDFW regulations and, if applicable, as specified in the streambed alteration agreement, if needed. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to CDFW and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to CDFW, BLM, and USFWS that is agreeable to these agencies, or, alternately, through the implementation of a habitat restoration plan consistent with the substantive policies of CDFW, BLM, and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan. Alternately, if CDFW declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, and during the design process it is shown that complete avoidance of habitats under CDFW jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, the substantive mandates of a streambed alteration agreement shall be implemented, and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a "no-net-loss" basis in accordance with CDFW regulations and, if applicable. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to CDFW and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan developed consistent with the substantive policies of CDFW, BLM and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.	This Work Plan, Future Site-Specific IM-3 Restoration Plan, the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats, and CDFW avoidance and minimization measures	Action	Restoration in the floodplain and other habitats subject to the jurisdiction of the CDFW will be accomplished according to the CDFW avoidance and minimization measures and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (included as appendices to the Construction/Remedial Action Work Plan). Section 8 of this Work Plan includes restoration guidelines (steps to be followed during restoration), elements of the restoration of habitat and revegetation and demobilization, and a draft annotated outline of a future, more detailed Site-Specific IM-3 Restoration Plan. In response to the Tribes' comments on the 60% design (CH2M HILL 2014) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA, and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. As stated in the responses to comments on the 60% design (RTC #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. The Future Plan will reference the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats, which includes information on salvage, relocation and transplantation methods, and replacement planting for plant species in sensitive habitat areas that are within areas under the jurisdiction of CDFW pursuant to Section 1600 of the State of California Fish and Game Code.

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Biological Resources	BIO-2a	a) Disturbance of Special-Status Birds and Loss of Habitat. To the extent feasible, the project implementation plans shall be designed to minimize removal of habitat for special-status birds. During the design process and before ground disturbing activities (except within the East Ravine as described in the Revised Addendum and unless otherwise required as noted below), a qualified biologist shall coordinate with PG&E to ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on habitat and nesting habitat for other special-status species, to the extent feasible. DTSC will ensure compliance with all preconstruction and construction phase avoidance measures identified during this process and included in any design plans. Vegetation removal and other activities shall be timed to avoid the nesting season for special-status bird species that may be present. The nesting cycle for most birds in this region spans March 15 through September 30. Preconstruction Measures: Preconstruction breeding season surveys shall be conducted during the general nesting period, which encompasses the period from March 15 through September 30, if the final design of the project (including East Ravine investigation Sites I, K and L) could result in disturbance or loss of active nests of special-status bird species. If vegetation removal or other disturbance related to project implementation is required during the nesting season, focused surveys for active nests of special-status birds shall be conducted before such activities begin. A qualified biologist shall conduct preconstruction surveys to identify active nests that could be affected. The appropriate area to be surveyed and the timing of the survey may vary depending on the activity and species that could be affected. For the Yuma clapper rail, the preconstruction surveys shall specifically identify habitat within 300 feet of construction areas, in accordance with substantive policies of USFWS including those set out in USFWS protocols. Construction Measures: Before the initiation of project elements that could result in disturbance of active nests or nesting pairs of other special-status birds, a qualified biologist shall be consulted to identify appropriate measures to minimize adverse impacts during the construction phase of the project. If deemed appropriate for the final project design because of the potential for impacts, minimization measures will include focusing construction activities that must be conducted during the nesting season to less- sensitive periods in the nesting cycle, implementing buffers around active nests of special-status birds to the extent practical and feasible to limit visual and noise disturbance, conducting worker awareness training, and conducting biological monitoring (including noise monitoring to determine if construction noise at the edge of suitable nesting habitat is elevated above 60 dBA Leq or ambient levels). An avoidance and minimization plan for special status bird species, as defined in Table 4.3-3 of the EIR and those species protected under the federal Migratory Bird Treaty Act, including the Yuma clapper rail, shall be developed and implemented in consultation with USFWS, and agreed upon by DTSC. Avoidance and impact minimization measures, such as prohibiting construction near or in sensitive bird habitat, limiting construction during breeding seasons, and requiring an on-site biological monitor, shall be included in the design plan and implemented to the extent necessary to avoid significant impacts on sensitive bird species.	This Work Plan, the Programmatic Biological Assessment (PBA), and the Bird Impact Avoidance and Minimization Plan (BIAMP)	Action	This measure, the conservation measures in the PBA, and the avoidance and minimization measures included in the Bird Impact Avoidance and Minimization Plan (included in an appendix to the Construction/Remedial Action Work Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities. Figures 3-1 through 3-3 of this Work Plan show the primary work zones, staging areas, waste management areas, and access and haul routes. The project footprint was selected to avoid disturbance of sensitive habitats and habitat for special-status birds to the extent feasible.

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Biological Resources	BIO-2b	b) Disturbance of Desert Tortoise and Loss of Habitat. Preconstruction Measures: In areas where impacts to potential desert tortoise habitat are unavoidable, measures outlined in the Programmatic Biological Agreement (PBA; CH2M HILL, 2007) and in the USFWS letter concurring with the PBA, shall be implemented, as described below. To the extent feasible, project construction shall be designed to minimize removal of habitat for the desert tortoise. Before any ground-disturbing project activities begin, and except within the East Ravine for which potential effects to the tortoise have been considered per the PBA), a USFWS-authorized desert tortoise biologist shall identify potential desert tortoise habitat in areas that could be affected by the final project design. Through coordination with the authorized biologist, PG&E shall ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on potential desert tortoise habitat to the extent feasible. These measures include the presence of a USFWS-authorized desert tortoise biologist onsite or designated agent in accordance with the PBA who will examine work areas and vehicles for the presence of desert tortoises, and who will conduct preconstruction desert tortoise surveys in areas where unavoidable impacts to tortoise habitat would occur. If feasible, the preconstruction desert tortoise surveys would coincide with one of the two peak periods of desert tortoise activity (i.e., if feasible, the surveys should be conducted in either the period from April through May, or from September through October). The preconstruction surveys shall be in full accordance with the substantive requirements of USFWS protocols. Construction Measures: Before the initiation of project elements that could result in disturbance of desert tortoises or desert tortoise habitat, a USFWS-authorized desert tortoise biologist shall be consulted to identify appropriate measures to minimize adverse impacts. Minimization measures are likely to include micro-siting structures, pipelines, and access roads in previously disturbed areas or in areas with sparse scrub vegetation, conducting worker awareness	This Work Plan and the PBA	No Action	This measure and conservation measures in the PBA (included in an appendix to the Construction/Remedial Action Work Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities. Figures 3-1 through 3-3 of the Work Plan show the primary work zones, staging areas, waste management areas, and access and haul routes. The project footprint was selected to avoid disturbance of sensitive habitats and desert tortoise habitat to the extent feasible.
Biological Resources	BIO-2c	c) Disturbance of Special-Status Species and Loss of Habitat Caused by Decommissioning. To avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities, an avoidance and minimization plan shall be developed and implemented through consultation with CDFW, BLM, and USFWS. These measures shall be based on surveys conducted prior to decommissioning, and during the breeding season (as previously defined in this EIR for each species or suite of species). Restoration of any disturbed areas shall include measures to achieve no net loss of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to CDFW, BLM, and USFWS that is agreeable to these agencies. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.	Future Site-Specific IM-3 Restoration Plan, future IM-3 Decommissioning Avoidance and Minimization Plan, the PBA, the BIAMP, the CIMP, and CWA 404/CDFW avoidance and minimization measures and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats.	Action	This measure, conservation measures in the PBA, the BIMP, CWA 404/CDFW avoidance and minimization measures, and CIMP protocols for restoring the environment to its preconstruction condition upon decommissioning (CUL-1a-8e) and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats will be implemented during IM-3 decommissioning, removal, and restoration activities. The CIMP protocols will also be referenced in the Site-Specific IM-3 Restoration Plan. An Avoidance and Minimization Plan will be developed in consultation with CDFW, BLM, and USFWS, prior to IM-3 decommissioning.
Biological Resources	BIO-3a	a) Potential Impacts to Aquatic Habitat Related to Turbidity, Erosion, Sedimentation, and Overall Water Quality during Construction of the Intake Structure. Hydrology & Water Quality Mitigation Measure HYDRO-1 shall be implemented in order to reduce water quality impacts related to erosion and pollutant runoff through implementation of BMPs. In addition, installing the cofferdam and dewatering a portion of the proposed intake structure site during fish screen construction may result in fish stranding. PG&E and its contractor shall coordinate with a qualified fisheries biologist to develop and implement a fish rescue plan. The fish rescue effort would be implemented during the dewatering of the area behind the cofferdam and would involve capturing those fish and returning them to suitable habitat within the river. The fish rescue plan shall identify and describe the following items: collection permits needed, fish capture zones, staffing, staging areas, fish collection and transport methods, species prioritization, resource agency contacts, fish handling protocols, fish relocation zones, site layout and progression of dewatering and fish rescue, and records and data. To ensure compliance, a fisheries biologist shall be present on-site during initial pumping (dewatering) activities and to oversee the fish rescue operation.	N/A	No Action	IM-3 decommissioning will not involve construction of an intake structure.

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Biological Resources	BIO-3b	b) Potential Loss or Degradation of Aquatic Habitat. To restore, replace, or rehabilitate habitat impacted by the intake structure, PG&E shall implement the measures described below. Unless as provided below, PG&E shall confer with CDFW regarding potential disturbance to fish habitat and shall obtain a streambed alteration agreement, pursuant to Section 1602 of the California Fish and Game Code, for construction work associated with intake structure construction; PG&E shall also confer with CDFW pursuant to the California Endangered Species Act (CESA) regarding potential impacts related to the loss of habitat or other operational impacts on state-listed fish species, respectively. PG&E shall comply with all requirements of the streambed alteration agreement and any CESA permits to protect fish or fish habitat or to restore, replace, or rehabilitate any important habitat on a "no-net-loss" basis. Alternatively, if CDFW declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the project proponent shall consult with CDFW regarding potential disturbance to fish habitat and shall meet the substantive policies of a streambed alteration agreement and of the CESA for construction work associated with intake structure construction and operations. PG&E shall comply with all substantive requirements of the streambed alteration agreement and CESA to protect fish and fish habitat or to restore, replace, or rehabilitate any important habitat on a "no-net-loss" basis and to operate the facility in accordance with CESA to ensure no net loss of habitat function.	N/A	No Action	IM-3 decommissioning will not involve construction of an intake structure.
Biological Resources	BIO-3b	Additionally, PG&E shall consult with USACE regarding the need to obtain permits under section 404 of the CWA and section 10 of the Rivers and Harbors Act. In conjunction with these permitting activities, the USACE must initiate consultation with USFWS under Section 7 of the federal ESA regarding potential impacts of the proposed project on federally listed fish species due to the loss of habitat on federally listed fish species. PG&E shall implement any additional measures developed through the ESA Section 7 processes, or its equivalent, to ensure "no-net loss" of habitat function. Alternatively, if USACE and/or USFWS decline to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, PG&E shall confer with USFWS regarding potential disturbance to federally listed fish species and federally listed fish species habitat and shall meet the substantive mandates under Section 7 of the federal ESA regarding potential impacts to fish or to habitat of federally listed fish species. PG&E shall implement any additional measures developed through that processes, including compliance with the substantive requirements of all of what would be permit conditions if not exempt pursuant to CERCLA, and to ensure "no-net-loss" of habitat function. Because the type and extent of habitat potentially affected is unknown, PG&E shall have an instream habitat typing survey conducted in the area potentially affected by the intake construction. Further, cooperation with USFWS and other fisheries biologists shall determine suitable and acceptable location(s) for the intake structure(s) to avoid the spawning habitat of special-status fish species. PG&E shall avoid habitat modifications, especially to habitat that is preferred by native fishes for spawning or rearing including side channels, cobble or gravel bars, and shallow backwaters. If these habitat types cannot be avoided, any disturbed habitat will be restored or replaced to achieve "no-net-loss" of habitat types and values as described above.	N/A	No Action	IM-3 decommissioning will not involve construction of an intake structure.
Biological Resources	BIO-3c	c) Potential Fish Entrainment and Impingement during Operation of the Intake Structure. Both screened and unscreened diversions can entrain larval life stages of fish. For example, adverse effects to early life stages of fish could occur if diversions coincide with planktonic larval life stages that occur during summer months, a period of high entrainment vulnerability. Prior to operation of the intake structure, PG&E shall consult with USFWS and CDFW to determine the most vulnerable time of the year for entrainment or impingement of razorback sucker and bonytail chub eggs or larvae. PG&E shall install a state-of-the-art positive-barrier fish screen that would minimize fish entrainment and impingement at the intake structure. The fish screen shall be designed in accordance with CDFW and the National Marine Fisheries Service criteria, with specific consideration given to minimizing harm to fish eggs and other early life stages. To be sure that the fish screen operates as intended and reduce the risk of impacts, long-term monitoring of the operations and maintenance of the positive-barrier screen shall be conducted. Monitoring at the onset of diversions through the intake shall include approach velocity measurements immediately after the positive-barrier screen operations begin, with fine-tuning of velocity control baffles or other modifications as necessary, to achieve uniform velocities in conformance with the screen criteria established by regulatory agencies.	N/A	No Action	IM-3 decommissioning will not involve construction of an intake structure.

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Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Cultural Resources	CUL-1a	a) During Design, Construction, O&M, and Decommissioning Implement Measures to Avoid, Minimize, or Mitigate Impacts on Cultural Resources. Establishment of a cultural impact mitigation program and a Corrective Measures Implementation Workplan (CMI Workplan), with specific activities stipulated for each phase of the project, will reduce the potential for impacts on historical resources within the project area, and will help preserve the values of and access to the Topock Cultural Area for local Tribal users. As detailed below, measures will be implemented to avoid known resources, re-use existing disturbed areas to the extent feasible, allow for Tribal input to the final design and maintain access for Tribal users during design, construction, operation, and decommissioning activities, as appropriate. During construction, a Worker Education Program and regular archaeological and Tribal monitoring will be implemented, and measures intended to reduce the potential for incursion by outside parties will be strengthened. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation (dated December 31, 2010).	This Work Plan and Worker Education Program	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities. Sensitivity training will be provided by PG&E to workers prior to commencing the IM-3 decommissioning, removal, and restoration activities, and will be reinforced throughout the duration of the project.
Cultural Resources	CUL-1a-1	During development of the final design and the construction, operation, and decommissioning phases of the project, PG&E shall carry out and require all subcontractors to carry out all investigative, testing, and remediation activities, including all supporting operations and maintenance activities, in ways that avoid, minimize, and mitigate significant adverse effects to historically significant cultural and historic resources, consistent with the CEQA Guidelines, and including the Topock Cultural Area, to the maximum extent feasible as determined by DTSC.	This Work Plan	Action	Sensitivity training will be provided by PG&E to workers prior to commencing the IM-3 decommissioning, removal, and restoration activities, and will be reinforced throughout the duration of the project.
Cultural Resources	CUL-1a-2	As part of the CMI Workplan, PG&E shall develop a written access plan to preserve Tribal members' access to, and use of, the project area for religious, spiritual, or other cultural purposes. This plan will allow access to the extent PG&E has the authority to facilitate such access, and be consistent with existing laws, regulations, and agreements governing property within the project area. The access plan may place restrictions on access into certain areas, such as the Compressor Station and the existing evaporation ponds, subject to DTSC review with regard to health and safety concerns and to ensure noninterference with approved remediation activities. This access plan may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the related stipulation (General Principle I.C) contained in the Programmatic Agreement (Appendix PA). PG&E shall demonstrate a good faith effort to coordinate with Interested Tribes by including communication logs as part of the CMI Workplan. "Interested Tribes" means, for purposes of this EIR and the mitigation measures contained herein, the six tribes that have substantially participated in the various administrative processes surrounding remediation of the site with DTSC, PG&E, and DOI, including throughout development of the final remedy. Interested tribes include the Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Fort Yuma-Quechan Indian Tribe, and Hualapai Indian Tribe.	This Work Plan and Access Plan	Action	Provisions in the Access Plan (included as appendix to the Construction/Remedial Action Work Plan) will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-3	PG&E shall enhance existing measures to prevent and reduce incursions from recreational and/or other outside users from affecting unique archeological and historically significant resources, including resources within the Topock Cultural Area, by:			
Cultural Resources	CUL-1a-3a	a. Retaining a Qualified Cultural Resource Consultant to implement the Mitigation Monitoring and Reporting Program (MMRP) and conducting yearly inspections (or less frequently upon approval by DTSC) of identified historical resources, including inspections of the Topock Cultural Area, to determine if substantial adverse changes have occurred relative to the condition of the historical resources during the past year or prior to the implementation of the proposed project. PG&E shall offer to retain a Tribal monitor at historic rates of compensation or Tribal representatives designated by the Tribal Council or chairperson, if so requested, to accompany the Qualified Cultural Resources Consultant during the inspections. The Qualified Cultural Resource Consultant shall be a person who is acceptable to DTSC and who is also a qualified archaeologist with a graduate degree in archaeology, anthropology or closely related field, plus at least 3 years of full-time professional experience in general North American archaeological research and fieldwork, with expertise/experience in the Southwest preferred.	N/A	No Action	This measure is under implementation. No additional action will be required during IM-3 decommissioning, removal, and restoration activities to comply with this measure.

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Cultural Resources	CUL-1a-3b	b. Developing a site security plan as part of the CMI Workplan. The site security plan shall include, but not be limited to, instructions for PG&E personnel to inspect the project site routinely during construction and report any human-caused disturbance to project facilities and the surrounding environment to DTSC and the appropriate landowner, such as BLM, USFWS, or FMIT, as appropriate, depending on the ownership of the property involved in the incursion. Notification shall be within a specified period, as established in the site security plan for the event, and shall also be summarized as part of the periodic implementation status report, as approved by DTSC for remedy implementation. This measure does not impose any obligation on PG&E to perform law-enforcement duties on federal or private lands, but is intended to provide increased observation of potential intrusions into the project area during construction and operation of the final remedy that may impact significant cultural resources. PG&E staff, or assigned agents, should be instructed to report any outside disturbance to the environment personally observed over the course of the working day. Information shall be reported within a specific period, as established in the site security plan, to DTSC and the appropriate landowners, such as BLM, USFWS, or FMIT, depending on the ownership of the property intruded upon. The site security plan may also include the use of PG&E security cameras at major ingress/egress gates into the project site. Finally, if requested by the FMIT the plan may include the use of private security personnel to patrol the FMIT-owned parcel within the project area to prevent outside incursions.	This Work Plan and Site Security Plan	Action	Provisions in the Site Security Plan (included as appendix of the Construction/Remedial Action Work Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-3c	c. Coordinating with BLM and San Bernardino County to facilitate an outreach effort to the staff at Moabi Regional Park, requesting that they communicate to visitors the parts of the project area that are off limits to off-road vehicle usage because of health and safety concerns, public lands management plans, or landowner requests. PG&E shall make a good faith effort to involve the surrounding Tribes in this outreach effort, providing Interested Tribes with the opportunity to comment on outreach materials or provide a Tribal cultural resources specialist the opportunity to participate in the outreach activities. As part of this outreach effort, PG&E shall work with Park Moabi and offer to design, develop, and fund the installation of an informational kiosk within Park Moabi that informs visitors of the work being done at the project site. PG&E shall involve the Tribes to the maximum extent feasible, as determined by DTSC, in the design and development of the informational kiosk.	N/A	No Action	This measure is under implementation. No additional action will be required during IM-3 decommissioning, removal, and restoration activities to comply with this measure.
Cultural Resources	CUL-1a-3d	d. Posting signage to indicate those parts of the project area that are off limits to off-road vehicle usage due to possible health and safety concerns and to reduce potential damage to environmental resources. If agreed to by land owners and/or local, state, or federal management entities within the project area, PG&E shall work with the relevant land owner or land management entity to develop, design, and fund the installation of easily visible and clear signage. This may include coordination with BLM to install signage noting the designation of the area as an Area of Critical Environmental Concern owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.	This Work Plan	Action	Exclusion zones with posted signage will be delineated and demarcated at the zones prior to commencing work.
Cultural Resources	CUL-1a-4	PG&E shall work with representative members of the Interested Tribes to convene and retain a multidisciplinary panel of independent scientific and engineering experts as part of a Technical Review Committee (TRC). The TRC shall be made up of not more than five multidisciplinary experts who will be on call to review project-related documents, participate in project-related meetings, and advise interested Tribal members on technical matters relating to the final design and remedy. The TRC shall include only persons with technical expertise, including but not limited to geology, hydrology, water quality, engineering, paleontology, toxicology, chemistry, biology, or botany. Before July 1, 2011, PG&E shall post an open grant or Request for Qualifications (RFQ) and retain members of the TRC at rates comparable to those paid historically to Tribal experts by PG&E for the remediation project. TRC members shall be selected by majority vote of one representative from each participating Interested Tribe. PG&E shall provide Interested Tribes at least 30-days' notice of the meeting to select TRC members and to review TRC candidate qualifications. For the purposes of contracting, the grant may be awarded to one Tribal government to manage or, alternatively, PG&E may reimburse the Tribe or TRC members directly. The entirety of the monies shall be used to fund the scientific and engineering team exclusively, and shall not be used to fund other Tribal government expenses or used to support legal counsel. A stipulation of the open grant shall be that the scientific and engineering team shall provide all deliverables and results to all involved Tribes, despite a possible contract agreement with only one Tribe or with PG&E. Upon conclusion of the construction phase of the project, the necessity and dollar value of the TRC shall be assessed by PG&E and, with the approval of DTSC, shall either be extended, reduced, or terminated under the operations and maintenance phase. An annual activity report shall be sent to DTSC for review and to ensure PG&E is in compliance.	N/A	No Action	This measure is under implementation. No additional action will be required during IM-3 decommissioning, removal, and restoration.

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Cultural Resources	CUL-1a-5	Should any indigenous plants of traditional cultural significance and listed in Appendix PLA of the EIR for the Topock remediation project (AECOM, 2011) be identified within the project area, PG&E shall avoid, protect, and encourage the natural regeneration of the identified plants when developing the remediation design, final restoration plan, and IM-3 decommission plan. In the event that impacts on the identified plants cannot be avoided and such plants will be displaced, PG&E shall retain a qualified botanist who shall prepare a plant transplantation/monitoring plan which can be included as part of the Cultural Impact Mitigation Program (CIMP) referenced in CUL-1a-8 either by (1) transplanting such indigenous plants to an on-site location, or (2) providing a 2:1 ratio replacement to another location decided upon between PG&E and members of the Interested Tribes. Plans to transplant or replace such plants shall be approved by DTSC. In coordination with the qualified botanist, PG&E shall monitor all replanted and replacement plants for at least 5 years, and shall ensure at least a 75 percent survivorship during that time. This mitigation measure is not meant to replace or subsume any actions required by state or federal entities with regard to the protection of species listed as rare, threatened, or endangered.	This Work Plan, Future Site-Specific IM-3 Restoration Plan, Mitigation and Monitoring Plan for Culturally Significant Plants, and the CIMP	Action	Section 8 addresses this mitigation measure. Section 8 of this Work Plan includes restoration guidelines (steps to be followed during restoration), elements of the restoration of habitat and revegetation and demobilization, and a draft annotated outline of a future, more detailed Site-Specific IM-3 Restoration Plan. In response to the Tribes' comments on the 60% design (CH2M HILL 2014) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA, and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. As stated in the responses to comments on the 60% design (RTC #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. In addition, CIMP protocols to restore the environment to its preconstruction condition upon decommissioning (CUL-1a-8e) and the Mitigation and Monitoring Plan for Culturally Significant Plants will be implemented and referenced in the Site-Specific IM-3 Restoration Plan.
Cultural Resources	CUL-1a-6	All additional phone calls and alarms associated with remediation activities or facilities shall not be routed through PG&E's existing alarm system utilized at the compressor station. The notification system for remediation-related alerts and/or phone calls shall not introduce additional noise to the project area, to the maximum extent feasible, provided there is ongoing compliance with applicable safety regulations or standards of the Federal Energy Regulatory Commission, Occupational Safety and Health Administration, and other agencies. (See Mitigation Measure NOISE-3 for additional mitigation related to the Topock Cultural Area).	N/A	No Action	No alarms will be associated with IM-3 Decommissioning work. Additional phone calls will not be routed through PG&E's existing alarm system used at the Compressor Station.
Cultural Resources	CUL-1a-7	Nighttime construction-related activities shall be limited to work that cannot be disrupted or suspended until the following day, such as, but not limited to, well drilling and development or decommissioning activities. Lighting considerations, including the potential use of solar power for some lighting, shall be included as part of the remedial design plan to be developed with involvement of Interested Tribes and the U.S. Department of the Interior. To minimize construction and operations-related lighting impacts, the lighting in the remedial design plan shall include, at a minimum: (1) shrouding/shielding for portable lights needed during construction and operational activities; (2) installation of portable lights at the lowest allowable height and in the smallest number feasible to maintain adequate night lighting for safety; (3) shielding and orientation of lights such that off-site visibility of light sources, glare, and light from construction activities is minimized to the extent feasible. No additional permanent poles shall be installed for lighting. This mitigation measure is not meant to replace or subsume any actions required by the County or state or federal entities with regard to lighting required for minimum security and safety purposes.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration. Protocols for nighttime lighting are included in an appendix to the Construction/Remedial Action Work Plan.
Cultural Resources	CUL-1a-8	Prior to commencement of construction, PG&E shall submit as part of the final Remedial Design, a CIMP developed in coordination with Interested Tribes for DTSC's review and approval. The CIMP may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the Programmatic Agreement (Appendix PA). The CIMP shall include, at a minimum and to DTSC's satisfaction, the following:	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Cultural Resources	CUL-1a-8a	a. Protocols for continued communication. Consistent with past practice and the communication processes previously entered into by PG&E with Interested Tribes, the company shall continue to communicate with Interested Tribes during the design, construction, operation, and decommissioning of the project. Prior to implementation of construction, PG&E shall communicate with Interested Tribes that place cultural significance on the Topock Cultural Area. Outreach efforts between the Tribes and PG&E shall be communicated by PG&E to DTSC quarterly during the design and construction phase for review and input, and annually during project operations.	EIR mitigation measures compliance reports (quarterly during design /construction, annual during project operation); and CIMP	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8b	b. Protocols for the appropriate treatment of archaeological materials that may be disturbed or discovered during implementation of the final remedy, including protocols for the repatriation of significant items of cultural patrimony that may be recovered during the project, and protocols for the curation of cultural materials recovered during the project. Treatment of archaeological sites may include data recovery or capping. If data recovery is proposed, a Research Design following California Office of Historic Preservation guidelines or federal guidelines, as applicable, shall be prepared and reviewed and approved by DTSC.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8c	c. Protocols for the review of cultural resource-related documents throughout the design, construction, and operational phases.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8d	d. Protocols for the review of project design documents before the beginning of construction, including reviews of project design documents throughout the design process (e.g., Preliminary [approximately 30% completed], Intermediate [approximately 60% completed] and Pre-final design).	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8e	e. Protocols for the appropriate methods to be used to restore the environment to its preconstruction condition upon decommissioning of individual groundwater remedy facilities.	N/A	No Action	Because IM-3 is not part of the Final Remedy, this measure does not apply to the IM-3 decommissioning, removal, and restoration work.
Cultural Resources	CUL-1a-8f	f. A plan for the decommissioning and removal of the IM-3 Facility and proposed restoration of the site (to be an appendix to the CIMP).	This Work Plan (appendix to the CIMP)	Action	This Work Plan fulfills this mitigation measure and will be included in Appendix B of the CIMP.
Cultural Resources	CUL-1a-8g	g. Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site.	CIMP and the Soil Management Plan (Appendix F of this Work Plan)	Action	Appendix F (Soil Management Plan) fulfills this measure.
Cultural Resources	CUL-1a-8h	h. Protocols for the appropriate methods, consistent with Mitigation Measure NOISE-3, to reduce auditory impacts.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8i	i. Protocols for the appropriate methods, consistent with Mitigation Measures AES-1 and AES-2, to reduce visual intrusions.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8j	j. Protocols for Tribal notification in advance of project-related activities that the Interested Tribes may feel have the potential to cause adverse impacts to sensitive cultural resources.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8k	k. Protocols to be followed by project personnel to accommodate, if feasible as determined by DTSC, key Tribal ceremonies that involve the Topock Cultural Area.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8l	l. Provisions affording sufficient Tribal monitors to observe ground-disturbing activities and/or other scientific surveying (e.g., biological surveys) that may occur in preparation for construction activities. Ground-disturbing activities include trenching, excavation, grading, well excavation/drilling, decommissioning of the IM-3 Facility and subsurface pipeline, or other construction-related activities.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8m	m. Provisions of reasonable compensation for Tribal monitors consistent with historic rates.	CIMP; Memoranda of Understanding between PG&E and various Tribes	No Action	This measure is under implementation. No additional action will be required during IM-3 decommissioning, removal, and restoration.
Cultural Resources	CUL-1a-8n	n. Locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction.	CIMP and this Work Plan (Section 3)	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Cultural Resources	CUL-1a-8o	o. Protocols for the reporting of discoveries of cultural importance consistent with existing statutes and regulations.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-8p	p. Protocols for the inspection of remediation facilities and/or staging areas throughout the construction phase.	CIMP	Action	This Work Plan is included in Appendix B of the CIMP. Protocols included in the CIMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1a-9	During selection of the design and specific locations for physical remediation facilities, PG&E shall, in communication with the Interested Tribes (and subject to their review), and to the maximum extent feasible, as determined by DTSC, give: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, such as but not limited to wells and pipelines, but not including IM-3 facilities. “Disturbed” areas in this context means those areas outside of documented archaeological site boundaries that have experienced ground disturbance in the last 50 years. PG&E shall produce an aerial map of these disturbed areas to guide project design, and PG&E shall make a good faith effort to provide Tribes with an opportunity to review and comment on the information displayed on the map in determining “disturbed” areas.	N/A	No Action	This mitigation measure applies to the design of the Final Remedy, not IM-3 decommissioning.
Cultural Resources	CUL-1a-10	PG&E shall consider the location of Loci A, B, and C of the Topock Maze during the design and approval of the physical facilities necessary for the final remedy and is prohibited from creating any direct physical impact on the Topock Maze, as it is manifested archaeologically. Through the design, PG&E shall prevent all indirect (e.g., noise, aesthetics) impacts on the Topock Maze, to the maximum extent feasible as determined by DTSC.	This Work Plan	Action	Figure 3-1 shows the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint does not create any direct physical impact on the Topock Maze as it is archaeologically manifested.
Cultural Resources	CUL-1a-11	PG&E shall provide an open grant for two part-time cultural resource specialist/project manager positions during the design and construction phases of the remediation project. The positions shall be filled by qualified members of an Interested Tribe as nominated by a majority vote of their Tribal Council(s) and appointed by DTSC’s project manager if more than two members are nominated. The award of the grants is for continued involvement in review of project documents and participation in project-related meetings, including TRC meetings, at rates of historic compensation. Additionally, in light of FMIT’s ownership of land in the project area and historical involvement in the environmental process, additional funding is guaranteed for one full-time FMIT position upon submission of an application by a qualified FMIT member who shall be appointed by the FMIT council, provided such funding is not duplicative of the services and funding provided by PG&E pursuant to the Settlement Agreement between PG&E and the FMIT in Fort Mojave Indian *Tribe v. Dept. of Toxic Substances Control, et al.*, Case No. 05CS00437 for a position with the FMIT’s Aha Makav Culture Society. The payment of grant monies shall be timed to the awarded Tribes’ fiscal cycles so that the Tribes are not forced to front funds for long periods of time. These positions shall act as cultural resources contacts and project managers for interactions between the Tribes, PG&E, and DTSC to ensure coordination for review and comment of subsequent project and/or environmental documents related to the design and implementation of the groundwater remediation project to avoid, reduce, or otherwise mitigate impacts on historical resources, as defined by CEQA. This funding is separate from provisions for Tribal monitor positions and shall not be used for routine Tribal business or legal counsel. For review and approval, PG&E shall provide DTSC with the names of the selected grant recipients and an annual report that summarizes activities associated with the grant program. Upon the conclusion of the construction phase of the project, the necessity and dollar value of the grant program shall be assessed by PG&E and, with the approval of DTSC, shall either be extended or terminated under the operations and maintenance phase.	N/A	No Action	This measure is under implementation. No additional action is required during the IM-3 decommissioning, removal, and restoration activities for compliance with this measure.
Cultural Resources	CUL-1a-12	PG&E shall provide sufficient opportunity, as determined by DTSC, for Interested Tribes to provide a traditional healing/cleansing ceremony (or ceremonies) before and after ground disturbing construction activities occur.	This Work Plan	Action	This measure will be implemented before and after the IM-3 decommissioning, removal, and restoration activities.

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Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Cultural Resources	CUL-1a-13	PG&E shall, in communication with Interested Tribes, develop as part of the CMI Workplan, a worker cultural sensitivity education program. The program shall be implemented before commencement of construction and throughout construction and operations as personnel are added. This program may include information provided directly by Tribal entities either in written form or on video, in a manner consistent with Appendix C in the existing BLM Programmatic Agreement. The worker cultural sensitivity education program shall ensure that every person working on the project as an employee or contractor, before participating in design or outdoor activities at the project site, is informed regarding: • the cultural significance of the Topock Cultural Area, • appropriate behavior to use within the Topock Cultural Area, • activities that are to be avoided in the Topock Cultural Area, and • consequences in the event of noncompliance.	Worker Cultural Sensitivity Education Program	Action	Prior to the start of field work, sensitivity training will be provided by the Topock Site Manager (Curt Russell) to IM-3 decommissioning, removal and restoration workers. Interested Tribes will be invited to attend the Project Initiation meeting and participate in providing training to workers.
Cultural Resources	CUL-1b and 1c	During Design, Construction, O&M, and Decommissioning Consider the Location of Historical Resources and Implement Measures to Avoid Resources to the Extent Feasible. The following actions will reduce the potential for impacts on identified historically significant resources (other than the Topock Cultural Area, which is separately addressed in CUL-1a) within the project area. As detailed below, these actions include consideration of the location of historical resources, preparation of a cultural resources study, and preparation of a treatment plan. Monitoring of ground-disturbing activities during project construction will further protect historically significant resources. Protective actions are also described pertaining to the discovery of any previously unidentified potentially significant cultural resources.	This Work Plan, Programmatic Agreement, the CHPMP, and the Treatment Plan	Action	Figure 3-1 shows the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint was selected in consideration of the location of historical resources. Applicable provisions under the CHPMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1b/c-1	PG&E shall consider the locations of the identified historic resources described above (EIR Table 4.4-3) during the design of the physical improvements necessary for the proposed project and avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible, as determined by DTSC. The final design plans for the project will be submitted to DTSC for review and approval.	This Work Plan, Programmatic Agreement, the CHPMP	Action	Figure 3-1 shows the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint was selected in consideration of the location of historical resources. Applicable provisions under the CHPMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-1b/c-2	During preparation of the final design, and consistent with CUL-1 a-3, PG&E shall retain a Qualified Cultural Resources Consultant to prepare a cultural resources study that assesses the potential for the construction, operations, or decommissioning of specific proposed improvements to result in significant impacts on identified historically significant resources described in Impacts CUL-1b and CUL-1c. This may include a geoarchaeological investigation and/or non-destructive remote-sensing surveys of potentially disturbed areas to determine if a potential exists for buried historical and archaeological resources. “Significant impacts” as used here means the potential for construction to demolish or materially alter in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR. The study will be submitted to DTSC for review and evaluation to determine if existing mitigation measures are appropriate.	Treatment Plan	No Action	This measure is under implementation. No additional action is required during the IM-3 decommissioning, removal, and restoration activities for compliance with this measure.
Cultural Resources	CUL-1b/c-3	If the cultural resources study determines that the construction of physical improvements would result in significant impacts on identified historically significant resources described in Impacts CUL-1b and CUL-1c, and avoidance of the resource is not feasible, PG&E shall prepare a treatment plan that identifies measures to reduce these impacts (see above description of the CIMP) for DTSC’s review and approval. The treatment plan shall identify which criteria for listing on the CRHR contribute to the affected resource’s significance and which aspects of significance would be materially altered by construction, operations, or decommissioning and shall provide for reasonable efforts to be made to permit the resource to be preserved in place or left in an undisturbed state. Methods of accomplishing this may include capping or covering the resource with a layer of soil. To the extent that a resource cannot feasibly be preserved in place or left in an undisturbed state, excavation as mitigation shall be restricted to those parts of the resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a historically significant resource if the treatment plan determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource. The plan shall require communication with all Interested Tribes with regard to their perspectives and wishes for the treatment of the resources.	CHPMP	Action	Applicable provisions under the CHPMP will be implemented during the IM-3 decommissioning, removal, and restoration activities

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Cultural Resources	CUL-1b/c-4	Consistent with CUL-1a-3a above, PG&E shall retain a Qualified Cultural Resources Consultant to observe ground-disturbing activities and shall be required to request the participation of Tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction (see the description of the CMI Workplan, above). The Qualified Cultural Resources Consultant shall provide training to construction personnel on the locations of identified resources, values associated with the identified resources, responsibility for reporting suspected historic resources, and procedures for suspension of work in the immediate vicinity of the discovery, and shall use exclusionary fencing, flagging, or other appropriate physical barriers to mark the boundaries of identified resources. The Qualified Cultural Resources Consultant shall invite participation from Interested Tribal members to participate in the training. In the event that previously unidentified potentially significant cultural resources are discovered during ground-disturbing activities, the Qualified Cultural Resources Consultant shall have the authority to divert or temporarily halt ground-disturbing activities in the area of discovery to allow evaluation of the potentially significant cultural resources. If such discoveries occur on land managed by a federal agency, Stipulation IX (Discoveries) of the Programmatic Agreement shall apply and are deemed adequate by DTSC. If a discovery occurs on other lands within the project area, the Qualified Cultural Resources Consultant shall contact the PG&E and DTSC project managers at the time of discovery and, in consultation with DTSC and Tribal monitors, shall evaluate the resource before construction activities will be allowed to resume in the affected area. For significant cultural resources, and before construction activities are allowed to resume in the affected area, the resource(s) shall be recovered with coordination of the Tribal monitors and DTSC. Recovery may include a Research Design and/or Data Recovery Program submitted to DTSC for review and approval. The Qualified Cultural Resources Consultant (and Tribal monitors) shall determine the amount of material to be recovered for an adequate sample for analysis or data recovery. Any concerns or recommendations regarding the ground-disturbing activities or the handling of cultural resources shall be directed to the Qualified Cultural Resources Consultant or PG&E's site supervisor.	This Work Plan	Action	This measure will be implemented before and after the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-2	During Project Design Consider the Location of Unique Archaeological Resources and Avoid Resources to the Maximum extent Feasible. Cultural resources that qualify as unique archaeological sites in the project area would probably also meet one or more of the criteria for historical resources and would be subject to Mitigation Measures CUL-1b/c-2 and CUL-1b/c-3. The mitigation measures under this identified impact are the same as listed for Impact CUL-1b and CUL-1c. These mitigation measures would reduce the potential for impacts on unique archaeological resources.	This Work Plan, the CHPMP, and the Treatment Plan	Action	Figure 3-1 shows the primary work zones, staging areas, waste management areas, and access and haul routes. This project footprint was selected in consideration of the location of historical resources. Applicable provisions under the CHPMP will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-3	Conduct Survey and Construction Monitoring. A paleontological investigation, including a detailed survey of the project area by a qualified paleontologist, shall be conducted to refine the potential impacts on unique paleontological resources within the final design area and determine whether preconstruction recovery of sensitive resources and/or construction monitoring would be warranted. If construction monitoring is determined to be warranted, ground-altering activity would be monitored by a qualified paleontologist to assess, document, and recover unique fossils. Monitoring shall include the inspection of exposed surfaces and microscopic examination of matrix in potential fossil bearing formations. In the event microfossils are discovered, the monitor shall collect matrix for processing. In the event paleontological resources are encountered during earthmoving activities, recovered specimens shall be prepared by the paleontologist to a point of identification and permanent preservation. PG&E shall retain a Qualified Paleontologist to observe ground-disturbing activities where determined necessary based on the results of the paleontological investigation and shall be required to request the participation of Tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction (see above description of the CMI Workplan). Paleontological resources of scientific value shall be identified and curated into an established, accredited, professional museum repository in the region with permanent retrievable paleontological storage. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation.	Paleontological Resources Management Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Cultural Resources	CUL-4	With Discovery of Human Remains or Burials Suspend Work, Protect Remains, and Comply with Local, State, and Federal Laws Regarding Discoveries During Ground-Disturbing Activities. Ground-disturbing activities may disturb as-yet undiscovered human remains or Native American burials and associated grave goods. PG&E shall retain a Qualified Cultural Resource Consultant and request designated Tribal monitor(s) to train construction personnel in the identification of human remains so that they may aid in the identification of such resources (see above description of the CIMP). A Qualified Cultural Resource Consultant and Tribal monitor(s) shall be in place to adequately oversee all ground-disturbing activities. In the event human remains are uncovered over the course of project construction, operation and maintenance (O&M), and/or decommissioning activities, the following procedures shall be followed to ensure compliance with all applicable local, state, and federal laws.	This Work Plan and the CIMP (CUL-1a-8b)	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities. Implementation procedures are included in an appendix to the Construction/Remedial Action Work Plan.
Cultural Resources	CUL-4f	f) The construction contractor shall immediately suspend work within the vicinity of the discovery and determine if the remains discovered are human or nonhuman. This determination shall be made by the Qualified Cultural Resources Consultant, a qualified archaeologist and/or physical anthropologist with expert skill in the identification of human osteological (bone) remains.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4g	g) The Qualified Cultural Resources Consultant (and Tribal monitor), or construction contractor, shall protect discovered human remains and/or burial goods remaining in the ground from additional disturbance.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4h	h) The Qualified Cultural Resources Consultant, archaeologist, or construction site supervisor shall contact the San Bernardino County Coroner, and the PG&E and DTSC project managers immediately. In California, all subsequent action shall conform to the protocols established in the Health and Safety Code and regulations. In Arizona, the Qualified Cultural Resources Consultant or PG&E construction site supervisor will follow Arizona laws and the implementing regulations. Human remains found on federal land would require the notification of the BLM Havasu City field office and compliance with applicable federal laws and regulations, including the Native American Graves Protection and Repatriation Act if the remains are determined to be of Native American origin. The Qualified Cultural Resources Consultant shall coordinate the interaction between Interested Tribes, PG&E, the County, and DTSC to determine proper treatment and disposition of any remains.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4i	i) The San Bernardino County Coroner will determine if the remains are of recent origin and if an investigation of the cause of death is required (California Health and Safety Code Section 7050.5). If the coroner determines that the human remains are not Native American and not evidence of a crime, project personnel shall coordinate with the Qualified Cultural Resources Consultant (s) to develop an appropriate treatment plan. This may include contacting the next-of kin to solicit input on subsequent disposition of the remains. If there is no next-of-kin, or recommendations by the next-of-kin are considered unacceptable by the landowner, the landowner will reinter the remains with appropriate dignity in a location outside the project area and where they would be unlikely to be disturbed in the future.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4j	j) In the event that the San Bernardino County Coroner determines that the human remains are Native American and not evidence of a crime, project personnel shall contact the NAHC so that a most likely descendent (MLD) can be identified as required under California Public Resources Code Section 5097.98.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4k	k) The MLD (s) shall inspect the area in which the human remains were found and provide treatment recommendations to the landowner and PG&E site manager in accordance with the provisions of PRC Section 5097.98. The treatment may include reburial, scientific removal of the discovered human remains and relinquishment to the MLD(s), nondestructive analysis of human remains and/or other culturally appropriate treatment. If the MLD(s) so requests, the landowner would reinter the remains with the appropriate dignity in a location outside the area of disturbance in a location unlikely to be disturbed in the future.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Cultural Resources	CUL-4l	l) To the maximum extent feasible, Mitigation Measure CUL-4 shall be implemented in a manner that is consistent with mitigation required by local, state, and federal requirements.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Geology & Soils	GEO-1a	Construction, Operation and Maintenance, and Decommissioning Impacts Related to Erosion of Soils.			
Geology & Soils	GEO-1a-a	a) A DTSC-approved grading and erosion control plan, prepared by a California Registered Civil Engineer, shall be completed prior to implementation of any grading in areas of the site where there is a potential for substantial erosion or loss of top soils. The plan shall outline specific procedures for controlling erosion or loss of topsoil during construction, operation and maintenance, and decommissioning.	Future Site-Specific IM-3 Restoration Plan	Action	A grading and erosion control plan will be developed as needed during the preparation of the future Site-Specific IM-3 Restoration Plan.
Geology & Soils	GEO-1a-b	b) To ensure soils do not directly or indirectly discharge sediments into surface waters as a result of construction, operation and maintenance, or decommission activities, PG&E shall develop a SWPPP as discussed in mitigation measure HYDRO-1 of the "Hydrology and Water Quality" section of this EIR. The SWPPP shall identify best management practices (BMPs) that would be used to protect stormwater runoff and minimize erosion during construction. PG&E shall prepare plans to control erosion and sediment, prepare preliminary and final grading plans, and shall prepare plans to control urban runoff from the project site during construction, consistent with the substantive requirements of the San Bernardino County Building and Land Use Services Department for erosion control.	Appendix G of this Work Plan	Action	Appendix G of this Work Plan includes construction BMPs that may be used to protect stormwater runoff and minimize erosion during decommissioning.
Geology & Soils	GEO-1a-c	c) During road preparation activities, loose sediment shall be uniformly compacted consistent with the substantive San Bernardino County Building and Land Use Services Department requirements to aid in reducing wind erosion. Ongoing road maintenance including visual inspection to identify areas of erosion and performing localized road repair and re-grading, installation and maintenance of erosion control features such as berms, silt fences, or straw wattles, and grading for road smoothness shall be performed as needed to reduce potential for erosion.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Geology & Soils	GEO-1a-d	d) Regarding the potential for contaminated soils to be eroded and contribute contamination into receiving waters, Mitigation Measures GEO-2 and HAZ-2 shall be implemented. Mitigation Measure GEO-2 provides the provisions for mitigating erosion through BMPs which shall be implemented. Mitigation Measure HAZ-2 provides the provisions for safe work practices and handling of contaminated soils as investigation derived wastes.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Geology & Soils	GEO-1b	Construction, Operation and Maintenance, and Decommissioning Impacts Related to Differential Compaction of Soils.			
Geology & Soils	GEO-1b-a	a) BMPs shall be implemented during construction, operation and maintenance, and decommissioning activities to minimize impacts on the affected areas. Such BMPs could include, but would not be limited to, the following: uniform compaction of roadways created for accessing the project area as per San Bernardino County Building and Land Use Services Department requirements, returning areas adversely affected by differential compaction to preexisting conditions when these areas are no longer needed, and continuing maintenance of access roads, wellhead areas, and the treatment plant areas.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Geology & Soils	GEO-1b-b	b) Work area footprints shall be minimized to the greatest extent feasible to limit the areas exposed to differential compaction. Where possible, existing unpaved access roads and staging/working areas shall be reused and maintained for different stages of the construction. New graded areas for staging or for access roads shall be compacted to a uniform specification, typically on the order of 90 to 95% compaction and consistent with substantive San Bernardino County Building and Land Use Services Department requirements to reduce differential compaction and subsequent erosion of site soils.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Geology & Soils	GEO-1b-c	c) After the completion of the operation and maintenance phase, the disturbed areas which result in increased potential for compaction shall be returned to their respective preexisting condition by re-grading consistent with the preconstruction slopes as documented through surveys that may include topographic surveys or photo surveys. The areas will be returned to the surrounding natural surface topography and compacted consistent with unaltered areas near the access roads or staging areas in question. The habitat restoration plan outlined in mitigation measure BIO-1 shall include restoration of native vegetation or other erosion control measures where revegetation would be infeasible or inadequate, for purposes of soil stabilization and erosion control of the project area.	This Work Plan and Future Site-Specific IM-3 Restoration Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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Hazardous Materials	HAZ-1a	Spills or Releases of Contaminants during Operation and Maintenance Activities.			
Hazardous Materials	HAZ-1a-a	a) PG&E shall store, handle, and transport hazardous material in compliance with applicable local, state, and federal laws.	N/A	No Action	IM-3 will not operate and will be in lay-up condition during Final Remedy O&M activities. Chemicals used for IM-3 will continue to be stored during lay-up in compliance with applicable local, state, and federal laws. There will be no active handling or transport of hazardous materials during lay-up. No additional activities will be required for compliance with this measure.
Hazardous Materials	HAZ-1a-b	b) All chemical storage and loading areas shall be equipped with proper containment and spill response equipment. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response.	N/A	No Action	IM-3 will not operate and will be in lay-up condition during Final Remedy O&M activities. Chemicals used for IM-3 will continue to be stored during lay-up in compliance with applicable local, state, and federal laws, and in secondary containment. No additional activities will be required for compliance with this measure.
Hazardous Materials	HAZ-1a-c	c) A project-specific HMBP, chemical standard operating procedure (SOP) protocols and contingency plans shall be developed to ensure that proper response procedures would be implemented in the event of spills or releases. Specifically, the HMBP and SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required personal protective equipment, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response. The field manager in charge of operations and maintenance activities shall be responsible for ensuring that these procedures are followed at all times.	Existing IM-3 HMBP and SOPs	No Action	IM-3 will not operate and will be in lay-up condition during Final Remedy O&M activities. The existing HMBP and SOPs for IM-3 will be implemented in the event of spills or releases. No additional activities will be required for compliance with this measure.
Hazardous Materials	HAZ-1b	Spill or Release of Contaminants during Construction and Decommissioning Activities.			
Hazardous Materials	HAZ-1b-a	a) Fueling areas and maintenance areas would be supplied with proper secondary containment and spill response equipment.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities; this measure is addressed in Section 3.
Hazardous Materials	HAZ-1b-b	b) PG&E shall develop fueling SOP protocols and a contingency plan that would be implemented at all fueling areas on-site. The SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required PPE, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. Potential measures include but are not limited to, fuel storage in bermed areas, performing vehicle maintenance in paved and bermed areas, and availability of spill kits for containment and cleanup of petroleum releases. The field manager in charge of construction and decommissioning activities shall be responsible for ensuring that these procedures are followed at all times.	Appendix C of this Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities. Appendix C includes fueling SOPs.
Hazardous Materials	HAZ-1b-c	c) PG&E shall comply with local, state, and federal regulations related to the bulk storage and management of fuels.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities; this measure is addressed in Section 3.

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Hazardous Materials	HAZ-2	Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil -- Before initiating ground-disturbing operations, a health and safety plan shall be developed and implemented by qualified environmental professionals to ensure health and safety precautions are being met. It is not possible to prepare the health and safety plan at this stage of the planning process because final construction plans and other design documents have not been finalized in sufficient detail. However, at a minimum, the health and safety plan shall include procedures to mitigate potential hazards, and such procedures shall include the use of PPE, measures that provide protection from physical hazards, measures that provide protection from chemical hazards that may be present at the site, decontamination procedures, and worker and health and safety monitoring criteria to be implemented during construction. The worker health and safety plan shall include protective measures and PPE that are specific to the conditions of concern and meet the requirements of the U.S. Occupational Safety and Health Administration's (OSHA's) construction safety requirements and Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). In accordance with OSHA requirements, appropriate training and recordkeeping shall also be a part of the health and safety program. The worker health and safety plan shall be certified by a Certified Industrial Hygienist in accordance with OSHA regulations. The worker health and safety plan shall be explained to the construction workers and all workers shall be required to sign the plan, which will be kept on the construction site at all times. Worker safety training shall occur prior to initiation of ground disturbing activities. Training shall include the review of all health and safety measures and procedures. All workers and engineering inspectors at the site shall provide written acknowledgement that the soils management plan (discussed below), worker health and safety plan, and community health and safety plan were reviewed and training was received prior to commencement of construction activities. The following are specific elements and directives that shall be included in the health and safety plan and implemented by PG&E during construction, operation and maintenance, and decommissioning of this project:	Construction HSP	Action	The Construction HSP was developed by PG&E and is included in an appendix of the Construction/Remedial Action Work Plan.
Hazardous Materials	HAZ-2a	a) Vehicles traveling on unpaved roadways or surfaces would be directed to avoid traveling in areas where contaminated soils are known to be present; vehicle speeds shall be controlled (e.g., limited to 15 mph or slower) to limit generation of dust; measures, such as wetting of surfaces, will be employed to prevent dust generation by vehicular traffic or other dust-generating work activities.	This Work Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Hazardous Materials	HAZ-2b	b) Pre-mobilization planning shall occur during which the likelihood of encountering contaminated soils shall be reviewed along with the HMBP, site-specific health and safety plan, and SOPs so that the procedures are followed and the contingencies for handling contaminated soils are in-place prior to implementing the field operations.	This Work Plan and Appendix F, Soil Management Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities.
Hazardous Materials	HAZ-2c	c) Should evidence of contaminated soil be identified during ground disturbing activities (e.g., noxious odors, discolored soil), work in this area will immediately cease until soil samples can be collected and analyzed for the presence of contaminants by the site supervisor or the site safety officer. Contaminated soil shall be managed and disposed of in accordance with a project-specific health and safety plan and soil management plan. The health and safety plan and soil management plan shall be approved by DTSC before beginning any ground disturbing activities. While the project is exempt from the requirements of the San Bernardino County Division of Environmental Health, the health and safety plan and soil management plan shall be prepared in general accordance with the substantive requirements of this agency.	Construction HSP and Appendix F, Soil Management Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities
Hazardous Materials	HAZ-2d	d) In the event that drilling sites must be located within areas of suspected soil contamination, the appropriate PPE shall be worn by all personnel working in these areas and methods specified in the health and safety plan used to control the generation of dust. When working in these areas, personnel shall be required to follow all guidance presented in the site-specific health and safety plan and soil management plan. The site-specific health and safety plan shall include provisions for site control such as, but not limited to, delineation of the exclusion, contaminant reduction and support zones for each work area, decontamination procedures, and procedures for the handling of contaminated soils and other investigation derived wastes. Soil that is excavated shall be loaded directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins. Suspected contaminated soils shall be segregated from suspected uncontaminated soils.	Construction HSP	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities
Hazardous Materials	HAZ-2e	e) Personnel working at the site shall be trained in Hazardous Waste Operations.	Construction HSP	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities

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TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Hazardous Materials	HAZ-2f	f) All soil excavated and placed in roll-off bins or trucks for transportation off-site shall be covered with a tarp or rigid closure before transporting, and personnel working in the area shall be positioned upwind of the loading location.	This Work Plan and Appendix F, Soil Management Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities
Hydrology and Water Quality	HYDRO-1	Exceedance of Water Quality Standards. The project shall implement BMPs to meet the substantive criteria of NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ NPDES No. CAS000002 (General Permit) (SWRCB 2009) as well as all other applicable federal, state, and local permit and regulatory requirements, even if a permit is not required pursuant to CERCLA, for purposes of ensuring the protection of receiving water quality. As such, a BMP plan shall be prepared and implemented for the project prior to construction and decommissioning phase activities. Impacts on water quality from pollutants, including soils from erosion, shall be controlled through use of the following types of BMPs, which shall be incorporated into the appropriate project-specific BMP plan. The General Permit requirements include specific BMPs as well as numeric effluent levels (NELs) and numeric action levels (NALs) to achieve the water quality standards (SWRCB 2009:3). Types of BMPs cited in the General Permit (SWRCB 2009: Attachment A:7) include: a) Scheduling of Activities; b) Prohibitions of Practices; c) Maintenance Procedures; d) Other Management Practices to Prevent or Reduce Discharge of Pollutants to Waters of the United States; e) Treatment Requirements; and f) Operating Procedures and Practice to Control Site Runoff, Spillage or Leaks, Sludge or Waste Disposal, or Drainage from Raw Materials Storage. Visual inspections and monitoring and sampling are required under the General Permit to evaluate the effectiveness of the BMPs and to determine whether modifying BMPs or implementing additional BMPs is required. The BMP designations cited below are based on those used by the California Stormwater Quality Association Construction BMP Handbook (California Stormwater Quality Association 2003) and are consistent with the types of BMPs referenced in the General Permit: g) Scheduling (SS-1): Proper scheduling assists in identifying ways to minimize disturbed areas, which allows for a reduction in the active project area requiring protection and also minimizes the length of time disturbed soils are exposed to erosive processes. h) Preservation of Existing Vegetation (SS-2): Preserving existing vegetation to the maximum extent practicable facilitates protection of surfaces from erosion and can also help to control sediments. Sensitive areas should also be clearly identified and protected. i) Hydraulic Mulch (S S-3), Straw Mulch (S S-6), and Wood Mulching (SS-8): Using various mulches is a method for temporarily stabilizing soil and can be used on surfaces with little or no slope. j) Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats (SS-7): These erosion control methods can be used on flat or, usually, sloped surfaces, channels, and stockpiles. k) Stabilized Construction Entrance/Exit (TC-1): A graveled area or pad located at points where vehicles enter and leave a construction site can be built. This BMP provides a buffer area where vehicles can drop their mud and sediment to avoid transporting it onto public roads, to control erosion from surface runoff, and to help control dust.	This Work Plan, and Appendix G, Construction BMP Plan	Action	This measure will be implemented during the IM-3 decommissioning, removal, and restoration activities; Appendix G addresses this mitigation measure.

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		l) Runoff Control Measures (SS-9, SS-10, and SC-10): These include graded surfaces to redirect sheet flow, diversion dikes or berms that force sheet flow around a protected area, and stormwater conveyances (swales, channels, gutters, drains, sewers) that intercept, collect, and redirect runoff. Diversions can be either temporary or permanent. Temporary diversions include excavation of a channel along with placement of the spoil in a dike on the downgradient side of the channel, and placement of gravel in a ridge below an excavated swale. Permanent diversions are used to divide a site into specific drainage areas, should be sized to capture and carry a specific magnitude of storm event, and should be constructed of more permanent materials. A water bar is a specific kind of runoff diversion that is constructed diagonally at intervals across a linear sloping surface such as a road or right-of-way that is subject to erosion. Water bars are meant to interrupt accumulation of erosive volumes of water through their periodic placement down the slope, and divert the resulting segments of flow into adjacent undisturbed areas for dissipation. m) Silt Fence (SC-1): A temporary sediment barrier consisting of fabric is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows. n) Gravel Bag Berm (SC-6) and Sand/Gravel Bag Barrier (SC-8): A temporary sediment barrier consisting of gravel-filled fabric bags is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows. o) Desilting Basin (SC-2) and Sediment Trap (SC-3): Constructing temporary detention structures facilitates the removal of sediment from waters. The devices provide time for sediment particles to settle out of the water before runoff is discharged. Secondary concerns include potential pollutants from inappropriate material storage and handling procedures and nonstormwater discharges. These will be addressed through the following types of BMPs, which shall be incorporated into the stormwater BMP plan: p) Material Delivery and Storage (WM-1): Provide covered storage for materials, especially toxic or hazardous materials, to prevent exposure to stormwater. Store and transfer toxic or hazardous materials on impervious surfaces that will provide secondary containment for spills. Park vehicles and equipment used for material delivery and storage, as well as contractor vehicles, in designated areas. q) Spill Prevention and Control (WM-4): Ensure that spills and releases of materials are cleaned up immediately and thoroughly. Ensure that appropriate spill response equipment, preferably spill kits preloaded with absorbents in an overpack drum, is provided at convenient locations throughout the site. Spent absorbent material must be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as nonhazardous. r) Solid Waste Management (WM-5): Provide a sufficient number of conveniently located trash and scrap receptacles to promote proper disposal of solid wastes. Ensure that the receptacles are provided with lids or covers to prevent windblown litter. s) Hazardous Waste Management (WM-6): Provide a sufficient number of proper receptacles to promote proper disposal of hazardous wastes. t) Concrete Waste Management (WM-8): Dispose of excess concrete in specific concrete washout facilities. u) Sanitary/Septic Waste Management (WM-9): Locate sanitary and septic waste facilities away from drainage courses and traffic areas. Maintain the facilities regularly. v) Vehicle and Equipment Cleaning (NS-8): Clean vehicles and equipment that regularly enter and leave the construction site. w) Vehicle and Equipment Fueling (NS-9): Fuel vehicles and equipment off- site whenever possible. If off-site fueling is not practical, establish a designated on-site fueling area with proper containment and spill cleanup materials. x) Vehicle and Equipment Maintenance (NS-10): Use off-site maintenance facilities whenever possible. Any on-site maintenance areas must be protected from stormwater runoff and on-site flooding.			

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Resources	Mitigation Number	Mitigation Measure	Which Document(s) Will Contain or Satisfy this Measure?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Hydrology and Water Quality	HYDRO-1	In addition to BMPs implemented to avoid or reduce impacts from the construction and decommissioning phases, BMPs shall also be implemented to avoid or reduce impacts from the operations and maintenance phases. To address potential violation of water quality standards caused by insufficient treatment, system failure at concentrations in excess of water quality standards, proper design shall include contingency measures such as safeguards to shut down the extraction wells in case of pipeline failure or malfunction. In addition, operation of the proposed project will be governed by and follow an operations and maintenance plan. PG&E will comply with all applicable water quality standards, the General Permit, and any SWRCB or RWQCB resolutions identified as ARAR, as well as a corrective action monitoring program. Under the corrective action monitoring program, data will be collected to measure performance of the remedy, compliance with standards, and progress of the remedial action as a part of the project description. In addition, the project will be operated to continually assess performance issues and to modify the type, method, and configuration of the treatment delivery systems to enhance performance of the remedy to attain the cleanup goals and to respond to site conditions and performance issues as described in the project description.		No Action	This measure applies to O&M of the groundwater remedy, and does not apply to IM-3 decommissioning, removal, and restoration activities. Activities during IM-3 lay-up period will be covered under the existing IM-3 Industrial SWPPP.
Hydrology and Water Quality	HYDRO-1	A SWPPP will also be prepared for the proposed project, which will contain BMPs related to industrial activities (industrial SWPPP). The BMPs are designed to reduce pollutants in discharges that may affect receiving water quality during operations and maintenance of the proposed project. As noted above, BMP designations are based on those used by the *California Stormwater Quality Association Construction BMP Handbook* (California Stormwater Quality Association 2003) and those referenced in the General Permit The SWPPP will incorporate BMPs such as the following: y) Good Housekeeping: Maintain facility in a clean manner and train facility personnel to contribute to a safe, clean, and orderly environment by properly disposing of trash in designated containers, storing materials in appropriate locations, and keeping equipment clean and in good working condition. z) Preventative Maintenance: Prevent or minimize release of pollutants. Develop Standard Operating Procedures for operation and maintenance of facility components and train employees to follow the procedures. aa) Non-Stormwater Discharges (SC-10): Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Conduct regular inspections of high priority areas. bb) Spill Prevention, Control, and Cleanup (SC-1 1): Store materials properly to prevent spills from entering the storm drain system or surface waters. Ensure that spill cleanup materials are located on-site and are easily accessible. Clean up leaks and spills immediately using proper absorbent materials. Absorbents used to clean up hazardous materials must be disposed of as hazardous waste. Educate employees about spill prevention and cleanup. cc) Vehicle and Equipment Fueling (SC-20): Maintain clean fuel-dispensing areas using dry cleanup methods, such as sweeping or using rags and absorbents for leaks and spills. Cover the fueling area to prevent contact with stormwater. Train personnel in pollution prevention, focusing on containment of spills and leaks. dd) Outdoor Loading/Unloading (SC-30): Load and unload chemicals during dry weather, if possible, and load and unload in designated areas. Check equipment regularly for leaks. ee) Outdoor Liquid Container Storage (SC-3 1): Cover the storage area with a roof and provide secondary containment. Inspect storage areas regularly for leaks or spills. ff) Outdoor Equipment Operations (SC-32): Perform activities during dry weather, cover the work area with a roof, and use secondary containment. Train employees in proper techniques for spill containment and cleanup. gg) Waste Handling and Disposal (SC-34): Cover storage containers with leak-proof lids, check for leaks weekly, and clean storage areas regularly. Ensure that wastes are disposed of properly. hh) Tank Design System: Ensure that tank systems have sufficient strength to avoid collapse, rupture, or failure and that they are protected against physical damage and excessive stress. Provide adequate secondary containment.		No Action	This measure applies to O&M of the groundwater remedy, and does not apply to IM-3 decommissioning, removal, and restoration activities. Activities during IM-3 lay-up period will be covered under the existing IM-3 Industrial SWPPP.

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Hydrology and Water Quality	HYDRO-1	In conformance with the substantive requirements of General Permit (Order No. 2009-0009-DWQ, a monitoring and reporting program will be implemented to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary, to continue to reduce pollutants and impacts on receiving waters. The monitoring program shall include the following minimum elements as per the General Permit: ii) quarterly, non-stormwater visual inspections, jj) storm-related visual inspections within 2 business days of a qualifying rain event (producing precipitation of one-half inch or more of discharge), kk) visual inspection after a storm event, ll) monitoring of non-visual pollutants based on the calculated risk level for the project, with Risk Level 2 and 3 requiring a minimum of three samples per day during qualifying rain events (SWRCB 2009: Tables 5 and 6, 22–27), and mm) monitoring and reporting for linear projects as per Attachment A of the General Permit Results of this monitoring shall be reported annually to DTSC and to the Storm Water Multi-Application Reporting and Tracking System (SMARTS). The annual report shall include a summary and evaluation of all sampling and analysis results, original laboratory reports, and chain of custody forms; a summary of all corrective actions taken during the compliance year; and identification of any compliance activities or corrective actions that were not implemented. NEL Violation Reports and/or NAL Violation Reports are required for Risk Level 3 and linear underground/overhead project (LUP) Type 3 Discharges. Should the project meet these criteria, the respective reports shall be submitted within 5 days of the end of the storm event, as per General Permit requirements, and provide the required information identified (SWRCB 2009:26–27 and Attachment A). The implementation of stormwater plans shall include an education component to train workers on water quality concerns and proper BMP implementation, maintenance, and repair, in addition to stormwater management program training on the construction BMP plan and industrial SWPPP.		No Action	This measure applies to O&M of the groundwater remedy, and does not apply to IM-3 decommissioning, removal, and restoration activities. Activities during IM-3 lay-up period will be covered under the existing IM-3 Industrial SWPPP.
Hydrology and Water Quality	HYDRO-2	Exceedance of Water Quality Standards and/or Waste Discharge Requirements - Implement Mitigation Measure HYDRO-1. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling erosion and siltation. Consequently, any impacts associated with erosion and siltation resulting from alterations of drainage and hydrology and water quality during construction, operation and maintenance, and decommissioning.	See above	Action	See HYDRO-1.
Hydrology and Water Quality	HYDRO-3	Exceedance of Water Quality Standards and/or Waste Discharge Requirements. Implement Mitigation Measure HYDRO-1. Mitigation Measure HYDRO- 1 shall be implemented. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling potential pollutants, including sediment, and runoff discharges from the project area. Consequently, any impacts associated with pollutants resulting from alterations of drainage and water quality during construction, operation and maintenance, and decommissioning.	See above	Action	See HYDRO-1.
Noise	Noise-1	Short-Term Groundborne Noise and Vibration Levels Caused by Construction Activities near Sensitive Receptors.			
Noise	Noise-1a	a) Construct new wells a minimum of 45 feet from vibration-sensitive receptors. Avoid constructing wells within 30 feet of vibration- sensitive land uses located in California and 275 feet of vibration- sensitive land uses located in Arizona;		No Action	IM-3 decommissioning will not include constructing new wells.

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Noise	Noise-1b	b) A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near the entrance so that it is clearly visible to nearby receivers most likely to be disturbed. The coordinator will manage complaints resulting from the construction vibration. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby vibration-sensitive receptors, advising them of the construction schedule.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities. Curt Russell and Chris Smith have been selected as the designated disturbance coordinators for PG&E.
Noise	Noise-2	Project-Generated Construction-Related Noise Levels.			
Noise	Noise-2a	a) Construction equipment shall be properly maintained per manufacturer specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools shall be shrouded or shielded, and all intake and exhaust ports on power equipment shall be muffled or shielded.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Noise	Noise-2b	b) Construction equipment shall not idle for extended periods of time (more than 15 minutes) when not being utilized during construction activities.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Noise	Noise-2c	c) Construction activities shall include the use of berms, stockpiles, dumpsters, and or bins to shield the nearest noise-sensitive receptor adjacent to construction activities to within acceptable non-transportation noise level standards. When construction activities are conducted within the distances outlined above (i.e., 1,850 feet and 5,830 feet from California receptors and 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively) relative to noise-sensitive uses in the project area, noise measurements shall be conducted by a qualified acoustical consultant at the nearest noise-sensitive land use relative to the construction activities with a sound level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2) to ensure that construction noise associated with the project component complies with applicable daytime and nighttime noise standards. If noise levels are still determined to exceed noise standards, temporary barriers shall be erected as close to the construction activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards. All acoustical barriers shall be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission Class (STC) rating of 25 or greater as defined by the American Society for Testing and Materials' Test Method E90. Placement, orientation, size, and density of acoustical barriers shall be specified by a qualified acoustical consultant.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities.
Noise	Noise-2d	d) A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near construction areas so that it is clearly visible to nearby receivers most likely to be disturbed. In addition, mailing of the same information will be sent to nearby receptors and all Tribes. The coordinator will manage complaints resulting from the construction noise. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby noise- sensitive receptors, advising them of the construction schedule.	This Work Plan	Action	This measure will be implemented during IM-3 decommissioning, removal, and restoration activities. Curt Russell and Chris Smith have been selected as the designated disturbance coordinators for PG&E.
Noise	NOISE-3	Land Use Compatibility of Future Project Noise Levels with Places of Worship and the Topock Cultural Area. Provided that the proposed project would be required to achieve the normally acceptable exterior noise level standard for places of worship, the following mitigation measure shall be incorporated in the project design:			
Noise	NOISE-3a	a) Implement all of the mitigation measures outlined for Impact NOISE- 1 and Impact NOISE-2;	This Work Plan and the CIMP	Action	See NOISE-1 and NOISE-2. Noise protocols for CUL-1a-8h will also be implemented during IM-3 decommissioning, removal, and restoration activities.
Noise	NOISE-3b	b) Upon completion of detailed project design, the determination of remediation activities and the schedule established to achieve these activities shall be communicated to Native American Tribes. PG&E shall maintain a liaison with requesting Tribes to alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis.	This Work Plan and the CIMP	Action	This measure and the noise protocols for CUL-1a-8h will be implemented during IM-3 decommissioning, removal, and restoration activities.

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Water Supply	WATER-1	Depletion of Groundwater. To mitigate potentially significant effects on local groundwater levels associated with the freshwater extraction wells, in the event that freshwater is to be supplied from wells rather than from a surface intake, a hydrologic analysis shall be conducted during the design phase of the project to evaluate the proposed pumping rates for extraction, the potential cone of depression, and the extraction effect on any existing wells in proximity. Proximity shall be defined by the cone of depression boundary of any well to be used in the extraction process. Extraction well location and/or extraction rates shall be adjusted during project design based on this analysis to be sure that extraction does not substantially adversely affect the production rates of existing nearby wells (e.g., adversely affect well production such that existing land uses would not be supported). It shall be demonstrated using computer simulations or other appropriate hydrologic analysis that production rates of existing nearby wells will not be substantially affected before the installation of any new freshwater extraction wells.	N/A	No Action	IM-3 decommissioning will not result in installing new freshwater extraction well(s). Water to be used during IM-3 decommissioning and restoration activities for dust control, cleaning, and decontamination will be supplied by the Compressor Station. The estimated duration for IM-3 decommissioning is approximately one year. It is expected that the water used for IM-3 decommissioning activities will not exceed the estimated quantity provided in the EIR (2 acre-feet annually). This is minimal compared to the estimated water use at the Compressor Station of 70 to 100 acre-feet annually, and therefore, will not adversely affect the existing water supply wells. Water use for restoring areas used by IM-3 and the source of that water will be provided in the future IM-3 Restoration Plan.

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TABLE 6-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Item No.	Reference Location in Document	Relevant Excerpt from Document	Triggering Event	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
1	Stipulation I(A)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to select and implement, or cause to be implemented, an alternative or combination of alternatives to remediate the groundwater and soil contamination in a manner that fulfills the requirements of CERCLA and the CERCLA Records of Decision (RODs) and protects the Colorado River, human populations, and the natural environment to the maximum extent practicable.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan proposes activities that are part of the Undertaking. The Plan was prepared in compliance with the requirements of CERCLA.
2	Stipulation I(B)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to Subject to I(A) above, carry out, and require others under their jurisdiction to carry out, all investigative, testing and remediation activities, including all supporting operations and maintenance activities, in ways that avoid, minimize, or mitigate adverse effects to cultural and historic properties within the APE, to the maximum extent practicable.	Implementation of Actions Proposed as part of the Undertaking	PG&E remediation resources specialist (Glenn Caruso) reviewed planned field activities and work areas proposed in the Work Plan. The purpose of the review is to ensure that the work activities and footprints of planned work areas are selected in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible. After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
3	Stipulation I(C)	The BLM, USFWS, USBR and PG&E shall consult with the Tribes that attach cultural significance to the TCP within the APE to develop a plan to ensure Tribal access to areas within the APE for religious, cultural, or spiritual purposes. Access shall be consistent with applicable laws, regulations, and agreements governing property within the APE, and may not impede the Topock Remediation Project, may not create health and safety concerns, and shall exclude the Topock Compressor Station and related facilities.	Development of Access Plan (Tribal Access)	The Tribal Access Plan for lands under federal management was completed on November 26, 2011. PG&E has also prepared an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan. The Access Plan is included in an appendix of the Construction/Remedial Action Work Plan. Additionally, per its agreement with PG&E, the Fort Mojave Indian Tribe has reasonable access to the IM-3 Property for religious, spiritual, or cultural purposes so long as such access does not interference with remediation activities.
4	Stipulation I(D)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to ensure that PG&E shall to the extent practicable restore the areas affected by the Topock Remediation Project within the APE, including, but not limited to, the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation and remediation-related appurtenances and facilities.	Planning for Restoration	This Work Plan presents the general approach for restoration of the areas originally affected by IM-3 operations. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. Implementation of this Work Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities, by grading, contouring, and revegetating the site.
4	Stipulation I(E)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to consult with other Signatories, Tribes, and Invited Signatories, following the guidelines in Appendix B of this PA, regarding actions proposed in this Undertaking, including establishment of any rights-of-way, time-critical, or emergency actions.	Implementation of Actions Proposed as part of the Undertaking	BLM will consult with the Signatories and Invited Signatories to the PA and the Tribes on this Work Plan.
5	Stipulation II(B)	At each phase (work plan or design document) of implementation of the Undertaking, an evaluation will occur to determine if the APE should be amended. This evaluation will coincide with the development of the work plan or design document for the specific phase of the Undertaking. Where alternatives under consideration consist of corridors or large land areas, or where access to properties is restricted, the agency official may use a phased process to conduct identification and evaluation efforts (36 CFR §800.4(b)(2)). Prior to implementation of each phase (work plan or design document) of the Undertaking, BLM will determine, in consultation with the AZ SHPO, CA SHPO, Tribes, and PG&E, what, if any, changes are required in the APE. If BLM determines that the APE must be revised, BLM will redefine the APE taking the input from those parties into account. Should such revision to the APE be needed, BLM will amend the CHPMP to include any changes to the APE.	Implementation of Actions Proposed as part of the Undertaking	BLM has consulted and is continuing to consult with the Tribes regarding actions proposed as part of the Undertaking under the PA's Consultation Protocol, including on the APE.
6	Stipulation III(B)(1), III(B)(2)(a) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, existing monitoring wells and related facilities shall be used to the maximum extent practicable.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan excludes the decommissioning of existing monitoring wells, allowing them to be re-used in the final groundwater remedy.

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TABLE 6-2
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IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Item No.	Reference Location in Document	Relevant Excerpt from Document	Triggering Event	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
7	Stipulation III(B)(2)(b) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, the need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the guidelines in Appendix B.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan does not propose any new facilities. BLM will consult with the Signatories and Invited Signatories to the PA and the Tribes on this Work Plan.
8	Stipulation III(B)(2)(c) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, new facilities or activities be placed in areas already disturbed by previous grading or other mechanized activities to the maximum extent practicable, consistent with protecting human health and the environment and achieving cleanup in a timely manner.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan does not propose any new facilities. Field activities proposed in the Work Plan are placed in areas already disturbed by previous grading or other mechanized activities to the maximum extent practicable.
9	Stipulation III(B)(2)(e) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, the performance of all field activities in support of the remedy shall be executed in such a way as to avoid and/or minimize adverse effects to cultural and historic properties to the maximum extent practicable.	Implementation of Field Activities in Support of the Groundwater Remedy	The planning of field activities in this Work Plan is executed under the guidance of PG&E remediation resources specialist (Glenn Caruso). After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
10	Stipulation III(B)(2)(f) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, subject to Stipulation I(A), direct, indirect, and cumulative adverse effects shall be considered and mitigated.	Implementation of Actions Proposed as part of the Undertaking	Adverse effects are being considered and mitigated through the implementation of the measures included in the PA, the CHPMP, and the EIR.
11	Stipulation III(B)(3)(a) - Remediation of GW contamination – Final Design	Consultation between the Signatories, Tribes, and Invited Signatories shall be initiated prior to final design and implementation of that alternative.	Implementation of Actions Proposed as part of the Undertaking	BLM has consulted and is continuing to consult with the Tribes regarding actions proposed in the Undertaking under the PA's Consultation Protocol. This Work Plan proposes activities that are part of the Undertaking. The Work Plan is included as Appendix B to the CIMP and in an appendix of the Construction/ Remedial Action Work Plan.
12	Stipulation III(B)(3)(b) - Remediation of GW contamination – Final Design	Every effort should be made to avoid and minimize adverse effects in accordance with the general principles set forth in Stipulation I.	Implementation of Actions Proposed as part of the Undertaking	PG&E remediation resources specialist (Glenn Caruso) reviewed planned field activities and work areas proposed in the Work Plan. The purpose of the review is to ensure that the work activities and footprints of planned work areas are selected in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible. After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
13	Stipulation III(B)(3)(c) - Remediation of GW contamination	Whatever the selected alternative, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the design, implementation, and monitoring activities to determine how best to restore the areas affected by the Topock Remediation Project. These areas will include, but not be limited to, the site of the existing treatment plant and related facilities but will exclude the Topock Compressor Station and related facilities. The Federal Agencies will ensure that environmental restoration to the conditions existing prior to the construction of the Project is planned and conducted to the extent practicable.	Implementation of Actions Proposed as part of the Undertaking	This Work Plan presents the general approach for restoration of the areas originally affected by IM-3 operations. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. Implementation of this Work Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities, by grading, contouring, and revegetating the site.
14	Stipulation V(A)	All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. All such removal will be planned in consultation with the Signatories, Tribes, and Invited Signatories, following the guidelines in Appendix B [Consultation Protocol).	Planning for decommissioning	This stipulation was adhered to in planning for the decommissioning and removal of the IM-3 facilities. PG&E will begin decommissioning and removal of the IM-3 facilities as soon as is reasonably practicable after DTSC issues its written approval to proceed (with DOI's concurrence). Figure 9-1 presents a target timeline/ schedule for the implementation of this Work Plan.
15	Stipulation V(B)	The removal of such facilities shall be monitored following the monitoring guidelines in Appendix C.	Implementation of Field Activities	After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.

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TABLE 6-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Item No.	Reference Location in Document	Relevant Excerpt from Document	Triggering Event	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
16	Stipulation V(C)	The removal of such facilities shall take place along existing graded roads to the maximum extent practicable.	Planning for decommissioning	This stipulation was adhered to in planning for the decommissioning of the IM-3 facilities. Section 4 of this Work Plan presents the decommissioning procedures.
17	Stipulation V(D)	Prior to decommissioning of any remediation facility, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the development of the closure plan to determine how to best restore the areas affected by the Topock Remediation Project, including but not limited to, the site of the existing treatment plant and related facilities, but excluding the Topock Compressor Station and related facilities, to ensure that environmental restoration of conditions existing prior to the construction of the Project, is achieved to the extent practicable.	Planning for decommissioning	This Work Plan presents the general approach for restoration of the areas originally affected by IM-3 operations. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation. Implementation of this Work Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities, by grading, contouring, and revegetating the site.
18	Stipulation V(E)	PG&E will draft a plan for decommissioning, removal, and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes, and Invited Signatories.	Planning for decommissioning	This Work Plan is included as Appendix B to the CIMP and in an appendix of the Construction/Remedial Action Work Plan. The Plan was drafted in consultation with the Tribes. Additionally, BLM will consult with the Signatories and Invited Signatories to the PA and the Tribes on this Work Plan.
19	Stipulation IX(A)-(D)	A. If the Undertaking affects a previously unidentified cultural and/or historic resource, including human remains and/or associated funerary objects or graves, or affect such resources in a way not previously anticipated, or have greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the BLM, in consultation with Tribal and Archaeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger area if warranted by specific circumstances) in which no further work is to take place until treatment of the discovery is resolved. At such point BLM will notify all Signatories, Tribes, and Invited Signatories of the nature and general location of the discovery. The BLM will implement appropriate measures, including stabilization or covering, to protect any discovery (human remains, funerary objects, sacred objects, or objects of cultural patrimony) from further disturbance in accordance with the principles set forth in Stipulation I. Ongoing work not within 50 meters (or a smaller area if determined appropriate by parties in the field) of the discovery may continue. If human remains and/or associated funerary objects compose all or part of the discovery, then BLM shall ensure the stipulations of the POA included in the CHPMP, as described in Stipulation VII (H) hereof, will be completed. Also, if human remains and/or funerary objects are encountered, all activities shall follow the procedures and direction provided in NAGPRA and California Public Resources Code sections 5097.98 and 5097.991. For Arizona, such activities shall follow the procedures and direction provided in NAGPRA and applicable state laws, including the Arizona Antiquities Act of 1927 (ARS § 41-841 to 41-846), Burial Protection Law of 1990 (ARS §41-865), and ARS §41-844 of 1990.	Field Implementation of Actions proposed as part of the Undertaking	This stipulation will be adhered to during the field implementation of this Work Plan. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.

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Item No.	Reference Location in Document	Relevant Excerpt from Document	Triggering Event	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
20	Stipulation IX(A)-(D) (continued)	B. If the Tribes, PG&E, and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed, and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E, and BLM will use their best efforts to resolve treatment as quickly as possible. C. If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. D. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will use the dispute resolution process in Stipulation XV of this PA to resolve any objection.	Field Implementation of Actions proposed as part of the Undertaking	This stipulation will be adhered to during the field implementation of this Work Plan. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
21	Appendix C Monitoring Protocol	Cultural sensitivity training will be required of all staff, workers, and contractors engaged in activities in the Topock Remediation Project APE to familiarize them with the sacred nature of the areas so that they will perform their job in a respectful manner. This training will also be given to new personnel before they are allowed to do fieldwork within the APE. This training will be conducted by PG&E with participation by Tribes and Tribal Monitors, Archaeological Monitors, Federal Agency staff, and PG&E supervising staff, as appropriate. Consistent with PG&E's stated policy, PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers, or contractors who do not comply with this section.	Implementation of Actions proposed as part of the Undertaking	Site orientation and the training on cultural/historical resources sensitivity will be provided at the project initiation meeting, to be held at the Topock Compressor Station. Site orientation will stress that all site activities will be conducted in a respectful manner. Sensitivity training will be provided by the PG&E Site Operations Manager and PG&E Remediation Resources Specialist, and PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate.
22	Appendix C Monitoring Protocol	Prior to execution of the PA for the Undertaking, PG&E sometimes invited the Tribes to be present on site during construction to monitor and observe non-maintenance grading, trenching, or other excavation for any facilities, new roads, or other project components related to the Undertaking that may have had the potential to adversely impact cultural and historic resources. The Tribal and Archaeological Monitors shall both be invited to monitor such field work.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
23	Appendix C Monitoring Protocol	This Protocol specifies ways in which the Tribes, BLM, and PG&E may ensure that: 1. Tribes, BLM, and PG&E each are kept well-informed of Undertaking activities and outcomes. 2. Tribal and Archaeological Monitors have the opportunity to alert PG&E's site supervisor (or designee) to potentially sensitive areas or issues that Monitors may be aware of or may become aware of while fieldwork is in progress. 3. PG&E's site supervisor (or designee) notifies BLM of potentially complicated situations. These situations may include discovery of a new cultural or historical resource, damage to a previously recorded cultural or historical resource, or unanticipated effects identified. 4. Tribal concerns regarding work activities are addressed while fieldwork is in progress.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
24	Appendix C Monitoring Protocol (Work Schedule)	Tribal and Archaeological Monitors will be provided with anticipated schedules for Topock Remediation Project work that requires monitoring as early as possible but at least three (3) business days in advance of the initiation of the identified project work, whenever possible. Recognizing that changes to the work schedule may be inevitable, any change in the work schedule will be provided to the Tribal and Archaeological Monitors as soon as possible after the change becomes part of the work schedule. If there is a question regarding need for a monitor, the questioning party shall consult the BLM Project or Field Manager who will make the final determination of need.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. The PG&E Site Operations Manager or his designee will provide the work schedule and inform the monitors of schedule changes as soon as practicable.

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Item No.	Reference Location in Document	Relevant Excerpt from Document	Triggering Event	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
25	Appendix C Monitoring Protocol (Discoveries)	If the Undertaking will affect previously unidentified resources, or affect a previously recorded cultural or historical resource in a way not previously anticipated, or have greater or different effects than previously anticipated, all work having potential for adverse effect shall cease within a fifty (50)-meter radius (or a smaller or larger area if determined appropriate by the BLM, the Monitors, and PG&E in the field) of the point of discovery. The Archaeological and Tribal Monitors will work with BLM and PG&E to ensure that the PA requirements of Stipulation VII (CHPMP) and Stipulation IX (Discoveries) are met.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
26	Appendix C Monitoring Protocol (Human Remains)	If the Undertaking affects previously unidentified human remains and/or associated funerary objects or graves, or affects such resources in a way not previously anticipated, or has greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the BLM, in consultation with Tribal and Archeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger area if warranted) in which no further work is to take place until treatment of the discovery is resolved.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground-disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
27	Appendix C Monitoring Protocol (Safety)	Tribal and Archeological Monitors will be required to meet with PG&E's site supervisor prior to initiating monitoring activity and will be required to obtain any applicable training required under 29 CFR 1910.120 and 40 CFR 300.150. The PG&E site supervisor will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors are invited to attend the safety meetings at the start of each workday or new work task. If the Monitors do not attend this meeting, they will be instructed about the safety concerns of the day by a PG&E representative. Tribal and Archaeological Monitors will be expected to wear all personal protective equipment specified by PG&E's site supervisor and required of other similarly situated field workers. Tribal and Archaeological Monitors will be expected to actively participate to enhance the safety of themselves and the other workers onsite by communicating with PG&E's site supervisor if any safety concerns are identified. Due to safety considerations at the Project site, Tribal and Archaeological Monitors will also be prohibited from conducting any monitoring within designated construction exclusion zones, unless otherwise authorized by PG&E. Such zones are to be clearly delineated to the Tribal and Archaeological Monitors by PG&E's site supervisor. In these situations, other efforts to provide alternative methods for accommodating Monitors including, but not limited to, high-powered binoculars, spotting scopes, or other vision enhancement tools or alternative viewing platforms will occur.	Implementation of Field Activities	The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities. During the project initiation meeting or at similar venues (as appropriate), the PG&E Site Operations Manager or his designee will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors will be invited to attend the safety meetings at the start of each work day or new work task. If they do not attend, they will be instructed of the safety concerns of the day by PG&E.

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TABLE 6-3
Summary of Compliance with Applicable Cultural and Historic Property Management Plan (CHPMP) Provisions
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Item No.	Reference Location in Document	Relevant Excerpt from Document	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
1	Section 6.2	Measures and principles to avoid, minimize, or resolve adverse effects include the following: • Existing monitoring wells and related facilities shall be used to the maximum extent practicable. • The need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the Guidelines in Appendix B. • New facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with human health and the environment and achieving cleanup in a timely manner. • The performance of all field activities in support of the remedy shall be executed in such a way as to avoid and/or minimize adverse effects to cultural and historic properties to the maximum extent practicable. • Subject to Stipulation I(A) above, direct, indirect, and cumulative impacts shall be considered and mitigated.	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c), (e) and (f).
2	Section 6.2.3	Refers to the requirement in the PA Stipulation V(E) and PG&E's 2006 Settlement Agreement with the Fort Mojave Indian Tribe that a plan will be prepared for the decommissioning, removal, and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes, and Invited Signatories. Additionally, PG&E will remove all other remediation facilities and appurtenances related to the Topock Remediation Project as soon as practicable following the attainment of cleanup standards and a determination by DOI that the removal of these facilities is protective of human health and the environment.	See responses to PA Stipulations V(A)-(E).
3	Section 6.3	"Environmental Restoration" refers to the restoration obligations in the Programmatic Agreement and the Consent Decree, including that PG&E draft a plan for decommissioning, removal, and restoration of the IM-3 facility and a Remedy Decommissioning Plan that will address post-remedy restoration of the site.	See responses to PA Stipulations I(D), III(B)(3)(c), and V(D)-(E).
4	Section 6.6.3	"Avoidance Measures/Management Thresholds" provides that: "The primary means for achieving avoidance will be through careful planning and placement of project facilities and installation of temporary barrier fences around significant cultural and historic properties. Metal fence posts and orange mesh all-weather fabric will be used, unless other appropriate materials are identified as preferable, for temporary fencing and will be regularly inspected and maintained. Permanent post-and double cable fencing may be required in high traffic areas. An archaeologist and/or Tribal representative(s) will clearly delineate the sensitive areas to be avoided by construction and will supervise fence installation. Project personnel will be notified that fenced locations are to be completely avoided."	See EIR MMRP CUL-1a. PG&E remediation resources specialist (Glenn Caruso) reviewed planned field activities and work areas proposed in the Work Plan. The purpose of the review is to ensure that the work activities and footprints of planned work areas are selected in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible. After the Work Plan is approved, the implementation of field activities will be performed in accordance with the approved work plan and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities. The provisions of the PA's Monitoring Protocol and its requirements regarding safety will be followed, as well as any additional safety obligations and requirements applicable to the work activities.
5	Section 6.6.4	Construction Monitoring Monitoring of all earth-disturbing Project activities will be in accordance with Appendix C of the PA (Tribal and Archaeological Monitoring Protocol). Qualified archaeological and Tribal monitors will be notified in advance and invited to be on site during earth-disturbing construction activities (grading, trenching, boring, drilling, or other excavation) for new injection, extraction, or monitoring wells, new pipelines, new treatment facilities, new access roads, new staging areas, other new transportation facilities, or other new Project components. Because of safety considerations at the Project site, Tribal and archaeological monitors will comply with all safety requirements.	See responses to PA Appendix C, Monitoring Protocol. See also EIR MMRP CUL-1a-8(l).
6	Section 6.6.5	Periodic Site Monitoring Sound management of the archaeological and historical properties requires that any progressive degradation of sites be identified. Additionally, it is recognized that a mechanism is needed to identify any accidental damage that may occur. To accomplish these goals, PG&E will develop a proposal describing a program of periodic site monitoring and condition assessment. BLM, following consultation with the Tribes and other appropriate parties, will approve any monitoring program before implementation by PG&E. The program will include all historic properties within the APE. Any previously unknown properties that may be encountered during the Project also will be included in the monitoring program unless such properties are evaluated as ineligible. During its initial phase, periodic monitoring and condition assessment will consist of annual field visits to monitor site conditions and disturbances.	As part of the 2004 Cultural Resources Management Plan, Applied Earthworks conducted quarterly monitoring the first year, and since then (2005 – 2013) annual monitoring and condition assessment.
7	Section 6.8	"Protocols for Tribal and Archaeological Monitoring" states that monitoring for the Project will be performed in accordance with the PA's Appendix C (Tribal and Archaeological Monitoring Protocol).	See responses to PA Appendix C, Monitoring Protocol. See also EIR MMRP CUL-1a-8(l).
8	Section 6.9	If the Undertaking extends beyond the APE, BLM will determine, in consultation with the PA Signatories, Tribes, and Invited Signatories, what (if any) changes are required in the APE. If BLM determines that the APE must be revised, BLM will redefine the APE, taking into account the advice of the other Consulting Parties. Should such revision to the APE be needed, BLM will amend the CHPMP to include any changes to the APE (BLM et al. 2010:8).	See response to PA Stipulation II(B).

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TABLE 6-3
Summary of Compliance with Applicable Cultural and Historic Property Management Plan (CHPMP) Provisions
IM-3 Decommissioning, Removal, and Restoration Work Plan
Topock Compressor Station, Needles, California

Item No.	Reference Location in Document	Relevant Excerpt from Document	IM-3 Decommissioning, Removal, and Restoration Work Plan Compliance Status
9	Section 7.1	1. Physical avoidance of the Topock Maze and associated prehistoric sites. 2. To the maximum extent practicable, PG&E will avoid all archaeological sites within the APE and protect all historic properties regardless of their NRHP status. The primary means for accomplishing avoidance will be through careful planning and placement of proposed access routes and drilling sites and by the installation of barrier fences around significant historic properties. A pre-project archaeological survey field verification will be conducted prior to any ground-disturbing activities. Consistent with other phases of work conducted at the Topock Remediation Project site, agency representatives and other stakeholders (including representatives of Native American Indian tribes involved with the Project) will be invited to the site for a project initiation meeting to discuss various cultural sensitivities associated with the Project. 3. Ensure that PG&E shall, to the extent practicable, restore the areas affected by the Topock Remediation Project within the APE, including but not limited to the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation- and remediation-related appurtenances and facilities per PA Stipulation I.D. 4. Remediation activities that propose the removal or introduction of vegetation on public lands shall be undertaken after coordination with the Tribes to assess if culturally significant native plant species are being impacted and if there could be potential visual impacts to the Topock TCP. 5. Existing monitoring wells and related facilities shall be used to the extent practicable per PA Stipulation III.B.2(a). 6. The need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the Guidelines in Appendix B and per PA Stipulation III.B.2(b). 7. New facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with human health and the environment and achieving cleanup in a timely manner per PA Stipulation III.B.2(c). 8. Clay deposits are an important resource identified by the Hualapai in their creation, and may be important as well to other Tribes. Accordingly, BLM, PG&E, and those Tribes that ascribe importance to clay deposits shall meet to identify the clay deposits that are considered a resource and develop a protocol to be followed if such clay deposits are encountered.	See responses to PA Stipulations I(B), I(D), III(B)(1), III(B)(2)(a)-(c) and (e), III(B)(3)(c), and V(D). See also EIR MMRPs CUL-1a-8(i), AES-1, and AES-2. Regarding Item 4, PG&E plans to avoid removing vegetation on public lands where possible in connection with the activities proposed in this Work Plan. Where impacts to vegetation cannot be avoided priority will be giving to trimming prior to removal of vegetation.The future Site-Specific IM-3 Restoration Plan will address habitat restoration and revegetation (see Section 8.1.3), and will be developed in consultation with the land owners and managers, including FMIT, USBR, and BLM. Signatories and Invited Signatories to the PA and the Tribes will also be consulted on the Site-Specific IM-3 Restoration Plan. Regarding Item 7, activities proposed in this Work Plan are placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable. Regarding Item 8, BLM met with the Hualapai Tribe and PG&E in late 2012 and discussed the Clay Monitoring Protocol. The Hualapai representative indicated that the Hualapai would make the initial draft of this protocol and then send it out for BLM and PG&E to review.
10	Section 7.2	Accommodation of Tribal Activities and Ceremonies Involving the Topock Maze/TCP The BLM will continue to work with the Tribes to identify tribal activities and ceremonies that are associated with the Topock TCP. When such activities and ceremonies are identified, BLM will consult with the Tribes and PG&E to develop treatment measures to accommodate them. Treatment measures may address scheduling of Undertaking work to accommodate ceremonial activities and to mitigate audible and visual impacts.	See response to EIR MMRP CUL-1a-8k. Additionally, per its agreement with PG&E, the Fort Mojave Indian Tribe has reasonable access to the IM-3 Property for religious, spiritual, or cultural purposes so long as such access does not interfere with remediation activities.
11	Section 7.3	Treatment of other cultural, historical, and archaeological properties within the APE "The only properties identified within the APE that are not contributing properties to the Topock TCP are the properties from the historic period (i.e., Route 66, the AT&SF Railroad Grade, and National Old Trails Road). None of these properties has been impacted, to date, by this Undertaking. These properties shall be avoided, to the extent practicable, in the implementation of the Undertaking. These properties are periodically monitored for condition assessment to assure that they are being protected."	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c) and (e).
12	Section 8.1	Discoveries - Steps to be taken if previously unrecorded properties are found	PG&E will follow the procedures specified in Appendix C of the CHPMP (Discovery Plan). See also response to PA Stipulation IX(A)-(D), EIR MMRP CUL-1a-8(b) and -8(o).
13	Section 8.2	Discoveries - Treatment of any human remains, funerary objections, ceremonial objects and items of cultural patrimony	PG&E will follow the procedures specified in Appendix D of the CHPMP (Plan of Action). See also response to PA Stipulation IX(A)-(D), EIR MMRP CUL-1a-8(b) and -8(o).
14	Section 8.3	Consultation Procedures Related to Unanticipated Discoveries The BLM will notify all Signatories of the PA, Tribes, and Invited Signatories of the nature and general location of any discovery. If the Tribes, PG&E, and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed, and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E, and BLM will use their best efforts to resolve treatment as quickly as possible. If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will use the dispute resolution process in Stipulation XV of the PA to resolve any objection.	See response to PA Stipulation IX(A)-(D). See also EIR MMRP CUL-1a-8(b) and -8(o).

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Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/future document(s) will document continued compliance with this ARAR?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
Chemical-Specific									
1	Federal Chemical-Specific	Federal Safe Drinking Water Act - 42 USC § 300f, et seq.; 40 CFR 141 -- Subpart F– Maximum Contaminant Level Goals (MCLGs)	ARAR Relevant and Appropriate	MCLGs are not federally enforceable drinking water standards, but CERCLA § 121(d) identifies MCLGs as relevant and appropriate requirements.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).
2	Federal Chemical-Specific	Federal Safe Drinking Water Act - 42 USC § 300g-1; 40 CFR 141 -- Subpart G – National Primary Drinking Water Regulations (MCLs)	ARAR Relevant and Appropriate	These MCLs are relevant and appropriate standards, which establish the maximum permissible level of contaminants (e.g., Chromium) in sources (or potential sources) of drinking water. MCLs may be applicable where water at a CERCLA site is delivered through a public water supply system.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).
3	Federal Chemical-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC §§ 1251-1387; 40 CFR 131.38	ARAR Applicable	These are federally promulgated Water Quality Standards for surface waters. Such water quality standards include specific criteria for water bodies in California, including standards for hexavalent chromium.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).
52	California Chemical-Specific	California Safe Drinking Water Act - Title 22, CCR, Div 4, Ch 15, §64431, §64444	ARAR Applicable	Maximum Contaminant Levels (MCLs) which shall not be exceeded in the water supplied to the public. California state MCLs for drinking water standards are more stringent than primary federal standards.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).
53	California Chemical-Specific	Secondary MCLs list for drinking water - Title 22, CCR, Div 4, Ch 15, §64449	ARAR Relevant and Appropriate	State secondary MCLs for drinking water standards are more stringent than federal standards. These secondary MCLs are relevant and appropriate standards, which establish the maximum permissible level of contaminants in sources (or potential sources) of drinking water. These secondary MCLs would be applicable if water at the site was used as drinking water and delivered through a community water supply system.	Remedy Implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities (beyond implementation of this work plan).

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55	California Chemical-Specific	Groundwater and vadose zone protection standards - Title 22, CCR, Div 4.5, Ch 15, Article 6, §66265.94	ARAR Applicable	RCRA hazardous waste Interim Status TSD facilities shall comply and ensure that hazardous constituents entering the groundwater, surface water, and soil from a regulated unit do not exceed the concentration limit from contaminants of concern in the uppermost aquifer underlying the waste management area beyond the point of compliance.	Remedy Implementation	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
Action-Specific									
31	Federal Action-Specific	Federal Safe Drinking Water Act - 42 USC §300f, et seq. Part C – Protection of Underground Sources of Drinking Water; 40 CFR 144-148	ARAR Applicable	These Underground Injection Control Regulations assure that any underground injection performed on-site will not endanger drinking water sources. Substantive requirements include, but are not limited to, regulation of well construction and well operation. These requirements will be applicable if underground injection is proposed as a part of a site remedy.	Underground injection activities	PG&E	Filing of inventory of injection wells	Action	USEPA Underground Injection Well(s), Class V Inventory Notification (USEPA Form 7520-16 'Inventory of Injection Wells') was submitted 3/24/2005; referenced USEPA ID No. CAR000151118. After the IM-3 injection wells (IW-2 and IW-3) are decommissioned, a letter will be sent to the USEPA to close out these wells.
32	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC § 1344 ; 40 CFR 230.10	ARAR Applicable	This section of the Clean Water Act prohibits certain activities with respect to on-site wetlands and waterways. No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed activity which would have less adverse impact to the aquatic ecosystem.	Activities that occur in the Colorado River or in jurisdictional waters of the United States that result in discharge of dredged or fill material.	PG&E	This Work Plan and CWA 404 avoidance and minimization measures, included in an appendix of the Construction/Remedial Action Work Plan.	Action	Decommissioning and restoration include activities in the jurisdictional waters of the US, subject to the jurisdiction of the USACE. Activities in these areas will be conducted in compliance with the CWA 404 avoidance and minimization measures, included in an appendix of the Construction/Remedial Action Work Plan. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.
33	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC § 1342; 40 CFR 122; 40 CFR 125	ARAR Applicable	These National Pollutant Discharge Elimination System (NPDES) requirements regulate discharges of pollutants from any point source into waters of the United States.	Point source discharges to waters of the US.	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not result in point source discharges to waters of the United States that will require an NPDES permit.

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34	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) -40 CFR 122.26	ARAR Applicable	These regulations define the necessary requirements with respect to the discharge of storm water under the NPDES program. These regulations will apply if proposed remedial actions result in storm water runoff which comes in contact with any construction activity from the site remediation.	Ground disturbance as a result of construction is > 1 acre	PG&E	This Work Plan, and Appendix G, Construction BMP Plan	Action	Appendix G (Construction BMP Plan) will be implemented during the IM-3 decommissioning, removal, and restoration activities.
35	Federal Action-Specific	River and Harbor Act of 1899 - 33 USC §§ 401 and 403	ARAR Applicable	This Act prohibits the creation of any obstruction in navigable waters, in addition to banning activities such as depositing refuse, excavating, filling, or in any manner altering the course, condition, or capacity of navigable waters. These requirements will apply if proposed activities at the Topock site have the potential of affecting any navigable waters on the site.	Activities with the potential to affect any navigable waters on the site	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities will not affect navigable waters.
38	Federal Action-Specific	Clean Air Act - USC §§ 7401, et seq. (National Emission Standards for Hazardous Air Pollutants (NESHAP)); 40 CFR 61; 40 CFR 63	ARAR Applicable	NESHAPs are regulations which establish emissions standards for certain hazardous air pollutants (HAPs) identified in the regulations. NESHAPs will apply if remediation activities on the site produce identified HAP emissions.	Activities produce identified HAP emissions	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include activities subject to NESHAPs.

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39	Federal Action-Specific	Religious Freedom Restoration Act - 42 USC § 2000bb	ARAR Applicable	Pursuant to this Act, the government shall not substantially burden a person's exercise of religion, unless the application of the burden is in furtherance of a compelling government interest, and it is the least restrictive means of furthering that interest. To constitute a "substantial burden" on the exercise of religion, a government action must (1) force individuals to choose between following the tenets of their religion and receiving a governmental benefit or (2) coerce individuals to act contrary to their religious beliefs by the threat of civil or criminal sanctions. If any remedial action selected imposes a substantial burden on a person's exercise of religion, it must be in furtherance of a compelling government interest and be the least restrictive means of achieving that interest.	Activities with the potential to impose a substantial burden on a person's exercise of religion.	DOI/BLM	This Work Plan	Action	IM-3 decommissioning, removal, and restoration activities do not substantially burden a person's exercise of religion. In an email dated June 3, 2013, DOI states the following: "The table of Applicable or Relevant and Appropriate Requirements is found in the Groundwater Corrective Measures Study/Feasibility Study (CMS/FS) Appendix B. The discussion found for ARAR 39 provides the judicial test as to what constitutes a "substantial burden" (in the context of the Religious Freedom Restoration Act). "To constitute a 'substantial burden' on the exercise of religion, a government action must (1) force individuals to choose between following the tenets of their religion and receiving a governmental benefit or (2) coerce individuals to act contrary to their religious beliefs by the threat of civil or criminal sanctions." Based on this information, activities performed to implement the groundwater remedy at the Topock site do not establish a "substantial burden" on the exercise of religion as that term is used in the Religious Freedom Restoration Act." In compliance with the PA, a Tribal Access Plan (BLM 2011) was completed for Tribal access to lands under federal management within the Topock site for traditional religious, cultural, or spiritual purposes during implementation of the groundwater remedy. Implementation of this Work Plan is anticipated to occur during groundwater remedy implementation. PG&E has also prepared an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan. The Access Plan is included in an appendix of the Construction/Remedial Action Work Plan.. BLM also developed the CHPMP to avoid, minimize and mitigate potential affects to historic properties, including the Topock TCP during implementation of the groundwater remedy. BLM issued the final CHPMP on January 20, 2012. The CHPMP can be modified and updated, as needed, to address new information and ongoing activities related to the project. Therefore, subsequent to the issuance of the CHPMP, BLM continues to hold periodic working meetings on the CHPMP. It should be noted that treatment measures are included in the CHPMP. A Treatment Plan will be submitted to the Agencies along with the 90% design.. Table 6-3 provides for IM-3 decommissioning, removal, and restoration activities, a summary of compliance with applicable CHPMP provisions.

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40	Federal Action-Specific	Endangered Species Act of 1973 - 16 USC §§ 1531-1544;50 CFR 402	ARAR Applicable	The ESA makes it unlawful to remove or "take" threatened and endangered plants and animals and protects their habitats by prohibiting certain activities. Examples of such species in or around the Topock site may include, but are not limited to, southwestern willow flycatcher, Mojave Desert tortoise, Yuma clapper rail, Colorado pike minnow, razorback sucker, and bonytail chub. Any remedial action selected for the Topock site will not result in the take of, or adverse impacts to, threatened and endangered species or their habitats, as determined based on consultation with the Fish and Wildlife Service under section 7 of the ESA.	Construction of remedy	DOI/USFWS/PG&E	Programmatic Biological Agreement (PBA)	Action	Compliance with this ARAR will occur during IM-3 decommissioning, removal, and restoration activities.
41	Federal Action-Specific	Migratory Bird Treaty Act - 16 USC 703-712	ARAR Applicable	This Act makes it unlawful to "take, capture, kill," or otherwise impact a migratory bird or any nest or egg of a migratory bird. The Havasu National Wildlife Refuge, which is part of the Topock site, was created as a refuge and breeding ground for migratory birds and other wildlife, therefore, there is potential for contact with migratory birds during proposed remediation activities. Any remedial action selected for the Topock site will be designed and implemented so as to not take, capture, kill, or otherwise impact a migratory bird, nest, or egg.	Remedial action for Topock site	PG&E	Future IM-3 Decommissioning Avoidance and Minimization Plan, the PBA, the BIAMP, and CWA 404/CDFW avoidance and minimization measures	Action	Compliance with this ARAR will occur during IM-3 decommissioning, removal, and restoration activities. An Avoidance and Minimization Plan will be developed in consultation with CDFW, BLM, and USFWS, prior to IM-3 decommissioning.
45	Arizona Action-Specific	Arizona Well Standards - A.A.C. R-12-15-850	ARAR	These requirements on the placement of wells will apply if the selected remedy includes placement of wells in Arizona.	During project design and before construction	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include any new monitoring wells in Arizona.
46	Arizona Action-Specific	Design criteria for treatment units - A.A.C. R18-5-(501-502)	ARAR	These minimum design criteria will apply if the selected remedy includes construction of a groundwater treatment plant.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve the construction of a groundwater treatment plant in Arizona.

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47	Arizona Action-Specific	Requirements for wells, groundwater withdrawal, treatment, and reinjection -A.R.S. §45-454.01	ARAR	This statute exempts new well construction, withdrawal, treatment, and reinjection into a groundwater aquifer as a part of a CERCLA Remedial Action from the requirements of the Arizona Groundwater Code, except that they must comply with the substantive requirements of A.R.S. 45-594, 45-595, 45-596, and 45-600. If groundwater that is withdrawn is not reinjected into the aquifer, the groundwater shall be put to reasonable and beneficial use.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of wells in Arizona.
48	Arizona Action-Specific	Well construction standards -A.R.S. §45-594 and 595	ARAR	These provisions identify the well construction standards and requirements for new well construction in the State of Arizona. These requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of wells in Arizona.
49	Arizona Action-Specific	Notice of intention to drill - A.R.S. §45-596	ARAR	Substantive requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of wells in Arizona.
50	Arizona Action-Specific	Report by driller - A.R.S. §45-600	ARAR	Substantive requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of wells in Arizona.
51	Arizona Action-Specific	Arizona Remedial Action Requirements - A.R.S. §49-282.06(A)(2)	ARAR	Any treatment of groundwater must be conducted in a manner to provide for the maximum beneficial use of the waters of the state.	Treatment of groundwater in Arizona	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve treatment of groundwater in Arizona.
74	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 1, §66262.11	ARAR Applicable	Owners or operators who generate waste shall determine whether waste is a hazardous waste. Applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Activity that generates waste that could potentially be hazardous	PG&E	This Work Plan, specifically Section 5 (Waste Management Plan and Recoverable Materials) and Appendix F (Soil Management Plan)	Action	Section 5 (Waste Management Plan and Recoverable Materials) and Appendix F (Soil Management Plan), which include performing waste determinations, will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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75	California Action-Specific	Hazardous Waste Control Act (HWCA) - Title 22, CCR, Div 4.5, Ch 12, Article 1, §66262.12	ARAR Applicable	A generator shall not treat, store, dispose of, transport or offer for transportation, hazardous waste without having received an identification number. Substantive requirements will be applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Activity that generates waste that could potentially be hazardous	PG&E	USEPA ID Number	Action	Hazardous waste generated from implementation of this Work Plan will be managed under the existing USEPA ID number for the Topock groundwater remediation area, CAR000151118.
76	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards for owners and operators of hazardous waste transfer and TSD facilities Title 22, CCR, Div 4.5, Ch 14, Article 2	ARAR Applicable	Establish requirements for a hazardous waste treatment facility to have a plan for waste analysis, develop a security system, conduct regular inspections, provide training to facility personnel, and use a quality assurance program during construction. The requirements may be applicable if CERCLA response action includes treatment, storage, or disposal as defined under RCRA, or may be relevant and appropriate if the requirements address problems or situations sufficiently similar to the specific circumstances at the site that their usage will be well suited.	Activity associated with construction and operation of a treatment facility or long term (longer than 90 days) storage of hazardous waste. If waste is simply removed, stored in appropriate containers after characterization, and removed off-site within 90 days, PG&E will be required to follow the substantive requirements of PG&E of a generator, including use of manifests, record keep, segregation of incompatibles, etc.	PG&E	This Work Plan, specifically Section 5 (Waste Management Plan and Recoverable Materials), Appendix B (Decommissioning Quality Assurance and Control Plan), and Appendix F (Soil Management Plan)	Action	As discussed in Section 5.1.3 (Onsite Management), hazardous wastes will be removed from the site within 90 days from the date of generation. Procedures for the proper collection, characterization, storage, transportation, and disposal of waste generated during the decommissioning, removal, and restoration activities are described in Section 5 (Waste Management Plan and Recoverable Materials), Appendix D (Transportation Plan), and Appendix F (Soil Management Plan).
77	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 2, §66262.20, §66262.22	ARAR Applicable	A generator of hazardous waste who transports or offers hazardous waste for transportation shall prepare a manifest. Substantive requirements will be applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Preparation of offsite shipment of hazardous waste	PG&E	This Work Plan, specifically Section 5 (Waste Management Plan and Recoverable Materials), Appendix D (Transportation Plan), and Appendix F (Soil Management Plan)	Action	Section 5 (Waste Management Plan and Recoverable Materials), and Appendices D and F, which include use of the hazardous waste manifest, will be implemented during the IM-3 decommissioning, removal, and restoration activities.

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78	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 3, §66262.30, §66262.31, §66262.32, §66262.33	ARAR Applicable	Before transporting hazardous waste or offering hazardous waste for transportation off-site, the generator must do the following in accordance with DOT regulations: package the waste, label and mark each package of hazardous waste, and ensure that the transport vehicle is correctly placarded.	Preparation of offsite shipment of hazardous waste	PG&E	This Work Plan, specifically Section 5 (Waste Management and Recoverable Materials)	Action	Section 5 (Waste Management and Recoverable Materials), which addresses the preparation of offsite shipment of hazardous waste, will be implemented during IM-3 decommissioning, removal, and restoration activities.
79	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 3, §66262.34	ARAR Applicable	Requirements with respect to accumulation of waste on-site.	Accumulation of hazardous waste onsite	PG&E	This Work Plan, specifically Section 5 (Waste Management and Recoverable Materials) and Appendix F (Soil Management Plan)	Action	Section 5 (Waste Management and Recoverable Materials) and Appendix F (Soil Management Plan), which address the requirements for onsite accumulation of hazardous waste by the waste generator, will be implemented during IM-3 decommissioning, removal, and restoration activities.
80	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 4, §66262.40, §66262.41	ARAR Applicable	Establishes requirements for record keeping of manifests, test results, waste analyses, and Biennial Reports. Any substantive requirements shall be attained.	Activity generating hazardous waste	PG&E	This Work Plan and Section 5 (Waste Management and Recoverable Materials)	Action	Section 5 (Waste Management and Recoverable Materials), which addresses the hazardous waste record keeping requirements, will be implemented during IM-3 decommissioning, removal, and restoration activities.
81	California Action-Specific	Corrective Action - Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.100 (a) through (d), (f), (g)(1), and (h)	ARAR Relevant and Appropriate	The owner or operator is required to take corrective action under Title 22, CCR, §66264.91 to remediate releases from the regulated unit and to ensure that the regulated unit achieves compliance with the water quality protection standard. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Remedy implementation	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.

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82	California Action-Specific	Corrective Action for Waste Management Units -Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.101	ARAR Relevant and Appropriate	The owner or operator is required to take corrective action to remediate releases from any solid or hazardous waste management unit at the facility to protect public health and the environment. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Remedy implementation	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
83	California Action-Specific	Closure and post-closure care -Title 22, CCR, Div 4.5, Ch 14, Article 7, §66264.111, §66264.112, §66264.115 through 120	ARAR Applicable	Owners and operators shall close a facility and perform post-closure care when contaminated subsurface soil cannot be practically removed or decontaminated. Contaminated soil, residues, or groundwater from remedial action at a site will achieve clean closure; otherwise, post-closure care requirements will be relevant and appropriate.	Decommissioning	PG&E	This Work Plan Documents required by the Soil RFI/RI and CMS/FS process	Action	Implementation of this Work Plan and the soil RFI/RI and CMS/FS process will achieve clean closure and satisfy the closure performance standard.
84	California Action-Specific	Use and management of containers -Title 22, CCR, Div 4.5, Ch 14, Article 9	ARAR Applicable	Containers used for the transfer or storage of hazardous waste must be in good condition, compatible with the waste, kept closed except to add or remove materials and be inspected weekly. The area used to store the containers must provide adequate secondary containment and be designed with runoff controls. Also, appropriate closure of the containers must take place.	Design and management of hazardous waste containers	PG&E	This Work Plan, specifically Section 5 (Waste Management and Recoverable Materials) and Appendix F (Soil Management Plan)	Action	Section 5 (Waste Management and Recoverable Materials) and Appendix F (Soil Management Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities.
85	California Action-Specific	Tank systems - Title 22, CCR, Div 4.5, Ch 14, Article 10	ARAR Applicable	The remedial activities may involve storage and/or treatment in tanks. These tanks are required to have secondary containment, be monitored and inspected, be provided with overfill and spill protection controls, and operated with adequate freeboard. Also, appropriate closure must take place.	During project design, operation and maintenance activities where tank systems are used to transfer, store or treat hazardous waste	PG&E	This Work Plan, specifically Section 5.1.3 (Onsite Management)	Action	Section 5.1.3 (Onsite Management), which addresses accumulation in portable tanks within secondary containment, will be implemented during IM-3 decommissioning and removal activities.

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86	California Action-Specific	Waste piles - Title 22, CCR, Div 4.5, Ch 14, Article 12	ARAR Applicable	The waste piles should be placed upon a lined foundation or base with a leachate system, protected from precipitation and wind dispersal, designed to prevent run on and run off. Also, closure and post-closure care requirements. Remedial action may involve soil excavation and the compiling of soil in a temporary waste pile. This requirement is applicable if the excavated waste meets RCRA hazardous waste criteria.	Under broad application, a triggering event could be any temporary stockpiling of haz soil	PG&E	This Work Plan, specifically Appendix F (Soil Management Plan)	Action	Appendix F (Soil Management Plan) will be implemented during IM-3 decommissioning, removal, and restoration activities. Permanent waste piles subject to the requirements of Chapter 14 Article 12 will not be created during decommissioning. If necessary, temporary staging piles will be used that meet the requirements of California Health and Safety Code Section 25123.3.
87	California Action-Specific	Landfills - Title 22, CCR, Div 4.5, Ch 14, Article 14	ARAR Relevant and Appropriate	The requirements for landfills include the design and operation, action leakage rate, monitoring and inspection, response actions, surveying and recordkeeping and closure and post-closure care.	Design, construction, O&M, and closure of landfills (66260.10 defines "Landfill" as a disposal facility or part of a facility where hazardous waste is placed in or on land and which is not a pile, a land treatment facility, a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground mine, a cave, or a corrective action management unit.)	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not include construction of a landfill.

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88	California Action-Specific	Miscellaneous Units - Title 22, CCR, Div 4.5, Ch 14, Article 16	ARAR Applicable	Applies to waste management unit not otherwise regulated under RCRA. It may include pumps, auxiliary equipment, air strippers, etc. The substantive requirements include design, construction, operation, maintenance and closure of the unit that will ensure protection of human health and the environment. The actions include general inspections for safety and operation efficiency, testing and maintenance of the equipment (including testing of warning systems). Applicable if pumps are used for extraction and treatment of leachate that meets RCRA hazardous waste criteria.	Design, construct, O&M, and closure of waste management units not otherwise regulated under RCRA	PG&E	This Work Plan	Action	Procedures specified in Section 4 (Decommissioning Procedures) and Section 5 (Waste Management Plan and Recoverable Materials) will result in any equipment identified as a miscellaneous unit being appropriately classified, and either disposed or decontaminated and recycled.
89	California Action-Specific	Land Disposal Restrictions (LDR) for RCRA wastes and non-RCRA wastes - Title 22, CCR, Div 4.5, Ch 18, Articles 1, 3, 4, 10, 11	ARAR Applicable	Movement of hazardous waste to new locations and placed in or on land will trigger LDR. General applicability, dilution prohibited, waste analysis and record keeping, and special rules apply for wastes that exhibit a characteristic waste. Best Demonstrated Available Technology (BDA) standards for each hazardous constituent in each listed waste, if residual is to be disposed. Utilize treatment standards table when necessary. Where applicable, hazardous waste generated from remedial activities must comply with LDR and meet the treatment standards or notify the disposal facility of the treatment standards before disposal at an appropriate offsite disposal facility.	Activity that generates hazardous waste	PG&E	This Work Plan, specifically Section 5 (Waste Management Plan and Recoverable Materials)	Action	IM-3 decommissioning and removal activities are not expected to involve onsite placement of hazardous waste that will trigger the LDR requirements. Hazardous waste generated will be characterized to determine if LDR treatment standards are exceeded. A notification will be submitted to the disposal facility indicating whether the waste is restricted from land disposal and whether it exceeds an applicable treatment standard.

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90	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards for owners and operators of hazardous waste transfer and TSD facilities, Title 22, CCR, Div 4.5, Ch 14, Articles 3 and 4	ARAR Applicable	Establish requirements for a facility to plan for emergency conditions. In addition, the design and operation of the facility must be done to prevent releases. Other requirements include testing and maintenance of equipment and incorporation of communication and alarm systems and contingency plan. The requirements may be applicable if CERCLA response action includes treatment, storage, or disposal as defined under RCRA, or may be relevant and appropriate if the requirements address problems or situations sufficiently similar to the specific circumstances at the site that their usage will be well suited.	Design, construction, operation and maintenance of the remedy	PG&E	This Work Plan Construction/ Remedial Action Work Plan	Action	This Work Plan addresses best management practices and measures to prevent releases during IM-3 decommissioning and removal activities. The Construction/Remedial Action Work Plan address communications and contingencies during construction.
91	California Action-Specific	Hazardous Waste Control Act (HWCA) - Groundwater monitoring and response, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.91 (a) and (c)	ARAR Relevant and Appropriate	Owners or operators of a RCRA surface impoundment, waste pile, land treatment unit, or landfill shall conduct a monitoring and response program for each regulated unit. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, construction, operation and maintenance of the remedy	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
92	California Action-Specific	Hazardous Waste Control Act (HWCA) - Monitoring, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.97 (b), (c), (d) and (e)(1) through (e)(5)	ARAR Relevant and Appropriate	Requirements for monitoring groundwater, surface water, and vadose zone. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
93	California Action-Specific	Hazardous Waste Control Act (HWCA) - Detection Monitoring Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.98	ARAR Relevant and Appropriate	Requires the owner or operator of a regulated unit to develop a detection monitoring program that will provide reliable indication of a release. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.

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94	California Action-Specific	Hazardous Waste Control Act (HWCA) - Evaluation Monitoring, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.99	ARAR Relevant and Appropriate	Requires the owner or operator of a regulated unit to develop an evaluation monitoring program that can be used to assess the nature and extent of a release from the unit. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E		No Action	Monitoring of the groundwater remedy will be conducted throughout the IM-3 decommissioning, removal, and restoration activities. No additional monitoring is required for IM-3 activities.
95	California Action-Specific	Discharges of Waste to Land - Title 23 CCR, Div 3, Ch 15	ARAR Relevant and Appropriate	The regulations in this chapter pertain to water quality aspects of hazardous waste discharge to land, establishing waste and site classifications and waste management requirements for waste treatment, storage, or disposal in landfills, surface impoundments, waste piles, and land treatment facilities. Requirements in this chapter are minimum standards for proper management of each waste category. Pursuant to Section 2511 (Exemptions), because this remediation constitutes actions taken by public agencies to cleanup unauthorized releases of waste, these regulations will only apply if the proposed remedial activities include (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	Activities involve (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	PG&E		No Action	Because implementation of this Work Plan and the soil RFI/RI and CMS/FS process will achieve clean closure, this ARAR will not be triggered.
96	California Action-Specific	Consolidated Regulations for Storage, Treatment, Processing, or Disposal of Solid Waste - Title 27 CCR, Div 2, Subdivision 1	ARAR Relevant and Appropriate	The regulations in this subdivision (promulgated by the State Water Resources Control Board [SWRCB]) pertain to water quality aspects of discharges of solid waste to land for treatment, storage, or disposal. Pursuant to Section 20090 (Exemptions), because this remediation constitutes actions taken by public agencies to cleanup unauthorized releases of waste, these regulations will only apply if the proposed remedial activities include (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	Activities involve (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	PG&E		No Action	Because implementation of this Work Plan and the soil RFI/RI and CMS/FS process will achieve clean closure, this ARAR will not be triggered.

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97	California Action-Specific	Requirements for land-use covenants - Cal. Code Regs. Title 22, § 67391.1	ARAR Applicable	This regulation requires appropriate restrictions on use of property in the event that a proposed remedial alternative results in hazardous materials remaining at the property at levels which are not suitable for unrestricted use of the land. This is an ARAR with respect to PG&E-owned land at the Topock site.	A decision document finding that hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels which are not suitable for unrestricted use of the land.	DTSC		No Action	While implementation of this Work Plan itself does not trigger compliance with this ARAR, the final groundwater remedy includes restrictions on use of the groundwater for potable use. The land use covenants (institutional controls) are described in Section 5.0 of the 90% Design document.
98	California Action-Specific	California Water Code - Section 1380[c], California Well Standards, Bulletin 74-90 (Supplement to Bulletin 74-81)	ARAR Applicable	These standards for water, cathodic, and monitoring wells will be applicable if the remediation requires use of such wells.	Design, construction, decommission of groundwater wells	PG&E	This Work Plan, specifically Section 4.1 (Wells)	Action	The general approach for decommissioning wells has been developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes. Section 4.1 of this Work Plan includes procedures for decommissioning IM-3 wells consistent with this approach.
99	California Action-Specific	State Water Resources Control Board Resolution No. 88-63 Adoption of Policy Entitled "Sources of Drinking Water"	ARAR Applicable	With certain exceptions, all surface and ground waters of the State of California are to be considered suitable, or potentially suitable, for municipal or domestic water supply. The Regional Water Quality Control Board and State Water Resources Board have designated the beneficial use of the ground and surface waters in the Topock Site area as "municipal and domestic water supply." This designation is set forth in the Basin Plan.	Remedy implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities.
100	California Action-Specific	Water Quality Control Plan; Colorado River Basin-Region 7, June 2006 (Basin Plan)	ARAR Applicable	This Basin Plan designates the Colorado River and the Colorado Hydrologic unit as having the beneficial use of "MUN" (or, municipal or domestic water supply). The Basin Plan also prescribes General Surface Water Objectives and Ground Water Objectives, in addition to Specific Surface Water Objectives for the Colorado River, which include a flow-weighted average annual numeric criterion for salinity for the portion of the Colorado River on the Topock Site of 723 mg/L. This TDS value must not be exceeded in any remedial alternative being considered	Remedy implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3 activities.

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101	California Action-Specific	State Water Resources Control Board Resolution No. 68-16 ("Antidegradation Policy") - Statement of Policy with respect to Maintaining High Quality of Waters in California	ARAR Applicable	Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.	Remedy implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3, beyond implementation of this work plan.
102	California Action-Specific	State Water Resources Control Board Resolution No. 92-49 -- Policies and Procedures for investigation and Cleanup and Abatement of Discharges under Water Code Section 13304	ARAR Relevant and Appropriate	Section III.A of this Resolution states that the Regional Water Board shall" "concur with any investigative and abatement proposal which the discharger demonstrates and the Regional Water Board finds to have a substantial likelihood to achieve compliance within a reasonable time frame…"	Remedy implementation	PG&E		No Action	Compliance with this requirement will be achieved through implementation of the groundwater remedy. The groundwater remedy will be in operation throughout the IM-3 decommissioning, removal, and restoration activities. No further action is required for IM-3, beyond implementation of this work plan.
Location-Specific									
5	Federal Location-Specific	Federal Land Policy and Management Act - (FLPMA);43 USC § 1701, et seq.; 43 CFR 2800	ARAR Applicable	In managing public lands, BLM is directed to take any action necessary to prevent unnecessary or undue degradation of the lands. Actions[3] taken on the public land (i.e. BLM-managed land) portions of the Topock site should provide the "optimal balance between authorized resource use and the protection and long-term sustainability of sensitive resources."	Activities on public lands	BLM	This Work Plan	Action	PG&E understands that DOI will coordinate its review of this submittal with BLM.

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7	Federal Location-Specific	National Wildlife Refuge System Administration Act, as amended - 16 USC §§ 668dd-ee; 50 CFR Part 27	ARAR Applicable	This Act governs the use and management of National Wildlife Refuges. The Act requires that USFWS evaluate ongoing and proposed activities and uses to ensure that such activities are appropriate and compatible with both the mission of the overall National Wildlife Refuge System, as well as the specific purposes for which the Havasu National Wildlife Refuge (HNWR) was established. The Topock site includes portions of the HNWR. Prior to selection of a remedial action[3] by DOI/USFWS, that remedial action must be found by the Refuge Manager to be both an appropriate use of the HNWR and compatible with the mission of the HNWR and the Refuge System as a whole. [2]	Activities on the HNWR	USFWS/DOI	This Work Plan	Action	PG&E understands that DOI will coordinate its review of this submittal with USFWS.
13	Federal Location-Specific	Fish and Wildlife Coordination Act - 16 USC §§ 661-667e	ARAR Applicable	This Act requires that any federally-funded or authorized modification of a stream or other water body must provide adequate provisions for conservation, maintenance, and management of wildlife resources and their habitat. Necessary measures should be taken to mitigate, prevent, and compensate for project-related losses of wildlife resources. Any remedial action selected for the Topock site that includes any modification of a water body will be subject to these requirements.	Any modification of a water body	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve modification of a water body.

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14	Federal Location-Specific	National Historic Preservation Act - 16 USC § 470, et seq.;36 CFR 800.1, et seq.	ARAR Applicable	This statute and the implementing regulations direct federal agencies to consider the effects of their undertakings on historic properties included in or eligible for inclusion in the National Register of Historic Places and to consult with certain parties before moving forward with the undertaking. The agency must determine, based on consultation, if an undertaking's effects would be adverse and consider feasible and prudent alternatives that could avoid, mitigate, or minimize such adverse effects on a National Register or eligible property. The agency must then specify how adverse effects will be avoided or mitigated or acknowledge that such effects cannot be avoided or mitigated. The Topock site includes historic properties in or eligible for inclusion in the National Register and remedial action selected for the Topock site qualifies as an undertaking pursuant to the NHPA. Measures to avoid or mitigate adverse effects of any selected remedial action that are adopted by the agency through consultation must be implemented by the remedial action to comply with the NHPA.	Remedial action selected for the Topock site qualifies as an undertaking under NHPA	BLM, Advisory Council on Historic Preservation, California and Arizona State Historic Preservation Offices, USFWS, the Hualapai Indian Tribe and PG&E are parties to the PA	This Work Plan, the PA, the CHPMP, the Tribal Access Plan, Annual Reports	Action	Documents led by BLM include the PA, the CHPMP, the Brochure, the Annual Report, and the Tribal Access Plan. The PA has been completed under the National Historic Preservation Act. BLM has completed the Brochure to notify other state and federal agencies of the Signatories and Invited Signatories with the actions to be taken within the vicinity of the Topock Remediation Project, and the Topock Maze. The CHPMP, which is a requirement of the PA, was issued on January 20, 2012. The CHPMP can be modified and updated, as needed, to address new information and ongoing activities related to the project. Therefore, subsequent to the issuance of the CHPMP, BLM continues to hold periodic working meetings on the CHPMP. It should be noted that treatment measures are included in the CHPMP. A Treatment Plan will be submitted to the Agencies along with the 90% design.. Applicable requirements in the PA and CHPMP measures will be adhered to as set forth in this Work Plan in Tables 6-2 and 6-3. The Tribal Access Plan for lands under federal management was completed on November 26, 2011. PG&E has also prepared an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan. The Access Plan is included in an appendix of the Construction/Remedial Action Work Plan. Annual reports of cultural resources activities will be prepared and submitted to all Signatories, Tribes, and Invited Signatories as directed in the PA. BLM published the first Annual Report on November 25, 2011, and the second Annual Report on January 29, 2013. The Third Annual Report was provided by BLM to the Signatories, Tribes, and Invited Signatories for comment on June 18, 2014. The PA requires that such reports will be prepared and submitted by December 1 each year for the first five years after execution of the PA and every two years thereafter.

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17	Federal Location-Specific	National Archaeological and Historic Preservation Act - 16 USC § 469, et seq.; 36 CFR 65	ARAR Applicable	This statute requires the evaluation and preservation of historical and archaeological data which might otherwise be irreparably lost or destroyed through any alteration of terrain as a result of federal construction projects or a federally-licensed activity. The Topock site includes historical and archaeological data. Any remedial action selected for the Topock site must include measures for the evaluation and preservation of historical and archaeological data that might be lost or destroyed as a result of the remedial action.	Alteration of terrain that threatens significant scientific, historical or archaeological data.	Federal Agencies, PG&E	PA, CHPMP	Action	Requirements in the PA and the CHPMP will be adhered to (see Tables 6-2 and 6-3 for details).
18	Federal Location-Specific	Archaeological Resources Protection Act - 16 USC § 470aa-ii, et seq.;43 CFR 7.1, et seq.	ARAR Applicable	This statute provides for the protection of archeological resources located on public and tribal lands. The Act establishes criteria which must be met for the land manager's approval of any excavation or removal of archaeological resources if a proposed activity involves soil disturbances. The Topock site includes archaeological resources on public land. Any remedial action selected for the Topock site must satisfy the criteria applicable to excavation or removal of archaeological resources that might be affected as a result of the remedial action.	Disturbance of archaeological and historical sites	Federal Agencies, PG&E	PA, CHPMP	Action	Requirements in the PA and the CHPMP will be adhered to (see Tables 6-2 and 6-3 for details).

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TABLE 6-4
Summary of Compliance with Identified ARARs
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/future document(s) will document continued compliance with this ARAR?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
19	Federal Location-Specific	Historic Sites Act - 16 USC 461-467	ARAR Applicable	Pursuant to this Act, federal agencies are to consider the existence and location of historic sites, buildings, and objects of national significance using information provided by the National Park Service to avoid undesirable impacts upon such landmarks. There are no designated historic landmarks within the APE, although 16 USC 461, through Public Law 106-45, provides for a cooperative program "for the preservation of the Route 66 corridor" through grants and other measures. Undesirable impacts on this site that might result from any remedial action selected for the Topock site will be evaluated and mitigated to the maximum extent practicable.	Existence of a historic landmark	Federal Agencies		No Action	There are no historic landmarks in the APE. No further action is required.
21	Federal Location-Specific	Native American Graves Protection and Repatriation Act (NAGPRA) - 25 USC § 3001, et seq.; 43 CFR 10.1, et seq.	ARAR Applicable	NAGPRA establishes requirements regulating the removal and trafficking of human remains and cultural items, including funerary and sacred objects. The Topock site may contain human remains. If remediation activities result in the discovery of Indian human remains or related objects, NAGPRA requirements must be met.	Federal Lands only - Discovery of human remains	PG&E	PA, CHPMP	Action	Requirements in the PA and the CHPMP will be adhered to (see Tables 6-2 and 6-3 for details).
22	Federal Location-Specific	American Indian Religious Freedom Act - 42 USC § 1996, et seq.	ARAR Relevant and Appropriate	The United States must "protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise [their] traditional religions..." Any remedial action selected for the Topock site must satisfy this requirement.	Remedy selection	Federal Agencies (BLM Lead), PG&E	Tribal Access Plan	Action	BLM led the preparation of the Tribal Access Plan for lands under federal management, and the Plan was completed on November 26, 2011. The EIR-required Access Plan was prepared by PG&E, and included as an appendix to the Construction/Remedial Action Work Plan.
27	Federal Location-Specific	Resource Conservation and Recovery Act - 42 USC § 6901, et seq.; 40 CFR 264.18	ARAR Applicable	These regulations promulgated under RCRA establish Seismic and Floodplain considerations which must be followed for treatment, storage, or disposal facilities constructed, operated, or maintained within certain distances of fault lines and floodplains. Portions of the Topock site are located on or near a 100-year floodplain.	Infrastructure in 100-year floodplain/ regulatory floodway	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve infrastructure in 100-year floodplain/regulatory floodway.

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TABLE 6-4
Summary of Compliance with Identified ARARs
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/future document(s) will document continued compliance with this ARAR?	Action/No Action for IM-3 Decommissioning and Restoration?	Action to be Taken/ Rationale for No Action
43	Arizona Location-Specific	Archeological Discoveries - A.R.S. § 41-841 through 847	ARAR	This Act prohibits any person from knowingly excavating on Arizona State or State agency owned land which is a historic or prehistoric ruin, burial ground, archaeological or paleontological site. These requirements will apply if the selected remedy involves excavation in Arizona.	Only if remedy in Arizona - Discovery of any archaeological, paleontological or historical site or object (including human remains) that is at least fifty years old	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities will not occur in Arizona.
44	Arizona Location-Specific	Historic Preservation - A.R.S. § 41-865	ARAR	This Act restricts any person from disturbing human remains or funerary objects on lands other than lands[2] owned or controlled by the State. These requirements will apply if the selected remedy involves excavation in Arizona.	Only if remedy in Arizona on private lands - Discovery of human remains/funerary objects	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities will not occur in Arizona.
63	California Location-Specific	Seismic and Floodplain standards -Title 22, CCR, Div 4.5, Ch 14, Article 2, §66264.18	ARAR Relevant and Appropriate	These standards are relevant and appropriate for TSD facilities constructed, operated, or maintained within certain distances of fault lines, floodplains, or the maximum high tide.	Infrastructure in 100-year floodplain/ regulatory floodway	PG&E		No Action	IM-3 decommissioning, removal, and restoration activities do not involve infrastructure in 100-year floodplain/regulatory floodway.

Notes:
[1] Source: Table 2 of the Groundwater Record of Decision, Pacific Gas and Electric Company Topock Compressor Station, Needles, San Bernardino County, California, December 2010 (DOI, 2011).
[2] As corrected by the Department of the Interior.
[3] The "action" notation in Location-specific ARARs #5 and 7 refers to the DOI Record of Decision (DOI, 2011), surnamed by the Bureaus (BLM, BOR, USFWS) and Bureau of Indian Affairs.

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SECTION 7

Soil Confirmation Sampling and Coordination with Soil RFI/Remedial Investigation

7.1 Sampling Objectives

Objectives for the soil sampling are as follows:

- Assess soil conditions in the vicinity of the IM-3 system, including the IM-3 Treatment Plant, a portion of the MW-20 Bench affected by IM-3 operations, vaults associated with the injection wells and extraction wells, and injection well support structure in the East Mesa. Background information, including operational history, incidental spill information, and summary of existing data for IM-3 Treatment Plan (AOC 29) and MW-20 Bench (AOC 30) is presented in the *Addendum to RCRA Facility Investigation/Remedial Investigation Report, Volume 1, Topock Compressor Station Needles, California* (CH2M HILL, 2014d).
- Collect sufficient soil samples in the IM-3 Treatment Plant (AOC 29) and MW-20 Bench (AOC 30) to support the data quality objectives set forth in the Soil RFI/RI program. To support this objective, additional data will be collected at these AOCs as part of the baseline sampling during the Topock groundwater remedy system installation, as proposed in the forthcoming Groundwater Remedy Implementation – Baseline Sampling and Analysis Plan. A portion of AOC 30 MW-20 Bench will be used to support the groundwater remedy, so this AOC will not be fully investigated until groundwater remedy decommissioning sampling is conducted.

7.2 Sampling Plan

Confirmation soil samples will be collected at the IM-3 Treatment Plant, MW-20 Bench, the vaults associated with the injection wells (IW-02 and IW-03) and extraction wells (TW-2S, TW-2D, TW-3D, and PE-1), and the injection well support structure in the East Mesa. Confirmation soil sampling is not proposed along the IM-3 pipelines, because new pipeline alignments proposed as part of the 90% design for the Final Remedy will be located adjacent to the existing IM-3 pipelines. Baseline soil samples will be collected along these new pipeline alignments during Final Remedy implementation. The baseline sampling data collected along the pipeline alignments will be used as the decommissioning confirmation samples and will be evaluated as described in Section 7.3. The proposed baseline soil sampling is presented in the *Baseline Soil Sampling and Analysis Plan, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California*, Appendix A of Volume 4 of the Draft O&M Manual for the Groundwater Remedy (CH2M HILL, 2013b).

If the Final Remedy pipeline alignments are adjusted or modified during the 90% design, or if a spill occurs along the IM-3 pipelines after implementing the baseline soil sampling, the new locations and spill information will be reviewed and appended to this Work Plan, as necessary.

7.2.1 Numbers and Locations

To assess soil conditions at the IM-3 Treatment Plant and MW-20 Bench and minimize the volume of soil sent offsite for analysis, soil samples will be collected using the following phased sampling approach:

Step 1 X-Ray Fluorescence (XRF) Screening: XRF screening will be used to identify areas of potential contamination where soil samples will be collected for off-site laboratory analysis (see Step 2 below). This first step will include collection of XRF screening samples (soil volume is considerably reduced from regular laboratory sample) on 50-foot centers across the AOCs, as shown on Figure 7-1. In areas with buildings, foundations, or pavement/gravel, XRF screening samples will be collected at 0.5 foot below these features after removal. If the excavation required to remove building and support structure foundations is greater than 3 feet below the ground surface (bgs), XRF screening samples will also be collected from the bottom of the excavation. The results of the XRF screening will be screened against Topock Specific Background Values (if available), and residential screening levels (screening levels).

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Step 2 Offsite Laboratory Analysis: If XRF metal results exceed applicable screening levels, an additional soil sample will be collected at the same location as the XRF screening location and sent to an offsite laboratory for analysis. If none of the XRF screening samples exceed screening levels, additional soil samples will be collected at the XRF screening locations in operational areas or areas where known releases occurred within each AOC. A minimum of 10 soil samples will be collected at each AOC to obtain sufficient data to satisfy the Soil RFI/RI Investigation Data Quality Objectives.

Samples will also be collected at injection/extraction well vaults and the injection wells support structure in the East Mesa. One sample from 0.5 feet below the bottom of the vault will be collected from the approximate center of well vault locations after the vault or structure has been removed (see Figure 7-2). The Well Vault completion depth and proposed soil sample depths are as follows:

Well Vault	Completion Depth (feet bgs)	Proposed Sample Depth (feet bgs)
IW-2, IW-3	5 ft, 8 inches	6 ft, 2 inches
PE-1	7 ft, 8 inches	8 ft, 2 inches
TW-2S, TW-2D, TW-3D	2 ft, 4 inches	2 ft, 10 inches

Sample locations will be modified to collect samples in areas of visible contamination or near potential release areas. Table 7-1 lists analytical suites for the sample locations.

7.2.2 Sampling and Analytical Procedures

For consistency between the IM-3 decommissioning and the Soil RFI/RI program, soil sample collection and handling activities will follow the SOPs included in the Soil RFI/RI Work Plan (CH2M HILL, 2013a). Following finalization, the SOPs will be appended to this Work Plan. Table 7-2 summarizes sample containers, preservation, and hold times.

7.2.3 Sample Management and Storage

Samples will be placed immediately into field coolers with ice; volatile organic compound (VOC) and total petroleum hydrocarbon (TPH)-gasoline containers will be arranged in the sample cooler standing upright. The field coolers will be taken to the sample management area, where the samples will be transferred into a refrigerator or freezer. If transport of a sample to the laboratory is scheduled for pick up more than 24 hours after sampling, samples will be stored in the freezer.

7.2.4 Shipping

Samples collected for chemical analysis will be transported to the laboratory via courier, generally daily. Chains-of-custody will accompany samples to the laboratory.

7.3 Soil Data Evaluation

Confirmation soil data collected at the IM-3 Treatment Plant (AOC 29) and MW-20 Bench (AOC 30) will be evaluated following the data gaps evaluation process outlined in the Soil RFI/RI Work Plan (CH2M HILL, 2013a). The data gaps evaluation for these AOCs, including results and conclusions, may be presented in the Compressor Station RFI/RI Volume 3 Report.

The results of confirmation soil data collected in areas outside of the IM-3 Treatment Plant and MW-20 Bench, including the baseline soil data from along the pipeline alignments, the vaults associated with the injection wells (IW-02 and IW-03), and the injection well support structure in the East Mesa, will be compared to the site-specific background values presented in Table 7-3. Initially, the comparison will be done on a point-by-point basis. If confirmation results are below the site-specific background values, then no further evaluation is necessary for that location. If confirmation results are above the site-specific background values, then an area-wide average

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concentration will be calculated as the 95th percent upper confidence limit of the mean, using ProUCL Version 4.0 software (USEPA, 2007). If area-wide average concentrations are below the site-specific background values, then no further evaluation is necessary. If area-wide average concentrations are above the site-specific background values, then further decisions for that specific area will be postponed until site-specific soil remedial goals have been developed.

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TABLE 7-1
Sites Planned for Removal and Confirmation Sampling Analytical Suite
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Soil RFI/RI Investigation Area	Analytical Suite
IM-3 Treatment Plant Area (AOC 29)	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, ferrous iron
MW 20 Bench (AOC 30)	Title 22 metals, hexavalent chromium
Injection/Extraction Well Vaults	Title 22 metals, hexavalent chromium
Injection Well Support Structure	Title 22 metals, hexavalent chromium

Notes:
PAH – polynuclear aromatic hydrocarbon
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

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TABLE 7-2
Sample Containers, Preservation, and Holding Times
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
Metals (except hexavalent chromium)	SW6010B or C, SW6020A, EPA200.7, EPA200.8, SM3120B, EPA245.1, SW7000 series methods	1-liter P or G	8-oz/P, G, or T	Water: add HNO_3 to pH<2; soil/sediment: none	28 days for mercury; 180 days for others
Hexavalent Chromium	SW7199	Not applicable	4-oz/P, G, or T	Soil/sediment: chill to 4°C (±2°C)	Soil: 30 days to extraction, 7 days to analysis
Hexavalent Chromium	EPA218.6	250-ml P	Not applicable	Chill to ≤6°C Laboratory or field filtration within 24 hours After filtration adjust the pH to 9 to 9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Hexavalent Chromium	SM3500-Cr B	250-ml P	Not applicable	Chill to ≤6°C Laboratory or field filtration within 24 hours After filtration adjust the pH to 9 to 9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Purgeable TPH	SW8015B, C or D Preparation methods: SW5035B (soil) SW5030B (water)	Three 40-ml G-TLC	Three 40-ml G-TLC	Water: add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: chill to 4°C (±2°C) and or • frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved within 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol
Extractable TPH	SW8015B, C or D	Two 1-liter G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis

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TABLE 7-2
Sample Containers, Preservation, and Holding Times
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
VOCs	SW8260B or C Preparation methods: SW5035B (soil) SW5030B (water)	Three 40-ml G-TLC	Three 40-ml G-TLC	Water: add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: chill to 4°C (±2°C) and or • Frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved with 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol
SVOCs	SW8270C or D	Two 1-liter G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
PAHs	SW8270SIM	Two 1-liter Amber G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
pH	SM4500H+B or SW9040	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C	15 minutes

Notes:

<	=	less than	NH_4OH	=	ammonium hydroxide
≤	=	less than or equal to	$(NH_4)_2SO_4$	=	ammonium sulfate
°C	=	degrees Celsius	oz	=	ounce
Cr	=	chromium	P	=	polyethylene
G	=	glass	PCB	=	polychlorinated biphenyl
HCl	=	hydrochloric acid	T	=	brass sleeves in the sample barrel (sometimes called California brass)
HNO_3	=	nitric acid	TLC	=	Teflon-lined closure
ml	=	milliliter			

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TABLE 7-3
Site-specific Background Values for Metals
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Analyte	Background Values (mg/kg)
Aluminum	16,400
Antimony	---
Arsenic	11
Barium	410
Beryllium	0.672
Cadmium	1.1
Calcium	66,500
Cr	39.8
Cr, Hexavalent	0.83
Cobalt	12.7
Copper	16.8
Cyanide	---
Iron	---
Lead	8.39
Magnesium	12,100
Manganese	402
Mercury [1]	---
Molybdenum	1.37
Nickel	27.3
Potassium	4,400
Selenium	1.47
Silver	---
Sodium	2,070
Thallium	---
Vanadium [2]	52.2
Zinc	58

Notes:

[1] Mercury: mercury, inorganic salts

[2] The oral reference dose (RfD) used for the vanadium screening level is derived from the Integrated Risk Information System oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

--- = data not collected, available or applicable

mg/kg = milligrams per kilogram

Source: CH2M HILL, 2009.

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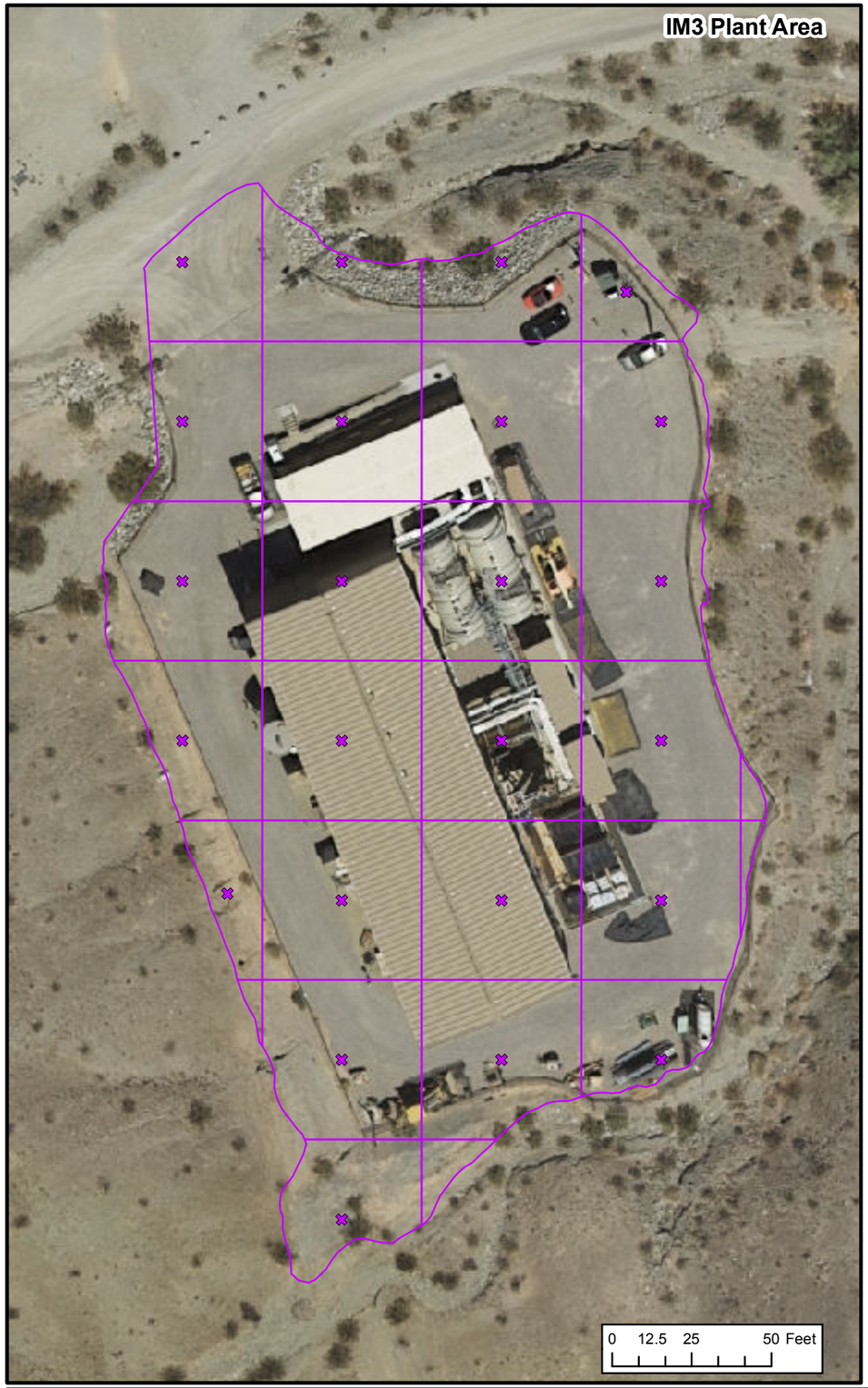
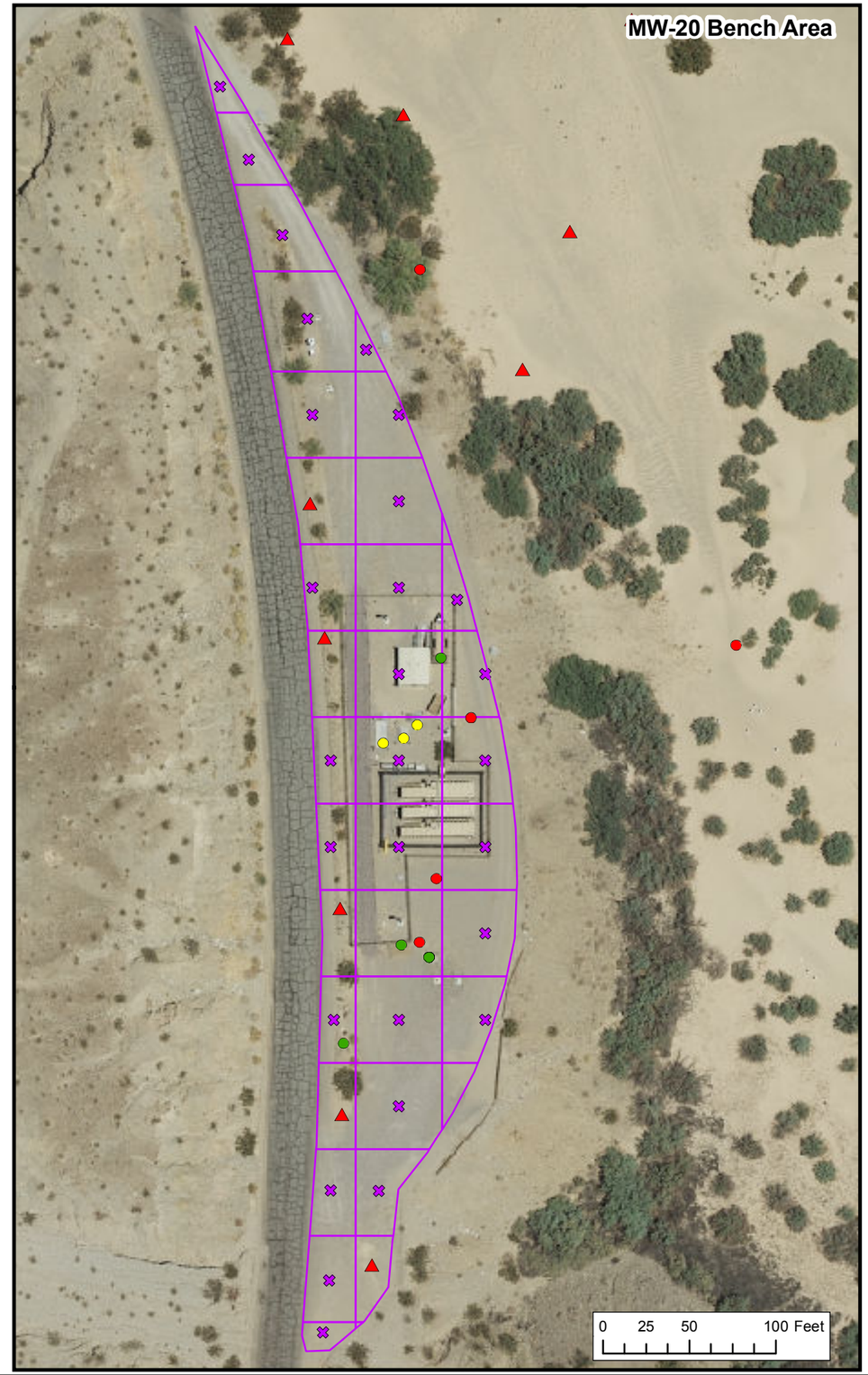
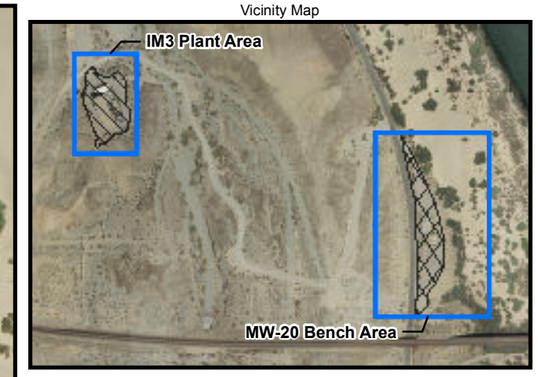




Vicinity Map



LEGEND

- Proposed Baseline Remedy System Soil Sample Location
- Proposed Baseline Remedy System Well and Vault Soil Sample Location
- Existing Soil Sample Location
- XRF Soil Screening Sample Location
- Decommissioning Soil Sampling Location
- 50-square-foot Sampling Grid

1. Baseline soil samples will be collected at 0.5 feet below ground surface (bgs) for aboveground Remedy System pipelines/conduit runs and from the bottom of the trench for underground Remedy System pipelines/conduit runs approximately every 500 linear feet along proposed pipeline/conduit runs.
2. Baseline soil samples will be collected at 1 foot bgs at each new Remedy System monitoring, extraction, injection, and recirculation well and at 0.5 feet bgs from the bottom of the associated well vault.
3. X-Ray Fluorescence (XRF) screening samples will be collected from surface soil or 0.5 feet bgs buildings, foundations or pavement/gravel. Results of the XRF screening will be screened against Topock Specific Background Values (if available), and residential screening levels (screening levels). If XRF metal results exceed applicable screening levels, an additional soil sample will be collected at the same location and sent to an offsite laboratory for analysis. If none of the XRF screening samples exceed screening levels, additional soil samples (minimum of 10 soil samples) will be collected at the XRF screening locations in operational areas or areas where known releases occurred within each AOC.
4. Decommissioning soil samples will be collected from 0.5 feet below the injection/extraction well vaults.

FIGURE 7-1
PROPOSED SAMPLE LOCATIONS AT IM3 AND MW-20 BENCH
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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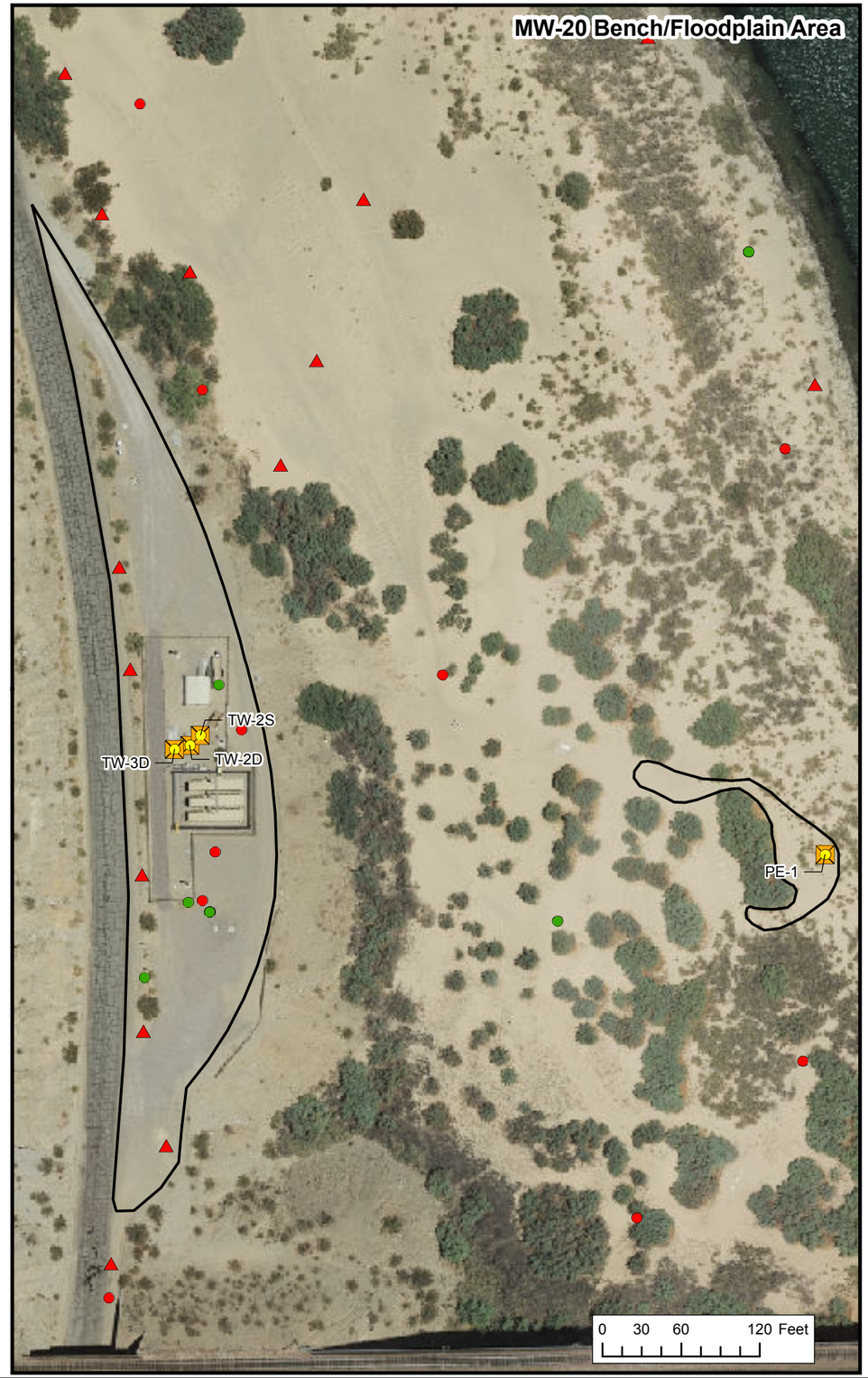
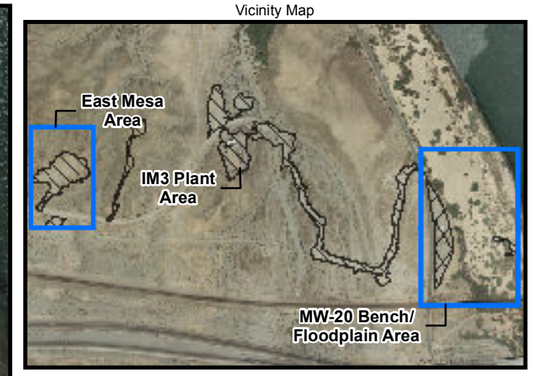


Vicinity Map



LEGEND

- Proposed Baseline Remedy System Soil Sample Location
- Proposed Remedy System Well and Vault Soil Sample Location
- Existing Soil Sample Location
- Decommissioning Soil Sampling Location
- Injection Well
- Extraction Well
- Restoration area

1. Baseline soil samples will be collected at 0.5 feet below ground surface (bgs) for aboveground Remedy System pipelines/conduit runs and from the bottom of the trench for underground Remedy System pipelines/conduit runs approximately every 500 linear feet along proposed pipeline/conduit runs.
2. Baseline soil samples will be collected at 1 foot bgs at each new Remedy System monitoring, extraction, injection, and recirculation well and at 0.5 feet bgs from the bottom of the associated well vault.
3. X-Ray Fluorescence (XRF) screening samples will be collected from surface soil or 0.5 feet bgs buildings, foundations or pavement/gravel. Results of the XRF screening will be screened against Topock Specific Background Values (if available), and residential screening levels (screening levels). If XRF metal results exceed applicable screening levels, an additional soil sample will be collected at the same location and sent to an offsite laboratory for analysis. If none of the XRF screening samples exceed screening levels, additional soil samples (minimum of 10 soil samples) will be collected at the XRF screening locations in operational areas or areas where known releases occurred within each AOC.
4. Decommissioning soil samples will be collected from 0.5 feet below the injection/extraction well vaults.

FIGURE 7-2
PROPOSED SAMPLE LOCATIONS AT IM3 INJECTION WELLS, EXTRACTION WELLS, AND THE INJECTION WELL SUPPORT STRUCTURE

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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SECTION 8

Restoration and Demobilization

8.1 General Restoration Approach

This Work Plan presents the general approach for restoration of the areas originally affected by IM-3 operations. In parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed.

As stated in the responses to comments on the 60% design (response to comment [RTC] #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.

Implementation of this Work Plan and the Site-Specific IM-3 Restoration Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities, by grading, contouring, and revegetating the site. This Work Plan and the Site-Specific IM-3 Restoration Plan will meet the requirements of the EIR MMRP (BIO-2c); the PA (Stipulation V); the 2006 Settlement Agreement between PG&E and FMIT (Section VII); the Consent Decree between the federal government and PG&E; and other applicable requirements.

8.1.1 Restoration Areas

In July 2005, PG&E estimated the total area of floodplain and upland land disturbed by IM-3 construction activities to be approximately 8.0 acres. Of these 8.0 acres, approximately 3.9 acres are on ground that was previously significantly disturbed[3] and 4.1 acres are previously undisturbed land. Of the 4.1 acres, approximately 1.2 acres are located on public (BLM) land and 2.9 acres are located on land owned by FMIT (previously owned by PG&E). A detailed breakdown of this estimate and a description of the methods used to generate this estimate are documented in the IM-3, Land Area Use memorandum, dated July 8, 2005 (see Appendix H).

In addition to the 8.0 acres identified in Appendix H, approximately 1.3 acres that comprise the MW-20 Bench Facility, will be restored, with the exception of any facilities associated with the final remedy. The MW-20 Bench area was not included in the IM-3 Land Area Use memorandum as an area originally affected by IM-3 operations. However, three IM-3 extraction wells and Valve Vault No. 1 are located on this bench and will be decommissioned as a part of IM-3; therefore, this area is included as an area to be restored.

The total combined area to be restored in the floodplain and upland areas is approximately 9.3 acres. No additional undisturbed land outside of the estimated 9.3 acres is intended to be disturbed by IM-3 decommissioning activities. However, if land outside of the estimated 9.3 acres (excluding the proposed staging

[3] The July 2005 Land Area Use Memorandum noted that "Various past activities have resulted in significant previous disturbance of the area where the IM-3 construction is occurring. The area is traversed by a major railway line, several gas pipelines, historic U.S. Route 66, and the National Old Trails Highway. Portions of the area were disturbed by a former gravel quarry, roadside debris piles, World War II era military training exercises, and a former roadhouse/ restaurant adjacent to the IM-3 project site boundary. During the design of the IM-3 facilities, much care was taken to utilize these previously disturbed areas wherever possible. Trenching was routed along existing roadways and pipeline right of ways. The treatment plant and staging areas were located in the area previously disturbed by gravel quarrying during the construction of the former U.S. Route 66 highway."

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areas that will have ongoing activities) is disturbed during IM-3 decommissioning, it will be restored in accordance with the IM-3 Restoration Plan.

Primary IM-3 decommissioning activities will be restricted to the 9.3 acres identified and to the old rock quarry area (owned by FMIT and BLM), which is outside of the 9.3 acres. The anticipated work areas (general exclusion, primary support, and contaminant-reduction zones) will be within the 9.3 acres and the old rock quarry area. The rock quarry area will only be used for displaced materials storage, concrete crushing, potential recycling, reuse storage, and equipment staging. Established roads and access pathways will be maintained during decommissioning and restoration activities. After demobilization, the condition of established roads and access pathways will be returned to pre-mobilization condition.

Some staging areas identified for use during IM-3 decommissioning are outside of the identified 9.3 acre boundary. These areas include only ground that has been previously significantly disturbed that contains limited to no vegetation. These areas are reserved for either temporary facilities or staging activities, with only the exception of the old rock quarry area. Some of the identified staging areas will have ongoing activities (e.g. the Compressor Station, the Transwestern Metering Bench, the MW-24 Bench, the evaporation ponds area, the trailer park area in Moabi Regional Park, the parking areas off I-40, etc.). Given the sparse vegetation in the proposed staging areas outside the 9.3 acres and the ongoing activities, no formal site restoration and revegetation plan is anticipated. After demobilization, the condition of areas that were previously significantly disturbed outside of IM-3 construction and decommissioning activities will be returned to pre-mobilization condition. Figure 8-1 shows the IM-3 decommissioning work zones with an overlay of the 8.0 acres identified in the Land Area Use memorandum and the 1.3 acres that comprise the MW-20 Bench. This figure also identifies the property owners of areas included in the IM-3 decommissioning work zone.

8.1.2 Restoration Guidelines

After the aboveground IM-3 infrastructure and components have been decommissioned as discussed in Section 4, the land within the work zone will be returned to a safe condition prior to commencing restoration activities. To return the land to a safe condition, excavated infrastructure, such as buried well and pipeline vaults, partially buried buildings, the IM-3 Treatment Plant foundation, and trenches excavated to remove utility lines, will be backfilled with displaced material or foreign fill and compacted. Excess displaced material from the Final Remedy and displaced material from IM-3 Decommissioning activities may be used for backfill after the materials are tested and proven to be suitable for this use. Displaced material is defined as material removed from the earth as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The handling and disposition of displaced material will be in accordance with the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California*, which is Appendix F. Foreign fill may be used if there is not enough displaced site material to backfill the excavated area or if the displaced material is not suitable for backfilling a particular area.

Backfilling and grading the decommissioned IM-3 infrastructure areas will be coordinated with the selected remedial action for AOC 29 and AOC 30. If remedial action alternative selection for AOC 29 and AOC 30 is not complete at the time of subsurface infrastructure decommissioning, temporary controls, such as barricades or gravel, may be placed at excavated areas to render the locations safe until the final remedial action for AOC 29 and AOC 30 is selected and implemented, and the final backfilling and grading is established.

Following backfill and compaction, light grading may be required to provide proper drainage and to control erosion. Grading, contouring, drainage, and erosion control plans for the identified areas to be restored will be designed and included in the IM-3 Restoration Plan. Final grading and contouring will occur prior to revegetating the identified disturbed areas.

The following general steps will be conducted during restoration:

1. Verify that the above- and below-grade components, with the exception of any facilities associated with the final remedy, have been decommissioned in accordance with Section 4.

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2. Verify soil confirmation sampling is complete, in accordance with Section 7, and that remedial actions selected for AOC 29 and AOC 30 are implemented.
3. In coordination with the selected remedial action for AOC 29 and AOC 30, backfill holes or trenches created during the removal of IM-3 infrastructure or components with either displaced materials in accordance with Appendix F or with foreign fill.
4. Grade, contour, and compact the soil in accordance with the grading, drainage, and erosion control plans included in the Site-Specific IM-3 Restoration Plan.
5. Revegetate the area in accordance with the Site-Specific IM-3 Restoration Plan.
6. PG&E will seek opportunity with affected Tribes for blessings or other ceremonies before, during and after physical restoration activities.

The following section describes a procedural habitat restoration and revegetation approach, because they pertain to the areas to be restored.

8.1.3 Habitat Restoration and Revegetation

Restoration in the floodplain and other habitats subject to the jurisdiction of USACE and CDFW will be accomplished according to EIR measure BIO-1 as well as the substantive requirements of the CWA, Section 404 and CDFW Code Section 1602. Restoration in upland areas will be accomplished according to EIR measure BIO-2c and CUL-1a-5. Elements of the restoration of habitat within these areas will be as follows:

1. **Transplantation**–A qualified botanist prepared a Mitigation and Monitoring Plan for Culturally Significant Plants (CH2M HILL 2014i) that is included as Appendix A of the CIMP by transplanting indigenous plants to an onsite location, or providing a 2:1 ratio replacement to another location agreed upon between PG&E and members of the Interested Tribes, as described in *Topock Compressor Station Groundwater Remediation Project Revised Ethnobotany Survey Report* (CH2M HILL, 2014j). If special-status plants are found within the restoration area, transplantation will follow guidelines presented in *Topock Compressor Station Groundwater Remediation Project Revised Floristic Survey Report* (CH2M HILL, 2013g). Mature plants within Key Views 5 and 11 that are affected by restoration activities will need to be transplanted according to the Aesthetics and Visual Resources Protection and Revegetation Plan (CH2M HILL 2014d) per EIR measures AES-1 and AES-2. Transplanting measures from the Habitat Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014e) will be implemented in CDFW jurisdictional areas.
2. **Planting**–A qualified botanist will prepare a planting/monitoring plan as part of the Site-Specific IM-3 Restoration Plan that describes the planting of native bare root stock or container seedlings for restoring the site. Planting recommendations from *Topock Compressor Station Groundwater Remediation Project Revised Ethnobotany Survey Report* (CH2M HILL, 2014j), *Topock Compressor Station Groundwater Remediation Project Revised Floristic Survey Report* (CH2M HILL, 2013g), the Aesthetics and Visual Resources Protection and Revegetation Plan (CH2M HILL 2014d) and the Habitat Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014e) will be referenced in the Site-Specific IM-3 Restoration Plan.
3. **Seed mix**–If reseeding is a preferred method for restoration, a generalized seed mix for the vegetation community will be developed based on plant species observed in the general area. The community-specific seed mix will be developed with specified seed quantities and application rates per acre prior to completion of the decommissioning. The seed mix will be developed to be comparable to species diversity in similar undisturbed habitats adjacent to the restoration area.
4. **Performance criteria**–The performance standards/success criteria will focus on quantifiable cover attributes, including percent bare ground, percent cover, and overall species diversity based on the seed mix and volunteer species found within the restoration areas. EIR measure CUL-1a-5 requires a minimum 75 percent survivorship for indigenous plant species transplanted or planted within the restoration area.

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5. **Maintenance**–The restoration area will be maintained and monitored for a minimum of 3 to 5 years. A specific schedule of pre- and post-planting maintenance, monitoring, and reporting activities will be included in the Site-Specific IM-3 Restoration Plan.
6. **Monitoring**–Monitoring frequency will be included in a schedule in the Site-Specific IM-3 Restoration Plan. The monitoring will include maintenance and a performance evaluation. A qualified biologist or restoration specialist will conduct the monitoring to determine the effectiveness of maintenance activities at the restoration area and prescribe additional maintenance activities that may be required to meet performance criteria.
7. **Reporting**–The data collected in a given year will be compiled and included in an annual monitoring report. Annual monitoring reports will be submitted to DTSC, Tribes, and BLM. The performance reports will describe the existing conditions of the restoration area and compare annual success criteria with field conditions, identify problems, and recommend remedial measures necessary for successfully restoring the site.
8. **Adaptive management**–Adaptive management is a flexible, iterative approach to the long-term management of the site in the event of unforeseen circumstances. Adaptive management will use regular quantitative assessments and rapid qualitative assessment data to assess the health of vegetation communities at the restoration site. In the event of damage to any part of the site, these data will be used to assist with repairing the affected areas.

8.2 Demobilization

Demobilization includes the removal of equipment, material, the security fence and gate around the IM-3 Treatment Plant, and personnel from the project site. Demobilization will occur after identified IM-3 infrastructure and components are removed, waste streams are properly managed and transported offsite, soil confirmation sampling and/or appropriate soil remediation is completed, all PG&E punch list items have been addressed, and the site is left in a safe and restored condition in accordance with this Work Plan and amendments to this Work Plan. (Following substantial completion of the work, PG&E will conduct a formal inspection of the project site and generate a punch list of items to be addressed prior to final completion of the work). The timing of demobilization will be coordinated with the timing of the IM-3 restoration.

8.3 Development of Future Detailed, Site-Specific IM-3 Restoration Plan

As previously mentioned, in parallel to this Work Plan and in response to the Tribes' comments on the 60% design (CH2M HILL 2013b) and a previous draft of this Work Plan, PG&E has proposed a schedule to develop a more detailed Site-Specific IM-3 Restoration Plan in consultation with the affected land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM, as well Signatories and Invited Signatories to the PA and the Tribes. The proposed schedule was tailored to provide timely details on the restoration process, and to avoid delay so that restoration will commence shortly after decommissioning is completed.

As stated in the responses to comments on the 60% design (response to comment [RTC] #277), PG&E anticipates that some details of the more detailed Site-Specific Restoration Plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of the ground surface is known, following the removal of the IM-3 facilities. The Site-Specific IM-3 Restoration Plan will be submitted for DTSC and DOI review and approval prior to implementation.

This Work Plan and the Site-Specific IM-3 Restoration Plan will meet the requirements of the EIR MMRP (BIO-2c); the PA (Stipulation V); the 2006 Settlement Agreement between PG&E and FMIT (Section VII); the Consent Decree between the federal government and PG&E; and other applicable requirements. Specifically, the site-specific restoration plan will include the following key chapters, at a minimum:

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- **Chapter 1: Scope of Restoration including Goals and Objectives -** This chapter will define the scope, goals, and objectives of restoration. The general framework is as follows:
  - **Scope of Restoration**: This will be an expansion of the write-up in Section 8.1.1 (Restoration Areas) and will include additional details that will become available after the decommissioning and demobilization are complete. For example, a detailed description of each restoration area will be provided, along with ground and/or aerial photos of the area prior to the construction of IM-3 (as available) and after decommissioning/demobilization are complete. Similarly, topographic information will also be presented. In addition, description of areas used during decommissioning activities that are outside of the 9.3 acres described in Section 8.1.1, will be presented and returned to pre-mobilization condition.
    - Not included in the scope of this restoration are: a) areas proposed for use by the groundwater remedy *[these areas will be restored after the groundwater remedial facilities are decommissioned]* and b) proposed staging areas that will have ongoing activities and established roadways and access pathways *[these areas will be returned to their pre-mobilization condition]*.
  - **Restoration Goals**: Implementation of Site-Specific IM-3 Restoration Plan will restore the site to conditions existing prior to the construction of IM-3 to the maximum extent practicable, subject to the continued use of remedial facilities**.**
  - **Restoration Objectives:** Measureable objectives will be developed based on the restoration goals. The objectives describe the actions that will be completed as part of the restoration to attain the goals. The objectives will be measurable through monitoring.
- **Chapter 2: Restoration Design and Adaptive Management –** This chapter will present planned restoration design to meet the project objectives. Also presented will be an adaptive management approach that allows for evaluation of the effectiveness of the restoration through monitoring, and long-term management of the site in the event of unforeseen circumstances. Example of details to be presented in this chapter are:
  - Grading, drainage, and erosion control plans (engineering drawings) that specify how the soil will be graded, contoured, and compacted.
  - A planting/monitoring plan that describes the planting of native bare root stock or container seedlings for restoring the site.
  - Performance criteria, monitoring strategies, and monitoring frequency.
  - Process for rapid qualitative assessment of data to assess the health of vegetation communities at the restoration site.
- **Chapter 3: Implementation and Reporting –** This chapter will discuss implementation details and will specify activities to be conducted (including site maintenance). Reporting format and frequency will also be discussed.

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LEGEND

- Property Boundary
- Area Used* for IM-3 [Per IM No. 3, Land Area Used Memorandum (July 2005)]
- MW-20 Bench Restoration Area (including PE-1), subject to the continued use of remedial facilities

Notes:

1. * - The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.
2. The MW-20 bench area was not included in the Interim Measures No. 3, Land Area Use Memorandum (July 2005) as an area originally affected by IM-3 operations. However, three IM-3 extraction wells and Valve Vault No.1 are located on this bench and will be decommissioned as a part of IM-3, so the MW-20 bench is included as an area to be restored. The approximate area on the MW-20 bench to be restored is 1.27 acres.
3. The total combined area to be restored in the floodplain and upland areas is approximately 9.3 acres (of which 4.11 acres are previously undisturbed lands). No additional undisturbed land outside of the estimated 9.3 acres is intended to be disturbed by IM-3 decommissioning activities. However, if land outside of the estimated 9.3 acres (excluding the proposed staging areas that will have ongoing activities) is disturbed during IM-3 decommissioning, it will be restored in accordance with the future IM-3 Restoration Plan.

0 200 400 800 Feet

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FIGURE 8-1
PLANNED IM-3 RESTORATION AREAS
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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SECTION 9

Permits and Authorizations, Reporting, and Schedule

9.1 Anticipated Permits and Authorization for IM-3 System Decommissioning and Closure

Table 9-1 lists existing IM-3 operating permits and authorizations that will be required to be closed to complete IM-3 system decommissioning and closure. These permits and authorizations have specific closure requirements that will require action prior to IM-3 system shutdown, decommissioning and removal, and final closure and are listed under the "Close-out Comments" column of Table 9-1. In addition to compliance with the above, implementation of Work Plan activities will also require prior approval from DTSC and DOI pursuant to their authority under RCRA and CERCLA, respectively. Additional approvals and authorizations for implementation of this Work Plan are as follows below. Note that because IM-3 system shutdown, decommissioning, removal and restoration is part of a CERCLA response action, implementation of Work Plan activities conducted onsite are covered under the permit exemption codified in Section 121(e)(1) of CERCLA. While the permit exemption applies to the administrative or procedural elements (e.g., preparing and submitting permit applications and obtaining permits), the substantive requirements of the applicable laws remain.

Agency/Organization	Approvals and Authorizations
DOI	Approval of this Work Plan from DOI is required. It is PG&E's understanding that DOI's approval constitutes permission to implement this Work Plan and authorization to access federal properties. No other application of approval for access to federal lands will be required before field implementation. Notification will be provided to land managers prior to field implementation.
DTSC	Approval of this Work Plan from DTSC is required.
CDFW/USACE	The substantive requirements of CDFW Code Section 1602 and CWA Section 404 will be met in the future, as applicable. The CWA 404 and CDFW avoidance and minimization measures are included in an appendix of the Construction/Remedial Action Work Plan.
BLM/USFWS	Project activities will be consistent with the substantive requirements of applicable ARARs, including but not limited to the Endangered Species Act and the National Historic Preservation Act. Conservation measures included in the Programmatic Biological Assessment (PBA) will be implemented during project activities.
San Bernardino County	Substantive requirements of a demolition permit and an encroachment permit for activities in the County right-of-way.
CUPA	Closure requirements for facilities operating under the Conditional Authorization Tier for Hazardous Waste Treatment include: • Title 22 CCR, Section 66265.111 requires generator to close facility in a manner that minimizes further maintenance and is protective of public health and the environment. • Title 22 CCR Section 66265.114 requires generator to properly dispose of contamination generated during closure. • CA Health and Safety Code, Division 20, Chapter 6.5, Section 25200.3(g) specifies the generator shall remove or decontaminate all waste residues, containment system components, soils, and structures or equipment contaminated with hazardous waste from the unit; also, a generator conducting treatment who permanently ceases operation shall, upon completion of all activities required under this subdivision, provide written notification, in person or by certified mail, with return receipt requested, to the department and (the CUPA).
FMIT	Project activities are covered under the Settlement Agreement and the Easement Agreement between PG&E and the FMIT
Private Utility/Pipeline Companies	As needed, activities located in the right-of-way of any pipelines/utilities will be subject to prior coordination with the owner/manager of the associated facilities. Prior to implementing the subject activities, Underground Service Alert notifications will be made so that utility companies can locate and mark the locations of their underground facilities.

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9.2 Biological Evaluation

A biological evaluation will be performed to outline the IM-3 decommissioning, removal, and restoration activities as they relate to federally listed species in the area. The USFWS issued a concurrence letter on July 7, 2014 for the Final Remedy Programmatic Biological Assessment (PBA) which addressed a variety of activities, including activities identified in this Work Plan. The intent of the PBA is to provide programmatic coverage of these actions and avoid the need for individual project-specific consultations under the federal ESA. The federally listed species evaluated include the southwestern willow flycatcher (*Empidonax traillii extimus*), Yuma clapper rail (*Rallus longirostris yumanensis*), Mojave desert tortoise (*Gopherus agassizii*), bonytail chub (*Gila elegans*), razorback sucker (*Xyrauchen texanus*), Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and Sonoran desert tortoise (*Gopher morafkai*).

9.3 Archeological Surveys and Reviews/Historical Sites Evaluation

The area subject to activities described in this Work Plan was included in an archaeological and historical site survey of the Area of Potential Effect (Applied Earthworks, 2007).

Archaeological and historic sites within or near the work areas were previously surveyed and recorded in 2007, and placed on a GIS layer for planning purposes. A number of both archaeological and historic sites are adjacent to most work areas. Archaeological and historic sites will be avoided to the maximum extent practicable during the implementation of this Work Plan. The archaeological and historic sites will be protected or avoided, using appropriate protective measures, from work activities, and will be monitored during the course of work. The PG&E Field Contact Representative(s) will be responsible for providing cultural sensitivity training to the workers, along with any of the Interested Tribes that choose to participate, prior to work commencing. This sensitivity training will include the following topics:

- Cultural significance of the Topock Cultural Area
- Appropriate behavior to use within the Topock Cultural Area
- Activities that are to be avoided in the Topock Cultural Area
- Consequences in the event of noncompliance

The TCS site and adjacent lands are contained within a larger geographic area that is considered sacred by FMIT and by other Native American tribes. The Tribes believe that the environmental, cultural, and spiritual resources may not be physically perceptible, but nonetheless exist. DTSC has concluded within the January 2011 certified EIR (DTSC, 2011b) that the 779-acre project area (along with the Topock Maze), which encompasses a large portion of the IM-3 Property, “appears to qualify as a historic resource under CEQA [California Environmental Quality Act] as an area that is significant in the social and cultural annals of California,” and the BLM also has determined that a traditional cultural property or property of traditional religious and cultural significance that is eligible for listing on the National Register of Historic Places exists in the area of the Topock project, within the Area of Potential Effect (APE) (consisting of 1,600 acres of surface area and a section of the Colorado River), which also encompasses the IM-3 Property (DTSC, 2011b).

Therefore, work activities will be conducted in a manner that recognizes and respects these resources and the spiritual values of the surrounding lands. PG&E understands that the environmental, cultural, and spiritual resources may not be physically perceptible. To this end, site orientation will stress that site activities must be conducted in a respectful manner that is conscious of this context. In addition, PG&E will contact the Tribes that have expressed a desire for tribal monitors. If there is a desire to monitor this work, PG&E will make arrangements for field activity monitoring, as acceptable to the landowner and consistent with security and health and safety considerations.

9.4 Schedule and Reporting

For preliminary planning purposes, IM-3 decommissioning and removal is estimated to take approximately 15 months, and restoration is estimated to take approximately 6 years (of which approximately 3-5 years is for

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implementation of the restoration plan). Figure 9-1 presents the estimated schedule for IM-3 decommissioning, removal, and restoration; however, it does not include the schedule for IM-3 lay-up (as stated in Section 2.1, IM-3 shut down and lay-up could take up to 3 months). Note that this preliminary schedule could vary based on several factors, for example, inputs from Tribal consultation, stakeholders' inputs, and agencies' directions; inputs from contractors selected for implementation; timing of actual activities (e.g., could take longer during southwestern willow flycatcher season); content of actual approved plans (this work plan, the future Site-Specific IM-3 Restoration Plan), etc.

During the decommissioning and removal period, PG&E will prepare and submit quarterly electronic progress reports to DTSC and DOI. After completion of the decommissioning and removal, a report of decommissioning and removal (demolition) activities will be prepared. The report will address the following:

1. Decommissioning and removal (demolition) activities
2. Waste management
3. Confirmation sampling activities and results
4. Log listing quantities and receptor of recovered equipment and materials

The report will be submitted approximately 12 weeks after the completion of decommissioning activities described in this Work Plan. Reporting during the restoration period will be outlined in the future Site-Specific IM-3 Restoration Plan.

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TABLE 9-1
IM-3 Operating Permits and Authorizations
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Current Permits and Authorizations	Agency	Permit/Authorization Identification Number	Closeout Comments
IM	BLM	Action Memorandum No. 3 issued 9/17/2000 authorized IM-3 activities on BLM land	Inform BLM in writing during the following stages: • IM-3 treatment shut down • Prior to IM-3 removal actions • After removal and sampling
Hazardous Waste Generator	USEPA	USEPA (Hazardous Waste) Identification No. CAR000151118	PG&E Topock Remediation Project to use USEPA ID No. CAR000151118 for Final Remedy hazardous waste shipments. When IM-3 is closed, revisit Form to update with no references to IM-3.
Underground Injection Well(s)	USEPA	USEPA Underground Injection Well(s), Class V Inventory Notification (USEPA Form 7520-16 "Inventory of Injection Wells') was submitted 3/24/2005; referenced USEPA ID No. CAR000151118	Decommissioning and removing two injection wells. Write and send letter to USEPA.
IM-3 ARARs for waste discharge	DOI Regional Water Board	IM-3 ARARs documented in Attachment A to Letter Agreement issued July 26, 2011, from the Regional Water Board to DOI, and the subsequent Letter of Concurrence issued August 18, 2011, from DOI to the Regional Water Board.	When IM-3 is not in operation, or no discharge occurs, then provide letter stating such in place of quarterly reports. Inform DOI and Regional Water Board in writing: • Prior to IM-3 removal actions • After removal and sampling have occurred
Stormwater Permit, Industrial Activities	California State Water Resource Control Board Regional Water Board	General Permit No. CAS000001, Notice of Intent for coverage filed April 5, 2005, IM-3 WDID No. 7 36I 019443	File NOT for coverage under General Permit

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TABLE 9-1
IM-3 Operating Permits and Authorizations
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Current Permits and Authorizations	Agency	Permit/Authorization Identification Number	Closeout Comments
Conditional Authorization Tier for Hazardous Waste Treatment at IM-3	CUPA – San Bernardino County Fire Department Hazardous Materials Division	Facility ID No. FA36001, Conditional Authorization Notification update sent to CUPA October 6, 2010	The following hazardous waste treatment facility closure requirements will be met by following the procedures outlined in this Work Plan: • Title 22 CCR, Section 66265.111 requires generator to close facility in a manner that minimizes further maintenance and is protective of public health and environment. • Title 22 CCR Section 66265.114 requires generator to properly dispose of contamination generated during closure.
IM-3 Hazardous Materials Business Plan (Business Emergency/Contingency Plan)	CUPA	Facility ID No. FA0009150	Pursuant to the requirements of CHSC Section 25503, facilities that handle hazardous materials (including hazardous waste) in threshold amounts of 55 gallons, 500 pounds, or 200 cubic feet, PG&E will submit an annual HMBP update to CUPA by March 1. If IM-3 has onsite or handles hazardous materials in the threshold amounts, PG&E will submit an annual HMBP update to the CUPA by March 1. PG&E will inform the CUPA in writing within 30 days of removing hazardous materials from IM-3 to below the threshold amounts.
Use Permit/Occupancy Permit	San Bernardino County, Land Use Services Department	DS1455-257/2004/DR01	Inform County Department in writing when improvements (including laboratory) are decommissioned.
Sewage Holding Tank Permit	San Bernardino County, Public Health Department	Facility ID FA0013860; Permit No. PT0018324	Inform County Department in writing when sewage holding tank is removed. Call the County Department of Land Use Services, Division of Building and Safety to schedule a final inspection to confirm closure.
IM-3 Diesel Powered Backup/ Emergency Power Generator	Mojave Desert Air Quality Management District (MDAQMD) California Air Resources Board (CARB)	MDAQMD Authority to Construct No. E009727 CARB Portable Equipment Registration Program No. 120168	Leased to CH2M HILL/OMI from AG Engineering. Inform MDAQMD in writing within 5 days of generator being moved offsite.

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TABLE 9-1
IM-3 Operating Permits and Authorizations
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

Current Permits and Authorizations	Agency	Permit/Authorization Identification Number	Closeout Comments
Backhoe and Forklift	CARB	CARB Portable Equipment Registration Program Nos.	Leased to CH2M HILL OMI from Jules and Associates. Coordinate with Jules and Associates to inform CARB within 5 days of backhoe and forklift being moved offsite.
Portable (trailer mounted) Air Compressor	CARB	CARB Portable Equipment Registration Program No. 137682	Owned by PG&E. Inform CARB within 5 days of portable air compressor being moved offsite.
Well Permits	San Bernardino County, Department of Public Health - Division of Environmental Health Services	Each well has a County well drilling permit number	The 4 extraction wells (PE-1, TW-3D, TW-2D, and TW-2S), and 2 injection wells (IW-2 and IW-3) will be decommissioned. Inform County Department in writing when wells are properly decommissioned. The County of San Bernardino is the local permitting agency for site wells located in California and has adopted the California Department of Water Resources standards. California Well Standards identify well destruction (or decommissioning for this Work Plan) requirements for both water supply wells, and MWs and exploratory boreholes. The general requirements for both well types are similar; however, special considerations for MWs and exploratory boreholes address the potential for these well types to be in areas of known or potential pollution or contamination.
Air Compressor Pressurized Vessel(s)	Cal-OSHA	Pressurized Vessel Permit	Inform Cal-OSHA in writing when pressurized vessel(s) are removed from site.

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September 8, 2014

FIGURE 9-1 -- DRAFT IM-3 Decommissioning, Removal and Restoration Schedule

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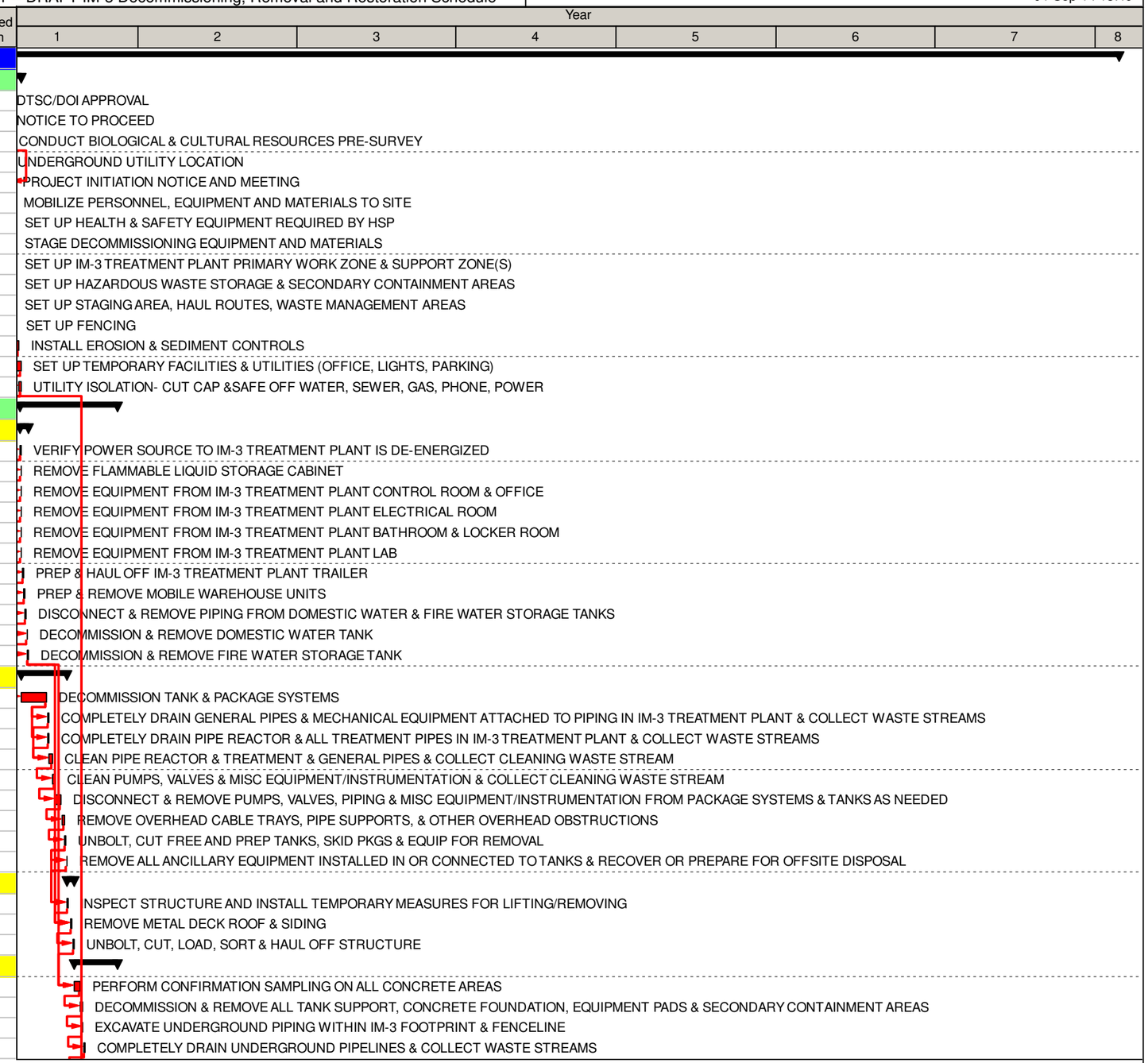
Activity ID	Activity Name	Estimated Duration
IM-3 Decommissioning		**1824**
PRE-DECOMMISSIONING		**27**
A1010	DTSC/DOI APPROVAL	0
A1020	NOTICE TO PROCEED	1
A3070	CONDUCT BIOLOGICAL & CULTURAL RESOURCES PRE-SURVEY	5
A1060	UNDERGROUND UTILITY LOCATION	2
A2060	PROJECT INITIATION NOTICE AND MEETING	10
A2930	MOBILIZE PERSONNEL, EQUIPMENT AND MATERIALS TO SITE	1
A1110	SET UP HEALTH & SAFETY EQUIPMENT REQUIRED BY HSP	2
A1150	STAGE DECOMMISSIONING EQUIPMENT AND MATERIALS	2
A1070	SET UP IM-3 TREATMENT PLANT PRIMARY WORK ZONE & SUPPORT ZONE(S)	3
A1100	SET UP HAZARDOUS WASTE STORAGE & SECONDARY CONTAINMENT AREAS	3
A1080	SET UP STAGING AREA, HAUL ROUTES, WASTE MANAGEMENT AREAS	4
A1170	SET UP FENCING	5
A1190	INSTALL EROSION & SEDIMENT CONTROLS	8
A1090	SET UP TEMPORARY FACILITIES & UTILITIES (OFFICE, LIGHTS, PARKING)	10
A1220	UTILITY ISOLATION- CUT CAP &SAFE OFF WATER, SEWER, GAS, PHONE, POWI	2
DECOMMISSION IM-3 TREATMENT PLANT		**160**
IM-3 TREATMENT PLANT TRAILER, MOBILE WAREHOUSE UNITS & UTILITY WATER		**14**
A2090	VERIFY POWER SOURCE TO IM-3 TREATMENT PLANT IS DE-ENERGIZED	1
A2850	REMOVE FLAMMABLE LIQUID STORAGE CABINET	1
A2100	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT CONTROL ROOM & OFFI(	2
A2570	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT ELECTRICAL ROOM	2
A2580	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT BATHROOM & LOCKER R	2
A2590	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT LAB	2
A2110	PREP & HAUL OFF IM-3 TREATMENT PLANT TRAILER	3
A2720	PREP & REMOVE MOBILE WAREHOUSE UNITS	2
A1280	DISCONNECT & REMOVE PIPING FROM DOMESTIC WATER & FIRE WATER STO	2
A2740	DECOMMISSION & REMOVE DOMESTIC WATER TANK	2
A2830	DECOMMISSION & REMOVE FIRE WATER STORAGE TANK	2
PIPES, PUMPS, VALVES, TANKS & PACKAGE SYSTEMS		**76**
A2810	DECOMMISSION TANK & PACKAGE SYSTEMS	44
A3040	COMPLETELY DRAIN GENERAL PIPES & MECHANICAL EQUIPMENT ATTACHED	3
A1250	COMPLETELY DRAIN PIPE REACTOR & ALL TREATMENT PIPES IN IM-3 TREATM	3
A2360	CLEAN PIPE REACTOR & TREATMENT & GENERAL PIPES & COLLECT CLEANIN(	5
A3050	CLEAN PUMPS, VALVES & MISC EQUIPMENT/INSTRUMENTATION & COLLECT CI	5
A1290	DISCONNECT & REMOVE PUMPS, VALVES, PIPING & MISC EQUIPMENT/INSTRUI	10
A2840	REMOVE OVERHEAD CABLE TRAYS, PIPE SUPPORTS, & OTHER OVERHEAD OB	5
A1470	UNBOLT, CUT FREE AND PREP TANKS, SKID PKGS & EQUIP FOR REMOVAL	2
A1310	REMOVE ALL ANCILLARY EQUIPMENT INSTALLED IN OR CONNECTED TO TANK	2
FACILITY SHADE STRUCTURE		**12**
A1330	INSPECT STRUCTURE AND INSTALL TEMPORARY MEASURES FOR LIFTING/RE	2
A2130	REMOVE METAL DECK ROOF & SIDING	3
A1340	UNBOLT, CUT, LOAD, SORT & HAUL OFF STRUCTURE	4
IM-3 TREATMENT PLANT FOUNDATION, SECONDARY CONTAINMENT AREAS & UNI		**71**
A2600	PERFORM CONFIRMATION SAMPLING ON ALL CONCRETE AREAS	10
A2140	DECOMMISSION & REMOVE ALL TANK SUPPORT, CONCRETE FOUNDATION, EQ	3
A2240	EXCAVATE UNDERGROUND PIPING WITHIN IM-3 FOOTPRINT & FENCELINE	2
A2390	COMPLETELY DRAIN UNDERGROUND PIPELINES & COLLECT WASTE STREAMS	2



Actual Work — Critical Remaining Work — Remaining Work — Milestone

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09-08-14	Draft R5		
15-Jul-13	Draft R4		

September 8, 2014

FIGURE 9-1 DRAFT IM-3 Decommissioning, Removal and Restoration Schedule

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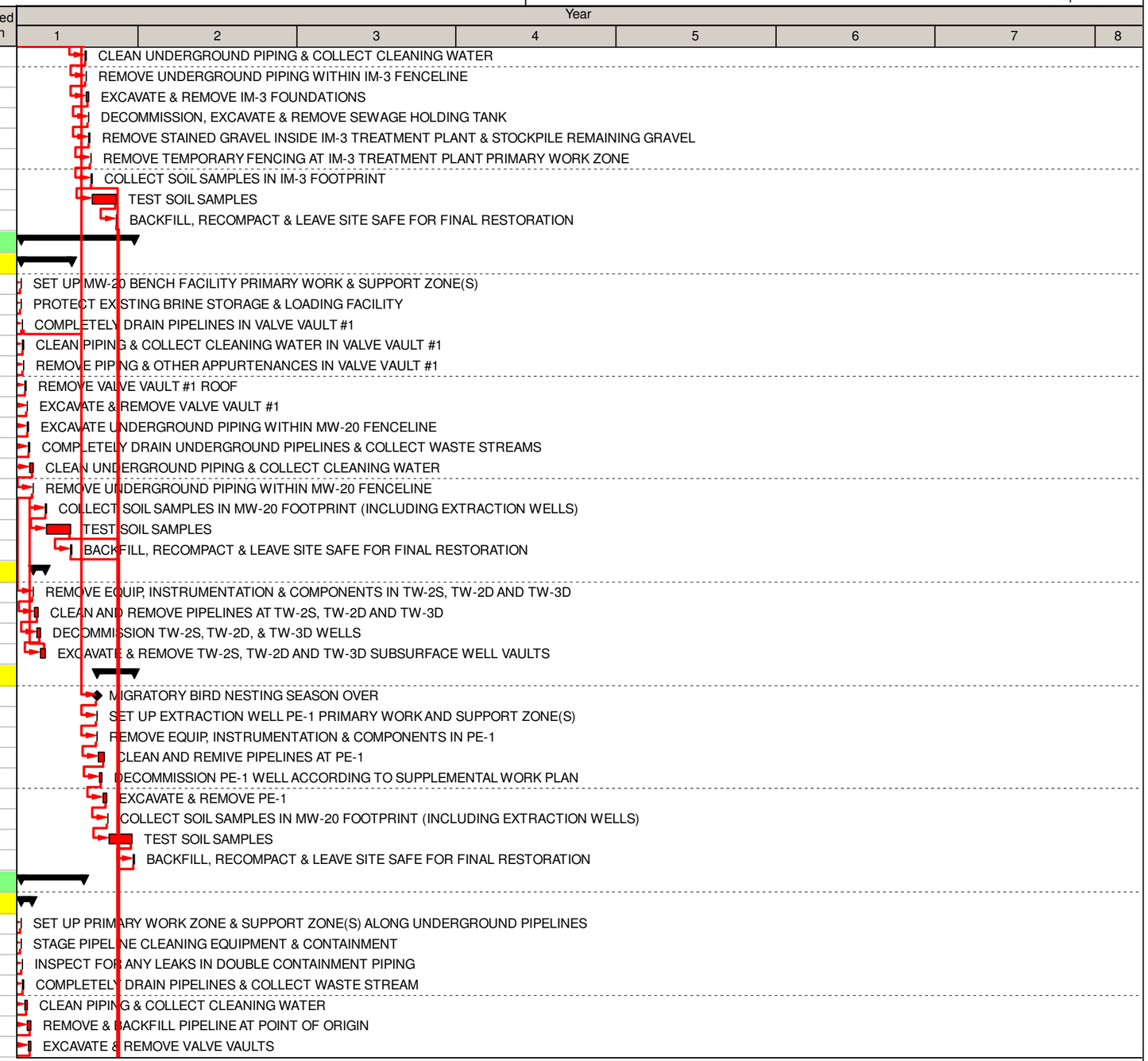
Activity ID	Activity Name	Estimated Duration
A2380	CLEAN UNDERGROUND PIPING & COLLECT CLEANING WATER	2
A2370	REMOVE UNDERGROUND PIPING WITHIN IM-3 FENCELINE	1
A2150	EXCAVATE & REMOVE IM-3 FOUNDATIONS	3
A2950	DECOMMISSION, EXCAVATE & REMOVE SEWAGE HOLDING TANK	1
A3030	REMOVE STAINED GRAVEL INSIDE IM-3 TREATMENT PLANT & STOCKPILE REM.	2
A3080	REMOVE TEMPORARY FENCING AT IM-3 TREATMENT PLANT PRIMARY WORK Z	1
A2160	COLLECT SOIL SAMPLES IN IM-3 FOOTPRINT	2
A2170	TEST SOIL SAMPLES	40
A2180	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	2
DECOMMISSION MW-20 BENCH FACILITY & EXTRACTION WELLS		186
VALVE VAULT #1 & UNDERGROUND WORK WITHIN MW-20 BENCH FACILITY FENCI		84
A3060	SET UP MW-20 BENCH FACILITY PRIMARY WORK & SUPPORT ZONE(S)	1
A2610	PROTECT EXISTING BRINE STORAGE & LOADING FACILITY	1
A2440	COMPLETELY DRAIN PIPELINES IN VALVE VAULT #1	1
A2450	CLEAN PIPING & COLLECT CLEANING WATER IN VALVE VAULT #1	2
A2460	REMOVE PIPING & OTHER APPURTENANCES IN VALVE VAULT #1	1
A2470	REMOVE VALVE VAULT #1 ROOF	3
A2480	EXCAVATE & REMOVE VALVE VAULT #1	2
A2340	EXCAVATE UNDERGROUND PIPING WITHIN MW-20 FENCELINE	2
A2320	COMPLETELY DRAIN UNDERGROUND PIPELINES & COLLECT WASTE STREAMS	2
A2330	CLEAN UNDERGROUND PIPING & COLLECT CLEANING WATER	5
A2350	REMOVE UNDERGROUND PIPING WITHIN MW-20 FENCELINE	1
A2420	COLLECT SOIL SAMPLES IN MW-20 FOOTPRINT (INCLUDING EXTRACTION WEI	2
A2410	TEST SOIL SAMPLES	40
A2400	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	2
EXTRACTION WELLS TW-2S, TW-2D &TW-3D		19
A2530	REMOVE EQUIP, INSTRUMENTATION & COMPONENTS IN TW-2S, TW-2D AND TV	1
A2540	CLEAN AND REMOVE PIPELINES AT TW-2S, TW-2D AND TW-3D	7
A2960	DECOMMISSION TW-2S, TW-2D, & TW-3D WELLS	7
A2500	EXCAVATE & REMOVE TW-2S, TW-2D AND TW-3D SUBSURFACE WELL VAULTS	8
EXTRACTION WELL PE-1 (no work 5/1-9/30, nesting season)		62
A2820	MIGRATORY BIRD NESTING SEASON OVER	0
A2980	SET UP EXTRACTION WELL PE-1 PRIMARY WORK AND SUPPORT ZONE(S)	1
A2870	REMOVE EQUIP, INSTRUMENTATION & COMPONENTS IN PE-1	1
A2880	CLEAN AND REMIVE PIPELINES AT PE-1	10
A2970	DECOMMISSION PE-1 WELL ACCORDING TO SUPPLEMENTAL WORK PLAN	5
A2890	EXCAVATE & REMOVE PE-1	8
A2900	COLLECT SOIL SAMPLES IN MW-20 FOOTPRINT (INCLUDING EXTRACTION WEI	2
A2910	TEST SOIL SAMPLES	40
A2920	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	2
DECOMMISSION INJECTION WELL FIELD, CONVEYANCE PIPELINES, CONDUITS, & VA		104
UNDERGROUND CONVEYANCE PIPELINES, CONDUITS & VALVE VAULTS		19
A2990	SET UP PRIMARY WORK ZONE & SUPPORT ZONE(S) ALONG UNDERGROUND P	1
A1380	STAGE PIPELINE CLEANING EQUIPMENT & CONTAINMENT	1
A1410	INSPECT FOR ANY LEAKS IN DOUBLE CONTAINMENT PIPING	1
A1420	COMPLETELY DRAIN PIPELINES & COLLECT WASTE STREAM	3
A1430	CLEAN PIPING & COLLECT CLEANING WATER	5
A1440	REMOVE & BACKFILL PIPELINE AT POINT OF ORIGIN	7
A2250	EXCAVATE & REMOVE VALVE VAULTS	5



Actual Work
Critical Remaining Work
Remaining Work
Milestone

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15-Jul-13	Draft R4		

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FIGURE 9-1 DRAFT IM-3 Decommissioning, Removal and Restoration Schedule

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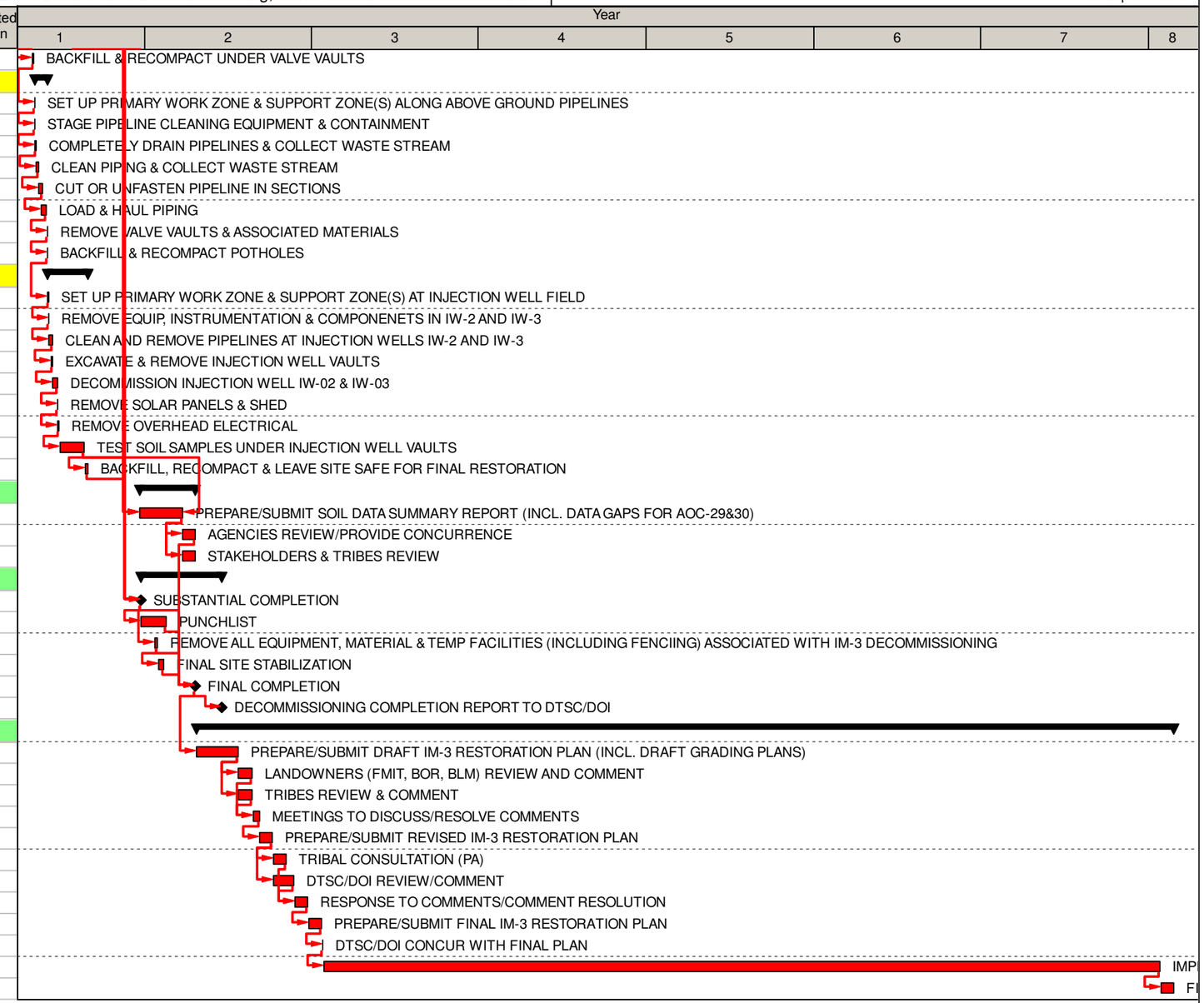
Activity ID	Activity Name	Estimated Duration
A2290	BACKFILL & RECOMPACT UNDER VALVE VAULTS	2
ABOVEGROUND CONVEYANCE PIPELINES, CONDUIT & VALVE VAULTS		**22**
A3000	SET UP PRIMARY WORK ZONE & SUPPORT ZONE(S) ALONG ABOVE GROUND P	1
A2120	STAGE PIPELINE CLEANING EQUIPMENT & CONTAINMENT	1
A1490	COMPLETELY DRAIN PIPELINES & COLLECT WASTE STREAM	2
A1500	CLEAN PIPING & COLLECT WASTE STREAM	3
A1520	CUT OR UNFASTEN PIPELINE IN SECTIONS	6
A1530	LOAD & HAUL PIPING	7
A2190	REMOVE VALVE VAULTS & ASSOCIATED MATERIALS	1
A1540	BACKFILL & RECOMPACT POTHOLES	1
DECOMMISSION INJECTION WELL FIELD & DRY ELECTRICAL UTILITIES & MISC SIT		**63**
A3010	SET UP PRIMARY WORK ZONE & SUPPORT ZONE(S) AT INJECTION WELL FIELD	1
A2560	REMOVE EQUIP, INSTRUMENTATION & COMPONENETS IN IW-2 AND IW-3	1
A2550	CLEAN AND REMOVE PIPELINES AT INJECTION WELLS IW-2 AND IW-3	5
A2510	EXCAVATE & REMOVE INJECTION WELL VAULTS	3
A2860	DECOMMISSION INJECTION WELL IW-02 & IW-03	7
A2220	REMOVE SOLAR PANELS & SHED	2
A2230	REMOVE OVERHEAD ELECTRICAL	2
A2200	TEST SOIL SAMPLES UNDER INJECTION WELL VAULTS	40
A2300	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	5
SOIL DATA EVALUATION & REPORTING		**88**
A3120	PREPARE/SUBMIT SOIL DATA SUMMARY REPORT (INCL. DATA GAPS FOR AOC-2	66
A3130	AGENCIES REVIEW/PROVIDE CONCURRENCE	22
A3140	STAKEHOLDERS & TRIBES REVIEW	22
DEMOBILIZATION		**127**
A1030	SUBSTANTIAL COMPLETION	0
A2520	PUNCHLIST	40
A3020	REMOVE ALL EQUIPMENT, MATERIAL & TEMP FACILITIES (INCLUDING FENCIIN(	5
A2080	FINAL SITE STABILIZATION	10
A1040	FINAL COMPLETION	0
A2070	DECOMMISSIONING COMPLETION REPORT TO DTSC/DOI	0
RESTORATION		**1525**
A3150	PREPARE/SUBMIT DRAFT IM-3 RESTORATION PLAN (INCL. DRAFT GRADING PL	66
A3160	LANDOWNERS (FMIT, BOR, BLM) REVIEW AND COMMENT	22
A3170	TRIBES REVIEW & COMMENT	22
A3180	MEETINGS TO DISCUSS/RESOLVE COMMENTS	10
A3190	PREPARE/SUBMIT REVISED IM-3 RESTORATION PLAN	22
A3200	TRIBAL CONSULTATION (PA)	22
A3210	DTSC/DOI REVIEW/COMMENT	33
A3220	RESPONSE TO COMMENTS/COMMENT RESOLUTION	22
A3230	PREPARE/SUBMIT FINAL IM-3 RESTORATION PLAN	22
A3260	DTSC/DOI CONCUR WITH FINAL PLAN	1
A3240	IMPLEMENTATION OF IM-3 RESTORATION PLAN (Includes Progress Reports)	1305
A3250	FINAL REPORT TO DTSC/DOI	22



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Remaining Work — Milestone

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SECTION 10

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Appendix A
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Floodplain Where Extraction Well PE-1 is Located

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Extraction Well Vaults Over TW-2S, TW-2D, & TW-3D and Valve Vault #1 on MW-20 Bench Facility

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Valve Vault #1 Interior View 3

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PHOTOGRAPH 10
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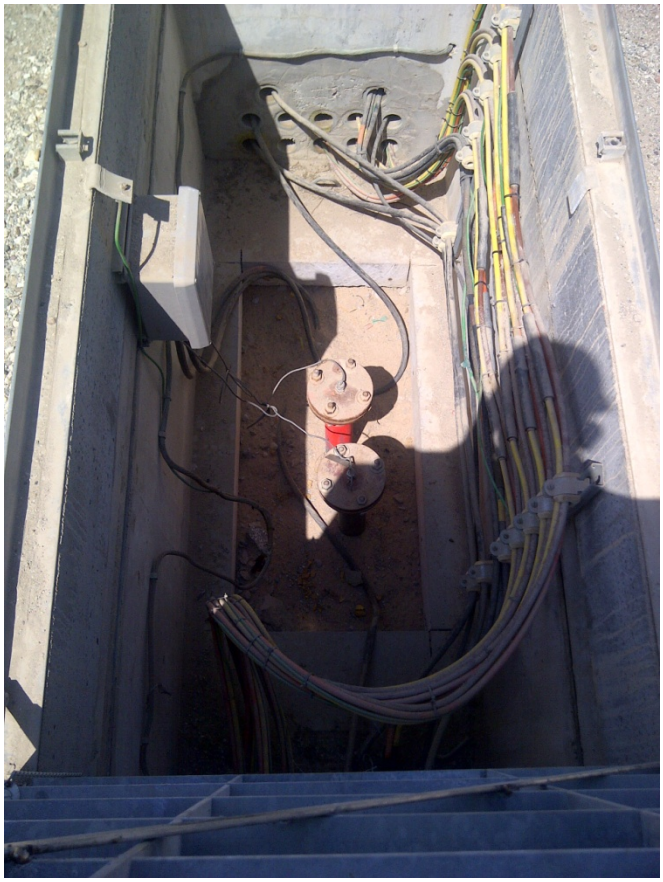

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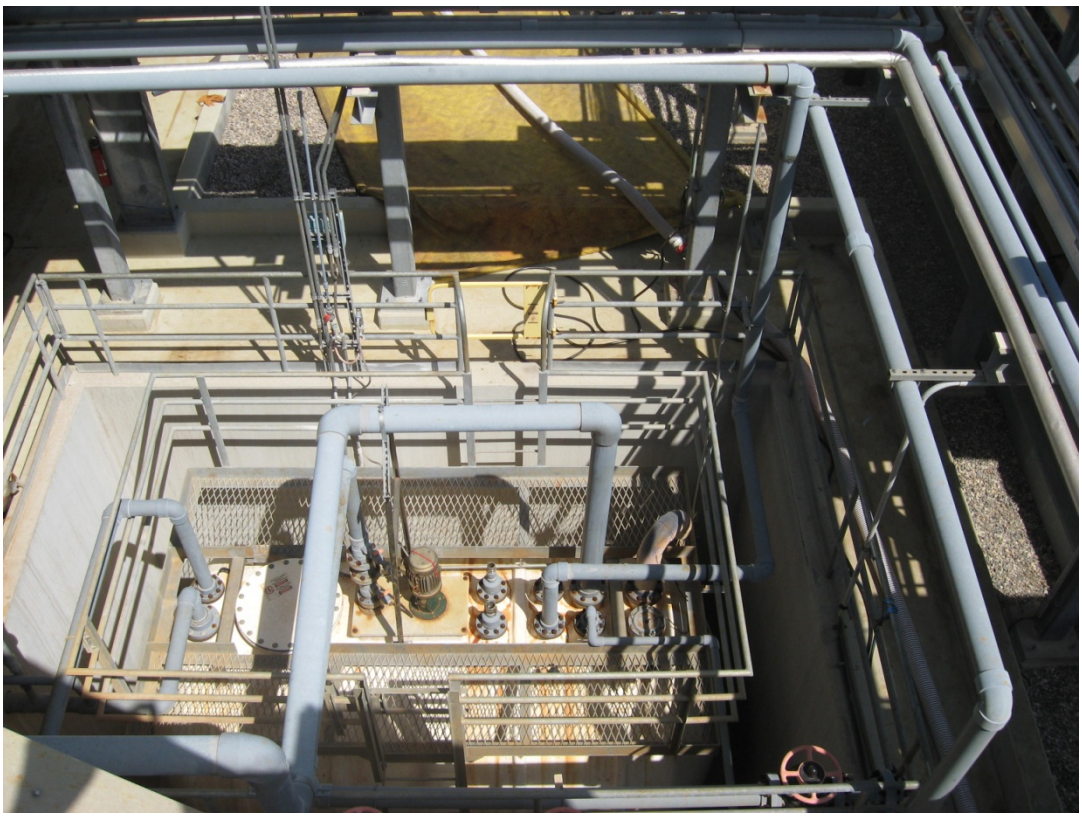

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Appendix B
Decommissioning Quality Assurance and Control Plan

Draft

Interim Measure No. 3 Decommissioning, Removal, and Restoration Quality Assurance and Control Plan, Topock Compressor Station, Needles, California

Prepared for:

Pacific Gas & Electric Company

September 2014

CH2MHILL Constructors, Inc.

3 Hutton Centre Drive, Suite 200
Santa Ana, California 92707

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Acronyms and Abbreviations

CAD	computer-assisted drafting
CM	Construction Manager
DQAC	Decommissioning Quality Assurance Control
DFW	Definable Feature of Work
IM-3	Interim Measure No. 3
NCR	Noncompliance Report
PG&E	Pacific Gas and Electric Company
PM	Project Manager
PQM	Program Quality Manager
QA	quality assurance
QC	quality control
RFI	request for information
Work Plan	IM-3 Decommissioning, Removal, and Restoration Work Plan

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SECTION 1

Introduction

This Decommissioning Quality Assurance and Control (DQAC) plan is a project-specific appendix to the Interim Measure No. 3 (IM-3) Decommissioning, Removal, and Restoration Work Plan (Work Plan) (CH2M HILL 2014). The purpose of this DQAC plan is to outline the quality control requirements applicable to executing the methods and technologies necessary for the planned decommissioning and removal of the IM-3 system and restoration of the areas originally affected by IM-3 operations.

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SECTION 2

Organization and Responsibilities

The Project Quality Control (QC) Manager and Demolition Project Manager (PM) are responsible for overall implementation and enforcement of the DQAC plan. Designated qualified individuals will assume execution responsibility of this plan. These individuals include the Project Engineer or other project personnel. The Program Quality Manager (PQM) has responsibility for verification of the effectiveness of the program and project QC.

A consistent project team is critical to the success of this project. The project team will be responsible for implementation of this plan and for the preparation of the final deliverables. Additional project team members may be added as needed; however, each new member will become familiar with this DQAC plan.

2.1 Project Team and Resolution of Conflicts

2.1.1 Project Team

- Demolition PM
- PM
- PQM
- Project QC Manager
- Senior Consultants
- Site QC/compliance, and health and safety
- Contract Administrator
- Project Engineer
- Project Controls Engineer
- Project Accountant
- Document and Data Manager

2.1.2 Resolution of Conflicts

If the QC team detects a nonconforming item, the issue will be investigated by the Project QC Manager. If the Project QC Manager determines that additional corrective action is warranted, the Project QC Manager will document and review the issue with the Demolition PM. The Project QC Manager has the authority to stop work on any nonconforming activity. If satisfactory resolution cannot be achieved between the Project QC Manager and the PM, it will be elevated to the PQM, and if necessary, to senior management (such as the Program Manager). The Pacific Gas and Electric Company (PG&E) Contracting Officer or Site Managers will be notified immediately of any nonconformance and will be advised of the impacts on the project cost or schedule, if any.

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SECTION 3

Inspection Activities

The Project QC Manager is responsible for performing inspection activities and documenting compliance with project requirements.

3.1 Inspections

The Project QC Manager's responsibilities include inspection of all recovered equipment and materials before being stored or turned over to a third party; inspection of waste management areas; and daily review of all decommissioning, removal, and restoration activities required to complete the scope of work, as identified in the final approved Work Plan.

As additional project-specific tasks are identified, this DQAC plan will be amended to include inspections for those tasks.

The Project QC Manager will conduct a detailed inspection prior to the Pre-final Inspection, when the work or an increment of work is deemed to be substantially complete. The work will be inspected for conformance to the Work Plan. The Project QC Manager will prepare an itemized list of work not properly completed, inferior workmanship, or work that does not conform to the Work Plan. The list will also include outstanding administrative items, such as record (as-built) utility drawings. The list will be included in the QC documentation and submitted to the PM following the inspection, and will specify an estimated date for correction of each deficiency. The completion inspection will be documented on the Daily Report (Attachment 1).

3.2 Punch List Inspections

Punch List Inspections may occur near the completion of work. The Project QC Manager will conduct an inspection of the work and develop a "punch list" of items that do not conform to the approved Work Plan. The punch list will include any remaining items on the "Rework Items List" (Attachment 2) that were not corrected before the Punch List Inspection. The punch list will include the estimated date when the deficiencies will be corrected. The Project QC Manager or staff will make Follow-on Inspections to ascertain that deficiencies have been corrected.

3.3 Pre-final Inspection

PG&E will perform a Pre-final Inspection to verify that the work is complete. A "Pre-final Punch List" may be developed as a result of this inspection. Each deficiency noted in the punch list will note the applicable reference in the Work Plan that the deficiency stems from. The Project QC Manager will verify that all items on this list are corrected before notifying that a "Final" Inspection can be scheduled. Any items noted on the Pre-final Inspection will be corrected in a timely manner and will be accomplished within the time slated for completion of the entire work, or any particular increment thereof if the project is divided into increments by separate completion dates.

3.4 Final Acceptance Inspection

The Project QC Manager, Construction Manager (CM), other project management personnel, and PG&E representatives will attend this inspection. Other PG&E personnel, land owners, land managers, regulatory agencies, and stakeholders may also attend. PG&E, based upon results of the Pre-final Inspection, will formally schedule the Final Acceptance Inspection. Notice should be given to PG&E at least 14 days before the Final Inspection. A Final Acceptance Inspection will be considered closed when the work has been accepted by PG&E, land owners, land managers, regulatory agencies, and stakeholders, and after acceptance has been documented and signed by all parties.

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SECTION 4

Meetings

Meetings will be held as necessary to discuss the project. These meetings may address problems, work status, scheduling, and conflict resolution. At a minimum, a project initiation meeting and weekly QC meetings will be held. This section details these meetings.

4.1 Project Initiation Meeting

Section 3.1 of the Work Plan discusses the project initiation meeting.

4.2 Quality Control Meetings

After the start of field activities, the Project QC Manager will conduct weekly QC meetings. The meetings will be held at the project site, and the following will be accomplished at each meeting:

1. Review the minutes of the previous meeting.
2. Review the schedule, including the following:
   a. Work accomplished since last meeting.
   b. Rework items identified since last meeting.
   c. Rework items completed since last meeting.
3. Review the work to be accomplished in the next 2 weeks and the following required documentation:
   a. Establish completion date for rework items.
   b. Required preparatory phases inspections.
   c. Required initial phases inspections.
   d. Required follow-up phases inspections.
   e. Status of offsite work.
   f. Required documentation.
4. Resolve open QC issues.
5. Address items that may require revisions to the DQAC plan.

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SECTION 5

Analytical Tests and Observations

The Project QC Manager is responsible for making certain that required analytical tests, as identified in the final approved Work Plan, are performed and results are documented. Completion of analytical tests will be documented in the Testing Plan and Log (Attachment 3). The Project QC Manager will obtain test results, update the Testing Plan and Log at least weekly, and maintain the records onsite in the project files.

For testing activities, the Project QC Manager and the CM will accomplish the following:

- Verify that testing procedures comply with Work Plan requirements.
- Verify that facilities and testing equipment are available and comply with testing standards.
- Check test instrument calibration data against certified standards.
- Verify that recording forms and the test identification control number system have been prepared.

Both passing and failing test results will be recorded in the Daily Report for the day the results are obtained. Pertinent specifications, location where tests were taken, and the sequential control number identifying the test will be recorded. Test reports will be submitted to the Demolition PM. As project-specific tasks are identified, the Testing Plan and Log will be amended to include analytical tests and observations for those tasks.

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SECTION 6

Quality Control Submittals

Quality control submittals are submittals generated by either the Project QC Manager during, or immediately before, decommissioning and removal (demolition) to demonstrate compliance with the Work Plan.

The Project QC Manager will log and track all submittals into the Submittal Register (Attachment 4). Specific responsibilities regarding submittals include the following:

- Coordinating submittal actions
- Maintaining necessary submittal records in an organized manner
- Maintaining and tracking submittals in the Submittal Register
- Reviewing and certifying submittals for compliance with the project plans, drawings, and specifications
- Approving submittals, except those designated to be approved by the Project Engineer, PG&E, or other party(ies)Checking material and equipment delivered to the project for compliance with the Work Plan

Certain designated submittals require approval by authorities other than the Project QC Manager (such as the Demolition PM, Project Engineer, or others). In such cases, the Project QC Manager forwards the submittal to the PM or Project Engineer who routes the submittal to the appropriate approver.

The CM and Project QC Manager are responsible for coordinating the submittal transmittal and approval process and following through to make certain that the process does not impact the project schedule.

6.1 Submittal Review and Control

A list of required submittals will be developed at the initiation of the project activities and revised as necessary. Submittals will be scheduled, reviewed, certified, and managed in accordance with procedures defined in this section.

PG&E will control and schedule submittals and document the process in the Submittal Register. The Project QC Manager is responsible for updating the submittal register at least weekly. The Project QC Manager will forward a copy of the Submittal Register onto the Demolition PM and PQM at the end of each month of project work. Each submittal will be routed using a Transmittal Form (Attachment 5). Units of weights and measures used on all submittals will be consistent with those used in the project documents.

Each submittal will be reviewed for completeness and compliance with the Work Plan requirements by individuals qualified to perform the review of that specific item. The submittal reviewers and approvers will be designated before construction.

Before each submittal, the Project QC Manager will certify that the submittal is in compliance with the project requirements. Submittals that do not comply with the requirements will be returned to the originator for correction and resubmittal. Substitutions or variations of specified requirements will be clearly noted. Certification of the approved submittals will be indicated by signing or initialing and dating the submittal form by the Project QC Manager. Required submittals may consist of the following types:

- **Data** – Submittals that provide calculations, analytical test results, descriptions, or documentation of the work.
- **Drawing** – Submittals that graphically show the relationship of various components of the work, schematic diagrams and layouts of particular elements, and other relational aspects of the work.
- **Instruction** – Preprinted material that describes the installation of a product, system, or material, including special notices and material safety data sheets concerning impedances, hazards, and safety precautions.

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- **Schedule** – Tabular lists showing the location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.
- **Statement** – A required document that confirms the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verifications of quality.
- **Report** – Reports of inspections or tests, each properly identified, and an interpretation of results that includes a description of test methods and all results.
- **Certificate** – A statement signed by an official authorized to certify on behalf of the manufacturer of a product, system, or material, attesting that the product, system, or material meets specified requirements. The statement must be dated after the award of this contract, state the contractor's name and address, name the project and location, and list the specific requirements that are being certified.
- **Sample** – Samples, including both fabricated and non-fabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.
- **Record** – Documentation to record compliance with technical or administrative requirements.

Additional submittals include, but are not limited to, the following:

- Personnel qualifications
- Product data
- Permits
- Samples
- Catalog cuts/pages
- Production, inspection, and test reports
- Material Certifications
- Progress reports, safety reports, or manpower reports
- As-built or certified data
- Operations and maintenance manuals
- QC records and certifications
- Sample and test results
- QC reports
- Photographs
- Contract close-out documents
- Completed hazardous and non-hazardous waste manifests and disposal certificates
- Completed list of recyclable materials/equipment
- Completed list of materials/equipment to be sold either through PG&E's Cost Recovery Program or Third Party

The following requirements apply to submittals:

- Units of weights and measures will match those used in the Work Plan and IM-3 Restoration Plan.
- Each submittal will be complete and in sufficient detail to allow determination of contract compliance.
- Each submittal will be reviewed by the Project QC Manager or an approved reviewer.
- Each submittal will be accompanied by a Catalog Cut/Shop Drawing Transmittal form certifying compliance with contract requirements.
- Proposed deviation from the contract requirements will be clearly identified.
- Spatial data, including computer-aided drafting (CAD) drawings, will conform to the Tri-Service Spatial Data Standard and be submitted as AutoCAD version 13 or Microstation version 5.0, or later, compatible format.

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6.2 PG&E Submittal Approval

Submittals for items that are extremely critical or complex, or are considered an extension of the Work Plan, should be submitted for PG&E approval. These submittals still require review for conformance and certification by the Project QC Manager.

Submittals will be reviewed to verify completeness, accuracy, and contract compliance. Items will be approved by the Project QC Manager and checked and approved by the Project QC Manager or designated representative. Any submittals requiring modifications or changes will be returned to the originating organization for correction and then resubmitted for review and approval by the Project QC Manager, or designee, prior to acceptance. Approved submittals will be stamped, signed, or initialed, and dated. During the preparatory phase of the QC inspections, the Project QC Manager or designee will verify that all materials and equipment have been tested and approved. No field activities will be performed without the required approval of applicable submittals.

Submittals will be presented to PG&E and project personnel, as determined by the distribution schedule. Each submittal will have a unique document control number. Every possible attempt will be made to schedule submittals to allow for sufficient review and approval time. However, certain submittals will require accelerated processing to maintain the construction schedule.

A Transmittal Form (Attachment 5) will accompany each submittal. Each transmittal will be identified with the following:

- Contract number
- Name and address of the submitting organization
- Date of submittal
- Description of item being submitted, including reference to specification section
- Approval of submitting organization indicating conformance to the requirements

The Project QC Manager will update the Submittal Register regularly. Material submitted for review by the Project QC Manager will indicate that it either conforms to established requirements or does not conform to established requirements. The Project QC Manager will advise submitter of the results of the review. The Submittal Register will be updated to indicate status. Conforming submittals will be transmitted to project and PG&E personnel, as determined by the distribution schedule. Non-conforming submittals will be returned to the submitter for correction, resolution of comments, and resubmittal.

Material submitted for review by the Project QC Manager will be signed to indicate that it conforms to requirements. Submittals reviewed by the Project QC Manager will then be transmitted to PG&E in accordance with the project distribution schedule for review and approval. Items sent to PG&E will be accompanied with a transmittal form indicating each item transmitted, the date reviewed by the Project QC Manager, and its review status. Upon review completion, PG&E will either return the transmittal sheet to the Project QC Manager for further action or accept the submittal as complete.

The Project QC Manager will advise the submitter of the results of the review in writing and include any comments. The Submittal Register will be updated to indicate status. Nonconforming submittals may be returned to the submitter for correction, resolution of comments, and resubmittal, if required. Revised submittals will be logged, reviewed, and processed in a manner identical with the initial submittal.

As project-specific tasks are identified, the Submittal Register will be amended to include documentation requirements for those tasks.

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SECTION 7

Change Control

Changes to the final approved Work Plan and field changes are subject to design verification measures commensurate with those applied to the draft project plans. The Demolition PM will approve work Plan changes in consultation with the Project Engineer.

Requests for Information (RFI) (Attachment 6) will be used to communicate and document clarifications and modifications requested by the subcontractor. The RFIs will be tracked and logged by the Project QC Manager to verify that each RFI is fully addressed and that changes to the plans, drawings, and specifications are completely and accurately documented. No work related to the RFI will be performed until the RFI is approved by the required parties.

Changes to materials, supplies, work approaches, and corrective action area design during the decommissioning, removal, and restoration effort will be documented in an overall effort to support sound engineering judgment and cost effective project delivery. Changes during decommissioning, removal, and restoration will be documented using the RFI process.

The RFI process involves identifying a situation in the field that requires change. The Project QC Manager will prepare an internal memorandum (RFI) identifying the concern and forward it onto the Demolition PM. The Demolition PM will review and forward the memorandum onto PG&E. The RFI will contain the project number, RFI Identification Number, and title. This information will be used for RFI tracking. The Demolition PM will forward the RFI onto the appropriate person, who is then responsible for identifying the appropriate design representative to evaluate the concern and prepare the appropriate response. The response should include a narrative explanation of the resolution and any drawings or specifications required to complete the work as attachments. The response will be returned to PM and forwarded onto the Project QC Manager and PG&E for field implementation.

Changes to drawings as a result of a RFI will be identified with a symbol in the border identifying the RFI identification number and title. The drawing will also be marked with a cloud, circle, or other mark to distinguish the change from the original drawings. The sheet will supersede the existing drawing in the drawing set.

The RFI process is a field tool for documenting changed field conditions or other issues that may require a deviation from project requirements identified in the Work Plan or IM-3 Restoration Plan. The RFI is intended to obtain input and concurrence from the Project Engineer responsible for developing the project plans. Approval of the RFI by the Project Engineer does not constitute approval for PG&E or its subcontractors to perform work outside of the project scope or budget. It should be clearly conveyed in the RFI if issues identified in the RFI require a change to the project scope, schedule, or budget. In these instances, it is the responsibility of the PM to work closely with the Contract Administrator to seek and obtain proper approval from PG&E (in accordance with established contract procedures) before implementing the change recommended in the RFI.

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SECTION 8

Noncompliance and Corrective Actions

The Project QC Manager will document any work or materials not conforming to the project plans or project/contract requirements onto a Noncompliance Report (NCR) (Attachment 7). The NCR will detail the nonconforming condition, recommended corrective action(s), and disposition of the corrective action(s). Qualified representatives from Engineering, QA, and Construction will review the NCR and either accept or reject the recommended corrective action or disposition. The NCR will remain open until the nonconforming condition has been satisfactorily resolved and verified by QC inspection staff and Project QC Manager. Following receipt of notification of detected nonconformance, NCRs for each item will be completed.

The Project QC Manager will notify the subcontractor of any detected noncompliance with the foregoing requirements. The subcontractor will take immediate corrective action after receipt of such notice. Such notice, when delivered to the subcontractor at the work site, will be deemed sufficient notification. If the subcontractor fails or refuses to comply promptly, the Project QC Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. Noncompliance notification or stop work orders will be documented into the Daily Report. Completion of corrective action will be noted on the Daily Report. Verification of the corrective action and its results will be performed by the Project QC Manager and documented in the Daily Report.

8.1 Identification of Nonconforming Items

Items identified as nonconforming will be documented in an NCR, including the following information:

- Description of nonconforming item or activity
- Detailed description of nonconformance
- Referenced criteria
- Recommended disposition and corrective action to prevent recurrence, as applicable
- Affected organization
- Deficient conditions, divided into the following three categories:
  - In-process deficiencies
  - Installed deficiencies
  - Conditions that require stop work

8.1.1 In-process Deficiencies

In-process deficiencies are those conditions discovered during the course of QC inspections that are intended to be corrected or brought into conformance with established acceptance criteria or requirements. In-process deficiencies will be noted briefly into the Daily Report and detailed on the In-process Deficiency Punch List. Items on the punch list that cannot be corrected will be considered as installed deficiencies.

8.1.2 Installed Deficiencies

Installed deficiencies are those conditions discovered during the course of QC inspection of completed work that do not meet established acceptance criteria or requirements and are not intended to or cannot be brought into conformance. These conditions will be noted on a Rework Items List in addition to an NCR for evaluation and disposition. The Project QC Manager will issue the report summarizing the discrepancies within 24 hours of discovery.

In the event that the deficiency is not resolved within 2 calendar days after issuance of the NCR, a notice of non-response will be issued to the Demolition PM. Each report will be consecutively numbered, logged, and updated by the Project QC Manager. Resolution of installed deficient conditions will be documented and approved by the PM. Copies of completed reports will be sent to PG&E.

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8.1.3 Condition Requiring Stop Work

If corrective actions are insufficient, resolution cannot be reached, or results of prior work are indeterminate, work may be stopped by the Project QC Manager. An Immediate Stop Work Order can be issued by anyone for health and safety issues. The Project QC Manager, Demolition PM, or PG&E can issue a Stop Work Order in writing to the CM who will direct site activities to stop. If there is a disagreement between the Project QC Manager and the PM, the difference will be brought to the attention of the PQM until resolution is achieved.

The conditions of the Stop Work Order will be noted in the Daily Report and described in detail on a Rework Item List in addition to the Deficiency Report to allow evaluation of the problem(s) and proper corrective action(s). Work will not continue until the Stop Work Order has been resolved and documented by the Demolition PM. All Stop Work Orders will be immediately reported to the PG&E Site Managers and PG&E Contracting Manager, with a follow-up notification of any cost and schedule impacts.

8.2 Nonconforming Items

The nonconforming items will be controlled to prevent inadvertent use of material or workmanship quality. Items noted as nonconforming will be clearly identified and segregated from acceptable items when practical. NCRs will be logged onto the NCR Log (Attachment 8).

8.3 Disposition

The disposition of NCRs will include the necessary actions required to bring the nonconforming condition to an acceptable condition and may include reworking, replacing, retesting, or reinspection. Implementation of the disposition may be done in accordance with the original procedural requirements, a specific instruction, or an RFI.

The CM and Project QC Manager will initiate RFIs to document a change to the approved plans, specifications, and drawings that occur in the field.

Changes will be qualified as follows:

- **Major change** – one that affects the intent of the original design, including equipment, component, system, or structure that relates to function, operation, or safety of the designed product and/or personnel safety
- **Minor change** – one that does not affect the intent of the original design or product, including equipment, component, system, or structure that relates to function, operation, or safety

Where the RFI is marked as a Minor Change, the CM and Project QC Manager may execute the change and, in parallel, obtain concurrence from the Demolition PM that the change was indeed minor.

Where the RFI is marked as a Major Change, disposition must be sought from the Demolition PM and PG&E before execution. The CM and Project QC Manager will respond by issuing an appropriately executed Design Change Notice. A Design Change Notice will not be issued for a Minor Change RFI.

The CM and Project QC Manager have the responsibility for identifying and providing input data relative to record conditions. Record drawings are drawings that reflect the as-installed conditions and consist of the latest revision of the design drawing plus attached copies of approved changes (RFIs and Design Change Notices).

8.4 Corrective Measure Plan

Resolution of failing test results or noncompliance reports will be completed through a Corrective Measure Plan. The Corrective Measure Plan will be developed and documented by the Project QC Manager in conjunction with the Demolition PM. The agreed-upon corrective measure plan will be implemented and documented by the Project QC Manager. Completion of the corrective measure plan is the responsibility of the Project QC Manager.

On detection of a nonconforming condition, the Project QC Manager will immediately take corrective action. In addition to resolving identified nonconforming conditions, corrective action records will also address the initial cause of adverse conditions and establish methods and controls to prevent recurrence of the same or similar types

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of nonconformances. The Project QC Manager will monitor the corrective actions to verify that they were properly implemented and accepted and that the NCR was closed out.

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SECTION 9

Quality Control Documentation

Preparation, review, approval, and issuance of documents affecting quality will be controlled to the extent necessary to determine that the documents meet specified requirements. Project documents to be controlled include the following (see Attachments 1 through 10):

- Attachment 1 - Daily Report
- Attachment 2 - Rework Items List
- Attachment 3 - Testing Plan and Log
- Attachment 4 - Submittal Register
- Attachment 5 - Transmittal
- Attachment 6 - RFIs
- Attachment 7 - NCRs
- Attachment 8 – NCR Log
- Attachment 9 – Photo Log
- Attachment 10 – Transportation and Disposal Log

9.1 Conference and Confirmation Notes

In addition to other required documentation, the Project QC Manager is responsible for taking notes and preparing the reports of conferences. Conference notes will be typed and the original report furnished to PG&E within 5 days after the date of the conference for concurrence and subsequent distribution to all attendees. At a minimum, this report will include the following:

- Date and place the conference was held
- List of attendees, including name, organization, and telephone number
- Written comments presented by attendees, attached to each report with the conference action noted: “A” for an approved comment, “D” for a disapproved comment, “W” for a comment that has been withdrawn, and “E” for a comment that has an exception noted
- Comments made during the conference and decisions affecting criteria changes
- Conference notes that augment the written comments

The Project QC Manager is also responsible for providing a record of items such as discussions, verbal directions, and telephone conversations in which PG&E personnel or their representatives participate on matters relating to this contract and work. These records, entitled “Confirmation Notices,” will be numbered sequentially and will fully identify participating personnel, subject discussed, and any conclusions reached. The Demolition PM, or designee, will forward a reproducible copy of the confirmation notices to PG&E within 5 working days.

9.2 Daily Report

The Daily Report is an essential tool for recording and reporting the daily production, safety, and QC activities. The Daily Report is the daily record of operations on the job site and must be kept current. These reports are the official record of work performance and compliance with project plans, drawings, and specifications. It is therefore critical that the reports are correct and timely.

The Project QC Manager is responsible for preparing the Daily Report and submitting them weekly to the PM and the PQM. The Project QC Manager will obtain operational information from the Site Supervisor. The Health and Safety Officer will provide information on health and safety activities. The report also includes reports from each site subcontractor to address the following, at a minimum:

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- Quality aspects of the project that are being performed by the subcontractor(s)
- Scheduling and resource issues
- Site safety inspections and concerns
- Environmental concerns
- Job progress
- Control inspections
- Tests performed and their results
- Onsite crafts, personnel, and equipment
- Material received

The project team must review the Daily Reports for accuracy and completeness, because they are often used to prepare the final reports for the project. The Demolition PM should review these reports and verify the QC process is working on their project. The PQM should review these reports and verify the program quality assurance (QA)/QC processes and systems are working.

Attachment 1 includes the Daily Report template. The following should be attached to the Daily Report:

- Tailgate safety meeting minutes and signatures
- Project status meeting minutes
- Submittals
- Testing Plan and log
- Permits
- Chain-of-custody records
- Waste disposal documentation

9.3 Field Documentation Operating Procedures

The objective of the field documentation operating procedures is to verify that appropriate project information is documented into logbooks during construction. This documentation is important for communicating activities with other staff members and PG&E.

Regular QC observations, inspections, and general activities include the following:

- Record daily progress and associated QA and QC sampling.
- Record operations, sequence, and staging into logbooks.
- Record operations onto photographs (Attachment 9).
- Maintain waste disposal records (Attachment 10; see Section 5 of the Work Plan for the Waste Management Plan).
- Describe deviations from expected conditions or unexpected problems and their resolution, including estimated impacts to cost and schedule.

9.4 Site Preparation

Section 3.2 of the Work Plan describes site preparation activities, and Section 3.3 describes utility isolation. Site preparation will be observed by the Project QC Manager with the following checks:

- Verify that the equipment delivered to the site is inspected and free of any defects, free of any leaks, meets all Agency requirements, (i.e., portable equipment CARB permitting, etc.), and is properly staged.
- Confirm that a clearance check is performed to locate and identify each pipeline for all known utilities.
- Make certain that primary work zones, contaminant reduction zones, and support zones are properly demarcated and staged.

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- Monitor the condition of the access roads. Verify that the proper signs are installed, roads are maintained, and that the road can accommodate construction traffic.
- Observe arrival and material testing as they are delivered onsite.
- Inspect delivered materials to verify there are no defects in workmanship.
- Monitor delivery, handling, and storage of materials in accordance with the specifications.
- Verify storage facilities are protected and secure to prevent damage to equipment and materials in accordance with specifications.
- Review manufacturer material certifications.

9.5 Field Logbook

The Project QC Manager will maintain a record of daily QC activities during decommissioning, removal, and restoration in a field logbook. The field logbook will be available for review upon request. Field logbooks and data forms are necessary to provide sufficient data and record observations to enable participants to reconstruct events that took place during the project, and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. Field logs will be kept in a bound logbook with sequentially numbered pages. Entries will be made in waterproof ink, dated, and signed. The Project QC Manager will sign or initial the bottom of each page of the field log and date the entry to show that notes are being taken daily.

As an operating procedure for logbook entries, the following items will be recorded, at a minimum:

- Name of person making log entry (signature)
- Names of onsite team members
- Names of onsite subcontractor personnel
- Equipment used
- Levels of personnel protection, including the following:
  - Level of protection originally used
  - Changes in protection, if required, and reasons for changes
- Summary of daily work performed
- Summary of weather conditions
- General description of work activities, size of work crew, equipment, and onsite personnel
- Duration of lunch break
- Start time and duration of downtime resulting from equipment breakdown, weather, or plant emergencies
- Summary of QC meetings and actions recommended to be performed
- QC testing equipment and personnel
- Identification of work locations
- Description of materials delivered to the site, including QC data provided by the suppliers
- Record of decisions made regarding defective work or corrective measures implemented, or both
- Field tests
- Field observations and remarks
- Unusual circumstances or difficulties

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- Initials of person recording the information

No pages will be removed for any reason. If corrections are necessary, they will be made by drawing a single line through the original entry (so that the original entry can still be readable) and writing the corrected entry alongside. The correction will be initialed and dated. Corrected errors may require a footnote explaining the correction.

9.6 Inspection Documentation

The Project QC Manager is responsible for the maintaining the inspection records. Inspection records will be legible and clearly provide necessary information to verify that the items or activities inspected conform to the specified requirements or, in the case of nonconforming conditions, provide evidence that the conditions were brought into conformance or otherwise accepted by the Project QC Manager.

In addition to the required QC field inspections, the PG&E Quality Program requires a Quality Management overview of the site QA/QC Plan implementation. The Project QC Manager will perform regular internal quality control checks on the site implementation of the QA/QC Plan. Reports of any deficiencies will be reported to the PM for corrective action. Inspections will be performed and checked for the following:

- Possession and use of approved procedures, standards, and project specifications
- Conformance with appropriate procedures, standards, and instructions
- Thoroughness of performance
- Identification and completeness of documentation generated during performance

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SECTION 10

Definable Features of Work

This section discusses the Definable Features of Work (DFW) for field activities, including that of subcontractors and suppliers, the inspection process, and the required meetings to verify compliance with the contract. DFWs establish the measures required to verify both the quality of work performed and compliance with specified requirements, and include inspecting materials and workmanship before, during, and after each DFW. The DFWs are based on the scope of work outlined in the Work Plan and future IM-3 Restoration Plan. The DFWs for this project are as follows:

- Planning
- Procedures for IM-3 lay-up
- Permitting
- Mobilization
- Site preparation
- Utility isolation
- Decommissioning of IM-3 system
- Waste management
- Best management practices and mitigation compliance
- Soil confirmation sampling
- Site restoration (in accordance with the future IM-3 Restoration Plan)
- Demobilization

Detailed descriptions of each DFW are presented in the Work Plan. The defined controls will be adequate to cover operations and are keyed to the proposed sequence. Project QC includes implementing the following three control phases for aspects of the work specified:

1. Preparatory phase
2. Initial phase
3. Follow-up phase

10.1 Preparatory Phase Inspection

The Project QC Manager will conduct Preparatory Phase Inspections, including the following actions:

- Review each paragraph (as applicable) of the Work Plan.
- Review the applicable drawings.
- Verify that materials/equipment have been approved.
- Verify that provisions have been made to provide required control inspection and testing.
- Examine the work area to verify that required preliminary work has been completed and is in compliance with the approved Work Plan requirements.
- Physically examine the required materials and equipment to verify that they are properly delivered to the site, conform to approved shop drawings or specifications, and are properly stored.
- Review the appropriate activity/job hazard analysis to verify safety requirements are met.
- Discuss procedures for the work, including potential repetitive deficiencies.
- Document tolerance and workmanship standards for the particular phase of work.

The Demolition PM, PG&E, and the appropriate site personnel will be notified at least 2 working days in advance of preparatory phase activity. This phase will include a meeting conducted by the Project QC Manager and attended by any other personnel involved in performing the DFW.

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The issues discussed during the preparatory phase meetings will be documented in the Daily Report. The Project QC Manager will direct personnel performing work activities as to the acceptable level of workmanship required.

10.2 Initial Phase Inspection

An initial inspection will be performed at the beginning of a DFW and will include the following:

- Check preliminary work to verify that it is in compliance with contract requirements.
- Review the Preparatory Phase Checklist to verify that it documents the results of the preparatory meeting.
- Verify full contract compliance, including required control inspection and testing.
- Establish the required level of workmanship, and verify that the work meets minimum acceptable standards.
- Resolve differences.
- Check safety requirements, verify compliance with and upgrade the Health and Safety Plan and activity/job hazard analysis.
- Review the activity/job hazard analysis with project personnel.

The Demolition PM, PG&E, and appropriate site personnel will be notified at least 2 working days in advance of any initial phase activity. The Project QC Manager will document initial inspections for each item in the Daily Report. The exact location of the initial phase inspection will be indicated for future reference and comparison with follow-up inspections.

An Initial Phase Inspection will be conducted each time a new crew arrives onsite or any time acceptable specified quality standards are not being met.

10.3 Follow-up Phase Inspection

During the completion of a particular work feature, follow-up inspections will be conducted to confirm continued compliance with contract requirements. The frequency of the follow-up inspections will depend on the extent of the work being performed on each particular feature. Each follow-up inspection will be documented in the Daily Report. A final follow-up check will be conducted on any completed work phase prior to commencing each subsequent phase. Any deficiencies will be corrected prior to starting additional phases of work or will be identified on a list of items that do not conform to the specified requirements or are incomplete.

10.4 Additional Preparatory and Initial Phases

The Project QC Manager may conduct additional preparatory and initial inspections on the same DFWs under any of the following circumstances:

1. If the quality of ongoing work is unacceptable as determined by the Project QC Manager, PG&E, or site personnel
2. If there are changes in the staff, onsite supervision, or work crew
3. If work on a DFW is resumed after a substantial period of inactivity
4. If other problems develop

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SECTION 11

Work Cited

CH2M HILL. 2014. *Draft Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan, Topock Compressor Station, Needles, California*. Prepared for Pacific Gas and Electric Company. September 8.

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Attachment 1
Daily Report

DAILY REPORT

Version 1.0

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

REPORT DATE:
REPORT NO:

PROJECT NAME / LOCATION: IM-3 Decommissioning, Removal, and Restoration, Topock Compressor Station, Needles, CA

PROJECT NUMBER:	**PROJECT DESCRIPTION:** Decommissioning and removal of IM-3 Treatment, Extraction, and Injection System and restoration of the land originally affected by IM-3 operations.		
DEMOLITION PROJECT MANAGER:	**QC REPRESENTATIVE:**	**PREPARED BY:**	
AM WEATHER:	**PM WEATHER**:	**HIGH TEMP**:	**LOW TEMP**:
WINDS:	**WIND DIRECTIONS:**	**DEW POINT:**	**PRECIPITATION:**

SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED

(Include Safety Violations, Corrective Instructions Given, Corrective Actions Taken, and Results of Safety Inspections Conducted):

- Safety Tailgate meetings are held each morning with all employees.
- **Mentioned need to contact PG&E same day of incident.**
- Completed Daily Tailgate forms are electronically filed and hard copies stored in the PG&E job site trailer.
- Tailgate topics discussed today:
  -

EQUIPMENT ON HAND

Description of Equipment	Make/Model/Manufacturer	Equipment ID Number	Inspection Performed By

COMMENTS (acceptance status, inspection findings, etc.):

MATERIALS DELIVERED TO JOB SITE

Description of Materials Received	Make/Model/Manufacturer	Equipment Lot Number	Inspection Performed By	Number/ Volume/ Weight

COMMENTS (acceptance status, inspection findings, etc.):

WORK FORCE – CONTRACTOR AND SUBCONTRACTOR

Company	Work Performed	Number of Employees	Hours per Employee	Total Hours
	Totals:			

WORK AND/OR TESTS ACCOMPLISHED OR IN PROGRESS

Performed Work / Test for Today:

-
-
-

Planned Work / Test for Tomorrow:

-
-

Planned Work / Test for Next Week:

-
-

SITE INSPECTIONS PERFORMED

Task/Activity	*Inspection Performed*	*Findings*

QUALITY AND/OR PRODUCTION ISSUES AND RESOLUTIONS

-

SUBMITTALS INSPECTION / REVIEW

Submittal No.	*Submittal Description*	*Specification/Plan Reference*	*Submittal Approval*	*Comment/Reason/Action*
			Yes ☐ No ☐	
			Yes ☐ No ☐	

CHANGED CONDITIONS/DELAY/CONFLICTS ENCOUNTERED

(List any conflicts with the delivery order [i.e., scope of work and/or drawings], delays to the project attributable to site and weather conditions, etc.)

-

VISITORS AND DISCUSSIONS

-

TRANSPORTATION AND DISPOSAL

Transportation and Disposal Activites/Summary Quantitites:

GENERAL COMMENTS

General Comments (rework, directives, etc.):

ATTACHMENTS

List of Attachments: (examples: submittals, meeting minutes, safety meeting minutes, COCs, weight tickets, manifests, profiles, rework item list, etc.):

NOTE: Write all entries legibly in ink. Line out all unused portions or designate as "not applicable". Preparer signs first name, middle initial and last name on each completed daily inspection record. This form may be filled out electronically and signed electronically.

PREPARER'S SIGNATURE DATE

Attachment 2
Rework Items List

ATTACHMENT 2
Rework Items List

Project Number:

IM-3 Decommissioning, Removal, and Restoration

Item	Date Identified	Description	Referenced Section of Work Plan	Action Performed	Resolution	Date Completed

Attachment 3
Testing Plan and Log

ATTACHMENT 3 TESTING PLAN & LOG

IM-3 Decommissioning, Removal, and Restoration

Reference	Test Required	Date Sampled	Sampled By	Tested By	Location of Test (on-site/ off-site)	Frequency	Date Test Completed	Remarks

Attachment 4
Submittal Register

IM-3 Decommissioning, Removal, and Restoration

Project No:

		Required in Closeout Report			Approval required before mobilization	Approval SOON after mobilization							
Submittal Number	Version	Section	Reference	Action (A) or Informational (I)	Submittal	Description	Lead Reviewer	From Sub	To Reviewer	From Reviewer	Rtn To Sub	Approval Status	Notes
1				A	Demolition Work Plan	Describes technical approach, number and responsibilities of personnel at site, tools, equipment/methods, quality control procedures, including testing requirements.							
2				A	Health & Safety Plan and AHAs	Site-specific HASP, including training, medical surveillance and drug testing records for all site personnel, plus AHAs for specific tasks							
3				A	Spill Response Plan	Site-specific spill prevention procedures and response procedures, notifications, and reporting							
4				A	Waste Management Plan	Describes how waste will be staged, labeled, managed, characterized, transported, and disposed of.							
5				A	Traffic Control Plan	Proposed methods, routes, equipment, and personnel for work being performed related to trucks, equipment, and personnel coming and leaving the site.							
6				A	Air Monitoring Plan	Descibes the methods of air monitoring for compliance.							
7				A	Construction Quality Plan	Describes the process and procesdures for assuring quality control and compliance for site activities.							
8				A	Compliance Checklist and Flowcharts	Checklist will be used to verify environmental compliance and flowchart will show procedures and process for compliance							
9				A	Project Schedule	Detailed project schedule depicting tasks necessary to complete construction, start dates, durations and predecessors/successors							
10				A	BMP Plan	BMP Plan review and acceptance as well as provide, maintain, and operate temporary facilities to control erosion and sediment releases. This plan will be reviewd for compliance with the site BMP Plan.							
11		YES		A	All Permits	Obtain all required permits for the abatement and demolition.							
12		YES		A	Import Material Data Sheets	Source, samples, certifications for imported material							
13		YES		A	Backfill Materials Placement Field Testing Results	Including in-place density tests per ASTM D1556, D2167, D2922, D3017							
14		YES		A	Recycle Documentation	Load, transport and dispose of waste materials at a PG&E approved off-site facility.							
15		YES		A	Waste Manifests	Waste manifests for non-haz, non-RCRA Cal haz, RCRA, or TSCA wastes							
16		YES		A	Load Tickets	Receipts from the disposal or recycling facility that are time and date stamped with weights from certified scales							
17		YES		A	Bill of Laden (or equivalent)	Shipping documents for all materials sent to recycling facilities.							
18				A	Construction Closeout Report	Prepare a Construction Closeout Report that includes all subcontractor daily reports, waste transportation and disposal logs, analytical testing, site photographs of construction progress, copies of all weight tickets associated with recycling and disposal, recycling compliance summary and any testing results that were performed during the course of demolition							

Attachment 5
Transmittal

T R A N S M I T T A L

To: **From:**

Attn: **Date:**

Contract: IM-3 Decommissioning, Removal, and Restoration

Project:

Re:

We Are Sending You:

Quantity	Description

If material received is not as listed, please notify us at once

Remarks:

Copy To:

Attachment 6
Requests for Information

REQUEST FOR INFORMATION/CLARIFICATION

CONTRACT NO. **PROJECT NO.**

PROJECT TITLE & LOCATION: **IM-3 Decommissioning, Removal, and Restoration, Topock Compressor Station, Needles, CA**

BRIEF DESCRIPTION OF RFI:

TO:	NAME		TITLE	
FROM:	NAME		TITLE	
Date Submitted:	RFI No		DC No	
Please Respond By:			Page:	of
REFERENCE				
WORK PLAN REFERENCE(S):				

1) DESCRIPTION OF EXISTING CONDITION AND/OR DEFICIENCY:

NAME TITLE

PROJECT TEAM MEMBER SIGNATURE DATE

2) RECOMMENDED SOLUTION:

NAME TITLE	NAME TITLE
PROJECT MANAGER APPROVAL SIGNATURE DATE	PROJECT TEAM MEMBER SIGNATURE DATE

3) RESPONSE/DISPOSITION:

NAME	NAME
LEAD ENGINEER SIGNATURE DATE	PROJECT MANAGER SIGNATURE DATE

RFC Required? Yes ☐ No ☐ **Schedule Impact?** Yes ☐ No ☐ **Cost Impact?** Yes ☐ No ☐

4) CTR RESPONSE/DISPOSITION CONCURRENCE:

NAME	NAME
QC MANAGER SIGNATURE DATE	AFCEE REP SIGNATURE DATE

REVIEW DISTRIBUTION			FINAL DISTRIBUTION		
☐ PGE REP	☐ TCS Rep	☐ LEAD ENG	☐ PG&E REP	☐ TCS Rep	☐ LEAD ENG
☐ PG&E COR	☐ PM	☐ Other	☐ PG&E COR	☐ PM	☐ Other
☐ PG&E KA	☐ PROJ ENG	☐	☐ PG&E KA	☐ PROJ ENG	☐

Attachment 7
Nonconformance Reports

ATTACHMENT 7
NON-CONFORMANCE REPORT

PART 1 – General Information

Date Submitted:	NCR Number:
Submitted To:	Company/ Title/Position:
Prepared By:	Company/ Title/Position:
Project Name: IM-3 Decommissioning, Removal and Restoration	Project Number:
PO Number:	Contract Number:

PART 2 – Non-Conformance Report

Description of Non-Conforming Item or Condition				
Contract Requirement or Project Specification/Drawing				
Test/Inspection/Audit Identifying Non-Conformance				
Reportable Release?	Yes ☐		No ☐	
Material Name:			Quantity:	
Disposition:	Repair ☐	Rework ☐	Use-As-Is ☐	Reject ☐

PART 3 – Investigation/Root Cause Determination

Personnel Responsible for Investigative Process:
Investigative Process Findings:
Probable Root and Contributing Cause(s):

PART 4 – Corrective Actions

Proposed Corrective Actions and Completion Dates:		
Personnel Responsible for Implementation of Corrective Actions:		
Resulting Actions and Effectiveness of Those Actions:		
Personnel Responsible for Monitoring Effectiveness of Corrective Actions:		
Corrective actions have been completed and monitored for effectiveness.		
Signature	Company/Title	Date

PART 5 – Response Approval

Responses Accepted By		
Signature	Company/Title	Date
Signature	Company/Title	Date

PART 6 – Quality Control Follow-Up

Comments/Findings of Follow-Up Observation / Inspection / Audit:		
Verification Results	Satisfactory ☐	Unsatisfactory ☐

PART 7 – NCR Closure

NCR Closed		
Project QC Manager		
Signature	Company/Title	Date

Attachment 8
Nonconformance Report Log

ATTACHMENT 8
NON-CONFORMANCE REPORT (NCR) LOG

Project No.

DESCRIPTION OF NONCONFORMANCE	NO NCR's FOR WEEK ENDING:	REPORT NO.	DATE FOUND	DATE CORRECTED	RESPONSIBLE CONTRACTOR

Attachment 9
Photo Log

Project No. **Photo Log**

PHOTO 1	

PHOTO 2	

PHOTO 3	

PHOTO 4	

PHOTO 5	

PHOTO 6	

PHOTO 7	

PHOTO 8	

PHOTO 9	

PHOTO 10	

PHOTO 11	

PHOTO 12	

PHOTO 13	

PHOTO 14	

PHOTO 15	

PHOTO 16	

PHOTO 17	

PHOTO 18	

PHOTO 19	

PHOTO 20	

PHOTO 21	

PHOTO 22	

PHOTO 23	

PHOTO 24	

PHOTO 25	

PHOTO 26	

PHOTO 27	

PHOTO 28	

PHOTO 29	

PHOTO 30	

Attachment 10
Transportation and Disposal Log

TRANSPORTATION AND DISPOSAL LOG

Project No	Project Name	Site Description	Container Type	Container Desig.	Accumula-tion Date	Waste Profile Sample No	Contractor	Transporter	Date Transported	Transporter EPA ID	Load ID	Disposal Facility	Disp Fac EPA ID	Media	Waste Type (Haz, Nonhaz, TSCA)	Waste Code/ Haz Waste No	Disposal Date	Manifest Number	Disposal Treatment Method (Enter disposal quantity under appropriate method)					Certif of Disp/ Destruc Date	Comments/Notes	File Status (see note)
																			Reuse	Recycle	Landfill	Other	Unit			

Appendix C
Safe Fueling and Fuel Handling Policy

Standard Operating Procedure
PG&E Topock Groundwater Remedy
Operations and Maintenance Plan

Title: Safe Fueling and Fuel Handling Policy

Number: Remedy-SOP-02_Rev0

Created Date: 7/15/2013

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS). The objective of this Standard Operating Procedure is to describe the policy required to refuel vehicles, fuel tanks, and equipment/portable containers safely during work on and off the project site.

2 Approvals

Each vendor/contractor must obtain approval from PG&E Topock Site Operations Manager, and or Sr. Environmental Inspector of a) the planned fueling and re-fueling methods for the contracted activities to be performed at the site, and b) the commercial fuel supplier prior to first use for contracted activities.

3 Safety Guidelines During Fueling Operations

PG&E requires all vendors/contractors to follow appropriate procedures during fueling/refueling activities in order to avoid spills and incidents. The following general guidelines will be followed unless pre-approved otherwise:

Preparation, Pre-Fueling and Fueling Guidelines

- Turn off all equipment or engines before refueling.
- When fueling at a pump, remain attentive to the fuel nozzle.
- When not fueling at a fixed pump, stage splash pad containment as needed.
- Identify and locate fire extinguisher prior to fueling.
- Do not become distracted while fueling by electronic devices, reading materials, or conversations with bystanders.
- Use only UL-approved containers for portable gasoline storage cans.
- When filling a portable container, always place the container on level ground and keep the pump nozzle in contact with the container when refueling to avoid a static electricity ignition of fuel vapors. Fill slowly to avoid spillage and skin/clothing contact and use a funnel if needed.
- When fueling from a portable container, stage splash containment as needed.
- Only store fuel in locations approved by PG&E, and never near any ignition sources.

- In the event of a fire, make use of fire extinguisher that is available. If fire cannot be contained, relocate yourself to a safe location and call 911.

General Remote Fueling Considerations

- Position the fuel supply source as close to the equipment to be fueled as is practicable and safe.
- Inspect fuel conveyance hose/equipment and all connections and fittings for signs of wear or defects prior to the initiation of fuel pumping or pouring. If pouring fuel from a portable container, a funnel constructed of suitable material must be used to avoid splashing.
- Stage splash containment and fire extinguisher as needed.
- Ensure the area is free from ignition sources (i.e., hot equipment/work, sources of spark or static electricity).
- Once fueling is complete, deactivate the fuel supply pump prior to removing the fill nozzle from the equipment, and ensure that residual fuel has been emptied from the conveyance hose (as appropriate based on design of the equipment used).
- Inspect work area for any signs of spills, and remove spill pad(s), as appropriate.

3 Communication and Contingency Action

If a spill occurs the appropriate clean-up actions should commence as efficiently and safely as possible. Use a natural fiber push broom and/or a spark resistant shovel or scoop.

In addition, the reason for the spill will be investigated, and the team will modify the fueling procedure or conduct equipment repairs as determined appropriate to minimize the potential for future spills. Further, PG&E Site Operations Manager/Sr. Environmental Inspector must be notified immediately.

4 Waste Management

All waste generated during refueling, such as oily absorbent pads, must be transported and disposed of as directed by PG&E immediately following generation. Do not dispose of any oil/fuel contaminated pads or rags in the soil roll-off bins or waste dumpsters.

Appendix D
Transportation Plan

Draft

Interim Measure No. 3 Transportation Plan, Topock Compressor Station, Needles, California

Prepared for:

Pacific Gas & Electric Company

September 2014

CH2MHILL Constructors, Inc.

3 Hutton Centre Drive, Suite 200
Santa Ana, California 92707

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Acronyms and Abbreviations

DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
IM-3	Interim Measure No. 3
PG&E	Pacific Gas and Electric Company
Plan	Transportation Plan

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SECTION 1

Introduction

This Transportation Plan (Plan) describes the hauling of waste for offsite disposal during the decommissioning and removal of the Interim Measure No. 3 (IM-3) Groundwater Extraction and Treatment System, and the restoration of the areas affected by IM-3 operations.

Wastes from the IM-3 decommissioning will be transported by a qualified (licensed/registered and insured) waste hauler in trucks using manifests or proper shipping documents to preapproved, permitted disposal facilities. This Plan provides the protocol and procedures for preparing, loading, transporting, and documenting transportation-related activities during IM-3 decommissioning, removal, and restoration. The plan covers the following activities:

- Removal of non-hazardous and hazardous materials and wastes from the project site in accordance with applicable federal, state, and local laws, regulations, and ordinances.
- Compliance with applicable regulations related to transportation of wastes to protect public health and safety.
- Compliance with Pacific Gas and Electric Company (PG&E) requirements for spill prevention and traffic safety.
- Transportation of waste materials in a manner that prevents the release of waste to areas outside of the approved disposal facilities.
- Disposal of waste materials after profiling and receipt of written acceptance from the permitted disposal facilities.
- Implementation of a traffic plan that includes staging and onsite access to minimize disruption to compressor station operations and prevent spills.
- Implementation of a site-specific health and safety plan and compliance with approved project procedures to prevent or minimize the occurrence of accident, spill, or worker exposure to hazardous materials.

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SECTION 2

Requirements for Transporters

Transporters of waste materials will comply with the procedures and requirements outlined in this section during IM-3 decommissioning, removal, and restoration.

2.1 Shipping Documents

Decommissioning wastes will be managed either as hazardous or non-hazardous waste, depending on the waste profile, and transported using the appropriate shipping documents (manifests, bill of lading, or invoice) by a licensed waste hauler. At a minimum, the shipping document for non-hazardous waste will include the following information:

- Name and address of waste generator, name and address of waste transporter
- Name and address of disposal facility
- Description of the waste
- Quantity of the waste shipped

The designated transportation and disposal coordinator will maintain a copy of shipping document for each truckload of waste or fill material until the removal action is complete.

2.2 License and Insurance

The selected haulers or transporters of waste or fill material will be licensed and insured in both the shipping and receiving states, and in states through which the waste will be transported. Hazardous wastes must be transported by a registered hazardous waste hauler. The designated transportation and disposal coordinator will verify the status of registration and insurance policy of the selected transporters.

2.3 Contingency Plan

Each transporter is required to have a written contingency plan for PG&E review and approval to address any of the following conditions:

- Emergency situations (such as vehicle breakdown, accident, waste spill, waste leak, fire, and explosion) during transportation of waste materials from the project site to the disposal site
- Change in waste characteristics and condition
- Inclement weather

The contingency plan will be prepared in accordance with DTSC's guidance for transportation plans for site remediation (DTSC 2001). After the transporter is selected, a copy of their contingency plan will be made a part of this Plan.

2.4 Site-specific Requirements for Transporters

Transporters are required to attend contractor training provided by PG&E. Transporters and onsite flaggers are required to inspect under and around their vehicle(s) for wildlife prior to moving the vehicle.

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SECTION 3

Traffic Control

This section describes traffic control procedures and requirements to be implemented during decommissioning.

3.1 Dust control

Most materials for offsite disposal will be transported in covered end-dump trailers/trucks, drums, or roll-off bins to an approved disposal facility. Some materials for disposal may be suitable for flatbed trucks or trailers. Project-related track out or spills on publicly maintained paved surfaces will be cleaned within 24 hours. For other required transportation-related, dust-control measures, see Table 6-1 (Air Quality and Hazardous Materials headers) and Appendix G of the IM-3 Decommissioning, Removal, and Restoration Work Plan.

3.2 Traffic Control

3.2.1 Speed Limit

While on the project site, vehicles are required to maintain speeds appropriate to the roadway for safety purposes and for dust control. While on streets or freeways, transporters will follow the posted speed limits and apply defensive driving techniques (traffic or road conditions) for traffic safety.

3.2.2 Site Access Control

Trucks will be well maintained; leaks and spills from vehicles are not acceptable. Trucks with excess grease or debris will be rejected and not allowed access to the project site. An inspector will be located at a designated location to inspect and approve vehicles, assisting the truck drivers to safely enter and depart the project site.

3.2.3 Truck Staging Area

Empty waste bins will be inspected by the designated transportation and disposal coordinator to confirm cleanliness prior to being off-loaded at sites designated within the IM-3 Decommissioning, Removal, and Restoration Work Plan, as directed by the inspector. Truck loading will be coordinated so as to avoid staging offsite and long wait times for trucks; idling will be limited to 5 minutes, except when queuing or as necessary for inspecting or servicing the vehicle, or operating a power take-off device.

3.3 Transportation Routes

3.3.1 Offsite Traffic Flow

Trucks will enter and exit the project through the IM-3 access road. Full and empty bins will be shuttled to the staging areas depicted on Figure 3-1 of the IM-3 Decommissioning, Removal, and Restoration Work Plan. Prior to entering the site, trucks will drive into a designated area for visual inspection of fuel or oil leaks, as well as inspection of empty bins. Figure 3-1 of the IM-3 Decommissioning, Removal, and Restoration Work Plan illustrates the proposed traffic routes. Appropriate signage will be developed to control traffic flow.

3.3.2 Onsite Traffic Flow

Only the designated onsite roll-off trucks will be allowed within the primary work zones to shuttle full and empty bins to the primary work areas. Trucks will wait inside the project site at a designated staging area until directions to loading areas within primary work zones are received. Traffic will be coordinated to reduce traffic on surrounding surface roads and reduce dust generation during onsite transportation. Figure 3-1 of the IM-3 Decommissioning, Removal, and Restoration Work Plan illustrates the proposed traffic route within the project site.

3.4 Truck Inspection and Cleaning

After loading, the trucks will be inspected to make certain they are clean prior to leaving the project site and entering offsite transportation routes. A cleanout station will be maintained for inspection and to keep trucks

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clean when leaving the project site. Dry decontamination will be used for onsite truck cleaning, when necessary. Trucks will be considered to be decontaminated if no solid material adheres to the outside of the vehicle. If trucks require washing, they will be washed offsite by the transporter.

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SECTION 4

Disposal Facilities

Disposal facilities receiving Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) waste (waste that contains CERCLA hazardous substances, pollutants, or contaminants) must be in compliance with 42 U.S.C § 9621 (d) (3) and 40 C.F.R. § 300.440. PG&E may ship waste material associated with the implementation of the Final Remedy from the Site to an offsite facility only if it demonstrates to DOI's satisfaction, prior to the first shipment, and annually thereafter, that USEPA has determined that the proposed receiving facility is operating in compliance with 42 U.S.C § 9621 (d) (3) and 40 C.F.R. § 300.440. If waste material is shipped to an out-of-state disposal facility, then PG&E will provide written notice of the disposal of waste to the appropriate state environmental official in each receiving facility's state and the DOI Project Manager prior to the first shipment of the waste material in accordance with the requirements of the Consent Decree. Wastes designated as RCRA or Non-RCRA hazardous wastes will be transported and disposed of in a pre-approved facility with the appropriate permits for the type of waste being accepted. Waste profiles will be established, and acceptance of the waste stream will be established prior to sending any waste material offsite. Receiving facilities for wastes designated as non-hazardous wastes will also be pre-approved. Facilities for the RCRA hazardous wastes, Non-RCRA hazardous and non-hazardous wastes will be identified just prior to implementing this Work Plan.

PG&E proposes use of the following potential disposal facilities for the project as well as others, subject to the communication and approval processes under the Consent Decree outlined above:

PSC Rancho Cordova – TSDF
11855 White Rock Road
Rancho Cordova, CA 95742

Chemical Waste Management – Kettleman Hills Facility – Landfill
35251 Old Skyline Road
Kettleman City, CA 93239

US Ecology Inc. - Landfill
Highway 95 (12 miles South of Beatty, NV)
Beatty, NV 89003

Clean Harbors Button Willow – Landfill
2500 West Lokern Road
Button Willow, CA 93206

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SECTION 5

Documentation

The designated transportation and disposal coordinator will be responsible for maintaining proper documentation of waste removal and transportation and site restoration activities.

5.1 Photographs

Photographic documentation representing activities, with particular attention to compliance with this Plan and the IM-3 Decommissioning, Removal, and Restoration Work Plan, will be collected throughout the course of the project.

5.2 Field Log Book

The designated transportation and disposal coordinator will be responsible for maintaining a field logbook to document observations, onsite personnel, truck arrival and departure times, and other vital project information.

5.3 Truck/Equipment Inspection Logbook

Trucks and equipment used in project activities will be inspected daily and prior to entering and leaving the project site. A logbook will be kept to document thorough and complete inspection.

5.4 Weekly Reports

As part of the weekly report, the designated transportation and disposal coordinator will summarize the transportation activities and accomplishments in the weekly report. The weekly report will also include the completion status of project objectives, verify designated transportation and disposal coordinator's adherence to proper site health and safety procedures, and describe the activities and goals for the following week.

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SECTION 6

Plan Review Corrective Actions

6.1 Plan Update Log

The designated transportation and disposal coordinator will keep a log of updates to this Plan and record written acknowledgment of changes or additions.

6.2 Corrective Action Log

The designated transportation and disposal coordinator will keep a log of corrective actions taken to accomplish project objectives.

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SECTION 7

Works Cited

CH2M HILL. 2014. *Draft Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan, Topock Compressor Station, Needles, California*. Prepared for Pacific Gas and Electric Company. September 8.

Department of Toxic Substances Control (DTSC). 2001. *Transportation Plan, Preparation Guidance for Site Remediation*. *Interim Final*. December.

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Appendix E
Utilities Drawing Set

(To be provided in the final work plan)

Appendix F
Soil Management Plan

This appendix is same as the Soil Management Plan that is currently under review with the 90% Basis of Design Report for the Final Groundwater Remedy (Appendix L, O&M Manual, Volume 4). The final version of this plan will be included with the final Work Plan.

Appendix G
Construction Best Management Practices (BMPs) Plan

APPENDIX G

Construction Best Management Practices (BMPs) Plan

In compliance with EIR mitigation measure HYDRO-1, the IM-3 decommissioning, removal, and restoration activities will implement BMPs to meet the substantive criteria of NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ NPDES No. CAS000002 (General Permit) (SWRCB 2009), as well as applicable Federal, state, and local permit and regulatory requirements. Although the IM-3 decommissioning, removal, and restoration activities are not required to obtain a General Permit, a current copy of the General Permit can be found at the State Water Resources Board website, *http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2009/wqo/wqo2009_0009_dwq.pdf*. This BMP plan has been prepared by a Qualified SWPPP Developer (QSD) and will be implemented prior to decommissioning activities under the direction of a Qualified SWPPP Practitioner (QSP). The BMPs are presented in Sections 1 and 2. Visual inspections, monitoring, and sampling are required to evaluate the effectiveness of the BMPs and to determine whether modifying or implementing additional BMPs is required. A monitoring and reporting program is presented in Section 4. Sections 5 and 6 discuss workers training and education, and record keeping. Final site stabilization is presented in Section 7.

The BMP designations cited below are based on those used by the California Stormwater Quality Association Construction BMP Handbook (California Stormwater Quality Association 2009) and are consistent with the types of BMPs referenced in the General Permit.

1. Pre-Decommissioning Control Practices

Scheduling of Activities (EC-1)

Proper scheduling assists in identifying ways to minimize disturbed areas, which allows for a reduction in the active project area requiring protection and also minimizes the length of time disturbed soils are exposed to erosive processes. Scheduling will occur at the start of the work and will be established to coordinate construction activities and BMP implementation during IM-3 decommissioning. Weather reports will be monitored by the Qualified SWPPP Practitioner (QSP) or his/her assigned representative and construction activities will be postponed during significant storm events. Prior to rain events, temporary soil stabilization BMPs will be implemented.

Preservation of Existing Vegetation (EC-2)

There is very sparse vegetation in the IM-3 primary work zones, staging areas, and access/haul routes (see Figure 3-1). The main areas of soil disturbance will be:

- PE-1 well site,
- MW-20 Bench Facility,
- Access road to IM-3 and the valve vaults located along that access road,
- IM-3 treatment plant,
- Access road from IM-3 treatment plant to the East Mesa injection well field,
- East Mesa injection well field, and
- Temporary staging areas at various locations.

Additional areas of anticipated minor soil disturbance are also shown in Figure 3-1. Prior to decommissioning, qualified biologist(s) will survey the work areas for sensitive species and habitats including confirmation/tagging the mature and sensitive plants (including ethnobotanically sensitive plants) previously identified in mapping efforts in compliance with mitigation measures AES-1/2 and CUL-1a-5. Areas that need to be preserved will be marked with temporary fencing. Protection methods and specifications described in future Avoidance and

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Minimization Plan will be followed (see Table 6-1); workers will be instructed to implement these avoidance and protection methods and be instructed to keep clear of areas outside of disturbance limits.

2. BMPs Addressing Control Site Run-on/Run-off, Prevent/Reduce Discharge of Pollutants to Waters of the United States, and Prevent Spills

BMPs Addressing Off-site Run-on to the Construction Site

Although the project site is in an arid region of California, there can be periods of intense rain. Run-on to the construction site is expected to be minimal but presents a high potential for sediment transport because of the intensity of the periodic rains and the susceptibility to the active work zones to erosion. Therefore, off-site run-on will be managed by constructing temporary berms or sandbag barriers above the work zones to route surface water around the work areas.

- Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats (EC-7): These erosion control methods can be used on flat or, usually, sloped surfaces, channels, and stockpiles. Plastic covers are typically used to cover soil stockpiles. Plastic covers can also be used under vehicles and equipment as spill, leak, and drip containment.
- Earth Dikes and Drainage Swales (EC-9): Temporary earth dikes and drainage swales use compacted soil or cement to divert offsite runoff around construction sites, divert runoff from stabilized and disturbed areas, and convey runoff to desired location. These include graded surfaces to redirect sheet flow, diversion dikes or berms that force sheet flow around a protected area, and stormwater conveyances (swales, channels, gutters, drains, sewers) that intercept, collect, and redirect runoff. Only temporary diversions will be used for IM-3 decommissioning work. Temporary diversions could include excavation of a channel along with placement of the spoil in a dike on the down gradient side of the channel, and placement of gravel in a ridge below an excavated swale.
- Velocity Dissipation Devices (EC-10): Velocity dissipation devices will be used at the downstream terminus of the channels to reduce the energy and velocity of the onsite runoff.
- Non-Vegetative Stabilization (EC-16): Roadways may be stabilized by addition of crushed rock or gravel for dust control and to prevent erosion from vehicle transportation. Areas stabilized with crushed rock or gravel should be maintained and additional gravel added as needed.

BMPs for Sediment Control

- Silt Fence (SE-1): A temporary sediment barrier consisting of fabric, held in place by supporting poles or stakes, is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flow. Silt fences are suitable for perimeter control and are placed below areas where sheet flows discharge from the site. They should also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion. Silt fences are most effective when used in combination with erosion control.
- Fiber Rolls (SE-6): Fiber rolls will be used to intercept runoff and reduce flow velocity. Fiber rolls will be placed at the perimeter of the disturbance areas to minimize sediment from leaving the construction area during storm events. Fiber rolls will also be installed to form a barrier around all of the stockpiles and will be anchored down with stakes. If the stockpiles are on paved areas, then gravel bags will be used to secure the fiber rolls. The fiber rolls shall be inspected prior to a forecasted rain event and after rain events to ensure the fiber rolls are working properly. Sediment accumulated by the fiber rolls should be removed to maintain the effectiveness of the fiber rolls.
- Gravel Bag Berm (SE-6): Gravel bag berm can be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. The QSP will determine if gravel bags will be placed along the up-gradient side of any equipment that is not in use. Gravel bags will also be used, if necessary, during trenching activities when stockpiles are left overnight. In the event that gravel bag berms are needed, they could be placed around the lay down area and trenching area.

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BMPs for Wind Erosion Control

- Wind Erosion Control (WE-1): Wind erosion control will be applied as necessary to prevent nuisance dust as directed by the QSP. Dust control shall be applied prior to grading activities. A water truck will be used to control dust as necessary. Care shall be taken not to over water the site to create runoff and sediment migration off site.
- EIR mitigation measure AIR-1a: Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes will be considered sufficient.
- EIR mitigation measure AIR-1b: Cover loaded haul vehicles while operating on publicly maintained paved surfaces
- EIR mitigation measure AIR-1c: Stabilize (using soil binders or establish vegetative cover) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions
- EIR mitigation measure AIR-1e: Curtail non-essential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.

BMPs for Tracking Control

- Stabilized Construction Entrance/Exit (TC-1): A temporary stabilized vehicular entrance located where traffic will enter and exit temporary staging areas. This purpose is to reduce the tracking of sediment onto public right of ways, streets, or parking areas where it could potentially be washed into drains or become air borne.
- EIR mitigation measure AIR-1d: Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours.

BMPs Addressing Material and Waste Storage and Handling Areas

- Material Delivery and Storage (WM-1) and Material Use (WM-2): Provide covered storage for materials, especially hazardous materials, to prevent exposure to storm water. Store and transfer hazardous materials on to impervious surfaces that will provide secondary containment for spills, leaks, or drips. Park vehicles and equipment used for material delivery and storage, as well as contractor vehicles, in designated areas. The storage area shall be covered and protected during non-working days and prior to and during rain events. Employees and subcontractors shall be trained on the proper material delivery and storage practices. Material Safety Data Sheets (MSDS) should be supplied for all materials used.
- Stockpile Management (WM-3): If stockpiles are left over night, they shall be located a minimum of 50 feet away from any concentrated flow of storm water, drainage courses, and inlets. Stockpiles will be covered with plastic and anchored down with gravel bags. Each stockpile will be surrounded with fiber rolls or gravel bag berm. Limit the use of plastic materials when more sustainable environmentally friendly alternatives exist.
- Spill Prevention and Control (WM-4): Ensure that spills and releases of materials are cleaned up immediately and thoroughly. Ensure that appropriate spill response equipment, preferably spill kits preloaded with absorbents in an over pack drum, is provided at convenient locations throughout the site. Spent absorbent material must be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as nonhazardous. Store materials properly to prevent spills from entering the storm drain system or surface waters. Ensure that spill cleanup materials are located on-site and are easily accessible. Clean up leaks and spills immediately using proper absorbent materials. Absorbents used to clean up hazardous materials must be disposed of as hazardous waste. Educate employees about spill prevention

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and cleanup and train workers in proper spill response procedures. Stop the source of spill and cleanup immediately, if it is safe to do so. Field crew to report all spills to PG&E.

- Solid Waste Management (WM-5): Work shall be performed in accordance with the Waste Management Plan. Maintain site in good order and free of litter and trash. Maintain storm drain inlets free of litter and construction wastes. Provide a sufficient number of conveniently located trash and scrap receptacles to promote proper disposal of solid wastes. Ensure that the receptacles are provided with lids or covers to prevent windblown litter. Maintain receptacles regularly.
- Hazardous Waste Management (WM-6): Provide a sufficient number of proper receptacles to promote proper disposal of hazardous wastes. Hazardous waste that cannot be reused or recycled must be stored, transported, handled, and disposed of in accordance with Federal, state, and local laws.
- Sanitary/Septic Waste Management (WM-9): Locate sanitary and septic waste facilities away from drainage courses (50 feet) and traffic areas. Maintain the facilities regularly.
- Liquid Waste Management (WM-10): Liquid waste shall be contained in a controlled area and not allowed to enter any water course. Potential sources of liquid waste and their appropriate disposal procedures shall be identified. Employees and subcontractors shall be educated on the proper practices of disposing liquid waste.

BMPs Addressing Non-Stormwater Controls

- Water Conservation Practices (NS-1): Water equipment shall be kept in good working condition and shall repair any water leaks promptly. Employees and sub-contractors shall be informed on the requirements of water conservation practices and will be required to implement the practices throughout the project.
- Clear Water Diversion (NS-5): Drainage pipes will be installed to divert water around the work area in order to reduce the potential storm water run on in the working areas.
- Illegal Connection/Illegal Discharge Detection Reporting (NS-6): All illicit connections or illegally dumped or discharged materials on the construction site will be reported to the QSP at the time of discovery. The site shall be inspected regularly during project duration for evidence of illicit connections, illegal dumping, or discharges.
- Vehicle and Equipment Cleaning (NS-8): Vehicle cleaning will be by dry brushing/wiping. Cleaning cloths will be managed and disposed of in accordance with federal, state, and local regulations. Soaps and solvents will not be used unless the resulting waste or wastewater is fully contained. Establish a designated area for equipment cleaning away from drainage courses. Vehicle washing should be kept to a minimum and in contained areas only using Phosphate-free, biodegradable soaps. Water used for washing should not be discharger or buried and must be captured and recycled or disposed of according to the requirements of WM-10, Liquid Waste Management or WM-6 Hazardous Waste Management. Vehicles should be cleaned offsite when possible and vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite. Employees and subcontractors should be educated in ways to prevent pollutions when washing. No steam cleaning is permitted onsite.
- Vehicle and Equipment Fueling (NS-9): Fuel vehicles and equipment off- site whenever possible. Follow fueling SOPs included in Appendix H of this Work Plan. Onsite re-fueling will be located away from any watercourse. Spill kits and absorbent spill clean-up materials shall be available in re-fueling areas and on trucks with portable re-fueling tanks. All fueling/re-fueling areas will have secondary containment and all spills shall be immediately cleaned up.
- Vehicle and Equipment Maintenance (NS-10): Use off-site maintenance facilities whenever possible. Any on-site maintenance areas must be away from any drainage course and protected from storm water runoff and on-site flooding. Use designated area that is a safe distance away from drainage facilities and water courses. Segregate and recycle wastes such as greases, used oil and oil filters, antifreeze, cleaning solutions, auto batteries, and hydraulic and transmission fluids. All maintenance areas will have spill kits and other spill protection devices.

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Good Housekeeping BMPs

The following good housekeeping measures should be implemented onsite for the duration of the IM-3 decommissioning, removal, and restoration:

1. Cover and berm loose stockpiled construction materials that are not actively being used.
2. Store chemicals in water tight containers (with appropriate secondary containment) to prevent any spillage and leakage in a completely enclosed storage shed.
3. Minimize exposure of construction materials to precipitation.
4. Prevent the tracking of loose construction and landscape materials offsite.
5. Prevent the disposal of rinse or wash waters or materials on impervious site surfaces.
6. Ensure the containment of sanitary facilities to prevent discharges of pollutants to the stormwater drainage system or receiving water. Regularly inspect sanitation facilities and clean or replace them as needed.
7. Cover waste disposal containers at the end of every business day and during rain events. Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water.
8. Contain and securely protect stockpiled waste materials from wind and rain at all times unless actively being used.
9. Contain all washouts so that there is no discharge into the underlying soil and onto the surrounding areas.
10. Prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters. Immediately clean up all leaked material and dispose of properly.
11. Contain fertilizers and other landscape materials when they are not being actively used.
12. Apply erodible landscape materials at quantities and application rates according to manufacturers' recommendations based on written specifications by knowledgeable and experienced field personnel. Discontinue the application of any erodible landscape material within two days before a forecasted rain event of during periods of precipitations. Stack erodible landscape materials on pallets and cover when not being used or applied.
13. Limit washing vehicles onsite to emergency situations only. Prevent non-stormwater discharges from vehicle washing from reaching drainage courses.
14. Provide soil cover for areas of construction that have been disturbed and are not scheduled to be re-disturbed for at least 14 days and for all finished slopes, open space, utility backfill, and completed lots.
15. Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to control erosion and sediment discharges from the site.
16. Conduct regular stormwater tailgate meetings with the workforce when the Project is staffed and work is underway.
17. Construction vehicles and equipment left idle for more than an hour should be placed on mats to prevent leaks from entering water bodies.
18. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (that is, poles, equipment pads, cabinets, conductors, insulators, bricks, and so forth).

3. Risk Determination

A Risk Type 1 has been calculated per the General Permit for the IM-3 decommissioning, removal, and restoration activities. The sediment risk was determined from a combination of the Rainfall Erosivity Factor (R value), the Soil Erodibility Factor (K value), and the hill slope length-to-gradient factor (LS value) to account for the effect of

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topography on erosion. These three values are multiplied to obtain a watershed erosion estimate, which then directly corresponds to a certain level of sediment risk.

The R value of 10.00 was calculated using the estimated annual R values and Erosivity Index Tables developed by the United States Department of Agriculture. The methodology is outlined by the EPA Fact Sheet 3.1 and is dependent on construction schedule and location. The K value of 0.10 was obtained from the Google Earth K Factor kmz file as provided by the SWRCB. The LS factor of 9.17 was calculated using Google Earth LS Factor kmz file as provided by the SWRCB. With these values, the combined watershed erosion estimate was found to be 9.17 tons per acre. Because it was calculated to be less than 15 tons per acre per the CGP this project is considered a Low Sediment Risk.

Stormwater runoff is expected to infiltrate or follow natural drainage courses to the receiving water body. The Project drains to the Colorado River. The Colorado River is not a 303d-listed impaired water body for sediment or siltation and is not deemed to have a beneficial reuse pertaining to COLD, SPAWN, and MIGRATORY. As a result, it is classified as a Low Receiving Water Risk. As classified by the Attachment A of the General Permit, the Risk Type determination for the Project is Type 1. Risk determination calculations are shown in Attachment 2 to this appendix.

Prior to implementation of the IM-3 Decommissioning, Removal, and Restoration Work Plan, the R value calculation will be updated using the actual construction dates.

4. Monitoring and Reporting Program

In conformance with the substantive requirements of General Permit (Order No. 2009-0009-DWQ), a monitoring and reporting program will be implemented to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary, to continue to reduce pollutants and impacts on receiving waters.

The Project Risk Type determines the monitoring and reporting requirements. The monitoring program will include the following minimum elements per Attachment A of the General Permit for Risk Type 1 projects:

- Quarterly, non-stormwater visual inspections,
- Daily visual inspections to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended,
- And before, during, and after storm inspections and once every 24 hour during extended storm events.
- Monitoring of non-visual pollutants per Attachment C of the General Permit Results of this monitoring shall be reported annually to the State Water Resources Control Board (SWRCB) through the Storm Water Multi-Application Reporting and Tracking System (SMARTS) and to DTSC. Sampling is not required for Risk Type 1 projects unless there is a leak, spill, or discharge of a non-visual pollutant.

An annual report is required for all projects with permit duration greater than 3 consecutive months. An annual report will be filed and will include a summary and evaluation of all sampling and analysis results, original laboratory reports, and chain of custody forms; a summary of all corrective actions taken during the compliance year; and identification of any compliance activities or corrective actions that were not implemented.

5. Workers Training and Education

Prior to the beginning of construction, construction workers will be trained on the overall storm water management program and more specifically, on proper implementation of this BMPs plan. Persons directly responsible for compliance with the plan, such as inspectors, workers installing and maintaining the erosion control devices, and workers collecting stormwater samples, will receive additional training. New personnel that require stormwater management training after the start of construction will be provided training. Documentation of the training will be kept onsite.

6. Record Keeping

The following records will be maintained onsite:

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- This BMPs Plan and any updates necessary to reflect current conditions and to maintain accuracy.
- Copies of relevant documents that would affect the provisions or implementation of the BMPs Plan.
- Descriptions and dates of any incidences of significant spills, leaks, or other releases pertaining to soil storage that resulted in discharges of pollutants in stormwater to a regulated municipal separate stormwater systems or to waters of the U.S., the circumstances leading to the release and actions taken in response to the release and measures taken to prevent the recurrence of such releases.
- Documentation of maintenance, including repairs of structural control measures, including the date(s) of discovery of areas in need of repair/replacement, date(s) that the structural control measure(s) returned to full function, and the justification for any extended repair schedules. The maintenance records shall include the date(s) of regular maintenance.
- BMP inspection reports and corrective action report forms (see Attachment 1 for an example of a corrective action report form which may be used for both California and Arizona).
- Annual reports.
- Training documentation.

7. Final Site Stabilization

After completion of decommissioning and removal activities, specific areas will need to be maintained until a plan for restoration is in place and associated work is complete. During this period, BMPs will be implemented to provide dust and erosion control. Soil stabilization will be conducted using a liquid soil binder (e.g., SoilTac) for dust control and erosion control. The soil binder may need to be reapplied based on periodic inspection and depending on the restoration plan. Final site stabilization has been achieved when:

- The site does not pose any additional sediment discharge risk than it did prior to the commencement of construction activities as determined by the QSP,
- There is no potential for construction related stormwater pollutants to be discharged into site runoff as determined by the QSP,
- Construction materials and waste have been disposed of properly, and
- Construction-related equipment, materials, and any temporary BMPs are no longer needed and removed from the site.

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Attachment 1
Inspection and Corrective Action Report Form

2013 Construction General Permit
Inspection & Corrective Action Report Form

Section I. General Information (see instructions)

Name of Project		CGP Tracking No.	AZCON – _____	Inspection Date	___ / ___ / _____

☐ **Check box when using this form to inspect an inactive/ unstaffed construction site (this option applies to an entire site only).** See Part 4.2(4) of the permit. Inspect the site immediately before becoming inactive/ unstaffed and every 6 months thereafter and within 24 hours of each storm event of 0.5 inch or greater in 24 hours.

Inspector Name, Title & Contact Information	**Name:** _____ **Title:** _____ **Contact information:** _____
Present Phase of Construction	

Inspection Schedule (all days are calendar days) *(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply.)*

Routine Schedule: ☐ Every 7 days ☐ Every 14 days and within 24 hours of a 0.5" storm event

☐ Once per month, but not within 14 days of the previous inspection and within 24 hours of a 0.25" storm event

Reduced Schedule: once per month (but not within 14 days of the previous inspection) and before an anticipated storm event and within 24 hours of the end of each storm event of 0.5 inch or greater in 24 hours.

☐ Once per month (in stabilized areas)

☐ Once per month (where discharges are unlikely based on seasonal rainfall patterns)

☐ Once per month (where winter conditions exist and earth-disturbing activities are being conducted)

Discharge points within 1/4 mile of an impaired water or outstanding Arizona water (OAW): ☐ Every 7 days and within 24 hours of a 0.5" storm event

Was this inspection triggered by either a 0.25" or 0.5" storm event? ☐ Yes ☐ No

If yes, duration of storm event: ☐ < 1 hour ☐ < 6 hrs ☐ > 6 hrs

If yes, how was the storm event determined (either 0.25" or 0.5")?

☐ Rain gauge on site ☐ Weather station representative of site. Specify weather station source: _____

Total rainfall amount that triggered the inspection (in inches)**:** _____

Identify all sources of non-stormwater discharges occurring at the site and the associated control measures in place

sources of non-stormwater discharges:	control measures associated with the non-stormwater discharges:
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

Adverse or Unsafe Conditions for Inspection

Did you determine that any portion of the site was unsafe for inspection per CGP Part 4.2(6)? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

Note: *Inspections may be postponed when adverse or unsafe conditions exist such as local flooding, high winds, or electrical storms, or situations that otherwise make inspections unsafe. However, the inspection must resume as soon as conditions are safe.*

Section II. Description of Discharges and Condition of the Discharge Locations (CGP Part 4.3(11)) (see instructions)

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
1.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
2.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
3.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section II. CONTINUATION SHEET FOR: Description of Discharges and Condition of the Discharge Locations [Print additional sheets as necessary]

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section III. Condition and Effectiveness of All On-site Control Measures (Erosion and Sediment (E&S)), Stabilization and Pollution Prevention (P2) Practices (CGP Part 3.1.1 through 3.1.3) (see instructions)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
1.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
2.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

Section III. CONTINUATION SHEET FOR: Control Measure Condition and Effectiveness [Print additional sheets as necessary]

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

ADEQ Arizona Department of Environmental Quality	Section IV. Corrective Action Report Form

Section IV.A. – General Information

(Complete this section within 24 hours of discovering the condition that triggered corrective action)

Date/ Time Problem First Discovered	Date: ___ / ___ / _____ Time: _____ ___AM ___PM	Today's Date	___ / ___ / _____
Name and Contact Information of Individual Completing this Form	**Name:** _____ **Contact information:** _____		

What site conditions triggered the requirement to conduct corrective action? *(Check the box that applies)*

- ☐ A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 2 and/or 3
- ☐ A prohibited discharge described in Part 1.4 has occurred or is occurring
- ☐ ADEQ or USEPA has determined that modifications to the control measures are necessary to meet the requirements of Part 3.

Provide a description of the problem: (Provide description of the specific problem that triggered the need for corrective action, and the specific location where it was found. If you have already provided this explanation in an inspection report, you can refer to that report.)

Deadline for completing corrective action:

- ☐ Work will be completed no more than 7 calendar days after the date the problem was discovered (enter date): ____ / ____ / _____
- ☐ It is infeasible to complete work within the first 7 days, therefore, the work will be completed as soon as practicable following the 7th day (enter date): ____ / ____ / _____

If the estimated date of completion falls after the 7-day deadline, document the following: (1) The reason it is infeasible to complete work within 7 days, and (2) The schedule for installing and making the new or modified stormwater control operational in the soonest practicable timeframe.

NOTE: *Any corrective actions that result in changes to any of the stormwater controls or procedures shall be documented in the SWPPP within 7 calendar days of completing the corrective action work.*

Section IV.B. – Stormwater Control Modifications to be Implemented in Response to a Corrective Action Trigger [Print additional sheets as necessary]			
List of stormwater control(s) to be modified or replaced to correct the condition that required the Corrective Action	**Actual or Planned Completion Date**	**SWPPP Update Necessary?** **If yes, specify date SWPPP modified**	**Notes and observations**
1.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
2.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
3.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
4.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
5.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
6.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
7.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	

Section V. CONTINUATION SHEET for Miscellaneous Items (see instructions) **[Print additional sheets as necessary]**
Use this space for miscellaneous information or as continuation of items found elsewhere in this report.

Section VI. Certification and Signature (CGP Appendix B. 9.)

Section VI.A. – Certification and Signature by Contractor or Subcontractor performing the inspections (if applicable)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Contractor or Subcontractor: _____ Title: _____

Printed name : _____ Date: _____

Business / Agency: _____ Phone number: _____

Section VI.B. – Certification and Signature by Permittee (permittee / operator or a duly authorized representative is required to sign)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Permittee or
"Duly Authorized Representative": _____ Title: _____

Printed Name: _____ Date: _____

Business / Agency: _____ Phone number: _____

Appendix H
Land Use Memorandum

Interim Measures No. 3, Land Area Use

DATE: July 8, 2005

Introduction

Ongoing Topock cleanup activities include construction of a groundwater treatment system under the direction of the California Department of Toxic Substances Control (DTSC) as part of Interim Measure No. 3 (IM-3). In response to a request from tribal representatives, DTSC has asked Pacific Gas and Electric (PG&E) to estimate the area of land that has already or will be used in some manner[1] during construction of the groundwater treatment plant and associated pipelines, roadways, and wells. This memorandum provides an updated summary of the ground use associated with IM-3, including the analysis methodology and assumptions. [2]

Construction of IM-3 facilities commenced in late September 2004, and startup of operations is anticipated to begin no sooner than July 16, 2005, pending approvals by the county, state and federal regulatory agencies. Approval of IM-3 by the Bureau of Land Management (BLM) and DTSC was subject to conditions provided in separate biological and cultural resource assessments of IM-3 activities. In conformance with these conditions, pre-construction surveys of all areas subject to use during construction of IM-3 facilities were conducted. Under the terms of the BLM approval, all construction work was conducted in areas where significant cultural or biological resources are not present. In addition, appropriate physical barriers were placed and construction activities were continuously monitored by qualified professional staff to insure the protection of nearby cultural and biological resources.

Methods Used to Measure Used Area

To assess the area of use associated with IM-3, a survey using Global Positioning System (GPS) technology was conducted to delineate the sub-areas subject to ground-use construction activities. Such activities include grading associated with the IM-3 treatment plant, staging area, injection wells, conveyance piping, monitoring wells, and access roads.

Various past activities have resulted in significant previous disturbance of the area where the IM-3 construction is occurring. The area is traversed by a major railway line, several gas pipelines, historic U.S. Route 66, and the National Old Trails Highway. Portions of the area were disturbed by a former gravel quarry, roadside debris piles, World War II era military training exercises, and a former roadhouse/restaurant adjacent to the IM-3 project site boundary. During design of the IM-3 facilities, much care was taken to utilize these previously disturbed areas wherever possible. Trenching was routed along existing roadways and pipeline right of ways. The treatment plant and staging area were located in

---

[1] The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.

[2] This memorandum was originally submitted on February 7, 2005. The updated summary of the ground use associated with IM-3 has been updated to reflect conditions at completion of construction in July 2005.

the area previously disturbed by gravel quarrying during the construction of the former U.S. Route 66 highway. To minimize disturbance of that historic roadway pursuant to the requirements of BLM, above-ground piping was installed to convey treated water from the treatment plant to the injection wells. As further protection of that resource, a fabric and gravel blanket was placed over the historic roadway – this blanket is not included as IM-3 construction use because it is mitigation and because the blanket is removable. In calculating the areas used by the IM-3 construction, previously disturbed ground was distinguished from ground that did not appear to be significantly disturbed previously.[3]

Data collected during the GPS survey data was imported into the geographic information system (GIS) maintained for the IM-3 project. Polygons were defined for each sub-area used as a result of IM-3 construction activities. In addition, polygons were defined for those areas determined to be previously disturbed. The acreage of each of the polygons was determined, and the total (net) area of use resulting from IM-3 was calculated by subtracting the previously disturbed acreage from the gross acreage used during IM-3 construction.

The assessment of IM-3 ground use also includes an estimate of use associated with IM-3 compliance monitoring wells. Four compliance monitoring wells were installed in the vicinity of the eastern injection well field. Access routes were provided to three of the four compliance monitoring wells. These are not constructed roadways, but rather just tracks of vehicles driving over the ground surface, but are included as "used area". In addition, the area used for installation of a potential extraction well (PE-1) was calculated and included.

The attached table summarizes the total area of use related to IM-3. Sub-totals are provided for each sub-area associated with IM-3 (e.g., treatment plant site, staging area, injection well areas, etc.). The summary table provides sub-totals for private (PG&E) and public (BLM) lands to reflect land ownership. The total area used includes all areas used by the construction activities, regardless of the prior condition of the ground. Also shown in the table is the area of ground that did not appear to be significantly disturbed previously and which was used by the construction activities.

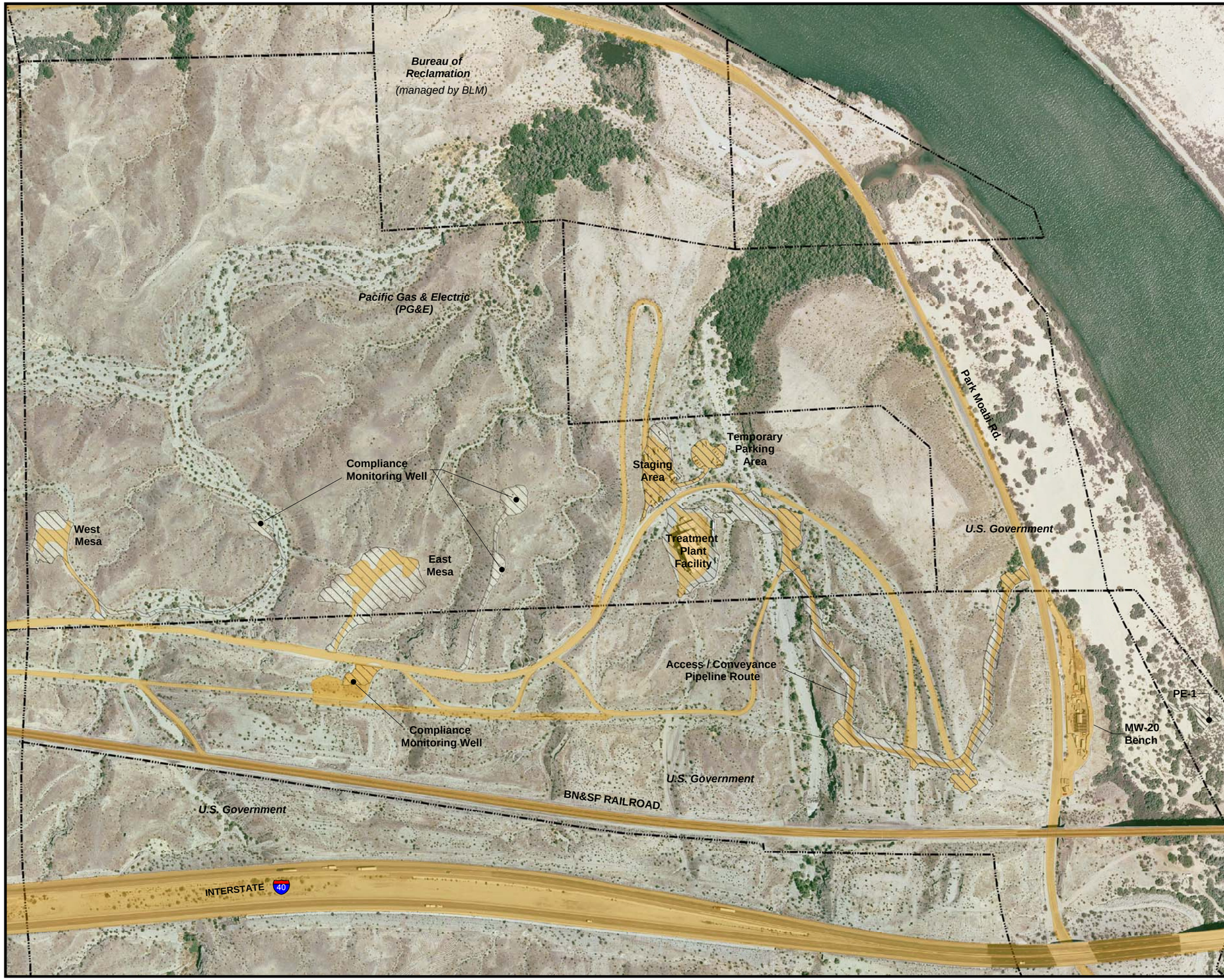
Conclusion

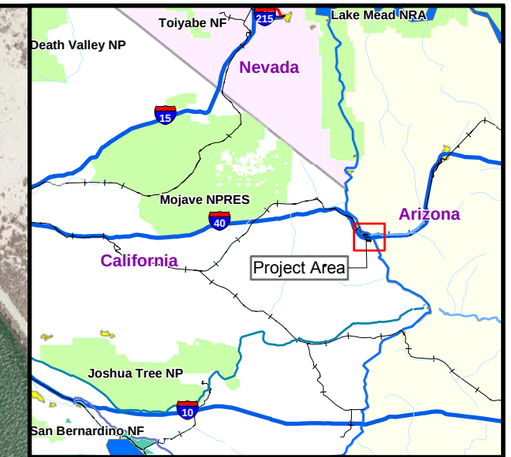
The total area of use resulting from construction of the IM-3 facilities is approximately 8.0 acres. Of these 8.0 acres, approximately 3.9 acres are on ground that was previously significantly disturbed. Thus, the net area of ground which was used, and which did not appear to be significantly disturbed previously, is about 4.1 acres. Approximately 1.2 acre of such area is located on public (BLM) land and 2.9 acres are located on private (PG&E) land.

[3] Land that did not appear to be previously disturbed may, in fact, have been significantly disturbed in the past, prior to the construction of IM-3.

GROUND USE ASSOCIATED WITH IM-3					
IM-3 Sub-Area	**Public Land**		**Private Land**		**Total Public & Private Land**
	Total Area Used by IM-3 (acres)	Previously Undisturbed Ground[1] Used by IM-3 (acres)	Total Area Used by IM-3 (acres)	Previously Undisturbed Ground[1] Used by IM-3 (acres)	Previously Undisturbed Ground Used by IM-3 (acres)
West Mesa	NA	NA	0.57	0.33	0.33
East Mesa	0.15	0.11	1.28	0.84	0.95
Staging Area	NA	NA	0.95	0.16	0.16
Treatment Facility	NA	NA	1.11	0.38	0.38
Pipeline Trench[2]	1.91	0.84	0.89	0.51	1.35
Compliance Monitoring Wells and PE-1	0.37	0.22	0.72	0.72	0.94
Total	**2.43**	**1.17**	**5.52**	**2.94**	**4.11**

Notes:
NA – Not Applicable
1 – Does not include acreage affected by prior ground-disturbing activities unrelated to IM-3 (e.g., roadways, pipelines, etc.). Land noted as being “previously undisturbed” did not appear to be significantly disturbed at the time of the construction of IM-3, but, in fact, may have been subject to prior disturbance.
2 – The acreage calculation for the pipeline trench includes the area used during improvement of the eastern access road.





N

0 175 350 700 Feet

1 inch equals 350 feet

LEGEND

- Property Boundaries
- Previously Disturbed Area
- Area Used* for IM-3

*The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.

Sources: San Bernardino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, and Plat maps provided by BLM.

TOPOCK IM3 PROJECT
LAND USE MAP
JULY 2005

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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Appendix I
Perimeter Air Monitoring Plan

Perimeter Air Monitoring Plan

IM-3 Decommissioning and Removal Topock Compressor Station, Needles, CA

Prepared for

Pacific Gas and Electric

September 2014

CH2MHILL®
155 Grand Avenue
Suite 800
Oakland, CA 94612

ES082614215856BAO

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	Potential Generation of Air Contaminants and Control Measures	3-1
	Available Soil Data	3-1
	Monitoring Parameters, Frequency, Action Levels, and Responses	3-2
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4	**Reporting Requirements**	**4-1**

SECTION 1

Introduction

This perimeter air monitoring plan (PAMP) has been developed to assist site personnel with monitoring and evaluating the effectiveness of the dust monitoring measures, guide modifications to field activities, if necessary, and document that adequate measures are being used to prevent the distribution of dust beyond the boundaries of the work zone during the decommissioning and removal of the IM-3 treatment plant at Topock Compressor Station (Compressor Station) located in San Bernardino County, near Needles, California.

During the decommissioning and removal activities, samples will be collected from the exclusion zone of the IM-3 treatment plant. Personnel air monitoring will be conducted by Contractors in accordance with the Contractors' health and safety plans, and is not addressed in this PAMP.

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SECTION 2

Key Personnel and Responsibilities

The PG&E Site Manager and the designated Project Air Monitoring Officer (AMO) have the primary responsibility for implementing the PAMP.

PG&E Site Manager

The PG&E Site Manager is responsible for directing and controlling all site activities and is responsible for enforcing on-site compliance with the provisions of the PAMP.

Project Air Monitoring Officer

The AMO will be responsible for implementing the PAMP under the direction of the PG&E Site Manager. The specific site duties will include, but will not be limited to:

- Assuring availability of air monitoring equipment per this PAMP,
- Maintaining documentation of manufacturers' calibration of equipment,
- Conducting and documenting daily field calibrations of equipment,
- Operating and maintaining meteorological station and utilizing meteorological data to identify air sampling locations,
- Conducting exclusion zone and perimeter air monitoring as required by this PAMP,
- Checking and documenting equipment operation during each shift,
- Making and documenting visual observations of potential emissions from equipment or processes,
- Downloading data from direct reading instruments and comparing to appropriate action levels,
- Shipping the samples to the appropriate laboratory for analysis, as required,
- Collecting laboratory data and comparing to appropriate action levels, as required,
- Notifying the PG&E Site Manager immediately of any action level exceedances, and
- Coordinating actions to be taken in the event of action level exceedances with the PG&E Site Manager and Construction Manager/Field Lead.

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SECTION 3

Potential Generation of Air Contaminants, Control Measures, and Chemicals of Concern

Potential Generation of Air Contaminants and Control Measures

Potential air contaminants include contaminants that could result from ground disturbance of contaminated soils and/or from specific decommissioning and removal activities. Controls will be used to minimize the potential generation of airborne contaminants. For example, abrasive blasting will be performed in a controlled environment. As a result, the contamination generation from abrasive blasting is not anticipated to leave the exclusion zone. The chemical transfer of the storage tank content will occur primarily as a closed system; the generation of airborne concentrations of the contents of the storage tanks is not expected to be sustained during transfer. The greatest potential risk of generating airborne concentrations is in the event of a release or spill. Similarly, the removal of the contents of the chemical storage tanks from the site will occur in closed containers. The generation of airborne concentrations of the contents is not expected to occur.

Work activities that have the highest potential to generate airborne contaminants are activities that generate dust, e.g., excavation of piping and vaults, decommissioning of wells, mechanical destruction and excavation of concrete pads, etc. The EIR mitigation measure AIR-1 specifies the following fugitive dust control measures below any construction and/or demolition activities:

- AIR-1a: Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient;
- AIR-1b: Cover loaded haul vehicles while operating on publicly maintained paved surfaces;
- AIR-1c: Stabilize (using soil binders such as SoilTac^{R}) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions;
- AIR-1d: Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours; and
- AIR-1e: Curtail nonessential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. A reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion will be considered sufficient to maintain compliance.

Available Soil Data

Tables 16-18 and 20-21 of the *Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1, Pacific Gas and Electric, Needles, California* (May 2014) contains a summary of the available soil data for the IM3 Treatment Plant (AOC 29), the East Mesa area, and the MW20 Bench (see Appendix A). Based on the available soil data, there are no chemicals present that exceed both background and human health screening levels. The metals that exceed site background levels are barium, chromium, lead, selenium, and zinc.

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Monitoring Parameters, Frequency, Action Levels, and Responses

Because the concentrations of metals detected in soils, based on available data, are well below residential Regional Screening Levels (RSLs) and California Human Health Screening Levels (CHHSLs) and the potential for generation of airborne contaminants outside of the exclusion zone will be minimized through implementation of control measures, the PAMP will focus primarily on action levels for particulate matter. The AMO may adjust the monitoring frequency and add monitoring parameters as needed to achieve the objective of the PAMP.

The Action Levels will be based on MDAQMD requirements. An exceedance of an action level does not automatically indicate an adverse health impact but rather, indicate that certain response actions are required to improve the effectiveness of fugitive dust control measures.

TABLE 3.3-1
Monitoring Parameters, Action Levels, and Responses

Monitoring Parameters	Monitoring Equipment	Tasks	Action Levels	Responses	Frequency[4]	Calibration
Wind speed and direction; average temperature; and precipitation	Meteorological Station - Wind[5]	All work activities	High winds (gusts in excess of 25 mph, or in excess of 15 mph on a 15-minute average)	Reduce earth-moving activity, altering the pace of excavation or work activities, modifying work practices to minimize fugitive dust emissions, temporarily halting work activities, or stopping activity until conditions are more favorable	Continual data recording during active work activities; check every two hours during active work activities	Per Manufacturer's Instructions
Visible Dust	Visual	All site activities		Reduce earth moving activities	Continual visual observations during active work activities	Not applicable
PM 10[6]	TSI 8530 DUSTRAK aerosol monitor or equivalent with environmental monitoring enclosure, e.g., the 8535 or 8537 and omni-	All work activities	$\geq$50 µg/m^3	Continually monitor dust levels and implement fugitive dust control measures specified in EIR mitigation measure AIR-1	Continual data recording during active work activities; check every two hours during active work activities	Daily or more frequently as needed

4 The exact frequency may be adjusted as determined by the AMO.

5 The MDAQMD Rule 403.2 states that a reduction of earth moving activity is required under high wind conditions. High winds are defined as gusts in excess of 25 miles per hour (mph), or in excess of 15 mph on a 15-minute average.

6 The Mojave Desert Air Quality Management District (MDAQMD) allowable concentration of fugitive respirable dust (PM10) is 50 µg/m^3 for a 24-hour average.

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TABLE 3.3-1
Monitoring Parameters, Action Levels, and Responses

Monitoring Parameters	Monitoring Equipment	Tasks	Action Levels	Responses	Frequency[4]	Calibration
	directional sampling inlet		$\geq$90 µg/m^3	Suspend work		

Monitoring Locations and Frequency

During site activities that will generate airborne dust, perimeter monitoring will be conducted by the AMO or designee at the exclusion zone boundary line to assess whether dust is leaving the exclusion zone. Generally, four monitoring locations will be identified for the exclusion zone boundary.

The specific locations of the monitoring will be established by the AMO or designee and adjusted as needed based on the predominant wind direction. Generally, one monitoring location will be upwind of the exclusion zone. One monitoring location will be directly downwind of the exclusion zone, and two monitoring locations on either side of the downwind location, but at roughly 60 degrees from the center line. Another way to view this is if the upwind location is at 12 o'clock, and the downwind location is at 6 o'clock. The other two monitoring locations would be located at 4 and 8 o'clock. The reason for the monitoring to be located in this manner is to account for minor variations in wind direction during the sampling period. If a monitoring location is not between the work being performed and the observers, a 5th location may be required.

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SECTION 4

Reporting Requirements

Direct reading instrumentation data will be collected by the AMO on a daily basis. The AMO will report all exceedances of any action level to the Site Manager immediately. The AMO will prepare a summary report of all air monitoring results on a weekly basis. The Site Manager will provide any reports as required by any agency with the support of the AMO.

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Appendix A
Available Soil Data

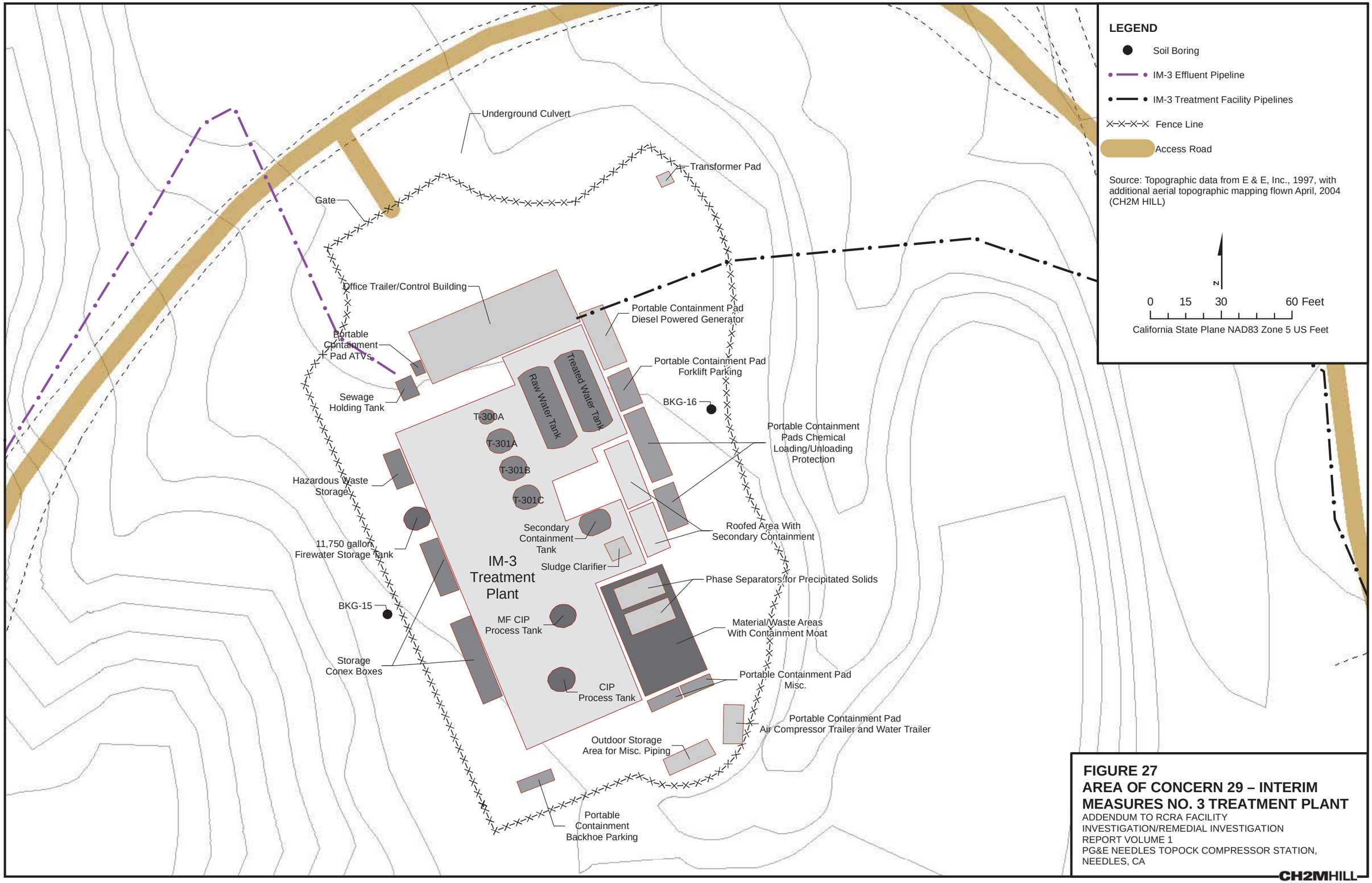

FIGURE 27
AREA OF CONCERN 29 – INTERIM MEASURES NO. 3 TREATMENT PLANT
ADDENDUM TO RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT VOLUME 1
PG&E NEEDLES TOPOCK COMPRESSOR STATION, NEEDLES, CA

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Table 16
Sample Results: Metals
Area of Concern 29 - Interim Measures No. 3 Treatment Plant
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
Pacific Gas and Electric Company Topock Compressor Station Needles, California

				Metals (mg/kg)																	
Interim Screening Level [1]:				**0.285**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**0.0125**	**1.37**	**27.3**	**1.47**	**5.15**	**2.32**	**52.2**	**58**
Residential Regional Screening Levels [2]:				**31**	**0.062**	**15,000**	**160**	**70**	**0.29**	**280**	**23**	**3,100**	**150**	**10**	**390**	**1,500**	**390**	**390**	**5.1**	**390**	**23,000**
Residential DTSC CHHSL [3]:				**30**	**0.07**	**5,200**	**16**	**39**	**17**	**NE**	**660**	**3,000**	**80**	**18**	**380**	**1,600**	**380**	**380**	**5**	**530**	**23,000**
Ecological Comparison Values [4]:				**0.285**	**11.4**	**330**	**23.3**	**0.0151**	**139.6**	**36.3**	**13**	**20.6**	**0.0166**	**0.0125**	**2.25**	**0.607**	**0.177**	**5.15**	**2.32**	**13.9**	**0.164**
Background [5]:				**NE**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**NE**	**1.37**	**27.3**	**1.47**	**NE**	**NE**	**52.2**	**58**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium, Hexavalent	Chromium, total	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
BKG-15	09/20/08	0 - 0.5	N	ND (2) *	4.8	160	ND (1) *	ND (1)	ND (0.404)	10	4.2	5.4	5.2	ND (0.1) *	ND (1)	7.5	ND (1)	ND (1)	ND (2)	22	24
	09/20/08	2 - 3	N	ND (2) *	1.8	120	ND (1) *	ND (1)	ND (0.408)	15	7.6	9.1	2.4	ND (0.1) *	1	11	1.8	ND (1)	ND (2)	33	34
	09/20/08	5 - 6	N	ND (2) *	2.6	180	ND (1) *	ND (1)	ND (0.407)	21	8.5	8.9	2.7	ND (0.1) *	1.3	12	ND (1)	ND (1)	ND (2)	33	39
	09/20/08	9 - 10	N	ND (2) *	2.6	100	ND (2) *	ND (1)	ND (0.409)	26	12	12	2.6	ND (0.1) *	ND (2) *	16	2	ND (2)	ND (4.1) *	40	47
BKG-16	09/23/08	0 - 0.5	N	ND (2) *	5.3	160	ND (2) *	ND (1)	ND (0.435)	12	5.4	10	6.5	ND (0.1) *	ND (2) *	9.4	ND (1)	ND (2)	ND (4) *	22	35
	09/23/08	2 - 3	N	ND (2.1) *	4.4	210	ND (1) *	ND (1)	ND (0.407)	15	6.7	8.5	4	ND (0.1) *	ND (1)	10	ND (1)	ND (1)	ND (2.1)	30	34
	09/23/08	5 - 6	N	ND (2) *	2.4	130	ND (1) *	ND (1)	ND (0.406)	14	6.3	6.8	2.7	ND (0.1) *	1.2	10	ND (1)	ND (1)	ND (2)	29	33
	09/23/08	9 - 10	N	ND (2) *	2.5	130	ND (1) *	ND (1)	ND (0.41)	16	8.8	11	2.4	ND (0.1) *	ND (1)	10	ND (1)	ND (1)	ND (2)	32	40

[1] Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.
[2] USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.
[3] California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.
[4] ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28.
[5] CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.
Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table 17
Sample Results: Contract Laboratory Program Inorganics
Area of Concern 29 - Interim Measures No. 3 Treatment Plant
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
PG&E Topock Compressor Station, Needles, California

				Contract Laboratory Program (CLP) Inorganics (mg/kg)						
Interim Screening Level[1] :				**16,400**	**66,500**	**55,000**	**12,100**	**402**	**4,400**	**2,070**
Residential Regional Screening Levels[2] :				**77,000**	**NE**	**55,000**	**NE**	**1,800**	**NE**	**NE**
Residential DTSC CHHSL[3] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Ecological Comparison Values[4] :				**NE**	**NE**	**NE**	**NE**	**220**	**NE**	**NE**
Background[5] :				**16,400**	**66,500**	**NE**	**12,100**	**402**	**4,400**	**2,070**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**Aluminum**	**Calcium**	**Iron**	**Magnesium**	**Manganese**	**Potassium**	**Sodium**
BKG-15	09/20/08	0 - 0.5	N	5,200	20,000	11,000	5,100	210	1,100	290
	09/20/08	2 - 3	N	8,100	14,000	18,000	6,200	260	2,500	380
	09/20/08	5 - 6	N	10,000	15,000	20,000	7,300	300	4,100	850
	09/20/08	9 - 10	N	12,000	34,000	22,000	8,300	340	3,300	890
BKG-16	09/23/08	0 - 0.5	N	8,400	33,000	14,000	8,100	290	2,700	ND (240)
	09/23/08	2 - 3	N	8,700	28,000	16,000	7,000	260	2,700	ND (700)
	09/23/08	5 - 6	N	7,800	17,000	16,000	6,000	240	2,800	ND (1,100)
	09/23/08	9 - 10	N	9,700	13,000	19,000	7,000	290	3,900	ND (850)

[1] Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

[2] USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

[3] California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil" November 2004 (January 2005 Revision). January.

[4] ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil". May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison Values for Additional Detected Chemicals in Soil." July 1.

[5] CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table 18
Sample Results: Pesticides
Area of Concern 29 - Interim Measures No. 3 Treatment Plant
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
PG&E Topock Compressor Station, Needles, California

				Pesticides (µg/kg)																					
Interim Screening Level [1] :				**2.1**	**2.1**	**2.1**	**33**	**77**	**430**	**270**	**77**	**5**	**370,000**	**370,000**	**370,000**	**21,000**	**21,000**	**21,000**	**500**	**430**	**130**	**53**	**340,000**	**460**
Residential Regional Screening Levels [2] :				**2,000**	**1,400**	**1,700**	**29**	**77**	**1,600**	**270**	**77**	**30**	**370,000**	**370,000**	**370,000**	**18,000**	**18,000**	**18,000**	**520**	**1,600**	**110**	**53**	**310,000**	**440**
Residential DTSC CHHSL [3] :				**2,300**	**1,600**	**1,600**	**33**	**NE**	**430**	**NE**	**NE**	**35**	**NE**	**NE**	**NE**	**21,000**	**21,000**	**21,000**	**500**	**430**	**130**	**NE**	**340,000**	**460**
Ecological Comparison Values [4] :				**2.1**	**2.1**	**2.1**	**NE**	**NE**	**470**	**NE**	**NE**	**5**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**470**	**NE**	**NE**	**NE**	**NE**
Background [5] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**4,4-DDD**	**4,4-DDE**	**4,4-DDT**	**Aldrin**	**alpha-BHC**	**alpha-Chlordane**	**beta-BHC**	**delta-BHC**	**Dieldrin**	**Endo sulfan I**	**Endo sulfan II**	**Endosulfan sulfate**	**Endrin**	**Endrin aldehyde**	**Endrin ketone**	**gamma-BHC**	**gamma-Chlordane**	**Heptachlor**	**Heptachlor Epoxide**	**Methoxy chlor**	**Toxaphene**
BKG-15	09/20/08	0 - 0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-16	09/23/08	0 - 0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)

1 Interim screening level is DTSC residential CHHSL. If CHHSL is not available, the USEPA residential regional screening level is used. If an ecological comparison value has been calculated, then the lowest between the ecological comparison value or the CHHSL/regional screening level is used.

2 USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

3 California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.

4 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison values for Additional Chemicals in Soil." July 1.

5 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
µg/kg	micrograms per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

LEGEND

- Sample Location
- AOC 30 (MW-20 Bench)

N

0 25 50 100 150

Feet

FIGURE 32
AREA OF CONCERN 30 - MW-20 BENCH
EXISTING SOIL SAMPLE LOCATIONS

ADDENDUM TO RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT VOLUME 1
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Path: D:\Projects\Topock\MapFiles\2013\MW20_AOC30SampleLocs.mxd

Table 21
Sample Results: Metals
Area of Concern 30 - MW-20 Bench
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
PG&E Topock Compressor Station, Needles, California

				Metals (mg/kg)																	
Interim Screening Level [1]:				**0.285**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**0.0125**	**1.37**	**27.3**	**1.47**	**5.15**	**2.32**	**52.2**	**58**
Residential Regional Screening Levels [2]:				**31**	**0.062**	**15,000**	**160**	**70**	**0.29**	**280**	**23**	**3,100**	**150**	**10**	**390**	**1,500**	**390**	**390**	**5.1**	**390**	**23,000**
Residential DTSC CHHSL [3]:				**30**	**0.07**	**5,200**	**16**	**39**	**17**	**NE**	**660**	**3,000**	**80**	**18**	**380**	**1,600**	**380**	**380**	**5**	**530**	**23,000**
Ecological Comparison Values [4]:				**0.285**	**11.4**	**330**	**23.3**	**0.0151**	**139.6**	**36.3**	**13**	**20.6**	**0.0166**	**0.0125**	**2.25**	**0.607**	**0.177**	**5.15**	**2.32**	**13.9**	**0.164**
Background [5]:				**NE**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**NE**	**1.37**	**27.3**	**1.47**	**NE**	**NE**	**52.2**	**58**
Location [6]	**Date**	**Depth (ft bgs)**	**Sample Type**	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium, Hexavalent	Chromium, total	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
BG01	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (13.9)	---	---	---	---	---	---	---	---	---	---	---
BG02	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	31	---	---	---	---	---	---	---	---	---	---	---
BG03	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	15.8	---	---	---	---	---	---	---	---	---	---	---
BG04	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	25	---	---	---	---	---	---	---	---	---	---	---
BG05	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	21.1	---	---	---	---	---	---	---	---	---	---	---
BG06	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (9.69)	---	---	---	---	---	---	---	---	---	---	---
BG07	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (13.8)	---	---	---	---	---	---	---	---	---	---	---
BG08	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (12.4)	---	---	---	---	---	---	---	---	---	---	---
BG09	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	15	---	---	---	---	---	---	---	---	---	---	---
BG10	05/25/05 [6]	0 - 1	N	---	---	---	---	---	---	ND (11.2)	---	---	---	---	---	---	---	---	---	---	---
	05/25/05 [6]	0 - 1	FD	---	---	---	---	---	---	ND (13.5)	---	---	---	---	---	---	---	---	---	---	---
CS01	04/21/05 [6]	0 - 1	N	---	---	---	---	---	ND (0.42)	23	---	---	---	---	---	---	0.82	---	---	---	---
CS02	04/21/05 [6]	0 - 1	N	---	---	---	---	---	ND (0.42)	14	---	---	---	---	---	---	0.96	---	---	---	---
CS03	04/21/05 [6]	5 - 6	N	---	---	---	---	---	ND (0.41)	17	---	---	---	---	---	---	0.67	---	---	---	---
CS04	04/28/05 [6]	7 - 8	N	ND (6.4) *	6.2	290	ND (0.53)	---	ND (0.43)	16	---	8.8	3.9	---	---	---	ND (0.53)	---	---	27	22
CS05	04/30/05 [6]	1 - 2	N	ND (6.2) J*	6.4	81	ND (0.52)	---	ND (0.41)	15 J	---	10	7.4	---	---	---	1.3	---	---	32 J	23
CS06	07/05/05 [6]	6 - 7	N	---	---	---	---	---	---	15 J	---	---	---	---	---	---	---	---	---	---	---
CS07	07/05/05 [6]	6 - 7	N	---	---	---	---	---	---	19	---	---	---	---	---	---	---	---	---	---	---
CS08	07/13/05 [6]	9 - 10	N	---	---	---	---	---	---	23 J	---	---	---	---	---	---	---	---	---	---	---
CS09	04/21/05 [6]	0 - 1	N	---	---	---	---	---	ND (0.41)	19	---	---	---	---	---	---	0.79	---	---	---	---
CS10	07/05/05 [6]	3 - 4	N	---	---	---	---	---	---	21	---	---	---	---	---	---	---	---	---	---	---
CS11	04/30/05 [6]	1 - 2	N	ND (6.2) *	6.1	170	ND (0.52)	---	ND (0.42)	27	---	8.5	6.1	---	---	---	0.69	---	---	31	24
CS12	04/30/05 [6]	1 - 2	N	ND (6.2) *	6.2	110	ND (0.52)	---	ND (0.41)	22	---	9.9	8.5	---	---	---	0.98	---	---	31	26
CS13	04/21/05 [6]	5 - 6	N	---	---	---	---	---	ND (0.41)	11	---	---	---	---	---	---	0.78	---	---	---	---
	04/21/05 [6]	5 - 6	FD	ND (6.3) *	4.4	130	ND (0.52)	ND (0.52)	ND (0.42)	29	ND (5.2)	8.4	16	ND (0.1) *	ND (4.2) *	8.1	0.97	ND (1)	ND (1)	22	27
CS14	04/28/05 [6]	6 - 7	N	ND (6.3) J*	5.9	47	ND (0.52)	---	ND (0.42)	20	---	11	3	---	---	---	0.54	---	---	26	22
CS15	07/05/05 [6]	3 - 4	N	---	---	---	---	---	---	25	---	---	---	---	---	---	---	---	---	---	---
CS16	07/08/05 [6]	6 - 7	N	---	---	---	---	---	---	27	---	---	---	---	---	---	---	---	---	---	---
Middle	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	15	---	---	---	---	---	---	---	---	---	---	---
NE Corner	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	15	---	---	---	---	---	---	---	---	---	---	---
NW Corner	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	18	---	---	---	---	---	---	---	---	---	---	---
SE Corner	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	10	---	---	---	---	---	---	---	---	---	---	---
SW Corner	02/12/09 [6]	0 - 0.5	N	---	---	---	---	---	---	18	---	---	---	---	---	---	---	---	---	---	---
TS-1	01/28/02 [6]	1	N	---	---	---	---	---	ND (0.02)	7.7	---	5	---	---	---	4.5	---	---	---	---	19.1
TS-1A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	11.8	---	13.7	---	---	---	6.8	---	---	---	---	33.4

Table 21
Sample Results: Metals
Area of Concern 30 - MW-20 Bench
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
PG&E Topock Compressor Station, Needles, California

				Metals (mg/kg)																	
Interim Screening Level [1]:				**0.285**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**0.0125**	**1.37**	**27.3**	**1.47**	**5.15**	**2.32**	**52.2**	**58**
Residential Regional Screening Levels [2]:				**31**	**0.062**	**15,000**	**160**	**70**	**0.29**	**280**	**23**	**3,100**	**150**	**10**	**390**	**1,500**	**390**	**390**	**5.1**	**390**	**23,000**
Residential DTSC CHHSL [3]:				**30**	**0.07**	**5,200**	**16**	**39**	**17**	**NE**	**660**	**3,000**	**80**	**18**	**380**	**1,600**	**380**	**380**	**5**	**530**	**23,000**
Ecological Comparison Values [4]:				**0.285**	**11.4**	**330**	**23.3**	**0.0151**	**139.6**	**36.3**	**13**	**20.6**	**0.0166**	**0.0125**	**2.25**	**0.607**	**0.177**	**5.15**	**2.32**	**13.9**	**0.164**
Background [5]:				**NE**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**NE**	**1.37**	**27.3**	**1.47**	**NE**	**NE**	**52.2**	**58**
Location [6]	**Date**	**Depth (ft bgs)**	**Sample Type**	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium, Hexavalent	Chromium, total	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
TS-2	01/28/02 [6]	0	N	---	---	---	---	---	0.021	12.8	---	9.8	---	---	---	6.8	---	---	---	---	28.9
TS-2A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	12.3	---	14.9	---	---	---	7.8	---	---	---	---	34.7
TS-3	01/28/02 [6]	0.5	N	---	---	---	---	---	0.021	15.4	---	10.2	---	---	---	7.2	---	---	---	---	36.2
TS-3A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	12.4	---	14.6	---	---	---	6.9	---	---	---	---	56.7
TS-4	01/28/02 [6]	0	N	---	---	---	---	---	ND (0.02)	21.8	---	12.2	---	---	---	13.7	---	---	---	---	35.7
TS-4A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	10.2	---	8.8	---	---	---	6.5	---	---	---	---	22.2
TS-5	01/28/02 [6]	0	N	---	---	---	---	---	ND (0.02)	14.3	---	8.1	---	---	---	6.8	---	---	---	---	29.9
TS-5A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	11.8	---	13.7	---	---	---	7.3	---	---	---	---	29.5
TS-6	01/28/02 [6]	0	N	---	---	---	---	---	ND (0.02)	10	---	7.2	---	---	---	6.2	---	---	---	---	28
TS-6A	02/12/02 [6]	0	N	---	---	---	---	---	ND (0.02)	15.6	---	13.9	---	---	---	8.8	---	---	---	---	45.3

[1] Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.
[2] USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.
[3] California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.
[4] ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28.
[5] CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.
[6] Sample locations starting with TS are background soil samples collected by Ecology and Environment.

Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table 22

Sample Results: Contract Laboratory Program Inorganics
Area of Concern 30 - MW-20 Bench
Addendum to RCRA Facility Investigation/Remedial Investigation Report Volume 1
Pacific Gas and Electric Company Topock Compressor Station Needles, California

				Contract Laboratory Program (CLP) Inorganics (mg/kg)
Interim Screening Level[1] :				**55,000**
Residential Regional Screening Levels[2] :				**55,000**
Residential DTSC CHHSL[3] :				**NE**
Ecological Comparison Values[4] :				**NE**
Background[5] :				**NE**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**Iron**
CS01	04/21/05	0 - 1	N	13,000
CS02	04/21/05	0 - 1	N	12,000
CS03	04/21/05	5 - 6	N	13,000
CS09	04/21/05	0 - 1	N	12,000
CS13	04/21/05	5 - 6	N	7,200
	04/21/05	5 - 6	FD	9,900

1 Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

2 USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

3 California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil" November 2004 (January 2005 Revision). January.

4 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil". May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison Values for Additional Detected Chemicals in Soil." July 1.

5 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Appendix B
Air Monitoring Forms

Direct Reading Air Monitoring Form

Date	Sampled by

Sample Location	PM 10 Ave.	PM 10 Peak	Wind Speed Ave.	Wind Speed Peak	Wind Direction	Temp. Ave.	Temp. Peak	Precipitation

TSP or PUF Calibration Form

Date	Sample Location	Contaminant

Pump Serial Number:		**Pump Mfg. & Model:**	
Precalibration Date:		**Calibrator:**	
Calibrated by:		**Last Mfg. Calibration:**	

1st Reading	2nd Reading	3rd Reading	Pre-Flow Rate

Post Calibration Date		**Calibrated by:**	

1st Reading	2nd Reading	3rd Reading	Post-Flow Rate	% Error[7]	Average Flow Rate

Sample Number	Start Time	Stop Time	Total Time	Sample Flow Rate	Sample Volume

Observations:

[7] (1) if pre and post is <5%, then use average of the two, (2) if >5% and <10% use lowest of the two, or (3) if >10% sample is voided difference too large.

Appendix C

Displaced Soil Protocol

Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California

PREPARED FOR: Topock Remediation Project Files

PREPARED BY: Pacific Gas and Electric Company

DATE: October 3, 2012

This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The management of material that may be disturbed as a result of remedial activities but not displaced from its natural location, such as soil disturbed by foot or vehicle traffic along a pathway, is not within the scope of this protocol. This protocol is applicable to the handling and disposition of displaced materials only. Further, materials that were not part of the natural site condition (e.g., building materials, equipment, waste, debris, or imported fill[1]) are not included in this protocol.

1.0 Introduction

PG&E carefully plans Topock Remediation Project activities to minimize both the disturbance and displacement of site material. The land and soils are to be handled and managed with care and respect. Therefore, the protocol established in this plan is intended to minimize the amount of displaced material that leaves the site and instead, provide for eventual return, reuse, or restoration of the material onto the lands from which it was displaced. Through the application of this protocol and its incorporation into future work plans involving material displacement, it is anticipated that the goal of careful and respectful handling of soil material will be fulfilled.

In addition to addressing Tribal requests, this protocol was developed to comply with Mitigation Measure CUL-1a-8 as set forth in the certified Environmental Impact Report (EIR) and Mitigation Monitoring and Reporting Plan (MMRP) adopted by the California Department of Toxic Substances Control (DTSC). This measure requires PG&E to develop a Cultural Impact Mitigation Program (CIMP) as part of the final design of the approved groundwater remedy, and specifically subparagraph (g) requires the CIMP to include protocols for handling soil cuttings[2]. DTSC adopted this measure following its determination that the project area is a significant historical resource for California Environmental Quality Act (CEQA) purposes (Final EIR, p. 4.4-57). Similarly, as part of the consultation process for the Programmatic Agreement (PA) under Section 106 of the National Historic Preservation Act (NHPA), the U.S. Bureau of Land Management (BLM) determined that a traditional cultural property (TCP) eligible for inclusion on the National Register of Historic Places exists within the Area of Potential Effect (APE). Throughout this document, the term "site" refers to the area within the APE.

[1] For the purpose of this protocol, imported fill is defined as unconsolidated mixtures of sand, silt, and gravel (engineered gradations, or otherwise) that were not originally derived from inside the defined project boundary. Specific examples of imported fill material may include road base material, shading material used in pipeline trenches, or crushed rock used for railroad ballast.

[2] Mitigation Measure CUL-1a-8(g) states the following: Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site.

2.0 Statement from Fort Mojave Indian Tribe

The following statement was made by the Fort Mojave Indian Tribe regarding the site background and cultural significance:

> *The Topock site and adjacent lands are part of a larger geographical area referred to as a Traditional Cultural Landscape (TCL). The TCL is the ancestral home of the Fort Mojave Indian Tribe and other Native American Tribes including the Hualapai Nation, Colorado River Indian Tribes, Quechan Nation, Cocopah Tribe, and Yavapai-Prescott Nation. This entire TCL is of tribal religious significance. In some areas and at certain times, tribal members carry out various cultural activities and religious ceremonies.*
>
> *The very nature of the remedial activities being performed at the Topock Compressor Station involve disturbance to the TCL. Such activities as drilling, soil sampling, excavation, construction, monitoring, testing, vehicle movement, foot traffic, geophysical and other surveys, emplacement of markers, and discharge of water, solids, and other material disturb the sanctity of the land that is held in the hearts of Native Americans.*
>
> *In particular, the removal and disturbance of soils, both surficially and from the subsurface, is of concern to the Tribes because such actions are regarded as profound disruptions of the sacred landscape. While the nature and significance of this concern is not easily understood by non-Native Americans, perhaps the following excerpt, attributed to the Duwamish Chief Sealth, begins to aid in the understanding:*
>
>> *Every part of this country is sacred to my people. Every hillside, every valley, every plain and grove has been hallowed by some fond memory or some sad experience of my tribe. Even the rocks that seem to lie dumb as they swelter in the sun along the silent seashore in solemn grandeur thrill with memories of past events connected with the fate of my people, and the very dust under your feet responds more lovingly to our footsteps than to yours, because it is the ashes of our ancestors, and our bare feet are conscious of the sympathetic touch, for the soil is rich with the life of our kindred. (Chief Sealth, 1854)*
>
> *The Pacific Gas & Electric Company (PG&E), in its implementation of the remedial actions required by the United States Department of the Interior (DOI) and the California Department of Toxic Substances Control (DTSC) must commit to performing these actions in a manner that is respectful of Native American values.*

3.0 General Protocol for Management of Displaced Material (Mitigation Measure: CUL-1a-8[g])

This section presents each element of the protocol for the management of displaced material, including work planning, handling and short-term storage, contamination assessment, long-term storage, and final disposition. A graphical presentation of key elements of this process, and associated decision points, is presented on Figure 1 at the end of this document.

3.1 Work Planning

PG&E is required to prepare a work plan whenever a field activity is performed at the Topock site in support of a regulatory requirement or action. Through the established federal regulatory review process, these work plans are made available for review by process stakeholders and by the governments of affected Native American Indian Tribes (referred to as “Tribes” throughout this document) via the consultation process set forth in the PA’s Consultation Protocol, consistent with Section 106 of the NHPA. In addition to the information describing the scope of work, field logistics and other implementation details, work plans that involve activities that displace site material also describe the process for the management and disposition of the materials. Work plans finalized subsequent to the development of this protocol will include specific description of the process for involving the input of Tribe(s) regarding the management of the material that will be displaced as a result of the work. Key procedural information to be included in the work plan will include, but not be limited to, the following:

- Summary of measures planned to minimize the amount of disturbance that will be incurred.
- Notification procedures to inform the Tribe(s), involved regulatory agencies, and affected land owner(s) regarding the proposed activities that will disturb/displace soil or other materials.
- The location of proposed disturbance activities (e.g. access pathways) and displacement activities (e.g. drilling or sampling locations), including maps.
- Estimation of the volume and type(s) of material that will be displaced.
- The location and methodology for short-term storage of displaced material (see Section 3.2).
- Methods that will be used to assess whether contaminants are present (see Section 3.3).
- Methods that will be used to minimize the volume of material that may require long-term storage (see Section 3.4).
- The location and methodology for long-term storage (see Section 3.4).
- The anticipated location and methodology for final on-site disposition (see Section 3.5).

3.2 Handling and Short-term Storage

Material that is displaced as a result of Topock Remediation Project activities including drilling, excavation, sample collection, testing, construction, grading, or other activities will be handled on-site in accordance with the project-specific work plan. Displaced material that must be characterized for key chemical properties prior to identifying the appropriate final disposition method will be stored for the short term. Short-term storage areas and the protocol for handing material in these areas may vary by project. Depending on the type and volume of material displaced, location, land owner considerations, and other pertinent factors, short-term storage methods may include storage devices (e.g. bins) or properly maintained stockpiles that prevent this material from commingling with other areas of the environment. In some cases, short-term storage for characterization may not be necessary. For example, displaced material that is pre-characterized or characterized rapidly as work is conducted will be managed directly for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively).

Specific material handling and short-term storage details will be defined in the approved work plan for a given activity. Key details to be identified in the work plan include:

- The mode and location of short-term storage.
- The method of transfer from the point of origin to short-term staging area.
- Best management practices/regulatory requirements to prevent releases of the potentially contaminated material during transfer and storage.
- Best management practices to protect the material from weather, erosion, contamination, and vandalism while located in the short-term staging area(s).
- Method for segregation of soils based by location, as practicable and appropriate.

A key element of this handling protocol is the development of an inventory of all material displaced by Topock Remediation Project activities. Key information maintained in this inventory will include:

- Material displacement authorization – Specific work plan under which the work was conducted.
- Material origin – Specific location of the site.
- Material description (e.g., soil, rock, etc.).
- Date(s) of displacement or accumulation.

- Generating activity (e.g., drilling, excavation, etc.).
- Approximate volume of material stored.
- Short-term storage mode and location – Type of storage (including container identification number, as applicable) and location of short-term storage pending material characterization. In some cases, this information may need to be updated as containers are moved between areas of the site.
- Characterization status – Characterization sample information (e.g., date of submittal and laboratory used), date of receipt of results, and the contamination assessment based on comparison to screening criteria (see Section 3.3).
- Long-term storage mode and location – Type of storage (including container identification number, as applicable) and location of long-term storage pending decision regarding final disposition (see Section 3.4). In some cases, this information may need to be updated as containers are moved between areas of the site.
- Final disposition information – Indication of the on-site or off-site final disposition action identified through discussion with Tribe(s), agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment (see Section 3.5).

Once the displaced material has been managed through final disposition, it will no longer be tracked in the displaced material inventory.

3.3 Contamination Assessment

Key chemical property information will be used to determine the final disposition method, and specifically, whether displaced material is suitable for retention on-site for eventual return, reuse, or replacement, or if the material must be removed from the site for disposal in accordance with applicable State and Federal laws and regulations. Key information that will be considered to assess whether the material is contaminated, and therefore, whether the material can remain on-site or not, includes:

- Existing information including knowledge of the history of an area, or laboratory analytical results collected during previous phases of work. Use of existing information may preclude the need for additional analytical testing. When available, this information will be included in the work plan.
- Results of characterization samples collected for laboratory analysis, and observation of the physical properties of the material (e.g., white powder, burned material, boulders, etc.), as defined in the approved work plan for a given activity.
- Screening values for various analytes identified for the purpose of determining the appropriate material disposition method. Tables 1 and 2 at the end of this document present a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations. Screening values included on Tables 1 and 2 are defined in the following bullets, which will be modified as screening levels are added to these tables:
  - **Interim Screening Levels (Table 1)** – This is predominantly the background value. However, if the background value is not available then the lesser of the DTSC residential California Human Health Screening Level (CHHSL) or the ecological comparison value is used. If a CHHSL is not available, it is the lesser of the United States Environmental Protection Agency (USEPA) residential regional screening level or the ecological comparison value. This value is the most conservative, and it is assumed that the project-specific cleanup goal and/or Tribal screening level will be equal to or greater than this value.

- **Hazardous Waste Toxicity Characteristic Levels (Table 2) –** These values are used to determine if the material should be classified as a State or Federal hazardous waste. Specifically, total constituent concentrations expressed in milligrams per kilogram (mg/kg) will be compared to the hazardous waste characteristic levels in Table 2, and will be evaluated as follows:

  1. If the total constituent concentration exceeds the total threshold limit concentration (TTLC), the soil represented by the sample will be classified as a non-RCRA California hazardous waste. Additional evaluation of the soluble threshold limit concentration (STLC), as described in step 3 below, will not be performed.
  2. If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic (TC) level by about 20 times or more, the toxicity characteristic leaching procedure (TCLP) will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.
  3. If the sample has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by about 10 times or more, the California Waste Extraction Test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA California hazardous waste.
  4. If the sample has not been classified as a hazardous waste in steps 1, 2, or 3, or by other applicable hazardous waste standards, the soil represented by the sample will not be classified or managed as hazardous waste.

These values will be used to determine the final disposition of displaced material by comparing the representative concentration of a given volume of material to the screening values. The methodology for determining the representative concentration will be established in the project-specific work plan and should not be limited to a concentration-by-concentration comparison, but could include statistical estimates or averages based on multiple samples. Material that has a representative concentration that is equal to or below the interim screening level is suitable for return, reuse, or replacement on-site. Material that is characterized as hazardous waste must be disposed of off-site in accordance with applicable laws and regulations. Material that has a representative concentration that is greater than the interim screening level, but not classified as a hazardous waste, will be stored on-site until the project-specific cleanup goals are established. Until these goals are established, material that falls into this intermediate category will be retained on-site for “long-term storage” (see Section 3.4).

The screening levels included in Tables 1 and 2 must be updated as applicable regulations and project-specific decisions are made. PG&E will review this information as remediation work plans are developed and implemented. As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review and comment. Only agency approved values will be utilized.

3.4 Long-Term Storage

Following contamination assessment, some material may be determined to be non-hazardous waste but unsuitable for final disposition on-site because contaminants are present above the interim screening level. Per DOI comment on this protocol (received in February 2012), this material cannot be returned to the land until project-specific cleanup goals are finalized in the Record of Decision (ROD) and may be stored until that time. Once these goals are established the contamination will be re-assessed based on existing data, or additional data as determined necessary, using the cleanup goals in place of the interim screening level to determine final disposition (see Section 3.5).

The long-term storage area(s) and the protocol for handling material in these areas may vary by project. Depending on the type and volume of material that must be stored, location, land owner considerations, and other pertinent information, long-term storage methods may include storage devices (e.g. bins) or contained

stockpiles that prevent this material from migrating away from the designated storage area(s). Coordination with agencies, Tribe(s), and affected land owners regarding the acceptable mode and location of long-term storage is critical in design of the work plan. Further, specific measures should be incorporated into the implementation of the given work plan, such as field screening and material segregation strategies, to try and minimize the volume of material that may require long-term storage.

3.5 Final Disposition

Final disposition refers to the final action taken on behalf of the Topock Remediation Project as it relates to the management of material displaced during associated activities. This protocol has been designed with the purpose of minimizing the volume of material that is disposed of off-site. Material determined to have a representative concentration that is equal to or less than the project-specific cleanup goal will be retained on site for return, reuse, and/or restoration. Material determined to have a representative concentration that is greater than this value will be transported off site for disposal in accordance with applicable laws and regulations or treated on site if appropriate based on the selection of the final soil remedy. Material return, reuse, and/or restoration options associated with final disposition on site are discussed in Section 4.

4.0 Return, Reuse, and/or Restoration of Displaced Material

Final on-site disposition alternatives include the return, reuse, and/or restoration of the displaced material. The preferred disposition alternative(s) will be considered on a case-by-case basis with the regulatory agencies, Tribe(s), and affected land owner(s), as suitable material is identified. Material types may differ by physical or chemical properties, and therefore the preferred on-site disposition alternative may also vary. Alternatives that have been preliminarily identified include, but are not limited to:

- Replacement of material into original borings, trenches, or excavations, from which they were removed.
- Replacement of material into borings, trenches, or excavations other than those from which they were removed.
- Creation of topographical or landscape barriers to protect sensitive areas.
- Creation of berms or other structures (e.g., gabions) to prevent erosion.
- On-site road maintenance (this alternative may require sorting the material for different physical sizes).
- Stockpiling in designated areas.

The above list of final on-site disposition alternatives is preliminary, and should not be considered complete. Further, if material is found to contain concentrations of volatile organic compounds it may not be suitable for return, reuse, and/or restoration near buildings where vapor intrusion would be of concern. Coordination with agencies, Tribe(s), and affected land owners is critical in design of the work plan to identify the preferred on-site disposition alternative(s) and communication milestones, so the material can be efficiently managed.

Material displaced as part of past remediation project activities was managed in accordance with project-specific work plans. As a result, some material has been retained at the site because contaminant concentrations were below the Interim Screening Level (previously displaced material that has exceeded these levels was disposed off-site in accordance with the work plans). Therefore, previously displaced material is available for the return, reuse, and/or restoration alternatives included in the bullets above, or as additional uses are developed. As of June 2012, the estimated volume of material that has been retained and stockpiled through past remediation project activities is approximately 30 to 35 cubic yards.

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level		Interim Screening Level Source	Hazardous Waste Disposal Criteria
Dioxins and Furans (ng/kg)					
	1,2,3,4,6,7,8-HpCDD	NE		Not Established	NE
	1,2,3,4,6,7,8-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8,9-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8-HxCDD	NE		Not Established	NE
	1,2,3,4,7,8-HxCDF	NE		Not Established	NE
	1,2,3,6,7,8-HxCDD	NE		Not Established	NE
	1,2,3,6,7,8-HxCDF	NE		Not Established	NE
	1,2,3,7,8,9-HxCDD	NE		Not Established	NE
	1,2,3,7,8,9-HxCDF	NE		Not Established	NE
	1,2,3,7,8-PeCDD	4.6		DTSC Residential CHHSL	NE
	1,2,3,7,8-PeCDF	NE		Not Established	NE
	2,3,4,6,7,8-HxCDF	NE		Not Established	NE
	2,3,4,7,8-PeCDF	NE		Not Established	NE
	2,3,7,8-TCDD	4.6		DTSC Residential CHHSL	See Table A-3
	2,3,7,8-TCDF	NE		Not Established	NE
	OCDD	NE		Not Established	NE
	OCDF	NE		Not Established	NE
	TEQ Avian	16		Soil Ecological Comparison Value (ECV)	NE
	TEQ Human	50		Soil Ecological Comparison Value (ECV)	NE
	TEQ Mammals	1.6		Soil Ecological Comparison Value (ECV)	NE
Metals (mg/kg)					
	Aluminum	16,400		Background Level	NE
	Antimony	0.285		Soil Ecological Comparison Value (ECV)	See Table A-3
	Arsenic	11	*	Background Level	See Table A-3
	Barium	410	*	Background Level	See Table A-3
	Beryllium	0.672		Background Level	See Table A-3
	Cadmium	1.1	*	Background Level	See Table A-3
	Calcium	66,500		Background Level	NE
	Chromium, Hexavalent	0.83	*	Background Level	See Table A-3
	Chromium, total	39.8	*	Background Level	See Table A-3
	Cobalt	12.7	*	Background Level	See Table A-3
	Copper	16.8		Background Level	See Table A-3
	Cyanide	0.9		Soil Ecological Comparison Value (ECV)	NE
	Iron	55,000		EPA Residential RSL	NE
	Lead	8.39	*	Background Level	See Table A-3
	Magnesium	12,100		Background Level	NE
	Manganese	402	*	Background Level	NE
	Mercury	0.0125		Soil Ecological Comparison Value (ECV)	See Table A-3
	Molybdenum	1.37	*	Background Level	See Table A-3
	Nickel	27.3	*	Background Level	See Table A-3
	Potassium	4,400		Background Level	NE
	Selenium	1.47	*	Background Level	See Table A-3
	Silver	5.15		Soil Ecological Comparison Value (ECV)	See Table A-3
	Sodium	2,070		Background Level	NE
	Thallium	2.32		Soil Ecological Comparison Value (ECV)	See Table A-3
	Vanadium	52.2	*	Background Level	See Table A-3
	Zinc	58	*	Background Level	See Table A-3

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Pesticides (µg/kg)				
	4,4-DDD	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	4,4-DDE	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	4,4-DDT	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	Aldrin	33	DTSC Residential CHHSL	See Table A-3
	alpha-BHC	77	EPA Residential RSL	NE
	alpha-Chlordane	430	DTSC Residential CHHSL	See Table A-3
	beta-BHC	270	EPA Residential RSL	NE
	delta-BHC	77	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table A-3
	Endo sulfan I	370,000	EPA Residential RSL	NE
	Endo sulfan II	370,000	EPA Residential RSL	NE
	Endosulfan sulfate	370,000	EPA Residential RSL	NE
	Endrin	21,000	DTSC Residential CHHSL	See Table A-3
	Endrin aldehyde	21,000	DTSC Residential CHHSL	NE
	Endrin ketone	21,000	DTSC Residential CHHSL	NE
	gamma-BHC (Lindane)	500	DTSC Residential CHHSL	See Table A-3
	gamma-Chlordane	430	DTSC Residential CHHSL	See Table A-3
	Heptachlor	130	DTSC Residential CHHSL	See Table A-3
	Heptachlor Epoxide	53	EPA Residential RSL	See Table A-3
	Methoxychlor	340,000	DTSC Residential CHHSL	See Table A-3
	Toxaphene	460	DTSC Residential CHHSL	See Table A-3
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	22,000	EPA Residential RSL	NE
	2-Methyl naphthalene	310,000	EPA Residential RSL	NE
	Acenaphthene	3,400,000	EPA Residential RSL	NE
	Acenaphthylene	1,700,000	EPA Residential RSL	NE
	Anthracene	17,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	38	DTSC Residential CHHSL	NE
	Benzo (a) anthracene	380	EPA Residential RSL	NE
	Benzo (a) pyrene	38	DTSC Residential CHHSL	NE
	Benzo (b) fluoranthene	380	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,700,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	380	EPA Residential RSL	NE
	Chrysene	3,800	EPA Residential RSL	NE
	Dibenzo (a,h) anthracene	110	EPA Residential RSL	NE
	Fluoranthene	2,300,000	EPA Residential RSL	NE
	Fluorene	2,300,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	380	EPA Residential RSL	NE
	Naphthalene	3,600	EPA Residential RSL	NE
	PAH High molecular weight	1,160	Soil Ecological Comparison Value (ECV)	NE
	PAH Low molecular weight	10,000	Soil Ecological Comparison Value (ECV)	NE
	Phenanthrene	1,700,000	EPA Residential RSL	NE
	Pyrene	1,700,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	3,900	EPA Residential RSL	See Table A-3
	Aroclor 1221	140	EPA Residential RSL	See Table A-3

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1232	140	EPA Residential RSL	See Table A-3
	Aroclor 1242	220	EPA Residential RSL	See Table A-3
	Aroclor 1248	220	EPA Residential RSL	See Table A-3
	Aroclor 1254	220	EPA Residential RSL	See Table A-3
	Aroclor 1260	220	EPA Residential RSL	See Table A-3
	Aroclor 1262	220	EPA Residential RSL	See Table A-3
	Aroclor 1268	220	EPA Residential RSL	See Table A-3
	Total PCBs	204	Soil Ecological Comparison Value (ECV)	See Table A-3
Semivolatile Organic Compounds (µg/kg)				
	1,1´-Biphenyl	3,900,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	18,000	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,800,000	EPA Residential RSL	NE
	2,4-Dichlorophenol	180,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,200,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	120,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,600	EPA Residential RSL	See Table A-3
	2,6-Dinitrotoluene	61,000	EPA Residential RSL	NE
	2-Chloro naphthalene	6,300,000	EPA Residential RSL	NE
	2-Chlorophenol	63,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,100,000	EPA Residential RSL	See Table A-3
	2-Nitroaniline	183,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,100	EPA Residential RSL	NE
	3-Nitroaniline	18,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	6,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,100,000	EPA Residential RSL	NE
	4-Chloroaniline	2,400	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table A-3
	4-Nitroaniline	24,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,100	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	240,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,100,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	180,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	260,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	24,000	EPA Residential RSL	NE
	Dibenzofuran	150,000	EPA Residential RSL	NE
	Diethyl phthalate	49,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	100,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	2,400,000	EPA Residential RSL	NE
	Hexachlorobenzene	300	EPA Residential RSL	See Table A-3
	Hexachloroethane	35,000	EPA Residential RSL	See Table A-3
	N-Nitroso-di-n-propylamine	69	EPA Residential RSL	NE
	N-nitrosodiphenylamine	99,000	EPA Residential RSL	NE

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Semivolatile Organic Compounds (µg/kg)				
	Pentachlorophenol	2,490	Soil Ecological Comparison Value (ECV)	See Table A-3
	Phenol	18,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	540	Regional Water Quality Control Board (RWQCB)	NE
	TPH as gasoline	540	Regional Water Quality Control Board (RWQCB)	NE
	TPH as motor oil	1,800	Regional Water Quality Control Board (RWQCB)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	1,900	EPA Residential RSL	NE
	1,1,1-Trichloroethane	8,700,000	EPA Residential RSL	NE
	1,1,2,2-Tetrachloroethane	560	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	43,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	3,300	EPA Residential RSL	NE
	1,1-Dichloroethene	240,000	EPA Residential RSL	See Table A-3
	1,1-Dichloropropene	1,700	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	49,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	22,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	62,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.4	EPA Residential RSL	NE
	1,2-Dibromoethane	34	EPA Residential RSL	NE
	1,2-Dichlorobenzene	1,900,000	EPA Residential RSL	NE
	1,2-Dichloroethane	430	EPA Residential RSL	See Table A-3
	1,2-Dichloropropane	890	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	780,000	EPA Residential RSL	NE
	1,3-Dichlorobenzene	530,000	EPA Residential RSL	NE
	1,3-Dichloropropane	1,600,000	EPA Residential RSL	NE
	1,4-Dichlorobenzene	2,400	EPA Residential RSL	See Table A-3
	1,4-Dioxane	18,000	DTSC Residential CHHSL	NE
	2,2-Dichloropropane	890	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,100,000	EPA Residential RSL	See Table A-3
	2,4,6-Trichlorophenol	6,900	EPA Residential RSL	See Table A-3
	2-Chlorotoluene	160,000	EPA Residential RSL	NE
	2-Hexanone	210,000	EPA Residential RSL	NE
	4-Isopropyltoluene	2,100,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	150	EPA Residential RSL	NE
	Acrylonitrile	55	EPA Residential RSL	NE
	Benzene	1,100	EPA Residential RSL	See Table A-3
	Bis (2-chloroethyl) ether	210	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,600	EPA Residential RSL	NE
	Bromobenzene	300,000	EPA Residential RSL	NE
	Bromochloromethane	270	EPA Residential RSL	NE
	Bromodichloromethane	270	EPA Residential RSL	NE
	Bromoform	61,000	EPA Residential RSL	NE
	Bromomethane	7,300	EPA Residential RSL	NE

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Volatile Organic Compounds (µg/kg)				
	Carbon disulfide	820,000	EPA Residential RSL	NE
	Carbon tetrachloride	250	EPA Residential RSL	See Table A-3
	Chlorobenzene	290,000	EPA Residential RSL	See Table A-3
	Chloroethane	15,000,000	EPA Residential RSL	NE
	Chloroform	290	EPA Residential RSL	See Table A-3
	Chloromethane	120,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	780,000	EPA Residential RSL	NE
	cis-1,3-Dichloropropene	1,700	EPA Residential RSL	NE
	Cyclohexane	7,000,000	EPA Residential RSL	NE
	Dibromochloromethane	680	EPA Residential RSL	NE
	Dibromomethane	25,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	180,000	EPA Residential RSL	NE
	Ethylbenzene	5,400	EPA Residential RSL	NE
	Hexachlorobutadiene	6,200	EPA Residential RSL	See Table A-3
	Hexachlorocyclopentadiene	370,000	EPA Residential RSL	NE
	Isophorone	510,000	EPA Residential RSL	NE
	Isopropylbenzene	2,100,000	EPA Residential RSL	NE
	m,p-Xylenes	3,400,000	EPA Residential RSL	NE
	Methyl acetate	22,000,000	EPA Residential RSL	NE
	Methyl ethyl ketone	28,000,000	EPA Residential RSL	See Table A-3
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	43,000	EPA Residential RSL	NE
	Methylcyclohexane	2,600,000	EPA Residential RSL	NE
	Methylene chloride	11,000	EPA Residential RSL	NE
	N-Butylbenzene	240,000	EPA Residential RSL	NE
	Nitrobenzene	4,800	EPA Residential RSL	See Table A-3
	N-Propylbenzene	240,000	EPA Residential RSL	NE
	o-Xylene	3,800,000	EPA Residential RSL	NE
	p-Chlorotoluene	5,500,000	EPA Residential RSL	NE
	sec-Butylbenzene	220,000	EPA Residential RSL	NE
	Styrene	6,300,000	EPA Residential RSL	NE
	tert-Butylbenzene	390,000	EPA Residential RSL	NE
	Tetrachloroethene	550	EPA Residential RSL	See Table A-3
	Toluene	5,000,000	EPA Residential RSL	NE
	trans-1,2-Dichloroethene	150,000	EPA Residential RSL	NE
	trans-1,3-Dichloropropene	1,700	EPA Residential RSL	NE
	Trichloroethene	2,800	EPA Residential RSL	See Table A-3
	Trichlorofluoromethane (Freon 11)	790,000	EPA Residential RSL	NE
	Vinyl chloride	60	EPA Residential RSL	See Table A-3
	Xylenes, total	630,000	EPA Residential RSL	NE

Notes:

This table presents a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes and screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations.

Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

Background	"Final Soil Background Investigation at Pacific Gas and Electric Company Topock Compressor Station, Needles, California" (CH2M HIll, May 2009)
DTSC CHHSL	California Department of Toxic Substances Control; California human health screening levels (OEHHA, 2005)
EPA RSL	United States Environmental Protection Agency Regional Screening Level, various dates. See Tables 3-1 to 3-8 of the Soil Investigation Part A Phase 1 Data Gaps Evaluation Report (CH2M HILL, 5/2011) for respective dates for each RSL.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis, 2008)
RWQCB	"San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels, Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater" (Table K-1). May 27, 2008
*	One or more screening levels (EPA RSL, DTSC CHHSL, ECV, or Soil SL) have values lower than the background level.
NE	not established
mg/kg	milligrams per kilogram
ng/kg	nanograms per kilogram
µg/kg	micrograms per kilogram

TABLE 2

Hazardous Waste Toxicity Characteristic Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Asbetos							
	Asbestos	1%	NE	NE	NE	NE	NE
Dioxins and Furans							
	2,3,7,8-TCDD	0.01	0.01	NE	0.001	NE	NE
Metals							
	Antimony	500	150	NE	15	NE	NE
	Arsenic	500	50	100	5	5	D004
j	Barium	10,000	1,000	2,000	100	100	D005
	Beryllium	75	7.5	NE	0.75	NE	NE
	Cadmium	100	10	20	1	1	D006
	Chromium, Hexavalent	500	50	NE	5	NE	NE
k	Chromium, total	2,500	50	100	5	5	D007
	Cobalt	8,000	800	NE	80	NE	NE
	Copper	2,500	250	NE	25	NE	NE
	Lead	1,000	50	100	5	5	D008
	Mercury	20	2	4	0.2	0.2	D009
l	Molybdenum	3,500	3,500	NE	350	NE	NE
	Nickel	2,000	200	NE	20	NE	NE
	Selenium	100	10	20	1	1	D010
	Silver	500	50	100	5	5	D011
	Thallium	700	70	NE	7	NE	NE
	Vanadium	2,400	240	NE	24	NE	NE
	Zinc	5,000	2,500	NE	250	NE	NE
Pesticides							
	4,4-DDD	1	1	NE	0.1	NE	NE
	4,4-DDE	1	1	NE	0.1	NE	NE
	4,4-DDT	1	1	NE	0.1	NE	NE
	Aldrin	1.4	1.4	NE	0.14	NE	NE
	alpha-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Dieldrin	8	8	NE	0.8	NE	NE
	Endrin	0.2	0.2	0.4	0.02	0.02	D012
	gamma-BHC (Lindane)	4	4	8	0.4	0.4	D013
	gamma-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Heptachlor	4.7	4.7	0.16	0.47	0.008	D031
	Heptachlor Epoxide	4.7	4.7	0.16	0.47	0.008	D031
	Methoxychlor	100	100	200	10	10	D014
	Toxaphene	5	5	10	0.5	0.5	D015
Polychlorinated Biphenyls							
	Aroclor 1016	50	50	NE	5	NE	NE
	Aroclor 1221	50	50	NE	5	NE	NE
	Aroclor 1232	50	50	NE	5	NE	NE
	Aroclor 1242	50	50	NE	5	NE	NE
	Aroclor 1248	50	50	NE	5	NE	NE
	Aroclor 1254	50	50	NE	5	NE	NE
	Aroclor 1260	50	50	NE	5	NE	NE
	Aroclor 1262	50	50	NE	5	NE	NE
	Aroclor 1268	50	50	NE	5	NE	NE

TABLE 2

Hazardous Waste Toxicity Characteristic Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

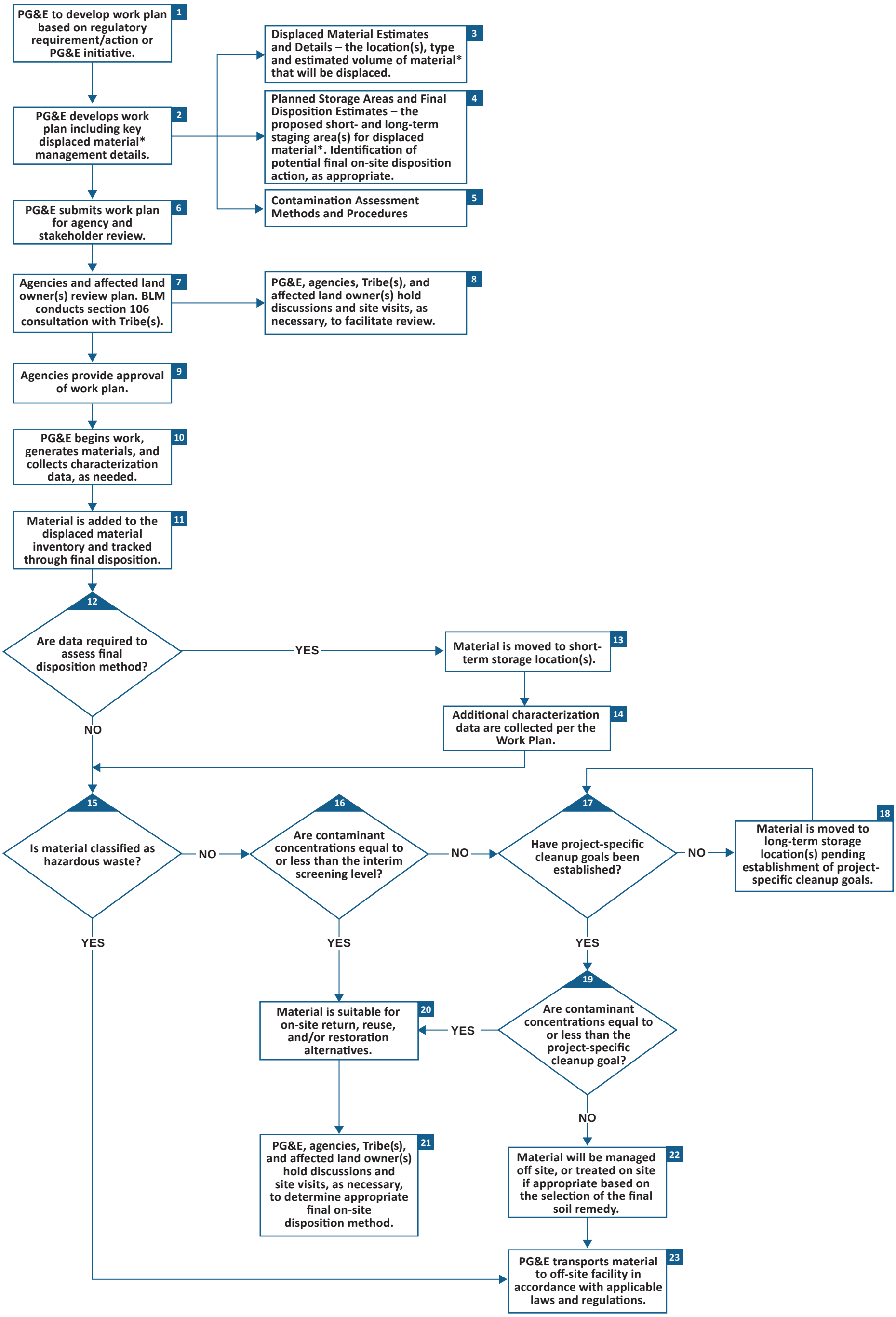
Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Polychlorinated Biphenyls							
	Total PCBs	50	50	NE	5	NE	NE
Semivolatile Organic Compounds							
	2,4-Dinitrotoluene	NE	NE	2.6	NE	0.13	D030
g	2-Methylphenol (o-Cresol)	NE	NE	4,000	NE	200	D023
g	3-Methylphenol (m-Cresol)	NE	NE	4,000	NE	200	D024
g	4-Methylphenol (p-Cresol)	NE	NE	4,000	NE	200	D025
	Hexachlorobenzene	NE	NE	2.6	NE	0.13	D032
	Hexachloroethane	NE	NE	60	NE	3	D034
	Pentachlorophenol	17	17	2,000	1.7	100	D037
Volatile Organic Compounds							
	1,1-Dichloroethene	NE	NE	14	NE	0.7	D029
	1,2-Dichloroethane	NE	NE	10	NE	0.5	D028
	1,4-Dichlorobenzene	NE	NE	150	NE	7.5	D027
	2,4,5-Trichlorophenol	NE	NE	8,000	NE	400	D041
	2,4,6-Trichlorophenol	NE	NE	40	NE	2	D042
	Benzene	NE	NE	10	NE	0.5	D018
	Carbon tetrachloride	NE	NE	10	NE	0.5	D019
	Chlorobenzene	NE	NE	2,000	NE	100	D021
	Chloroform	NE	NE	120	NE	6	D022
	Hexachlorobutadiene	NE	NE	10	NE	0.5	D033
	Methyl ethyl ketone	NE	NE	4,000	NE	200	D035
	Nitrobenzene	NE	NE	40	NE	2	D036
	Tetrachloroethene	NE	NE	14	NE	0.7	D039
	Trichloroethene	2,040	2,040	10	204	0.5	D040
	Vinyl chloride	NE	NE	4	NE	0.2	D043

Notes:

NE	not established
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
EPA HW	Environmental Protection Agency Hazardous Waste Code
TC	Toxicity Characteristic
TTLC	Total Threshold Limit Concentration
STLC	Soluble Threshold Limit Concentration
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure
WET	California Waste Extraction Test

Hazardous waste critiera exist for kepone, 2,4-D, mirex, pyridine, and 2,45-TP (Silvex); however, since they are not contaminants of potential concern at the Topock site, they are excluded from this table.

a	Total Threshold Limit Concentration (TTLC) from 22 CCR 66261.24(a)(2). Calculated based on the concentration of the elements, not the compounds.
b	Screening level is 10x Soluble Threshold Limit Concentraction (STLC). If screening level is exceeded in total analysis, California Waste Extraction Test (WET) should be run to evaluate whether STLC is exceeded.
c	Screening level is 20x RCRA Toxicity Characteristic (TC). If screening level is exceeded in total analysis, Toxicity Characteristic Leaching Procedure (TCLP) should be run to evaluate whether RCRA TC is exceeded.
d	Soluble threshold limit concentration from 22 CCR 66261.24(a)(2), measured using the WET. Calculated based on the concentration of the elements, not the compounds.
e	RCRA TC level from 22 CCR 66261.24(a)(1), measured using the TCLP.
f	A waste is assigned a RCRA waste code for each constituent where the results of the TCLP equal or exceed the RCRA TC level.
g	If o-, m- and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/L.
h	This footnote letter skipped intentionally.
i	In the case of asbestos and elemental metals, the specified concentration limits apply only if the substances are in a friable, powdered or finely divided state. Asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.
j	TTLC and STLC exclude barite. TTLC excludes barium sulfate.
k	For STLC, if the waste does not exceed the RCRA TC or exhibit another RCRA hazardous characteristic, the STLC is 560 mg/L, not 5 mg/L.
l	For TTLC, excludes molybdenum disulfide.



Notes:

* Throughout this figure the term "material" is defined as soil and rock that may be displaced (i.e., removed from the Earth) as a result of work activities including drilling, excavation, sample collection, testing, construction, grading, or other activities. This does not include materials that were not part of the natural site condition (e.g. building materials, equipment, or imported fill).

Throughout this figure, the term "site" refers to the area within the Area of Potential Effect (APE).

FIGURE 1
General Management Protocol for Handling and Disposition of Displaced Site Material
PG&E Topock Remediation Project
Needles, California

Pacific Gas and Electric Company®

PG&E TOPOCK COMPRESSOR STATION
COMBINED COMMENTS RECEVIED FROM: DOI, DTSC, FMIT, AND THE TRC
ON THE DRAFT (MAY 14, 2012) "MANAGEMENT PROTOCOL FOR HANDLING AND DISPOSITION OF DISPLACED SITE MATERIAL, TOPOCK REMEDIATION PROJECT, NEEDLES, CALIFORNIA" AND ASSOCIATED PG&E RESPONSES, FOR DISCUSSION

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
1	In redline	Page 3, Handling and Short Term Storage First paragraph	DTSC	In some cases, short-term storage for characterization may not be necessary.	List some examples for clarity.	In situations where characterization data is available prior to disturbance, or is made available during disturbance (e.g. field screening or expedited laboratory analysis), short-term storage may not be necessary. Text will be revised to read as follows (changes in bold): "In some cases, short-term storage for characterization may not be necessary. **For example,** displaced material that is pre-characterized **or characterized rapidly as work is conducted** will be managed **directly** for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively).	Resolved.
2	In redline	Page 3, Handling and Short Term Storage First paragraph	DTSC	Displaced material that is pre-characterized **per an agency approved work plan** will be managed for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively)	Strike "per an agency approved work plan". Comment: Data may come from other sources (e.g., opportunistic samples). No need to limit available data.	Text will be deleted. See revised text in response to comment 1.	Resolved.
3	In redline	Page 4, Handling and Short Term Storage Final bullet	DTSC	Final disposition information – Indication of the **on-site** or off-site final disposition action identified through discussion with Tribe(s), agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment (see Section 3.5).	Comment: Need to define "on-site/site/on site" used throughout the document to clearly understand where soil may end up.	The following statement has been added to the end of the second paragraph in Section 1.0: "Throughout this document, the term "site" refers to the area within the APE."	Resolved.
4	In redline	Page 4, Contamination Assessment First bullet	DTSC	Existing information including knowledge of the history of an area, or laboratory analytical results collected during previous phases of work. Use of existing information may preclude the need for additional analytical testing. When available, this information **should** be included in the work plan.	Replace "should" with "will".	Concur. The change has been incorporated.	Resolved.
5	In redline	Page 5, Contamination Assessment – (bullet) Hazardous Waste Toxicity Characteristic Levels Bullet 2	DTSC	If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic (TC) level by **about** 20 times or more, the toxicity characteristic leaching procedure (TCLP) will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.	Add word "about". Comment: Adding flexibility to conduct leach tests if the dry values are in the neighborhood. Do this due to potential for soil to be heterogeneous.	Concur. The change has been incorporated.	Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
6	In redline	Page 5, Contamination Assessment – (bullet) Hazardous Waste Toxicity Characteristic Levels Bullet 3	DTSC	If the sample has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by **about** 10 times or more, the California Waste Extraction Test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA California hazardous waste.	Add word "about".	Concur. The change has been incorporated.	Resolved.
7	In redline	Page 5, Contamination Assessment Last paragraph, last sentence	DTSC	As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review **and acceptance. Only agency approved values will be utilized.**	Add text in bold.	Concur. Final text based on discussion with DTSC: As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review and comment. Only agency approved values will be utilized.	Resolved.
8	1	End of document Table 2	DTSC	None.	The document does not speak to inside the fence line versus outside the fence line. If we use the Interim Screening Levels identified in this document for displaced soils originating from inside the fence line, there is a potential that more soil will be stored unnecessarily as inside the fence line soils would probably exceed background levels.	The management protocol currently addresses all material, regardless of area of origin, in the same way. A screening level specific to material inside the fence line may be established at a later date. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	Resolved.
9	2	End of document	DTSC	None.	Will inside the fence line soils versus outside the fence line soils be allowed to move back and forth? How does this tie into the on-site soil management plan (SMP) being developed by PG&E? Discuss components of the SMP in this protocol.	This management protocol will be applied to material displaced as a result of remediation project activities regardless of whether the material originated inside or outside the fence line. Therefore soils may move outside from inside, or potentially vice-versa depending on designated storage areas or reuse options. The SMP will mirror the concepts in this protocol. Because this document is the standard protocol and the SMP will be a standalone document as part of the operations and maintenance manual for the groundwater remedy, the SMP will reference this document and include additional detail, but we do not see a reason to reference the SMP in this protocol. Further, this management protocol will be updated as is determined necessary based on additional details included in the finalized SMP.	**Subsequent DTSC Comment:** The comment should be revised to clarify that the SMP is not limited to groundwater and is intended to ensure potentially contaminated soils are adequately identified and handled at the compressor station (inside the fence line). See absolute comment 154 from the RTC table (June 29, 2012) for the soils work plan. **PG&E Response:** The SMP is part of the final groundwater remedy design document, and therefore, is specific to groundwater. However, details regarding the management of potentially contaminated soils on the compressor station (inside the fence line) will be addressed in the Soil RFI/RI Work Plan (Appendix J – Displaced Soil and Hazardous Waste Management Procedures). Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
10	3	End of document Table 1	DTSC	None.	Interim Screening Level Source: Include soils screening levels for groundwater protection as screening criteria.	The Interim Screening Level represents the most conservative value, and are lower than the soil screening level for groundwater protection, with the exception of hexavalent chromium and molybdenum. The soil screening level for protection to groundwater for hexavalent chromium and molybdenum is below the background concentration for these metals. Final reuse decisions will be based on the more conservative Interim Screening Level or the project-specific clean up goal (or hazardous waste criteria), and therefore inclusion of soil screening levels for groundwater protection would not add a meaningful decision criteria to the protocol.	**Subsequent DTSC Comment:** Table 1 will need to be modified to identify that the soil screening level for molybdenum is below background. **PG&E Response:** Concur. The edit has been made. Resolved.
11	4	End of document Table 1	DTSC	None.	Interim Screening Level: The protocol should address screening criteria for vapor intrusion to indoor air, to ensure that vapor intrusion pathways will not be potentially created (e.g., do not place VOC impacted soil in areas that have, or likely to have enclosed structures such as MW-20 bench).	VOCs have not been detected in soils to date. Therefore there is no need to develop screening levels that are protective of indoor air from vapor intrusion pathways. However, the following statement will be added to second paragraph of Section 4.0: "Further, if material is found to contain concentrations of volatile organic compounds it may not be suitable for return, reuse, and/or restoration near buildings where vapor intrusion would be of concern."	Resolved.
12	5	End of document Table 1 - Notes	DTSC	None.	Include fluoride salts as they are COPC.	The note in Table 2 has been revised as discussed with DTSC.	Resolved.
13	6	End of document Table 2	DTSC	None.	Any listed wastes to be concerned with?	At this time we are not aware of any listed wastes that need to be considered for this management protocol. Additional soil data is pending collection as part of the soil investigation. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	Resolved.
14	In redline	Figure 1	DTSC	**Agencies direct** PG&E to develop work plan based on regulatory requirement or action.	Revised text: PG&E to develop work plan based on regulatory requirement/action **or PG&E initiative**.	Concur. The change will be incorporated.	Resolved.
15	In redline	Figure 1	DTSC	PG&E begins work and generates material.	Revised text: PG&E begins work and generates material **and characterization data**.	To clarify, the word "additional" will be deleted from the decision box two levels below the box commented on, and the original box will not be edited.	**Subsequent DTSC Comment:** Edits were not completed as stated in text. Box 10: Add "characterization" in front of "data". Box 12: Delete "additional" as proposed. **PG&E Response:** Concur. The edits have been made. Resolved.
16	In redline	Figure 1	DTSC	Material is suitable for **on-site** return, reuse, and/or restoration alternatives.	Define "on-site".	The following note has been added to the figure: "Throughout this figure, the term "site" refers to the area within the Area of Potential Effect (APE)."	Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
17	In redline	Page 5, Contamination Assessment Last paragraph, last sentence	DOI	As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review **and acceptance. Only agency approved values will be utilized.**	It is unclear what is meant by acceptance. (See also comment 7 [DTSC])	See response to comment 7 (DTSC).	Resolved.
18	In redline	Page 6, Long-term Storage First paragraph, second sentence	DOI	Per DOI comment on this protocol (received in February 2012), this material must remain on-site until project-specific cleanup goals are finalized.	For clarification, DOI stated that the material could not be returned to the land until cleanup criteria are finalized in the ROD and may be stored until that time.	To clarify, the text has been revised as follows: "Per DOI comment on this protocol (received in February 2012), this material cannot be returned to the land until cleanup criteria are finalized in the Record of Decision (ROD) and may be stored until that time."	Resolved.
19	1		FMIT	None.	The 5-14-12 draft protocol still does not address the matter of the existing inventory of displaced soils. It only looks forward to activities that will involve soil disturbance as part of future work plans. This comment has been made previously by FMIT, but the issue remains unaddressed. The existing inventory of displaced soils must be addressed in this protocol. It is not anticipated that the handling and disposition of the existing soil inventory would be different from procedures and policies for addressing future displaced soils. A section of this protocol must address disposition of the existing displaced soils inventory.	As stated in the first sentence of the document, the intent is for this management protocol to apply to material that is displaced as a result of past (as practical), present, and future activities associated with the Topock Remediation Project. To speak specifically to the inventory of previously displaced soils at the site, the following text has been added to the end of Section 4.0 (Return, Reuse, and/or Restoration of Displaced Site Material): "Material displaced as part of past remediation project activities was managed in accordance with project-specific work plans. As a result, some material has been retained at the site because contaminant concentrations were below the Interim Screening Level (previously displaced material that has exceeded these levels was disposed off-site in accordance with the work plans). Therefore, previously displaced material is available for the return, reuse, and/or restoration alternatives included in the bullets above, or as additional uses are developed. As of June 2012, the estimated volume of material that has been retained and stockpiled through past remediation project activities is approximately 30 to 35 cubic yards."	
20	2		FMIT	None.	The draft does not address soil disturbances associated with the soils investigation. It appears that only soils displaced as a result of the groundwater remedy activities are explicitly covered. Again, this point has been raised by FMIT but remains largely unaddressed. FMIT realizes the necessity and importance of PG&E's addressing the respective mitigation measure (CUL-1a-8[g]) but that measure does not exclude applying these procedures to all displaced soils. The issue of soil handling was initially raised by FMIT years ago, and was not intended to be limited to the fulfillment of a mitigation measure for, or the implementation of, the groundwater remedy. PG&E has apparently reframed the issue to limit the scope of the protocol, however, the FMIT is concerned with the disturbance and displacement of soils, regardless of the	Based on clarification received from FMIT during the June 15, 2012 call, the tribes want this protocol to be inclusive of all activities at the Topock Compressor Station. This topic has been tabled for future discussion with PG&E, and the protocol will not be modified at this time. DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: As indicated in the first paragraph of the Protocol, "*This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities*	The Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
					associated activity or remedial action at the Site, and expects the PG&E and the Agencies to examine and find solutions for the whole of the issue.	*associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities*". As cited, DTSC does not interpret the Protocol to be limited only to soil displaced as a result of groundwater remedy implementation. On the contrary, the scope appears to be sufficiently broad to cover all aspects of the environmental project conducted under the oversight of DTSC and the US Department of the Interior. DTSC is aware, however, that this protocol, once developed, could be submitted by PG&E to comply with a portion of Mitigation Measure CUL-1a-8 of the certified Final Environmental Impact Report where PG&E is to develop a protocol for handling soil cuttings to be included in the Cultural Impact Mitigation Program as part of the final design of the approved groundwater remedy. Currently, DTSC is in the process of conducting a California Environmental Quality Act (CEQA) evaluation for the soil investigation work plan. Based on the results of the soil CEQA evaluation, the same mitigation measure may be found to be appropriate for the soil investigation activities. Note that displaced soils from soil investigation activities will not be generated until after the soil CEQA evaluation is completed and the soil investigation work plan is approved.	
21	3		FMIT	None.	There is no commitment to minimize disturbances that are not associated with the listed activities as a result of incidental or associated activities (e.g., vehicles, etc.). PG&E is directing this primarily at CUL-1a-8[g], however, FMIT again requests that these procedures be a broader statement of policy committing to minimization or disturbance for all Site activities. Other soil disturbing activities that PG&E might perform should also 'voluntarily' follow this protocol.	See response to comment 20 (FMIT). Per Aug-6, 2012 discussion, additional detail was added to the bullets in Section 3.1 regarding areas of disturbance and displacement.	
22	4		FMIT	None.	The application of soil criteria for the determination of reuse needs some additional flexibility. Since there will likely be (or should be) several discrete soil samples with chemical concentrations for a given amount of soil, it is the average of these values for that soil accumulation that should be used. This is justified because exposure occurs over an area and the soil will be further mixed when it is placed back on the site.	The specific process for characterization of displaced site material is an example of a detail that would be included in the project-specific work plan. DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: In addition to potential concentration-by-concentration comparison between the disturbed soil and screening criteria, DTSC does not object to considering other alternative methods as long as the methods will yield data that are representative of the material in question, are in accordance with waste classification regulations, and standard practice for classifying materials such as	As of the September 7, 2012 letter, the Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached. The document has been revised per the direction in the September 18, 2012 letter in response to the September 7, 2012 letter (as detailed in the column to the left).

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
						investigation derived soil cuttings for the purposes of determining proper disposal. DTSC concurs with the approach that additional details regarding this issue can be addressed in the individual work plans. PG&E Comment – The sixth paragraph on page 5 has been revised to read as follows (text additions are in **bold**): "These values will be used to determine the final disposition of displaced material **by comparing the representative concentration of a given volume of material to the screening values. The methodology for determining the representative concentration will be established in the project-specific work plan and should not be limited to a concentration-by-concentration comparison, but could include statistical estimates or averages based on multiple samples**. Material that **has a representative concentration that** is equal to or below the interim screening level is suitable for return, reuse, or replacement on-site. Material that is characterized as hazardous waste must be disposed of off-site in accordance with applicable laws and regulations. Material that **has a representative concentration that** is greater than the interim screening level, but not classified as a hazardous waste, will be stored on-site until the project-specific cleanup goals are established. Until these goals are established, material that falls into this intermediate category will be retained on-site for "long-term storage" (see Section 3.4)."	
23	5	Table 1	FMIT		Why is the "Project-specific Cleanup Goal" differentiated from the "Tribal Screening Level"? The Tribal land use scenario is the most appropriate future land use and the calculation of risk-based concentrations is a "Project-specific Cleanup Goal" and not a screening level.	Based on discussion during the June 15, 2012 call, it is premature to have the project-specific cleanup goals and the tribal screening levels included on Table 1 since they have yet to be determined. Therefore, these columns will be deleted from Table 1. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	
24	6		FMIT		The overall logic that would set screening criteria according to the location of origin of the soil is flawed. Soil disturbances often involve commingling of soils to various depths, while the potential exposure scenarios usually relate to materials at or near the surface. The depth of soil placement/reuse should be considered in the decision for reuse.	Separation of displaced soil to this level of detail (shallow vs. deeper) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint, but could be accomplished. However, current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios. The document will be revised as additional screening levels are developed.	The Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
						DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: DTSC supports PG&E's response in the RTC summary table that separation of displaced soil to this level of detail (shallow vs. deep) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint. The current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios. More importantly, the decision to reuse soil that is above screening criteria regardless of depth ultimately rests on the respective land owners who own the land where the displaced soil will be reused. If potentially contaminated soils will be reused, the land owner must agree to a land use covenant restricting the use of their land after backfilling. DTSC believes that this issue cannot be managed at a global level since the decision is dependent on location, depth, concentration of material and landowner acceptance, DTSC believes that this issue can be deferred and handled on a case-by-case basis, potentially during the individual work plan, to first determine if there are potential locations that will require deep backfill, and more importantly, the individual land-owners preference on this issue. **PG&E comment – Additional detail regarding potential material reuse scenarios that are specific to a given work plan will be included in the individual work plans, as necessary.**	
25	7	Figure 1	FMIT		We suggest adding a number to each block in the diagram for clarity. In the "second to the last block" it says "Material must be managed offsite." If contaminant concentrations are less than or equal to (<) project-specific cleanup goal, why couldn't they be treated onsite if appropriate and feasible?	Numbers will be added to flow chart boxes. The text in the "second to last block" will be modified to read as follows: "Material will be managed off site, or treated on site if appropriate based on the selection of the final soil remedy." Additional text has also been added to Section 3.5.	
26	1	Page 4, Contamination Assessment	Hualapai / TRC		Key information that will be used in assessing whether the displaced material is contaminated is discussed in Section 3.3 Contamination Assessment. Within this section it is stated that contamination determinations of displaced materials can be based on "existing information including knowledge of the history of an area" and "observation of the physical properties of the material". It is unclear however, how physical observation or historical knowledge of an area can be used in comparisons against the quantitative interim screening values provided in	Examples of key physical properties have been added to the second bullet in Section 3.3, and now reads as follows: "Results of characterization samples collected for laboratory analysis, and observation of the physical properties of the material (e.g., white powder, burned material, boulders, etc.), as defined in the approved work plan for a given activity." Regarding "existing information/history of an area", see response to comment 27 (Hualapai/TRC).	

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
					Tables 1 and 2.		
27	2	Page 4, Contamination Assessment Third bullet.	Hualapai / TRC	The specific analytes and interim screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations.	Section 3.3 Contamination Assessment states that "the specific analytes and interim screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations." This statement appears to suggest that the interim soil screening levels that are provided in Tables 1 and 2 are not to be consistently applied to all displaced soils but rather the origin and fate of the displaced soil will dictate which analyte will be evaluated and what interim threshold value is used. This is unclear and could use additional clarification.	The screening levels included on Tables 1 and 2 will be applied uniformly to all analytes included on the table. To clarify, the text "**and screening levels**" will be deleted from the statement. Regarding specific analytes, the protocol provides flexibility such that a subset of analytes included on Table 1 may be used to characterize displaced material, as determined appropriate. For example, material that is generated from an area not suspected of dioxin/furan contamination may not need to be characterized for dioxin/furan concentrations prior determining the appropriate disposition alternative.	
28	3		Hualapai / TRC		Interim screening values should not be based on background values. The use of background is unnecessarily over-conservative, the background data are based on a small yet variable group of samples, and use of the background threshold value will inevitably result in long term stockpiling of soils with no associated risk. Until a Tribal Screening level is developed it can still be safely assumed that the use of a CHHSL interim screening value will be equal to or greater than the Tribal Screening level and should be used in place of the background screening level.	The use of background is purposefully conservative until project-specific cleanup goals are established. While it is correct that this may result in long term storage of soils that are later determined to have no associated risk, agency input and concurrence is required if less conservative values are to be used.	
29	4		Hualapai / TRC		The use of ecological screening values (ECVs) should only occur in situations were displaced soils would be returned to surface locations. Most of the developed ECVs were developed based on exposures to terrestrial receptors which would not come into contact with subsurface soils. Clearly no significant pathway of exposure for ecological receptors exists for soils removed and replaced into deep boreholes. Therefore if ECVs are to be used it is suggested that there use be limited to the screening of only surface related soils.	See response to comment 24 (FMIT) and 28 (Hualapai/TRC).	

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
30	5		Hualapai / TRC		It was clearly stated in the Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil that "the ECVs, while based on information developed during the ecological risk assessment (ERA) scoping, are to be applied only to soil investigation planning in conjunction with background values. Specifically, the ECVs are not intended for use as either cleanup goals or as screening levels to eliminate COPECs." Furthermore within the Revised Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan (August 2008) PG&E states that "ECVs were developed to support the soil investigation data gaps assessment". Therefore it appears that the use of ECVs as interim screening levels for the determination of soil cleanup is outside of the scope of which these values were developed.	ECVs are only included on Table 1 for select analytes as the Interim Screening Level (see notes). However, the Interim Screening Level is not used for the determination of soil clean-up. The Interim Screening Level is used as the most conservative screening level to determine if the material is suitable for on-site return, reuse, and/or restoration alternatives. As presented on Figure 1, if the material contains contaminant concentrations greater than the Interim Screening Level (and below hazardous waste criteria), then it must stored until project-specific clean-up goals are established.	
31	6		Hualapai / TRC		There may be a need for rapid field analyses in order to, for example, place cuttings materials back down a bore hole or to work in very sensitive areas. Selected elements and possible field methods need to be discussed as part of the process to define screening levels.	It is conceivable that rapid field screening or laboratory analytical data may be necessary to make expeditious decisions related to the characterization of displaced material. However, these operational details are deferred to the project-specific work plan, where all details related to the implementation of the scope of work can be fully considered. The reference list of potentially applicable analytes and associated screening levels (Table 1) is being developed based on past operation information available for the Site, and therefore, is inclusive of all analytes of potential concern. However, this list is not dependant on the types of analytical methods (field or fixed-base laboratory) used for characterization of displaced site material.	
32	7		Hualapai / TRC		Other details were not presented in the report. For example, composite samples may be collected and analyzed in order to categorize a batch of soils. A displaced material tracking data base may be necessary in order to catalog the site locations, depths, methods of displacement, etc.	Many operational details, such as the method(s) for characterizing soils that are displaced as a result of Topock Remediation Project activities, are deferred to the project-specific work plan. See also the response to comment 22 (FMIT). Please refer to Section 3.2 (Handling and Short-term Storage) regarding plans to build an inventory of all material displaced by Topock Remediation Project activities.	

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

1820 East River Road, Suite 220
Tucson, AZ 85718
Phone: 520.881.7300
Fax: 520.529.2141

September 7, 2012

VIA ELECTRONIC MAIL

Mr. Jose Marcos, Geologist
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, CA 90630

Re: FMIT Comments on Revised Protocol on Displaced Materials, August 28, 2012

Dear Mr. Marcos:

Hargis + Associates, Inc. (H+A) on behalf of our client, the Fort Mojave Indian Tribe ("the Tribe" or "FMIT"), is hereby providing comments on the above-referenced revision to the Displaced Materials Protocol ("the Protocol"), in response to your email of September 4, 2012.

The Tribe is concerned over the suggestion that this Protocol is nearing finalization, yet there does not appear to be full resolution of Tribal comments. The Tribe agrees that this document has been prepared in a collaborative manner with frequent opportunity to exchange ideas and for the parties to provide input. Nevertheless, our review of the "Response to Comments," (RTC) prepared by the Pacific Gas & Electric Company (PG&E), characterizes the status of various tribal comments as "resolved." However, some of the issues that have been consistently raised by the Tribe during the process in fact remain unresolved. As you know from the correspondence of July 23, 2012, referenced below, the Tribe has concerns with the comment resolution process for the project in general.

The Tribe commented previously on the RTC process for the draft *Soil RCRA Facility Investigation/Remedial Investigation Work Plan (Work Plan), PG&E Topock Compressor Station, Needles, California.* Specifically, the last column of the RTC table identifies the resolution status of individual "Absolute Comments," much like the last column in PG&E's RTC for the displaced soils protocol. The Tribe took issue with the fact that the Agencies, the California Department of Toxic Substances Control (DTSC) and U.S. Department of the Interior (DOI), characterized the resolution status as "resolved," when in fact the Tribe had certain residual issues.

While the Tribe understands that the ultimate decisions for project matters remain the Agencies' responsibility, it is important that dissenting views of Tribes and stakeholders be documented in the record whenever the "resolution" overrides the concerns expressed throughout the process. On August 31, 2012, the Tribe received a letter from DOI and DTSC in response to the Tribe's letter of July 23, 2012, expressing concerns over the RTC process. The Agencies' letter recognized that several of the Tribe's issues in fact remain unresolved and indicated that DOI would request that PG&E remove the "resolved" notation from all Tribal comments. DOI further

Other Offices:
Mesa, AZ
San Diego, CA

indicated its willingness to consult with the Tribe on the matter and procedure for issue resolution.

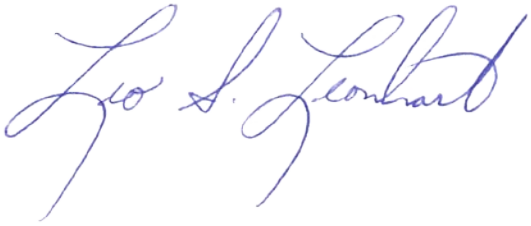
The RTC for the displaced soils protocol is unacceptable to the Tribe for the same reasons: the document seems to state that PG&E, not the Agencies, had made determinations in regard to issue resolution. This function properly belongs to the Agencies and must not be directly or indirectly delegated to a third party. Also, the document does not accurately reflect unresolved issues raised by the Tribe or document why they cannot be accommodated, if that is the case, a key part of meaningful collaboration and consultation. Perhaps finalization of the Protocol can await the Agencies' consideration of this letter and the conclusion any further discussions on this subject with the Tribes.

Accordingly, below, the Tribe hereby is identifying three items where the Tribal issues remain unresolved, and requests that either these issues be resolved jointly with the Tribe(s) or the reasons why these issues cannot be accommodated at this time be identified and documented within the RTC summary. The comments are attached.

Please contact me if you have questions concerning this letter.

Sincerely,

HARGIS + ASSOCIATES, INC.



Leo S. Leonhart, PhD, PG, CHG
Principal Hydrogeologist

Comments attached below

cc: K. Baker, DTSC
J. Bathke, Quechan
D. Bonamici, CRIT
M. Cavaliere, CH2M Hill
C. Coyle
M. Eggers, TRC
R. Escobar, Chemehuevi
W. Fisher-Holt, CRIT

D. Hubbs, Hualapai
P. Innis, DOI
L. Jackson-Kelly, Hualapai
J. McCormick, Cocopah
S. McDonald
N. McDowell-Antone, FMIT
Y. Meeks, PG&E
K. Morton, Cocopah
L. Otero, FMIT
R. Prucha, TRC
E. Rosenblum, TRC
C. Schlinger, TRC
M. Sullivan, CSUN
T. Williams, FMIT
W. Wright, TRC
A. Yue, DTSC

839.07 Displaced Materials

Fort Mojave Indian Tribe Comments on the Draft Soils Reuse Protocol that Remain Unresolved

Comments on the RTC

1. Comment 20 by FMIT.

   There are two separate issues that have been inappropriately combined. The first issue is the Tribe's position that this Protocol should apply to all aspects (*e.g.,* groundwater and soil) of the Topock Remediation Project. The second issue was the request by the Tribe that the Protocol be applied to all soil-related projects. This second issue was potentially addressed by moving it to discussions between PG&E and the Tribes directly. However, this resolution does not address the first issue. Therefore, the Tribe again requests that this Protocol be applied to all aspects of the Topock Remediation Project.

2. Comment 24 by FMIT and 29 by Hualapai/TRC.

   The comment and the comment's final sentence are two separate, but related issues regarding the application of the soil criteria to decide on the disposition of disturbed soils. One issue is that it should be the final location of disturbed soil replacement that determines the applicable criteria, not the source location of the disturbed soil. And second, when the final location of disturbed soil replacement is selected, if the location has deep (*i.e.,* below 2 feet bgs) backfill areas, and if future erosion is unlikely, then this deeper backfill soil may have less stringent acceptance criteria. While it is understood that the Protocol has criteria that are not depth-related, this issue of backfill depth can be used to decrease the amount of soil that must be removed from the site, thereby lessening the impact of the cleanup on the Site.

Comments on the August 30, 2012, Draft Protocol

1. Page 5, paragraph 6.

   FMIT has commented previously that when the Protocol describes a simple comparison between the material *(i.e.,* the disturbed soil) and the criteria, without further discussion, it gives the impression that concentration-by-concentration comparisons will be used. As discussed in the last teleconference, there may be other estimates of 'material concentration' that could be used (*e.g.,* average). While the RTC specifies that the procedure for this comparison will be addressed in specific work plans, the Tribe requests that this paragraph be edited to include the statement "material concentrations will be established for each soil pile in short-term storage. This concentration may include a statistical estimate for that soil pile." (Note: 'pile' may not be the correct word in this context and a substitute can be discussed.)

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
5796 Corporate Avenue
Cypress, California 90630

Edmund G. Brown Jr.
Governor

Sent Via Electronic Mail

September 18, 2012

Leo S. Leonhart, PhD, PG, CHG
Principal Hydrogeologist
Hargis + Associates, Inc.
1820 East River Road, Suite 220
Tucson, AZ 85718

RESPONSE TO SEPTEMBER 7, 2012 LETTER ON FMIT COMMENTS REGARDING REVISED PROTOCOL ON DISPLACED MATERIALS, PACIFIC GAS AND ELECTRIC COMPANY (PG&E), TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

Dear Dr. Leonhart:

The Department of Toxic Substances Control (DTSC) is in receipt of your letter dated September 7, 2012, which was sent on behalf of the Fort Mojave Indian Tribe (FMIT) pertaining to the FMIT concerns over the *"Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project"* (Protocol). DTSC appreciates the FMIT's input as provided in your letter, and believes that they will help greatly in quickly resolving any potentially unresolved issues related to the Protocol.

As you know, it has been nearly one year since your initial draft of what has evolved into the current version of the Protocol. Its development has been a collaborative effort between the various agencies, Tribes, stakeholders and PG&E as part of the displaced soil committee. The parties involved have met multiple times to discuss the details of the document and its implementation strategy. DTSC believes that these meetings throughout the past year demonstrate the commitment of all parties to completing this task and to provide meaningful input into its development.

After reviewing the August 28, 2012 version of the Protocol, DTSC believes that the document has captured the issues and the resolutions suggested during the yearlong dialogues of the committee. However, in your letter, you expressed, on behalf of the FMIT, concern over DTSC's suggestion that the Protocol is nearing completion, and your letter indicates that the response to comments (RTC) summary table does not accurately reflect unresolved issues raised by the Tribes. You specified three

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comments that the FMIT believes remain unresolved and you requested that these issues be resolved jointly with the Tribes or document the reasons why they cannot be accommodated at this time in the RTC summary table.

DTSC notes, however, that the 'resolved' status for comments listed on the RTC table were determined by the committee members during the various meetings after each comment was discussed. Never the less, DTSC will request PG&E to revise the RTC summary table for those three comments to reflect the FMIT's position. DTSC is providing the following discussion to clarify our understanding of the issues raised by the three specific comments. DTSC hopes that the responses adequately address the FMIT's comments so that the Protocol can continue to move forward.

1. Absolute Comment No. 20 by FMIT – According to the FMIT comment, the Protocol does not address soil disturbances associated with the soils investigation, and it appears that only soils displaced as a result of the groundwater remedy activities are explicitly covered. The FMIT requests that the protocol to be applied to all aspects (e.g., groundwater and soil) of the Topock Remediation Project.

As indicated in the first paragraph of the Protocol, *"This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities".* As cited, DTSC does not interpret the Protocol to be limited only to soil displaced as a result of groundwater remedy implementation. On the contrary, the scope appears to be sufficiently broad to cover all aspects of the environmental project conducted under the oversight of DTSC and the US Department of the Interior. DTSC is aware, however, that this protocol, once developed, could be submitted by PG&E to comply with a portion of Mitigation Measure CUL-1a-8 of the certified Final Environmental Impact Report where PG&E is to develop a protocol for handling soil cuttings to be included in the Cultural Impact Mitigation Program as part of the final design of the approved groundwater remedy.

Currently, DTSC is in the process of conducting a California Environmental Quality Act (CEQA) evaluation for the soil investigation work plan. Based on the results of the soil CEQA evaluation, the same mitigation measure may be found to be appropriate for the soil investigation activities. Note that displaced soils from soil investigation activities will not be generated until after the soil CEQA evaluation is completed and the soil investigation work plan is approved. DTSC will instruct PG&E to add a statement in the RTC summary table reflecting DTSC's position.

2. Absolute Comments No. 24 by FMIT and 29 by Hualapai/TRC – The Tribes request that the depth of the soil placement/reuse should be considered in the decision for reuse.

DTSC supports PG&E's response in the RTC summary table that separation of displaced soil to this level of detail (shallow vs. deep) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint. The current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios.

More importantly, the decision to reuse soil that is above screening criteria regardless of depth ultimately rests on the respective land owners who own the land where the displaced soil will be reused. If potentially contaminated soils will be reused, the land owner must agree to a land use covenant restricting the use of their land after backfilling. DTSC believes that this issue cannot be managed at a global level since the decision is dependent on location, depth, concentration of material and landowner acceptance, DTSC believes that this issue can be deferred and handled on a case-by-case basis, potentially during the individual work plan, to first determine if there are potential locations that will require deep backfill, and more importantly, the individual land-owners preference on this issue. DTSC will instruct PG&E to revise the RTC summary table to remove the 'resolved' status for this comment, incorporate DTSC's position, and indicate that additional detail can be included in the individual work plans.

3. FMIT Comment on page 5, paragraph 6 of the August 2012 draft protocol – The FMIT requests the inclusion of the statement, *"material concentrations will be established for each soil pile in short-term storage. This concentration may include a statistical estimate of the soil pile"*. In addition to potential concentration-by-concentration comparison between the disturbed soil and screening criteria, DTSC does not object to considering other alternative methods as long as the methods will yield data that are representative of the material in question, are in accordance with waste classification regulations, and standard practice for classifying materials such as investigation derived soil cuttings for the purposes of determining proper disposal. DTSC concurs with the approach that additional details regarding this issue can be addressed in the individual work plans. DTSC will instruct PG&E to update the Protocol and RTC summary table to incorporate the FMIT's proposed concept as a potential alternative.

Finally, your letter indicated that the FMIT has concerns with the comment resolution process for the project in general. The FMIT expressed similar concerns in a letter dated July 23, 2012. DTSC and the U.S. Department of the Interior provided a response to the FMIT letter on August 31, 2012. If you feel that this letter and the August 31, 2012 letter do not adequately address your general concerns regarding the comment resolution process for the project, we would like to meet with you to discuss any remaining concerns you may have.

DTSC hopes that this letter provided additional clarification and adequately addressed the FMIT's issues related to the Protocol. As always, DTSC appreciates the Tribes and stakeholders continuing involvement on the PG&E Topock project and we look forward to working with you in moving the overall project forward. If you have any questions, please feel free to contact me at (714) 484-5492.

Sincerely,

Jose Marcos, PG
Engineering Geologist
Department of Toxic Substances Control

cc: Ms. Karen Baker, DTSC
Mr. John Bathke, Quechan
Mr. Douglas Bonamici, CRIT
Mr. Mike Cavaliere, CH2MHill for PG&E
Ms. Courtney Ann Coyle, for FMIT
Ms. Margaret Eggers, TRC
Mr. Ron Escobar, Chemehuevi
Ms. Wilene Fisher-Holt, CRIT
Mr. Christopher Guerre, DTSC
Ms. Dawn Hubbs, Hualapai
Ms. Pamela Innis, DOI
Ms. Loretta Jackson-Kelly, Hualapai
Ms. Jill McCormick, Cocopah
Mr. Steven McDonald, for FMIT
Ms. Nora McDowell-Antone, FMIT
Ms. Yvonne Meeks, PG&E
Ms. Kendra Morton, Cocopah
Ms. Linda Otero, FMIT
Mr. Robert Prucha, TRC
Mr. Eric Rosenblum, TRC
Mr. Charlie Schlinger, TRC
Mr. Michael Sullivan, for FMIT
Mr. Timothy Williams, FMIT
Mr. Win Wright, TRC
Mr. Aaron Yue, DTSC

Appendix I
Cultural Historic Properties Management Plan
(On CD-ROM Only)

Appendix J
Paleontological Resources Management Plan: MMRP CUL-3
(On CD-ROM Only)

Topock Project Executive Abstract

Document Title: Paleontological Resources Management Plan, Topock Groundwater Remediation Project, San Bernardino County, California and Mohave County, Arizona

Submitting Agency/Authored by: PG&E

Final Document? ☒ Yes ☐ No

Date of Document: February 28, 2013

Who Created this Document?: (i.e. PG&E, DTSC, DOI, Other)

PG&E

Document ID: PGE20140228A

Priority Status: ☐ HIGH ☒ MED ☐ LOW

Is this time critical? ☒ Yes ☐ No

Type of Document:

☐ Draft ☒ Report ☐ Letter ☐ Memo

☐ Other / Explain:

Action Required:

☒ Information Only ☐ Review & Comment

Return to: _____

By Date:_____

☐ Other / Explain:

What does this information pertain to?

☐ Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)/Preliminary Assessment (PA)

☐ RCRA Facility Investigation (RFI)/Remedial Investigation (RI) (including Risk Assessment)

☐ Corrective Measures Study (CMS)/Feasibility Study (FS)

☐ Corrective Measures Implementation (CMI)/Remedial Action

☐ California Environmental Quality Act (CEQA)/Environmental Impact Report (EIR)

☐ Interim Measures

☒ Other / Explain: MMRP Requirement (CUL-3) per the Environmental Impact Report (EIR)

Is this a Regulatory Requirement?

☒ Yes

☐ No

If no, why is the document needed?

What is the consequence of NOT doing this item? What is the consequence of DOING this item?

This satisfies the Environmental Impact Report (EIR) Mitigation Measure CUL-3

Other Justification/s:

☐ Permit ☐ Other / Explain:

Brief Summary of attached document:

The report provides a paleontological survey and summary for areas included in the Project Area. The study was specifically intended to identify the potential for paleontological resources and determine if paleontological monitors would be necessary during the groundwater remediation implementation activities.

Written by: ARCADIS and Parus Consulting on behalf of PG&E

Recommendations:

A paleontologist should be on call to respond in the unlikely event that fossils are encountered during construction or drilling, so that they may be evaluated to determine whether they meet significance criteria.

How is this information related to the Final Remedy or Regulatory Requirements:

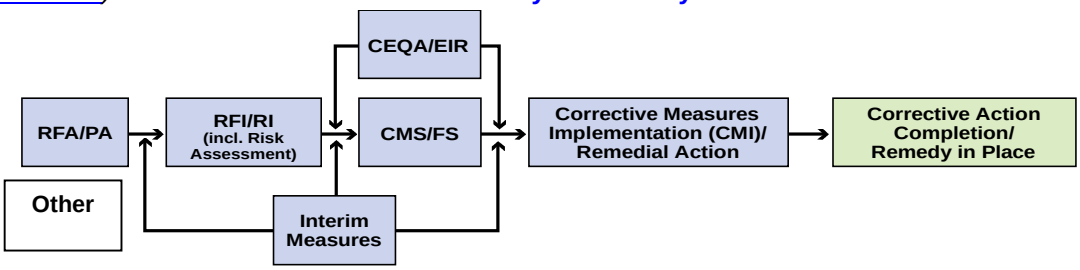
This report was prepared in response to mitigation measure CUL-3.

Other requirements of this information?

None.

Related Reports and Documents:

Click any boxes in the Regulatory Road Map (below) to be linked to the Documents Library on the DTSC Topock Web Site (www.dtsc-topock.com). **The link to the Documents Library is currently UNDER CONSTRUCTION.**



Version 8

Legend
RFA/PA – RCRA Facility Assessment/Preliminary Assessment
RFI/RI – RCRA Facility Investigation/CERCLA Remedial Investigation (including Risk Assessment)
CMS/FS – RCRA Corrective Measure Study/CERCLA Feasibility Study
CEQA/EIR – California Environmental Quality Act/Environmental Impact Report

Imagine the result

Paleontological Resources Management Plan: MMRP CUL-3

Topock Groundwater Remediation Project
San Bernardino County, California, and
Mohave County, Arizona

February 28, 2014

Sherri Gust
Principal Investigator

Paleontological Resources Management Plan

Topock Groundwater Remediation Project
San Bernardino County, California, and
Mohave County, Arizona

Prepared for:
Pacific Gas and Electric Company

Prepared by:
ARCADIS U.S., Inc.
2033 North Main Street
Suite 340
Walnut Creek
California 94596
Tel 925 274 1100
Fax 925 274 1103

Our Ref.:
RC000753.0009

Date:
February 28, 2014

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Acronyms and Abbreviations

AOC	Area of Concern
BLM	Bureau of Land Management
CACA	Corrective Action Consent Agreement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Compressor Station	Topock Compressor Station
DOI	Department of the Interior
DTSC	Department of Toxic Substances Control
EIR	Environmental Impact Report
LACM	Natural History Museum of Los Angeles County, Vertebrate Paleontology Section
LACMIP	Natural History Museum of Los Angeles County, Invertebrate Paleontology Section
MMRP	Mitigation Monitoring and Reporting Program
my	million years
mya	million years ago
PG	Professional Geologist
PFYC	Potential Fossil Yield Classification
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
SBCM	San Bernardino County Museum
SWMU	Solid Waste Management Unit

UCMP	University of California Museum of Paleontology
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator

1. Executive Summary

This Paleontological Resources Management Plan is being prepared as required by the Mitigation Monitoring and Reporting Program (MMRP) document for the Topock Remediation Project at the for Pacific Gas & Electric (PG&E) Topock Compressor Station. The following protocol describes the paleontological evaluation and survey results and provides protocols for PG&E and their subcontractors during construction. PG&E is implementing the selected groundwater remedy for chromium in groundwater at the Topock Compressor Station, which is located within eastern San Bernardino County, California, and western Mohave County, Arizona.

There is both public and private land ownership in the project area. Substantial portions are owned by the BLM or managed by the BLM on behalf of the Bureau of Reclamation. A portion of the project area also includes the Havasu National Wildlife Refuge, which is administered by the USFWS. No BLM paleontology permit and fieldwork authorization will be required for any paleontological fieldwork in these areas due to the CERCLA exemption.

Substrate beneath the PG&E Topock Compressor Station is mapped as Holocene alluvium of sand, river, lake, and floodplain deposits; Pleistocene Chemehuevi Formation and Pleistocene older alluvium; Pliocene Bouse Formation; Miocene fanglomerate; Cretaceous or Jurassic Whale Mountains quartz monzonites; and Precambrian igneous and metamorphic rocks. Paleontological records searches were conducted by the Natural History Museum of Los Angeles County, the San Bernardino County Museum, in online databases, and in the literature. Within the project area near locations proposed for new wells, the San Bernardino County Museum reported collecting unidentified mollusk shell fragments in the Chemehuevi Formation. Pleistocene and Pliocene localities near the groundwater project in Topock/Golden Shores and upriver at Needles have produced fossils.

Geological setting and fossil localities were considered in determining paleontological sensitivity according to the Potential Fossil Yield Criteria (PFYC). No deposits within the facility boundaries have consistently produced abundant fossils and thus, none is ranked 4 (High) or 5 (Very High). In addition, a large percentage of the project area is known to have disturbed surface sediments. Both the Chemehuevi Formation and the Bouse Formation are known to produce vertebrate fossils or scientifically significant nonvertebrate fossils but only as unpredictable scatters or isolates resulting in a ranking of 3a (Moderate and unevenly distributed). The Pleistocene alluvial fan deposits are also ranked as 3a because they are similar to the Chemehuevi Formation but have not been formally described. Types of fossils that may be recovered include Ice Age megafauna such as extinct mammoth, horse, and camel; microvertebrate fossils; invertebrate fossils such as mollusk shells; and trace fossils including root casts and animal burrows. Holocene youngest alluvium, Holocene young alluvium, Holocene dune and river sands, and the Miocene fanglomerate are ranked 2 (Low). The Holocene sediments are too young to contain fossils, and the Miocene fanglomerate is too coarse-grained to contain fossils. Igneous and metamorphic rocks are ranked

1 (Very Low) due to their heat and pressure of formation. This includes the Cretaceous/Jurassic Whale Mountains quartz monzonites, the Early Proterozoic gneiss, and the Precambrian igneous and metamorphic rocks.

Site specific geologic information from available borehole data was reviewed from the existing well network on site. It is anticipated that trenching would be all within recent alluvium. Deeper excavations for the groundwater remediation project are limited to exploratory boreholes and extraction and injection wells to depths of up to 400 feet with diameters of approximately 42 inches.

A paleontological reconnaissance survey was conducted on July 25, 2012. Only areas ranked PFYC 3a were considered for survey and previously disturbed areas were not included. No fossils were observed during the reconnaissance survey, however, sediments with the potential to contain fossils were observed within the proposed impact area. Of the sediments observed, the fine grained deposits of the Chemehuevi Formation sands/Pleistocene older alluvium and the sediments of the Bouse Formation have the highest potential for fossil resources.

The potential to impact any fossils varies with depth of impacts, previous disturbance and presence of non-fossiliferous sediments. Shallow grading and shallow trenching are unlikely to impact any fossils in areas mapped as Holocene alluvium as the surface sediments are too young to contain fossils. Drilling may impact older sediments that might contain fossils. Generally the potential to recover fossils that meet significance criteria will be unlikely since the specimens will not be associated with necessary contextual information such as formation of origin, depth and exact location.

Only the Chemehuevi Formation sands/Pleistocene older alluvium and the Bouse Formation appear to have potential to produce fossils. No portion of the proposed groundwater remediation project will impact Bouse Formation sediments. Trenching for the groundwater remediation project to the proposed depth of nine feet appears to be entirely in Holocene alluvium (not in the Pleistocene older alluvium) without potential for fossils. Therefore, no paleontological monitoring is required during construction for the proposed groundwater remediation project. All borings, regardless of depth, have a low potential to produce fossils meeting significance criteria. It is recommended that paleontological awareness training be completed by all personnel so they will understand the procedures to follow in the event of a find. PG&E recommends that a paleontologist should be on call to respond in the unlikely event that fossils are encountered during construction so that they may be evaluated to determine whether they meet significance criteria.

2. Introduction

The protocols presented in this document have been developed in accordance with the Mitigation Monitoring and Reporting Program (MMRP) for the Topock Remediation Project. MMRP CUL-3 requires that a paleontological investigation, including a detailed survey, be completed for the area. The following protocol describes the paleontological evaluation and survey results and provides protocols for Pacific Gas & Electric (PG&E) and their subcontractors during construction.

The project will provide for compliance with the MMRP by PG&E and all subcontractors during the construction, operations and maintenance, and decommissioning phases, specifically with mitigation measures CUL-3 (Department of Toxic Substances Control [DTSC] 2011):

> ***A paleontological investigation, including a detailed survey of the project area by a qualified paleontologist, shall be conducted to refine the potential impacts on unique paleontological resources within the final design area and determine whether preconstruction recovery of sensitive resources and/or construction monitoring would be warranted. If construction monitoring is determined to be warranted, ground-altering activity would be monitored by a qualified paleontologist to assess, document, and recover unique fossils. Monitoring shall include the inspection of exposed surfaces and microscopic examination of matrix in potential fossil bearing formations. In the event microfossils are discovered, the monitor shall collect matrix for processing. In the event paleontological resources are encountered during earthmoving activities, recovered specimens shall be prepared by the paleontologist to a point of identification and permanent preservation. PG&E shall retain a Qualified Paleontologist to observe ground-disturbing activities where determined necessary based on the results of the paleontological investigation and shall be required to request the participation of tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction.***
>
> ***Paleontological resources of scientific value shall be identified and curated into an established, accredited, professional museum repository in the region with permanent retrievable paleontological storage. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation.***

See Final Environmental Impact Report (EIR) at 4.4-72. The paleontological investigation under Mitigation Measure CUL-3 is to be implemented before construction activities begin. If deemed necessary, monitoring of ground-disturbing activities in areas that could contain unique paleontological resources would be conducted during construction. Under Comprehensive Environmental Response, Compensation, and

Liability Act (CERCLA), the selected groundwater remedy and other site activities must also comply with the substantive requirements of all Applicable or Relevant and Appropriate Requirements (ARARs).

3. Background

This Paleontological Resources Management Plan is being prepared as required by the MMRP document for the Topock Remediation Project at the PG&E Topock Compressor Station, which is located within eastern San Bernardino County, California, and western Mohave County, Arizona (Figure 1).

The Colorado River runs through the eastern portion of the facility property and also forms a portion of its northern border. The project area is situated within Sections 5, 6, 8, and 9 of Township 7 North and Range 24 East of the Topock and Whale Mountain United States Geological Survey (USGS) 7.5-minute quadrangles, San Bernardino Base and Meridian (Figure 2). The total Groundwater Remediation project area is 779.2 acres (DTSC 2011).

Figure 1. Project Vicinity

3.1 Project Description

PG&E is implementing the selected groundwater remedy for chromium in groundwater at the Topock Compressor Station (the Compressor Station) in San Bernardino County, California. The existing chromium contamination in groundwater near the Compressor Station is largely attributable to the historical wastewater discharge from Compressor Station operations to Bat Cave Wash, designated as Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1, and within the East Ravine, designated as AOC 10, and within the East Ravine, designated as AOC 10 (CH2M Hill, 2012).

Remedial activities at the Topock site are being performed in conformance with the requirements of the Resource Conservation and Recovery Act (RCRA) Corrective Action pursuant to a Corrective Action Consent Agreement (CACA) entered into by PG&E and the California Department of Toxic Substances Control (DTSC) in 1996, as well as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) pursuant to the Administrative Consent Agreement entered into between PG&E and the federal agencies (U.S. Department of the Interior [DOI], Bureaus of Land Management [BLM] and Reclamation [Reclamation] and the United States Fish and Wildlife Service [USFWS]) in 2005. A Record of Decision was issued by the United States Department of Interior under CERCLA in Jan. 2011 and DTSC's remedy decision letter to PG&E dated January 31, 2011 approved the groundwater remedy consistent with applicable state and federal law.

There is both public and private land ownership in the project area. Substantial portions are owned by the BLM or managed by the BLM on behalf of the Bureau of Reclamation. A portion of the project area also includes the Havasu National Wildlife Refuge, which is administered by the USFWS. No BLM paleontology permit and fieldwork authorization will be required for any paleontological fieldwork in these areas due to the CERCLA exemption.

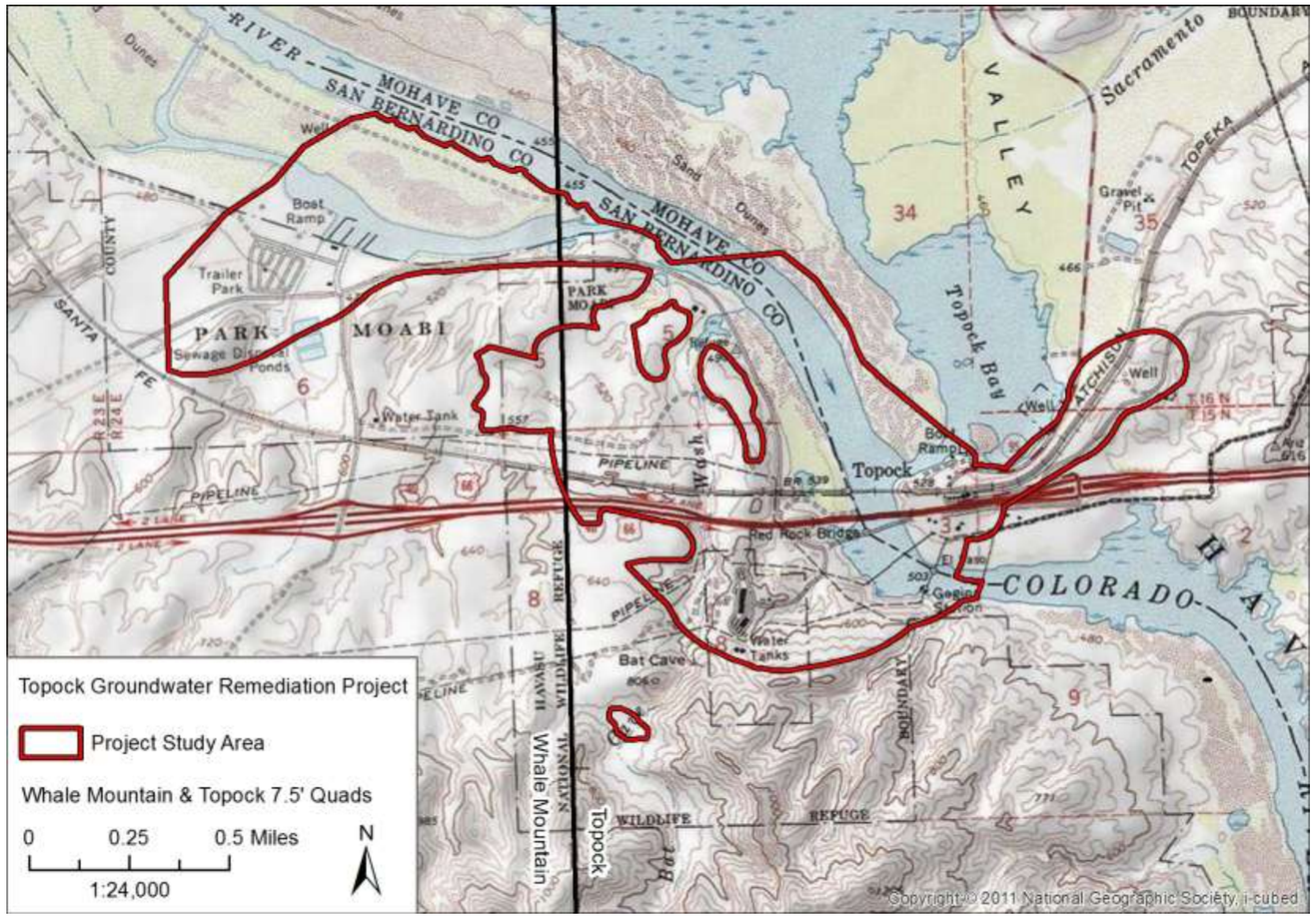


Figure 2. Topock Remediation Project Map

3.2 Project Personnel

Cogstone Resource Management Inc. prepared this report. Cogstone holds California Statewide BLM Paleontology permit CA-10-00-004P. The permit names Sherri Gust as Principal Investigator and Kim Scott as Field Director.

Sherri Gust served as the Principal Investigator for the project, wrote the management plan, and edited the report. Gust is an associate of the Vertebrate Paleontology and Rancho La Brea sections of the Natural History Museum of Los Angeles County. She has an M.S. in Anatomy (Evolutionary Morphology) from the University of Southern California, a B.S. in Anthropology from the University of California, Davis, and over 30 years of experience.

Kim Scott conducted the research and literature review and field survey. She wrote the background and survey results. Scott has a B.S. in Geology with an emphasis in Paleontology from the University of California, Los Angeles, as well as an M.S. in Biology from California State University San Bernardino and over 18 years of experience in California paleontology and geology. Todd Wirths reviewed the bore logs. Wirths is a Professional Geologist (PG) 7588 and has a M.S. in Geology from San Diego State University. He has more than 15 years of experience as a geologist and over two as a paleontologist. Courtney Richards prepared portions of this report. She has a M.S. in Biological Sciences with an emphasis in Paleontology from Marshall University.

Molly Valasik prepared the maps for the report. Valasik has an M.A. in Anthropology from Kent State University in Ohio and experience in Southern California archaeology with cross training in paleontology.

4. Regulatory Environment

The selected remedy is being conducted under the authority of CERCLA Section 104 and is therefore exempt from obtaining federal, state, or local permits or complying with other administrative requirements, pursuant to CERCLA Section 121(e). However, PG&E will comply with the substantive requirements of all applicable laws.

4.1 Federal Potential Fossil Yield Classification System

The federal Potential Fossil Yield Classification (PFYC) system was developed by the U.S. Forest Service and refined by the BLM (2007). Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used to assess the potential for the occurrence of paleontological resources.

Using the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. This classification is applied to the geologic formation, member, or other distinguishable unit, preferably at the most detailed mappable level. It is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions.

The descriptions for the classes listed below are written to serve as guidelines rather than as strict definitions. Knowledge of the geology and conditions for preservation, and hence, the paleontological potential for individual units should be considered when determining the appropriate class assignment. Assignments are best made by collaboration between land managers and knowledgeable researchers.

Class 1 Very Low. Geologic units that are not likely to contain recognizable fossil remains.

- Units that are igneous or metamorphic, excluding reworked volcanic ash units.
- Units that are Precambrian in age or older.

(1) Management concern for paleontological resources in Class 1 units is usually negligible or not applicable. (2) Assessment or mitigation is usually unnecessary except in very rare or isolated circumstances.

The probability for impacting any fossils is negligible. Assessment or mitigation of paleontological resources is usually unnecessary. The occurrence of significant fossils is nonexistent or extremely rare.

Class 2 Low. Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.

- Vertebrate or significant invertebrate or plant fossils not present or very rare.
- Units that are generally younger than 10,000 years before present.
- Recent aeolian deposits.
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

(1) Management concern for paleontological resources is generally low. (2) Assessment or mitigation is usually unnecessary except in rare or isolated circumstances.

The probability for impacting vertebrate fossils or scientifically significant invertebrate or plant fossils is low. Assessment or mitigation of paleontological resources is not likely to be necessary. Localities containing important resources may exist, but would be rare and would not influence the classification. These important localities would be managed on a case-by-case basis.

Class 3 Moderate or Unknown. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.

- Often marine in origin with sporadic known occurrences of vertebrate fossils.
- Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low.
- Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.

Class 3a Moderate Potential. Units are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils

may be found in the area, and opportunities may exist for hobby collecting. The potential for a project to be sited on or to impact a significant fossil locality is low, but is somewhat higher for common fossils.

Class 3b Unknown Potential. Units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this Class may eventually be placed in another Class when sufficient survey and research is performed. The unknown potential of the units in this Class should be carefully considered when developing any mitigation or management actions.

(1) Management concern for paleontological resources is moderate; or cannot be determined from existing data. (2) Surface-disturbing activities may require field assessment to determine appropriate course of action.

This classification includes a broad range of paleontological potential. It includes geologic units of unknown potential, as well as units of moderate or infrequent occurrence of significant fossils. Management considerations cover a broad range of options as well, and could include pre-disturbance surveys, monitoring, or avoidance. Surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources. These units may contain areas that would be appropriate to designate as hobby collection areas due to the higher occurrence of common fossils and a lower concern about affecting significant paleontological resources.

Class 4 High. Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface-disturbing activities may adversely affect paleontological resources in many cases.

Class 4a. Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than 2 acres. Paleontological resources may be susceptible to adverse impacts from surface-disturbing actions. Illegal collecting activities may impact some areas.

Class 4b. These are areas underlain by geologic units with high potential but have lowered risk of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.

- Areas of exposed outcrop are smaller than 2 contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

(1) Management concern for paleontological resources in Class 4 is moderate to high, depending on the proposed action. (2) A field survey by a qualified paleontologist is often needed to assess local conditions. (3) Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered. (4) Class 4 and Class 5 units may be combined as Class 5 for broad applications, such as planning efforts or preliminary assessments, when geologic mapping at an appropriate scale is not available. Resource assessment, mitigation, and other management considerations are similar at this level of analysis, and impacts and alternatives can be addressed at a level appropriate to the application.

The probability for impacting significant paleontological resources is moderate to high, and is dependent on the proposed action. Mitigation considerations must include assessment of the disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access resulting in greater looting potential. If impacts to significant fossils can be anticipated, on-the-ground surveys before authorizing surface-disturbing actions will usually be necessary. On-site monitoring or spot-checking may be necessary during construction.

Class 5 Very High. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

Class 5a. Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than 2 contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface-disturbing actions. Unit is frequently the focus of illegal collecting activities.

Class 5b. These are areas underlain by geologic units with very high potential but have lowered risk of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures limited or not expected to be impacted.

- Areas of exposed outcrop smaller than 2 contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics that lower the vulnerability of both known and unidentified paleontological resources.

(1) Management concern for paleontological resources in Class 5 areas is high to very high. (2) A field survey by a qualified paleontologist is usually necessary prior to surface-disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions. (3) Official designation of areas of avoidance, special interest, and concern may be appropriate.

The probability for impacting significant fossils is high. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. On-the-ground surveys will usually be necessary before authorizing any surface-disturbing activities. Onsite monitoring may be necessary during construction (BLM 2007).

5. Background

5.1 Regional Setting

The physiographical, geological, and ecological zones represented in the project area are best described as the mountains and alluvial valleys of the eastern Mojave Desert Geomorphic Province. Local extension has created subparallel, fault-bounded mountains with steeply climbing western slopes and shallowly dipping eastern slopes throughout the eastern Mojave Desert. These north-south trending ranges are interrupted by valleys with internal drainage systems, resulting in the formation of lakes during Ice Ages and playas during interglacials (Wagner 2002). The Colorado River formed along the California-Arizona corridor from a series of naturally dammed lakes that filled and failed sequentially starting approximately 6 million years ago (Spencer and Pearthree 2001, 2005).

5.2 Stratigraphy

Substrate beneath the PG&E Topock Compressor Station is mapped as Holocene alluvium of sand, river, lake, and floodplain deposits; Pleistocene Chemehuevi Formation and Pleistocene older alluvium; Pliocene Bouse Formation; Miocene fanglomerate; Cretaceous or Jurassic Whale Mountains quartz monzonites; and Precambrian igneous and metamorphic rocks (Table 1, Figure 3; Bishop 1963; Howard et al. 1997; John 1987; Stone and Howard 1979; Wilson et al. 1959).

5.2.1 Holocene Deposits

Holocene alluvial deposits (Qal, Qs, Qya) include silts, sands, and conglomerates exist in the form of drainage fill, alluvial fans, and dunes (Figure 3; Bishop 1963; Howard et al. 1997; John 1987; Stone and Howard 1979; Wilson et al. 1959). The character of river deposits (Qal) differs depending on stream flow energy and distance from the source. In the Colorado River area, river deposits consist of poorly to moderately sorted sands and gravels having angular to subangular clasts composed of igneous and metamorphic rock (Howard et al. 1997).

The younger alluvial fan deposits (Qya) cap older deposits. Sediments consist of poorly to moderately sorted, undissected sands and gravels composed of angular to subangular, igneous and metamorphic clasts (Howard et al. 1997). Windblown dune sands (Qs) are typically well-sorted, fine to medium-grained sand.

Table 1. Geological Deposits in Chronological Order

Era	Period	Time (million years ago [mya])	Epoch	Project Geologic Deposit
Cenozoic	Quaternary	< 0.01	Holocene	Holocene alluvium and sands (Qal, Qya, Qs)
		2.60	Pleistocene	Chemehuevi Formation (Qrg, Qrs, Qc)
	Tertiary	5.30	Pliocene	Bouse Formation (Tb)
		23.00	Miocene	Miocene fanglomerate (Tf)
		33.90	Oligocene	
		55.80	Eocene	
		65.50	Paleocene	
Mesozoic	Cretaceous	145.50		Cretaceous or Jurassic Whale Mountains quartz monzonites (KJqm, KJqd)
	Jurassic	199.60		
	Triassic	251.00		
Paleozoic	Permian	299.00		
	Carboniferous	359.20		
	Devonian	416.00		
	Silurian	443.70		
	Ordovician	488.30		
	Cambrian	542.00		
Precambrian		2500.00		Early Proterozoic gneiss (p€g), Precambrian igneous and metamorphic rocks (p€c)

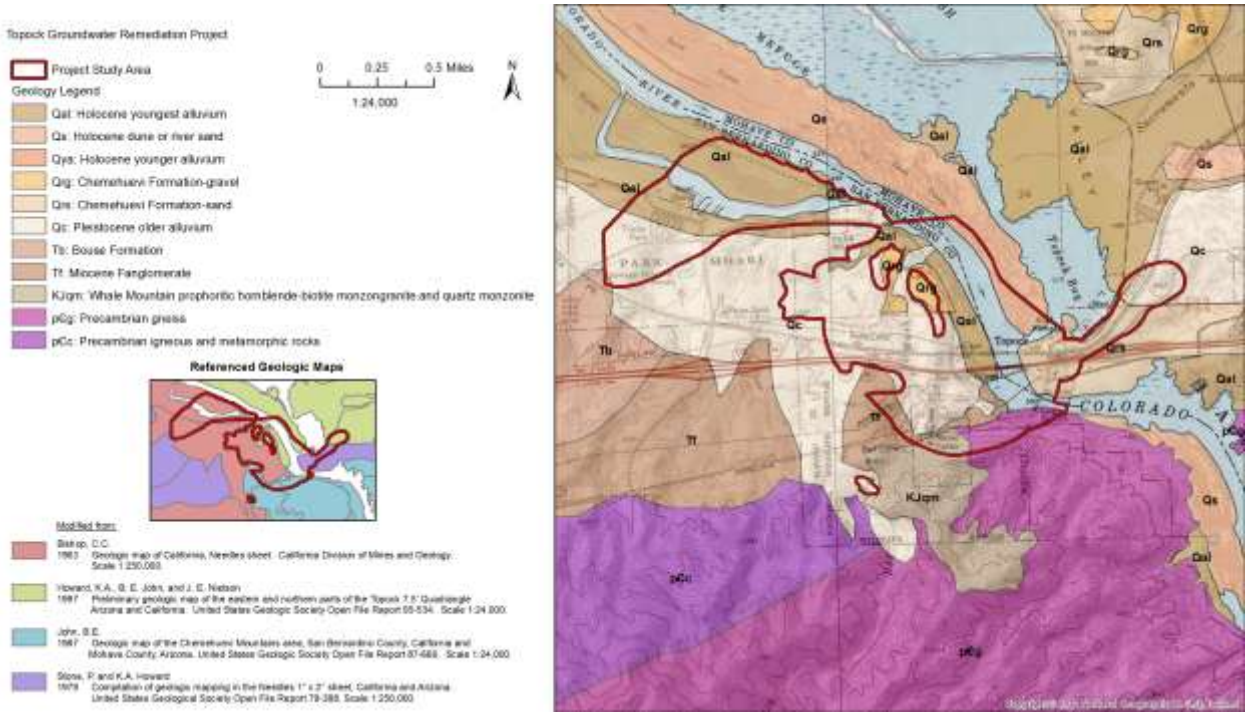


Figure 3. Geology of the Remediation Project Area

5.2.2 Pleistocene to Pliocene Deposits

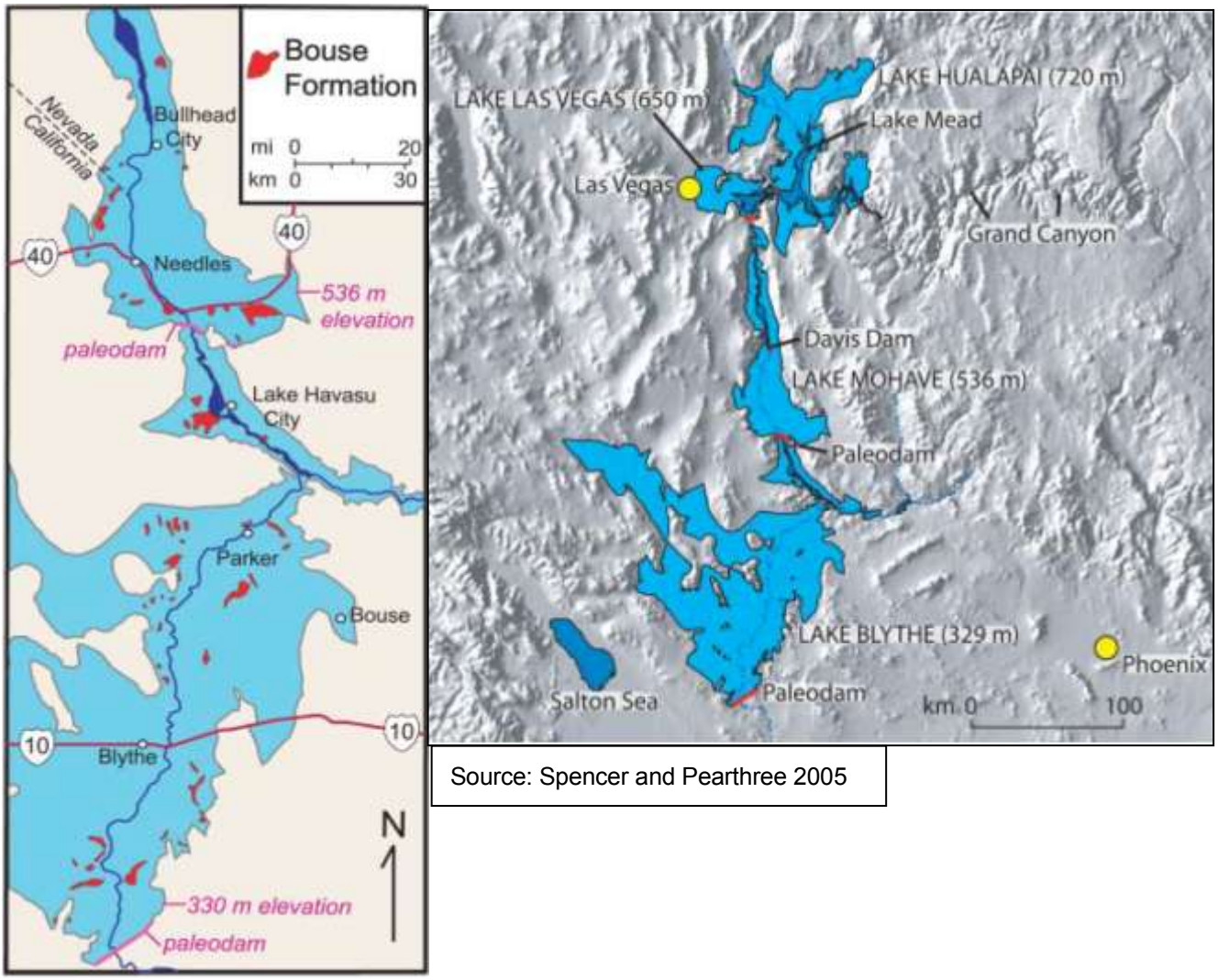
The Pleistocene Chemehuevi Formation (Qrg, Qrs, Qc) and the earliest Pliocene to latest Miocene Bouse Formation (Tb) (Howard et al. 1997; John 1987; and Stone and Howard 1979) occur on the project. At Topock, Golden Shores, and in Needles, the Chemehuevi Formation and Bouse Formation have produced mammoth (*Mammuthus meridionalis, Mammuthus* sp.; Agenbroad et al. 1992; Howard et al. 1997), mollusks, animal burrows, and plant remains (Scott 2010).

Ancestral Colorado River deposits include the Pleistocene (11,000 years to 2.6 million years [my]) Chemehuevi Formation, described by some geologists as alluvial fan deposits, and the Pliocene (5 to 2.6 my) Bouse Formation. Sediments of the Chemehuevi Formation consist of about 800 feet of sands and gravels from the ancestral Colorado River that forms terraces along the river valleys. These are capped by a 4-million-year-old volcanic ash (Spencer and Pearthree 2005). Chemehuevi Formation gravels (Qrg) are interbedded with Chemehuevi Formation sands (Qrs). The Chemehuevi Formation gravels consist of well sorted sands and gravels composed of well-rounded clasts of limestone, quartzite, and chert, much of which is derived as erosional debris from the Colorado Plateau. Locally derived clasts of gneiss and volcanic rocks are also present and include boulders up to 3 feet in diameter (Howard et al. 1997). The Chemehuevi

Formation sands (Qrs) consist of pink to tan, weakly to moderately indurated clays, silts, and sands interbedded with well-sorted, well-rounded pebble conglomerates. Near Topock, Arizona, this unit contains charcoal and root casts (Howard et al. 1997).

The Pleistocene older alluvial fan deposits (Qc) are up to tens of meters thick, and consists of poorly sorted sands to boulder conglomerates, and is dissected by younger stream channels. The Pleistocene fan deposits can be distinguished from similar Holocene deposits by the Pleistocene fans' deep dissection, varnishing, terracing, thickness, and presence of clasts of basalt from the Black Mountains and gneiss from the Hualapai Mountains (Howard et al. 1997).

The Bouse Formation (Tb) of Pliocene (2.6 to 5.3 my) to Miocene (5.3 to 23.3 my) age occurs at the base of the Colorado River deposits. This 10- to 250-foot-thick, green to tan to pinkish, limey claystone to siltstone contains green nodules and yellowish-brown to white concretions (Howard et al. 1997; Spencer and Pearthree 2005). The unit was deposited as a result of a series of overspilling lakes that drained into the Salton Trough about 5.3 million years ago (Figure 4; Spencer and Pearthree 2005). The Bouse Formation overlies volcanic ash dated at 5.5 my, placing the age of the formation to be approximately 5.3 to 5.5 million years old, making it earliest Pliocene or latest Miocene in age (Spencer and Pearthree 2005).



Source: Spencer and Pearthree 2005

Figure 4. Map of Paleolakes and Paleodams Associated with Bouse Formation.

5.2.3 Miocene Fanglomerate

Miocene (5.3 to 23.0 my) nonmarine deposits within the project area consist of a gneiss-rich fanglomerate (Tf). These are dark-red to brown, poorly sorted alluvial fan deposits having subangular to subrounded clasts of Proterozoic gneiss, granite, and amphibolite from the Chemehuevi Mountains (John 1987; Stone and Howard 1979).

5.2.4 Cretaceous or Jurassic Whale Mountain Quartz Monzonites

Two Cretaceous (65.5 to 145.5 my) or Jurassic (145.5 to 299.6 my) granitoid bodies (quartz monzonites) of the Whale Mountain sequence occur within the project area (KJqm and KJqd). KJqm, a porphyritic hornblende-biotite monzogranite and quartz monzonite, is tan to pale-pink, medium- to coarse-grained with feldspar crystals of up to 1.25 inches long. KJqd, a hornblende biotite quartz diorite and quartz monzonite, consists of dark-grey to brown intrusive bodies up to 0.6 mile wide by 2.5 miles long (John 1987).

5.2.5 Precambrian Igneous and Metamorphic Rocks

Two Precambrian (542 my to 4.6 by) units are present in the project area – Early Proterozoic (1.6 to 2.5 by) gneiss (p€g) and Precambrian igneous and metamorphic rocks (p€c) (Bishop 1963; John 1987). The highly metamorphosed rocks (p€g) include augen gneiss, granitic to dioritic gneiss, and several named gneisses (Bishop 1963; John 1987). The Precambrian igneous and metamorphic rocks (p€c) include granite to diorite igneous rocks mixed with gneisses (Bishop 1963). Although Bishop (1963) mapped all these rocks as Precambrian, Bishop states that the gneisses may be younger.

6. Record Search Results

A paleontological records search was conducted in 2010 by the Natural History Museum of Los Angeles County, Vertebrate Paleontology Section (LACM; McLeod 2010) and the San Bernardino County Museum (SBCM) (Scott 2010). Additional searches were conducted in online databases of the Natural History Museum of Los Angeles County, Invertebrate Paleontology Section (LACMIP 2011), in the University of California Museum of Paleontology database (UCMP 2011), and in the literature (Hay 1927; Jefferson 1991a, 1991b).

No localities were reported by LACM or UCMP. Within the project area near locations proposed for new wells, SBCM reports collecting unidentified mollusk shell fragments (Figure 5) on the surface at 600 to 640 feet of elevation in the Chemehuevi Formation (SBCM 1.39.3; Scott 2010). Root casts and animal burrows were also reported by SBCM (SBCM 1.39.1; Scott 2010); however, none were collected or photographed. No additional fossils have been reported from Topock since the SBCM survey. Pleistocene and Pliocene localities near the groundwater project in Topock/Golden Shores and upriver at Needles have produced fossils (Table 2).

Figure 5. Mollusk Shell Fragments (photo courtesy of Eric Scott, SBCM)

Table 2. Pleistocene and Pliocene fossil localities near project area (no locality numbers assigned)

Common name, element	Taxon	Location; Institution	Reference	Figure
Mammoth, nearly complete skeleton	*Mammuthus meridionalis* or *imperator*	Golden Shores, AZ, elev. 645'; Northern Arizona University	Agenbroad et al. 1992	6
Mammoth, humerus, distal end	*Mammuthus* sp.	Needles, CA; Needles Museum	Agenbroad et al. 1992	7
Horse, molar, upper	*Equus* sp.	Needles, CA; Needles Museum	this report	8, 9
Bison, molar, lower, third	*Bison* sp.	Needles, CA; Needles Museum	this report	8, 9
Camel, vertebrae, partial	*Camelops* sp.	Needles, CA; Needles Museum	this report	10

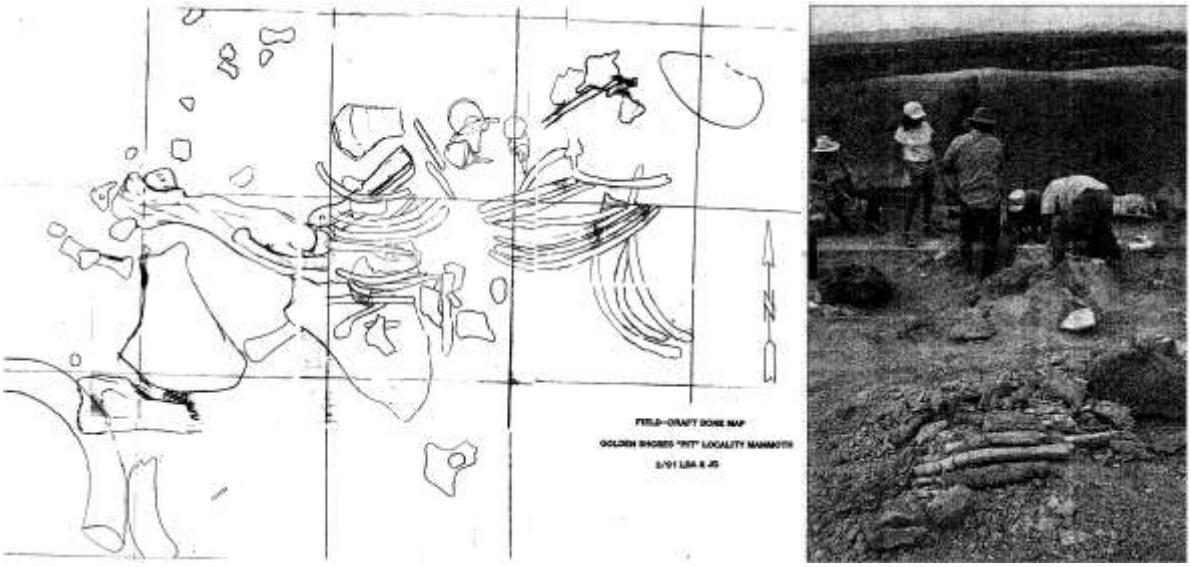


Figure 6. Field map and recovery of Golden Shores mammoth skeleton

Figure 7. Mammoth, humerus, distal end (elbow articulation)

Figure 8. Horse, upper molar tooth, and Bison, lower third molar, occlusal view

Figure 9. Horse, upper molar tooth, and Bison, lower third molar, lateral view

Figure 10. Camel, vertebrae

Kim Scott of Cogstone relocated the SBCM localities during the field survey, visited the Needles Museum to view the fossils held there, and visited the site of the Golden Shores mammoth with George Shannon of BLM. Additional information learned modifies the previous locality information, as discussed below.

A locality discovered by SBCM in 1991 was relocated during the survey. SBCM collected the specimens during their survey but provided Cogstone with exact coordinates to allow the locality to be re-located for evaluation. The SBCM 1.39.3 locality produced a specimen was a fragment of mollusk that was mapped in a channel to the north of a pipeline.

The Golden Shores mammoth, reported by Agenbroad et al. (1992) as being in the Bouse or Chemehuevi Formation, was actually in Chemehuevi/Pleistocene older alluvium sands as verified by a visit to the locality. Specimens from the Needles Museum that were reported by Agenbroad as being in the Chemehuevi Formation were actually found at the Golden Shore gravel quarry and no exact location information is known (Needles Museum Vice-President Corrine Moore, personal communication 2012). All of the specimens were donated by local citizens who found them. In addition to mammoth, fossils of camel, bison and horse are also known. These specimens were identified by Sherri Gust from photographs taken by Kim Scott during her visit.

7. Paleontological Sensitivity Analysis

Geological setting and fossil localities were considered in determining paleontological sensitivity according to PFYC criteria (Table 3, Figure 11). No deposits within the facility boundaries have consistently produced abundant fossils and thus, none is ranked 4 (High) or 5 (Very High). In addition, a large percentage of the project area is known to have disturbed surface sediments (Figure 12). Disturbed areas in this context means those areas outside of documented archaeological site boundaries that have experienced ground disturbance in the last 50 years.

Both the Chemehuevi Formation (Qrg, Qrs) and the Bouse Formation (Tb) are known to produce vertebrate fossils or scientifically significant nonvertebrate fossils but only as unpredictable scatters or isolates resulting in a ranking of 3a (Moderate and unevenly distributed). The Pleistocene alluvial fan deposits (Qc), as mentioned above, is also ranked as 3a because they are essentially similar to the Chemehuevi Formation but have not been formally described. Types of fossils that may be recovered include Ice Age megafauna such as extinct mammoth, horse, and camel; microvertebrate fossils; invertebrate fossils such as mollusk shells; and trace fossils including root casts and animal burrows (Scott 2010). Holocene youngest alluvium (Qal), Holocene young alluvium (Qya), Holocene dune and river sands (Qs), and the Miocene fanglomerate (Tf) are ranked 2 (Low). The Holocene sediments are too young to contain fossils, and the Miocene fanglomerate is too coarse-grained to contain fossils.

Igneous and metamorphic rocks are ranked 1 (Very Low) due to their heat and pressure of formation. This includes the Cretaceous/Jurassic Whale Mountains quartz monzonites (KJqm, KJqd), the Early Proterozoic gneiss (p€g), and the Precambrian igneous and metamorphic rocks (p€c).

Table 3. Potential Fossil Yield of Topock Geological Deposits

Geologic Deposit	PFYC Ranking			
	3a (Moderate with uneven distribution)	3b (Unknown with undemonstrated yield)	2 (Low)	1 (Very Low)
Holocene alluvium and sands (Qal, Qya, Qs)			x	
Chemehuevi Fm. (Qrg, Qrs, Qc)	x			
Bouse Fm. (Tb)	x			
Miocene fanglomerate (Tf)			x	
Cretaceous or Jurassic Whale Mountains quartz monzonites (KJqm, KJqd)				x
Early Proterozoic gneiss (p€g)				x

Geologic Deposit	PFYC Ranking			
	3a (Moderate with uneven distribution)	3b (Unknown with undemonstrated yield)	2 (Low)	1 (Very Low)
Precambrian igneous and metamorphic rocks (p€c)				x

Topock Project

- Project Study Area
- US Bureau of Land Management

Yield Classification (PFYC)

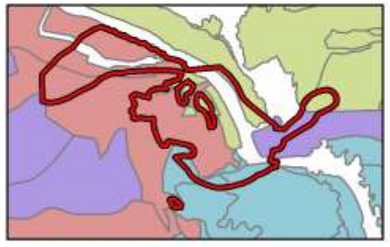
- 1 Very Low to none
- 2 Low Potential
- 3b Undemonstrated
- 3a Moderate
- 4b High- Unexposed
- 4a High- Exposed
- 5b Very High- Unexposed
- 5a Very High -Exposed

0 0.15 0.3 Miles

1:15,000

N

Referenced Geologic Maps



Modified from:

Bishop, C.C.
1963 Geologic map of California, Needles sheet. California Division of Mines and Geology. Scale 1:250,000.

Howard, K.A., B. E. John, and J. E. Nielson
1997 Preliminary geologic map of the eastern and northern parts of the Topock 7.5' Quadrangle Arizona and California. United States Geologic Society Open File Report 95-534. Scale 1:24,000.

John, B.E.
1987 Geologic map of the Chemehuevi Mountains area, San Bernardino County, California and Mohave County, Arizona. United States Geologic Society Open File Report 87-666. Scale 1:24,000.

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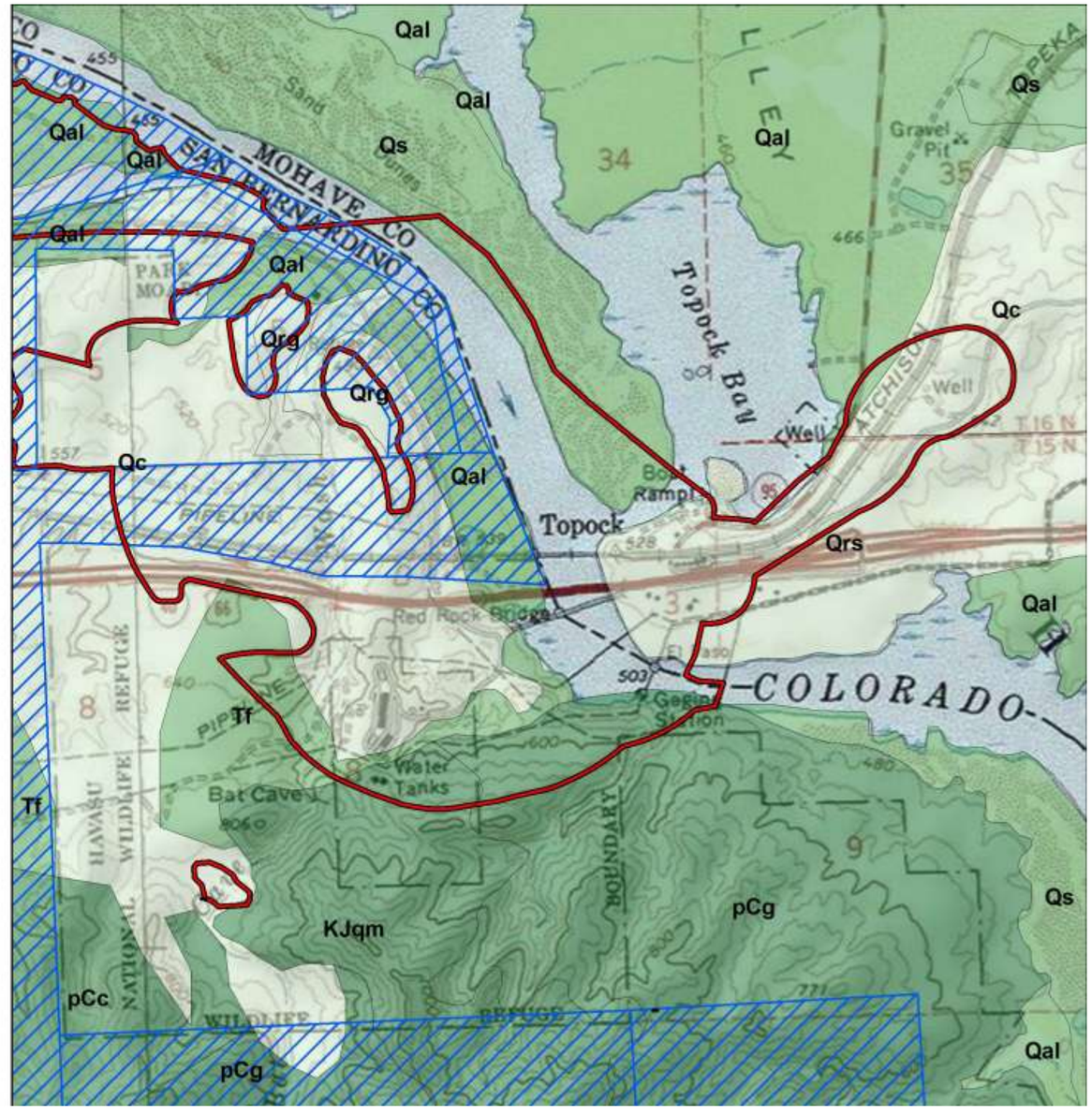

Figure 11. Remediation Project Paleontological Sensitivity Map

Topock Groundwater Remediation Project

Project Study Area

Yield Classification (PFYC)

- 1 Very Low to none
- 2 Low Potential
- 3b Undemonstrated
- 3a Moderate
- 4b High- Unexposed
- 4a High- Exposed
- 5b Very High- Unexposed
- 5a Very High -Exposed

Level of Disturbance of Areas with Moderate or Higher Fossil Potential

- Undisturbed
- Active Wash Channel
- Mechanical Soil Surface Damage

Information on extent and nature of disturbance provided by CH2M Hill

0 0.25 0.5 Miles

1:24,000

N

Referenced Geologic Maps

Modified from:

Bishop, C.C.
1963 Geologic map of California, Needles sheet. California Division of Mines and Geology. Scale 1:250,000.

Howard, K.A., B. E. John, and J. E. Nielson
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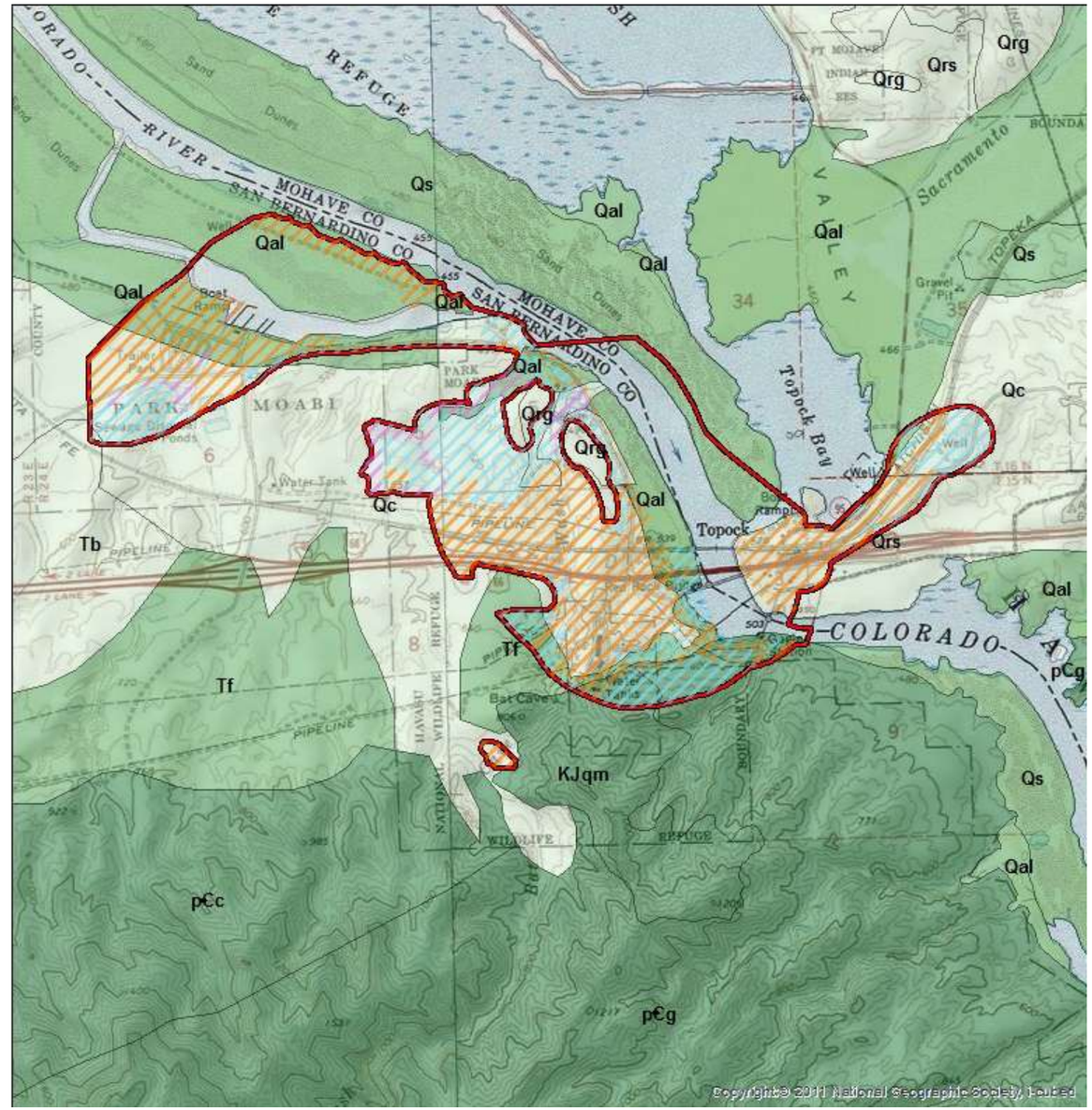

Figure 12. Project Surface Disturbance Map

8. Field Indicators

8.1 Borings Logs

Site specific geologic information from available borehole data was reviewed from the existing well network on site. The groundwater project remedy map was overlain onto the borehole location map and the project was divided into quadrants (Figure 13). Utilizing only those borehole locations near groundwater remediation impact areas, limited information resulted due to generic interpretations by the soil scientists who prepared the boring logs. For example, in the southwest quadrant a contact was reported between the recent and older alluvium at 10.5-12 feet and between Quaternary alluvium and Miocene sediments at 85 feet. In the southeast quadrant the Miocene contact is reported at 11 feet in one borehole and between 80-103 feet in others. No contacts are reported for the northwest quadrant until Miocene bedrock is encountered at 200 feet. In the northeast quadrant the contact between the recent and Quaternary alluvium is reported at 23-45 feet and the Miocene contact at 65-13 feet.

The dynamic fluvial environment of the project area probably accounts for these variations but a recent geo-archaeological study should define the stratigraphy in a manner more useful for paleontology. Currently, it appears that recent alluvium is widely present in all quadrants at depths of 10-25 feet. Metzger et al. (1973) estimated the depth of Holocene deposition in the Colorado River channel to be between 130 and 260 feet in the Parker area. Resistivity studies undertaken by CH2M Hill (2012) indicate that the thickness of fluvial sediments in wells near the Topock site indicate up to 150 feet of Holocene sediment above the older Tertiary alluvium, which is consistent with Metzger's observations near Parker (Metzger et al. 1973). Since the trenching for the groundwater remediation project is designed to have a maximum depth of 9 feet, it is anticipated that trenching would be all within recent alluvium. Deeper excavations for the groundwater remediation project are limited to exploratory boreholes and extraction and injection wells to depths of up to 400 feet with diameters of approximately 42 inches.

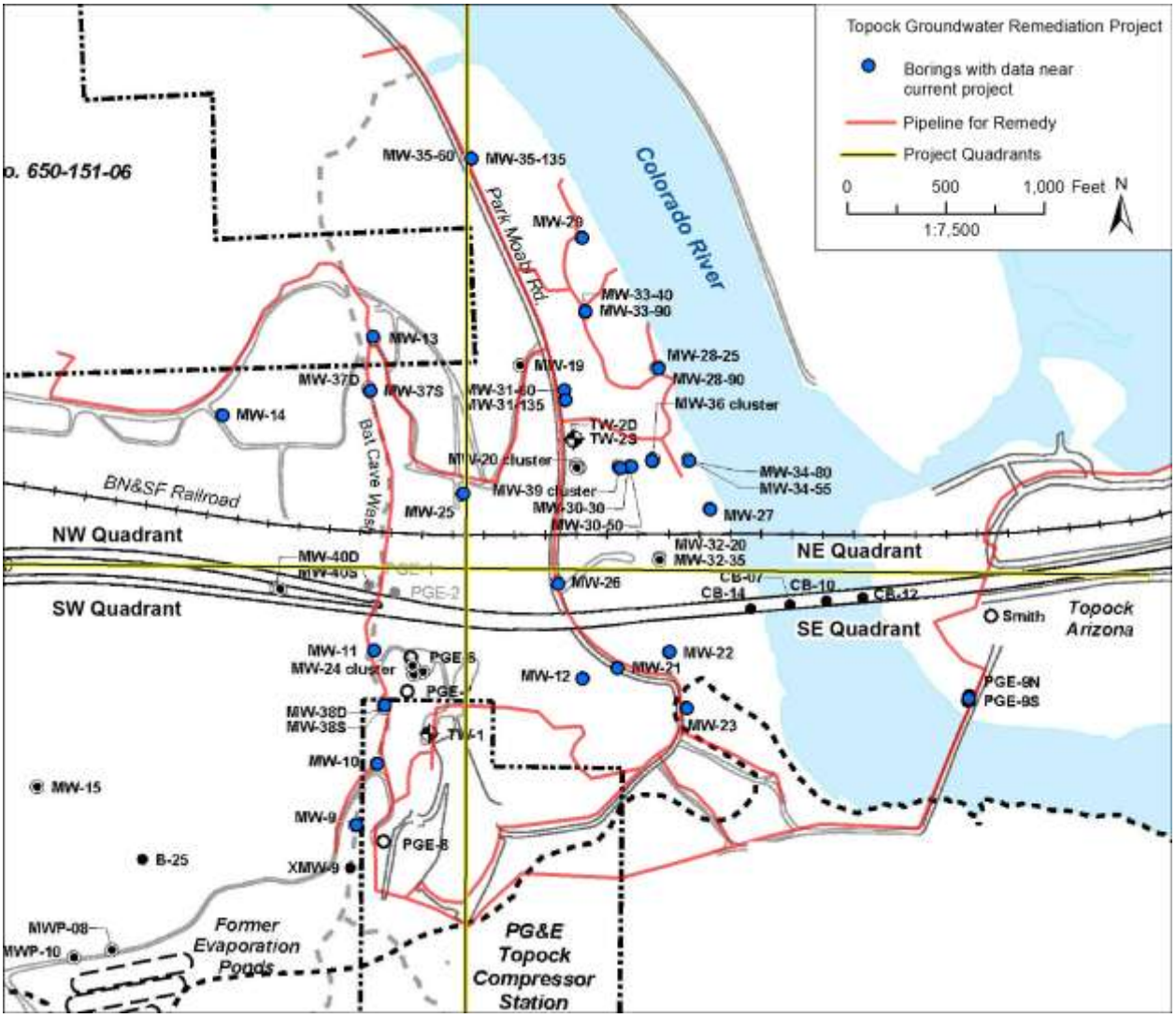

Figure 13. Prior Borings with Logs Available near Project

8.2 Survey

A paleontological reconnaissance survey was conducted on July 25, 2012 by Kim Scott of Cogstone. Only areas ranked PFYC 3a were considered for survey and previously disturbed areas were not included (Figure

14). A windshield survey was used to review the sediments to assess their overall potential. The paleontologist exited the vehicle and implemented pedestrian survey of areas likely to produce fossils. A 2-meter-rod with decimeter intervals of alternating colors was used in many photos for scale.

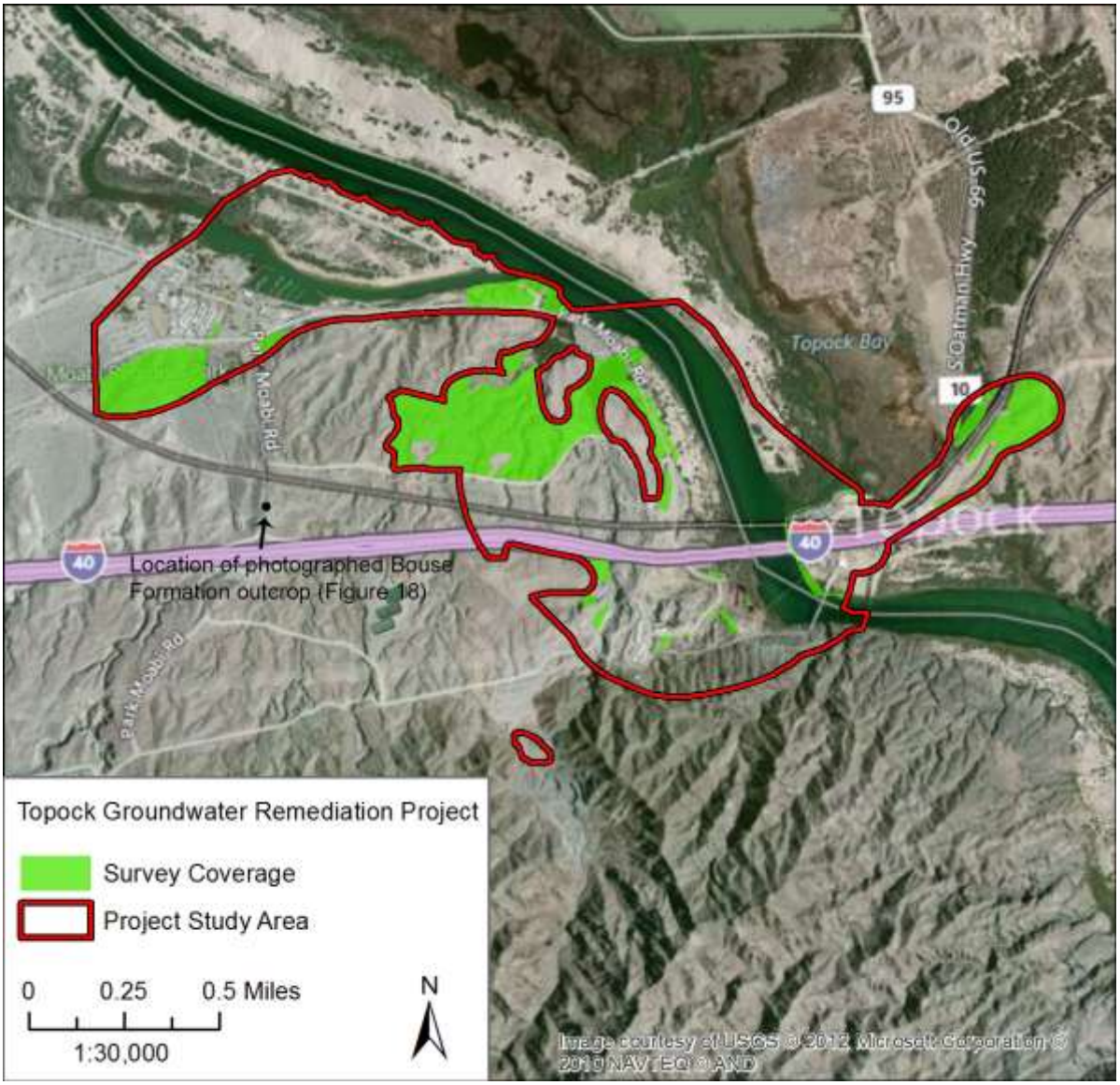

Figure 14. Survey Coverage Map

On the western shore of the Colorado River, the Chemehuevi/Pleistocene older alluvium existed as light pink silts to sands with occasional pebble to cobble channel conglomerates. This was covered by angular to subangular clast supported, pebble to cobble conglomerate of sheet floods and channels from a proximal alluvial fan (Figure 15).

Figure 15. Quaternary Silts and Sands Covered by Cobbles of the Alluvial Fan Deposits

On the eastern shore of the Colorado River, the finer sediments of the Chemehuevi/Pleistocene older alluvium are buff colored and are covered by a more distal alluvial fan of matrix supported, rounded pebbles to cobbles (Figure 16).

Figure 16. Pleistocene Older Alluvium under Cobbles, East Side, Colorado River

The Pleistocene Chemehuevi Formation gravels consist of imbricated, clast supported cobble to boulder conglomerate (Figure 17). No fine-grained sediments were observed in the small portion of these deposits within the project area along Route 66.

Figure 17. Imbricated Cobbles and Boulders of the Chemehuevi Formation Gravels

Only a small section of the Pliocene Bouse Formation is mapped at the surface of the area of potential effect. It is located along Park Moabi Road in the westernmost portion of the project study area (refer to Figure 3). Sediments consisted of greenish silts and sands (Figure 18). The representative photograph of the Bouse Formation (Figure 18) was taken from a road cut along Park Moabi Road just south of the area of potential effect (refer to Figure 14).

Figure 18. Greenish Silts and Sands of the Bouse Formation

Miocene Fanglomerate sediments were mapped in Bat Cave Wash and along the Colorado River. Those along the wash are indurated pebble to cobble conglomerates oxidized to a light pinkish grey (Figure 19a) or more fully oxidized to red along the river (Figure 19b).

Figure 19a. Miocene Fanglomerate along Bat Cave Wash

Figure 19b. Miocene Fanglomerate along the Colorado River

A couple of shallow caves including “Bat Cave” are present in Bat Cave Wash in the Cretaceous or Jurassic Whale Mountains quartz monzonite complex at the south end of the project area. Bat Cave only extended about 15 feet into the canyon wall (Figure 20). Most of the floor had been covered in breccia from a recent

flood in the area. A second “cave” north of Bat Cave in the wash was filled with wood rat midden deposits of unknown age. As no impacts are planned in this area, these wood rat middens were not further investigated. Should impacts be planned in the future, these deposits should be fully investigated.

Figure 20. Bat Cave

No fossils were observed during the reconnaissance survey. While previous SBCM localities were relocated, the specimens had been previously removed. Sediments with the potential to contain fossils were observed within the proposed impact area. Of the sediments observed, the fine grained deposits of the Chemehuevi Formation sands/Pleistocene older alluvium and the sediments of the Bouse Formation have the highest potential for fossil resources.

9. Definition of Significance for Paleontological Resources

Only qualified, trained paleontologists with specific expertise in the type of fossils being evaluated can determine the scientific significance of paleontological resources. Fossils are considered to be significant if one or more of the following criteria apply:

1. The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct;

2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;

3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas;

4. The fossils demonstrate unusual or spectacular circumstances in the history of life; or

5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

As so defined, significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, uncommon, or diagnostically important. Significant fossils can include remains of large to very small aquatic and terrestrial vertebrates or remains of plants and animals previously not represented in certain portions of the stratigraphy. Assemblages of fossils that might aid stratigraphic correlation, particularly those offering data for the interpretation of tectonic events, geomorphologic evolution, and paleoclimatology are also critically important (Scott and Springer 2003, Scott et al. 2004).

PRELIMINARY SIGNIFICANCE EVALUATION

The potential to impact any fossils varies with depth of impacts, previous disturbance and presence of non-fossiliferous sediments. Shallow grading and shallow trenching are unlikely to impact any fossils in areas mapped as Holocene alluvium as the surface sediments are too young to contain fossils. Drilling may impact older sediments that might contain fossils. Generally the potential to recover fossils that meet significance criteria will be unlikely since the specimens will not be associated with necessary contextual information such as formation of origin, depth and exact location.

Unidentifiable fossils will generally not meet significance criteria and should not be collected unless the amount and preservation is sufficient for dating purposes (criteria 5 above). For identifiable fossils, significance will need to be assessed subsequent to recovery but generally single fossils are isolated finds that will not meet significance criteria unless they represent previously unknown species in the area or they provide a useful radiocarbon date that assists with local sedimentary sequencing (criteria 2 and 5 above).

This is because single fossils, such as a left bison tibia, do not have sufficient data potential to evaluate evolutionary relationships, development of biological communities, interaction between paleobotanical and paleozoological biotas, or unusual or spectacular circumstances in the history of life (criteria 1, 3 and 4 above). Associations of whole or partial skeletons of different animals are likely to meet multiple significance criteria.

The above discussion does not include cultural context or significance. Fossils are known in direct association with Holocene human deposits and thus project archaeologists should be aware that fossils may occur in archaeological sites.

10. Management Recommendations

10.1 Grading and Trenching Recommendations

Prior fossil recoveries in the vicinity and field survey indicate that only the Chemehuevi Formation sands/Pleistocene older alluvium and the Bouse Formation appear to have potential to produce fossils. No portion of the proposed groundwater remediation project will impact Bouse Formation sediments. Trenching for the groundwater remediation project to the proposed depth of nine feet appears to be entirely in Holocene alluvium (not in the Pleistocene older alluvium) without potential for fossils (refer to Figure 11). Therefore, no paleontological monitoring is required during construction for the proposed groundwater remediation project. It is recommended that paleontological awareness training (Section 10.4) be completed by all personnel so they will understand the procedures to follow in the event of a find. PG&E recommends that a paleontologist should be on call to respond in the unlikely event that fossils are encountered during construction so that they may be evaluated to determine whether they meet significance criteria.

10.2 Drilling Management Recommendations

All borings, regardless of depth or diameter, have a low potential to produce fossils meeting significance criteria since any fossils that rotate out on the auger during drilling activities will not have information on formation, depth or context. The only instance in which such fossils will meet significance criteria is if the fossil is a new species in the region. It is recommended that paleontological resources awareness training (Section 11.4) be completed by all personnel so they will understand the procedures to follow in the event of a find. PG&E recommends that a paleontologist be on call to respond in the unlikely event that fossils are encountered during drilling so that they may be evaluated to determine whether they meet significance criteria.

11. Paleontological Procedures

11.1 Introduction

The following paleontological monitoring procedures and personnel are established to ensure timely and accurate communication and implementation to minimize adverse effects on significant paleontological resources that may be discovered during earth-disturbing activities.

11.2 Personnel

The Principal Paleontologist will have a graduate degree with a specialization in Vertebrate Paleontology and more than ten years of experience as a principal investigator. The Principal Paleontologist is responsible for ensuring that all paleontological personnel are qualified and experienced and maintaining professional standards of work and conduct and meeting the substantive requirements of all ARARs. Qualified paleontological crew members will have a minimum of a bachelor's degree with paleontological training and experience. All paleontological personnel will receive safety training and environmental awareness training before performing any fieldwork on the project.

11.3 Communication

Paleontological surveyors and monitors will act to protect potentially significant paleontological resources (including direct notification to construction personnel onsite) and then notify the PG&E site manager and the paleontological field supervisor of any find. The surveyor or monitor will estimate the time required to recover the fossil as part of that notification. If work will be diverted for more than two hours, the PG&E site supervisor will make final decisions regarding formal work stoppage orders and disputes between parties. Temporary halt work conditions will be in effect until the PG&E site supervisor has made a decision regarding treatment. The Principal Paleontologist will notify the BLM contact when significant finds are discovered on BLM lands and the USFWS contact if significant finds are discovered on USFWS lands.

Site Manager: Curt Russell (760) 326-5582

11.4 Paleontological Resources Awareness Training

All project personnel involved in ground-disturbing activities will receive paleontological resources awareness training before beginning work. This is critical when paleontological monitors will not be present full-time. Attendance rosters will be submitted to verify training and hard hat stickers will be issued to demonstrate completion of the training. The training will be developed by the Principal Paleontologist and presented by the Principal Paleontologist or Field Director.

11.5 Surveys

A survey has been completed for the present project. If additional work is planned in the future, survey should be conducted for any areas ranked PFYC 3a or above. Generally, a paleontological survey is conducted by checking the unvegetated ground surface and both natural and man-made cuts but does not involve transects or comprehensive coverage. The project boundaries, project geology, and locations of any known fossil localities will be loaded to Trimble® GeoXH units to ensure that surveyors have all information necessary to accurately record field information. Detailed information on where sediments conducive to the

preservation of fossils occur, any stratigraphy revealed in cuts, contacts between formations, and other important information will be recorded. If fossils are discovered, BLM locality forms (or other appropriate forms depending upon land ownership) will be completed and photographs will be taken.

11.6 Monitoring and On-Call Response

In the unanticipated event that sensitive sediments are impacted during grading and trenching activities, a paleontological monitor will observe and inspect all earthmoving in native sediments to potentially contain fossils (refer to Figure 11). This may include locations where depth of impacts will remove sediments of low paleontological sensitivity to reveal sediments of moderate paleontological sensitivity and in response to finds reported by construction personnel. This excludes drilling activities as any recovered fossils will lack information on formation, depth or context (Section 10.2). Monitoring will include inspection of exposed cut surfaces and microscopic examination of exposed sediments for microfossils.

The paleontological monitor is responsible for maintaining close communication with the on-site earthmoving personnel in order to maintain a safe working environment and to be fully apprised of the upcoming areas of impact and any schedule changes. The paleontological monitor is empowered to temporarily redirect earthmoving to permit recovery of potentially significant fossils. It is important that all earthmoving contractor personnel recognize the authority of the paleontological monitor to redirect them. The paleontological monitor will attempt to minimize schedule impacts. The monitor will stay with the fossil and utilize a cell phone to contact the site supervisor and paleontological field supervisor. If phone communication is problematic, the paleontological monitor will demarcate a buffer zone around the specimen using flagging on lath and speak personally with the site supervisor.

The paleontological monitor will complete daily documentation of monitoring presence, activities, location, observations of sediment type and distribution, observations of fossils, collection, and other information. A completed BLM Locality Form (or other appropriate forms depending upon land ownership) is required for all fossils recovered on federal lands. The paleontological monitor is responsible for photographing activities, sediments, and paleontological resources, and for filling out a Photograph Record Sheet for each digital roll. All documentation is submitted to the Principal Paleontologist weekly and will be submitted to the repository along with any significant fossils upon completion of the project with an electronic copy to PG&E.

11.7 Fossil Discovery and Recovery

Fossils observed will be treated differently depending on type and circumstance. Generally, discovery of identifiable invertebrate (shells, crustaceans, etc.) fossils requires that a scientifically significant sample be collected for identification and analysis and that the locality be documented (see below). Similar procedures are followed for microvertebrates such as rodents. Current professional standards call for testing 200

pounds of sample (five full 5-gallon buckets) from each locality followed by processing of up to 6,000 pounds of matrix if significant fossils are recovered by testing. Documentation of localities is required.

Larger fossils observed must be evaluated to determine their condition. Generally, the paleontological monitor will be able to quickly determine if the fossils are sufficiently well preserved to meet significance criteria (refer to section 9). If necessary, the paleontological monitor will cordon off the immediate area around the fossil to permit a safe work zone to recover the fossil and will notify the site manager. The monitor will also immediately notify the field supervisor if assistance is needed and sufficient personnel to perform the work will be fielded. Documentation of localities is required.

Discovery of a bone bed or other type of fossil sites containing multiple large fossils will likely require a formal Stop Work order but is considered unlikely. The paleontological monitor will cordon off the area until evaluation occurs. The project Principal Paleontologist will consult with the site supervisor regarding the amount of time necessary. This type of discovery requires a detailed field map, a sedimentary structure analysis, one or more stratigraphic columns, and data for taphonomic analysis.

Depending on the formations being impacted, additional samples collected may include specimens for dating analyses or materials for microfossil, botanical, or pollen analyses. All fossils and specimens are accompanied by a field tag with project and locality information, including a unique number.

11.8 Locality Documentation

Each fossil locality requires a standard set of data be taken. This includes one or more Universal Transverse Mercator (UTM) readings using a global positioning system unit, an accurate elevation measurement if possible, the depth below surface, a lithology, and true north reading. Additional information collected may include one or more stratigraphic columns, sedimentary structure analysis, taphonomic analysis, and photographs of the fossil *in situ*.

11.9 Fossil Preparation

Many fossils require only cleaning and stabilization through the use of hardeners. Others require lab excavation of plaster jackets with gradual cleaning and hardening. Sometimes larger fossils require a “cradle,” usually a form-fitted plaster lined with acid-free cloth to provide support and prevent breakage during transport or storage. Depending on the hardness of the surrounding sediment, fossils may require more tedious preparation using mechanical devices such as zip scribes. Funding for fossil preparation will be the responsibility of PG&E.

Processing of matrix samples for microvertebrates varies depending on the nature of the sediments and may be washed using water, may require chemical agents to break apart the rock, or may require floatation using heavy liquids.

11.10 Fossil Identification

All fossils will be identified by experts. All identifications will be as specific as possible and include element, portion, side, sex, age, taphonomy, and notes. Cataloging, including identification information, is entered into a computer database. Each specimen in maintained with a tag specifying the provenience and identification information. Necessary funding for fossil identification and cataloguing of scientific value will be the responsibility of PG&E.

11.11 Fossil Analyses

Analyses conducted depend to a great extent on the number of fossils recovered and their condition. Guild analysis (relative number of carnivores, herbivores, and omnivores of various body weights in an ecosystem), demographic analysis (age and sex structure of populations), habitat analysis (e.g., certain types of animals indicate grasslands as opposed to deserts), paleoecology (use of botanical and/or pollen analysis to reconstruct the paleoenvironment), and comparative analysis (comparison to other faunas of the same time period regionally) are the most typical. Geological context analyses include stratigraphy of the fossil deposits, dating (to narrow the time range of the fossils), taphonomy (history of alteration of the fossils by scavengers, water transport, etc.), and other ancillary studies. Necessary funding for fossil analyses of scientific value will be the responsibility of PG&E.

11.12 Repository

The SBCM will be the primary repository for fossils recovered on this project (Figure 21). This museum is a federally accredited repository for fossils. Necessary funds for curation of paleontological resources of scientific value will be the responsibility of PG&E. The project Principal Paleontologist is authorized to submit fossils with accompanying deeds of gift for curation on behalf of PG&E.

29 September 2011

Sherri Gust
Cogstone
Paleontology Archaeology History
1518 W Taft Ave
Orange, CA 92865-4157

Dear Ms. Gust:

The San Bernardino County Museum (SBCM) is a professional, permanent repository for paleontologic resources collected from private and Federal lands, and is accredited by the American Association of Museums. Additionally, the SBCM upholds professional museum standards and has been recognized by the Federal Government as DM411compliant as set forth by the Department of the Interior's Departmental Manual. Our institution will accept and professionally curate paleontologic collections and accompanying samples, records, data, maps, photographs, field notes, and other documents derived from paleontologic work conducted by Cogstone, under the direction of Ms. Sherri Gust as the Principal Investigator. This repository letter is written specifically for the PG & E Topock Compressor Station, near Needles, San Bernardino County, California.

The SBCM further agrees to assume permanent curatorial responsibility for such materials collected during the course of this project. Curation costs and storage fees will be borne by the project proponent and will require a curation contract between Cogstone and the SBCM at that time.

Sincerely,

Kathleen Springer, Senior Curator
Division of Geological Sciences
San Bernardino County Museum

Figure 21. Repository Letter

11.13 Reporting

The daily field documentation will be the basis for preparing the Weekly Summary of Activities for submittal to PG&E. If fossils are recovered, additional documentation regarding laboratory work will also be incorporated. These records and the field notes will be used to prepare a monthly letter report. The monthly reports will summarize the monitoring activities of the previous period, discoveries made, progress of laboratory work, incidents, and actions taken. PG&E will subsequently distribute copies of the monthly report to other stakeholders including the Tribes.

Upon the conclusion of earthmoving activities, a final report will be prepared. The final report will include the inclusive dates of monitoring, personnel utilized including qualifications, a summary of the monitoring effort and coverage using text and maps, documentation of paleontological localities discovered, paleontological resources identified, interpretation of fossils, non-compliance issues and their resolution, evaluation of the adequacy of this Paleontological Resources Management Plan, and suggestions for improving paleontological resource monitoring procedures. The final report will include all specialists' reports as appendices.

Copies of the final report will be submitted to PG&E, the BLM Needles field office, the Havasu National Wildlife Refuge, as well as with the repository. PG&E will subsequently distribute final report to other stakeholders including the Tribes.

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Appendix K
Summary of Compliance with EIR Mitigation Measures, CIMP, Identified ARARs, Applicable PA Stipulations, and Applicable Cultural and Historic Property Management Plan Provisions
(On CD-ROM Only)

Summary of Compliance with EIR Mitigation Measures, CIMP

(On CD-ROM only)

TABLE 6.1-1
Summary of Compliance with EIR Mitigation Measures
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which document(s) will contain or satisfy this measure?[1]	Action (Compliance Status)			Date Completed
				Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design	
Aesthetics	**AES-1**	**Impacts on Views from Topock Maze Locus B, a Scenic Vista (Key View 5) - The proposed project shall be designed and implemented to adhere to the design criteria presented below.**					
Aesthetics	AES-1a	a) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases consistent with CUL1a-5. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation.	Mature Plants Survey Report including map of mature plant species Aesthetics and Visual Resources Protection and Revegetation Plan	Identification and mapping of mature plant species was completed in August 2011. The survey methodology is summarized in a technical memorandum entitled "*Topock Groundwater Remediation Project, Mature Plants Survey Methodology*" (CH2M HILL 2011b) and is included in Appendix A3 of the Basis of Design Report. The mature plant map is under preparation and will be used to guide the remedy design and the planning for construction.	The Mature Plants Survey Report (CH2M HILL 2012b) was completed on January 17, 2012, and is included in Appendix A4 of the 60% BOD Report. The report contains surveys results and associated maps, which have been used to guide the design. An overview of the report and the survey results were discussed with interested Tribes on January 26, 2012. Figure 2.4-8 in the 60% BOD Report document presents the mature plant survey information for Key Views 5 and 11. PG&E biologist Melanie Day and CH2M HILL biologist Marjorie Eisert participated in a field review of planned remedial facilities with the design team on April 23-24, 2012. A field review was also conducted on June 20 by PG&E biologist Virginia Strohl. The purpose of these field reviews along with in office reviews was to ensure the footprints of planned facilities including potential access routes are designed to avoid disturbance of sensitive habitats to the extent feasible.	An addendum to the Mature Plants Survey Report (CH2M HILL 2014j) was completed on May 22, 2014, and is included in Appendix A4 of the 90% BOD Report. The addendum contains surveys results and associated maps for the freshwater well sites (HNWR-1 and Site B) in Arizona as well as potential sites identified for soil storage and/or construction staging west of Moabi Regional Park. Figure 2.4-8 in the 90% BOD Report presents the mature plant survey information for Key Views 5 and 11.The Aesthetics and Visual Resources Protection and Revegetation Plan (CH2M HILL 2014l) is included in an appendix of the Construction/Remedial Action Work Plan. CH2M HILL biologist Steve Long and E2 biologist Russell Huddleston participated in a field review of planned remedial facilities with the design team on April 7-10, 2014.An additional field review of planned remedial facilities was conducted by CH2M HILL biologist Melissa Fowler and E2 biologist Russell Huddleston on August 6-8, 2014. PG&E biologist Virginia Strohl also led the office reviews of planned facilities and footprints. The purpose of the field reviews along with in office reviews was to ensure the footprints of planned facilities including access routes and construction footprints are designed to avoid disturbance of mature plant specimens and sensitive habitats to the extent feasible.	The survey methodology tech memo was completed on October 31, 2011, and provided to Interested Tribes on November 8, 2011. The Mature Plants Survey Report (CH2M HILL 2012b) was completed on January 17, 2012. An addendum to the Mature Plants Survey Report was completed on May 22, 2014. The Aesthetics and Visual Resources Protection and Revegetation Plan was submitted with the Construction/Remedial Action Work Plan on September 8, 2014.
Aesthetics	AES-1b	b) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed and shall be implemented consistent with CUL1a-5. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.	Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats	A revegetation plan for the riparian vegetation along the river will be prepared and submitted with the final design.	A revegetation plan for the riparian vegetation along the river will be prepared and submitted with the final design.	A Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats is included in an appendix of the Construction/Remedial Action Work Plan. The plan was prepared by plant ecologist Russell Huddleston of E2 Consulting under the direction of Linda Cyra-Korsgaard, a CH2M HILL landscape architect licensed in California. The plan will be implemented consistent with mitigation measure CUL-1a-5.	The Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats was submitted with the Construction/Remedial Action Work Plan on September 8, 2014.
Aesthetics	AES-1c	c) Plant material shall be consistent with surrounding native vegetation.	Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats	This requirement will be incorporated into the revegetation plan, and therefore, will be satisfied by implementation of AES-1b/2c.	This requirement will be incorporated into the revegetation plan, and therefore will be satisfied by implementation of AES-1b/2c.	This requirement was incorporated into the revegetation plan, and therefore satisfied by implementation of AES-1b/2c.	

TABLE 6.1-1
Summary of Compliance with EIR Mitigation Measures
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which document(s) will contain or satisfy this measure?[1]	Action (Compliance Status)			Date Completed
				Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design	
Aesthetics	AES-1d	d) The color of the wells, pipelines, reagent storage tanks, control structures, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.	Design submittals	The requirement of this mitigation measure has been incorporated into the design criteria as presented in Appendix C of this Basis of Design Report for the preliminary design. In addition, the detailed specification for colors will also be included the intermediate (60%) design.	The requirement of this mitigation measure was incorporated into the design criteria as presented in Appendix C of the 60% BOD Report. The detailed specification for colors are included in Appendix E of the 60% BOD Report.	The requirement of this mitigation measure was incorporated into the design criteria as presented in Appendix C of the 90% BOD Report. The detailed specification for colors are included in Appendix E of the 90% BOD Report.	
Aesthetics	AES-1e	e) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.	Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats	This requirement will be incorporated into the revegetation plan, and therefore, will be satisfied by implementation of AES-1b/2c.	This requirement will be incorporated into the revegetation plan, and therefore will be satisfied by implementation of AES-1b/2c.	This requirement will be incorporated into the final revegetation plan, and therefore will be satisfied by implementation of AES-1b/2c.	
Aesthetics	**AES-2**	**Impacts on Views from Colorado River, a Scenic Resources Corridor (Key View 11) - The proposed project shall be designed and implemented to adhere to the design criteria presented below:**					
Aesthetics	AES-2a	a) A minimum setback requirement of 20 feet from the water (ordinary high water mark or OHWM) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the river bank.	Design submittals	The OHWM along the bank of the Colorado River, from the mouth of Bat Cave Wash to the BNSF railroad bridge, was mapped in March 2011. The OHWM methodology is summarized in a technical memorandum entitled "*Topock Groundwater Remediation Project, Ordinary High Water Mark Mapping Methodology*" (CH2M HILL 2011d) and is included in Appendix A3 of this Basis of Design Report. A 20-feet setback from the OHWM was used to guide the placement of the River Bank Extraction Wells and associated infrastructure in the floodplain. A map showing the OHWM and the 20-feet setback is included in Figure 2-17 of the 30% BOD Report.	Figure 2.4-6 in the 60% BOD Report illustrates that the locations of the River Bank Extraction Wells and associated piping met the 20-foot setback requirement.	Figure 2.4-6 in the 90% BOD Report illustrates that the locations of the River Bank Extraction Wells and associated access road/piping corridor met the 20-foot setback requirement.	The mapping methodology technical memorandum and a map with the 20-foot setback from the OHWM were submitted on November 18, 2011.

TABLE 6.1-1
Summary of Compliance with EIR Mitigation Measures
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Resources	Mitigation Number	Mitigation Measure	Which document(s) will contain or satisfy this measure?[1]	Action (Compliance Status)			Date Completed
				Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design	
Aesthetics	AES-2b	b) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation consistent with CUL1a-5.	Mature Plants Survey Report including map of mature plant species Aesthetics and Visual Resources Protection and Revegetation Plan	Identification and mapping of mature plant species was completed in August 2011. The survey methodology is summarized in a technical memorandum entitled "*Topock Groundwater Remediation Project, Mature Plants Survey Methodology*" (CH2M HILL 2011b) and is included in Appendix A3 of this Basis of Design Report. The mature plant map is under preparation and will be used to guide the remedy design and the planning for construction.	The Mature Plants Survey Report (CH2M HILL 2012b) was completed on January 17, 2012, and is included in Appendix A4 of the 60% BOD Report. The report contains surveys results and associated maps, which have been used to guide the design. An overview of the report and the survey results were discussed with interested Tribes on January 26, 2012. Figure 2.4-8 in the 60% BOD Report presents the mature plant survey information for Key Views 5 and 11. PG&E biologist Melanie Day and CH2M HILL biologist Marjorie Eisert participated in a field review of planned remedial facilities with the design team on April 23-24, 2012. A field review was also conducted on June 20 by PG&E biologist Virginia Strohl. The purpose of these field reviews along with in office reviews was to ensure the footprints of planned facilities including potential access routes are designed to avoid disturbance of sensitive habitats to the extent feasible.	An addendum to the Mature Plants Survey Report (CH2M HILL 2014j) was completed on May 19, 2014 and is included in Appendix A4 of the 90% BOD Report. The addendum contains surveys results and associated maps for the freshwater well sites (HNWR-1 and Site B) in Arizona as well as potential sites identified for soil storage and/or construction staging west of Moabi Regional Park. Figure 2.4-8 in the 90% BOD Report presents the mature plant survey information for Key Views 5 and 11. The Aesthetics and Visual Resources Protection and Revegetation Plan (CH2M HILL 2014l) is included as an appendix to the Construction/Remedial Action Work Plan (CH2M HILL 2014m). CH2M HILL biologist Steve Long and E2 biologist Russell Huddleston participated in a field review of planned remedial facilities with the design team on April 7-10, 2014. An additional field review of planned remedial facilities was conducted by CH2M HILL biologist Melissa Fowler and E2 biologist Russell Huddleston on August 6-8, 2014. PG&E biologist Virginia Strohl also led the office reviews of planned facilities and footprints. The purpose of the field review along with in-office reviews was to ensure the footprints of planned facilities, including access routes and construction footprints, are designed to avoid disturbance of mature plant specimens and sensitive habitats to the extent feasible.	The survey methodology tech memo was completed on October 31, 2011, and provided to Interested Tribes on November 8, 2011. The Mature Plants Survey Report was completed on January 17, 2012. An addendum to the Mature Plants Survey Report was completed on May 22, 2014. The Aesthetics and Visual Resources Protection and Revegetation Plan was submitted with the Construction/Remedial Action Work Plan on September 8, 2014.
Aesthetics	AES-2c	c) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.	Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats	A revegetation plan for the riparian vegetation along the river will be prepared and submitted with the final design.	A revegetation plan for the riparian vegetation along the river will be prepared and submitted with the final design.	A Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014o) is included in an appendix of the Construction/Remedial Action Work Plan (CH2M HILL 2014m).	The Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats was submitted with the Construction/Remedial Action Work Plan on September 8, 2014.
Aesthetics	AES-2d	d) Plant material shall be consistent with surrounding native vegetation.	Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats	This requirement will be incorporated into the revegetation plan, and therefore, will be satisfied by implementation of AES-1b/2c.	This requirement will be incorporated into the revegetation plan, and therefore will be satisfied by implementation of AES-1b/2c.	This requirement was incorporated into the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats included as an appendix to the Construction/Remedial Action Work Plan (CH2M HILL 2014o), and therefore was satisfied by implementation of AES-1b/2c.	The Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats was submitted with the Construction/Remedial Action Work Plan on September 8, 2014.

TABLE 6.1-1
Summary of Compliance with EIR Mitigation Measures
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

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Aesthetics	AES-2e	e) The color of the wells, pipelines, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.	Design submittals	The requirement of this mitigation measure has been incorporated into the design criteria as presented in Appendix C of the Basis of Design Report for the preliminary design. In addition, the detailed specification for colors will also be included the intermediate (60%) design.	The requirement of this mitigation measure was incorporated into the design criteria as presented in Appendix C of the BOD Report for the 60% design. The detailed specifications for colors are included in Appendix E of the 60% BOD Report.	The requirement of this mitigation measure was incorporated into the design criteria as presented in Appendix C of the 90% BOD Report. The detailed specifications for colors are included in Appendix E of the 90% BOD Report.	
Aesthetics	AES-2f	f) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.	Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats	This requirement will be incorporated into the revegetation plan, and therefore will be satisfied by implementation of AES-1b/2c.	This requirement will be incorporated into the revegetation plan, and therefore will be satisfied by implementation of AES-1b/2c.	This requirement was incorporated into the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats revegetation plan (CH2M HILL 2014o) included as an appendix to the Construction/Remedial Action Work Plan, and therefore was satisfied by implementation of AES-1b/2c.	The Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats was submitted with the Construction/Remedial Action Work Plan on September 8, 2014.
Aesthetics	AES-3	**Impacts on Visual Quality and Character along the Colorado River (Key View 11)** -- Mitigation Measure AES-1 shall be implemented. Implementation of Mitigation Measures AES-1 would reduce the overall change to the visual character of the view corridor along the Colorado River. Although the proposed project would still be visible, incorporating a facilities design that is aesthetically sensitive and preserving the vegetation would blend the proposed project into their visual setting within the floodplain and would reduce the overall contrast of the proposed project.	Design submittals	This requirement is addressed by the actions taken to address AES-1.	This requirement is addressed by the actions taken to address AES-1.	This requirement is addressed by the actions taken to address AES-1.	
Air Quality	**AIR-1**	**Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors - PG&E shall implement the fugitive dust control measures below for any construction and/or demolition activities:**					
Air Quality	AIR-1a	a) Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient;	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; and Closure Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan (which will be submitted as part of the 90% design) and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (which will be submitted as part of the Cultural Impact Mitigation Program [CIMP; PG&E 2014] and concurrently with the 90% design). The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	This requirement was incorporated into the BMP Plan of the Construction/Remedial Action Work Plan (Section 4) and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (presented as an appendix in the CIMP and the Construction/Remedial Action Work Plan). Both plans were submitted as part of the 90% design documents. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	

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Air Quality	AIR-1b	b) Cover loaded haul vehicles while operating on publicly maintained paved surfaces;	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; and Closure Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan which will be submitted as part of the 90% design, and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration which will be submitted as part of the CIMP and concurrently with the 90% design. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	This requirement was incorporated into the BMP Plan of the Construction/Remedial Action Work Plan (Section 4) and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (presented as an appendix in the CIMP and the Construction/Remedial Action Work Plan). Both plans were submitted as part of the 90% design documents. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	
Air Quality	AIR-1c	c) Stabilize (using soil binders or establish vegetative cover) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions;	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; and Closure Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan which will be submitted as part of the 90% design, and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration which will be submitted as part of the CIMP and concurrently with the 90% design. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	This requirement was incorporated into the BMP Plan of the Construction/Remedial Action Work Plan (Section 4) and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (presented as an appendix in the CIMP and the Construction/Remedial Action Work Plan). Both plans were submitted as part of the 90% design documents. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	
Air Quality	AIR-1d	d) Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours; and	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; and Closure Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan which will be submitted as part of the 90% design, and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration which will be submitted as part of the CIMP and concurrently with the 90% design. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	This requirement was incorporated into the BMP Plan of the Construction/Remedial Action Work Plan (Section 4) and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (presented as an appendix in the CIMP and the Construction/Remedial Action Work Plan). Both plans were submitted as part of the 90% design documents. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	
Air Quality	AIR-1e	e) Curtail nonessential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; and Closure Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be incorporated into the forthcoming Corrective Measure Construction/ Remedial Action Work Plan which will be submitted as part of the 90% design, and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration which will be submitted as part of the CIMP and concurrently with the 90% design. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	This requirement was incorporated into the BMP Plan of the Construction/Remedial Action Work Plan (Section 4) and the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (presented as an appendix in the CIMP and the Construction/Remedial Action Work Plan). Both plans were submitted as part of the 90% design documents. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning.	

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Biological Resources	BIO-1	**Potential Fill of Wetlands and Other Waters of the United States and Disturbance or Removal of Riparian Habitat** -Areas of sensitive habitat in the project area have been identified during project surveys. These areas include floodplain and riparian areas, wetlands, and waters of the United States. Habitats designated by CDFW as sensitive, including desert washes and desert riparian, are also included. To the extent feasible, elements of the project shall be designed to avoid direct effects on these sensitive areas. During the design process and before ground disturbing activities within such areas (not including East Ravine), a qualified biologist shall coordinate with PG&E to ensure that the footprints of construction zones, drill pads, staging areas, and access routes are designed to avoid disturbance of sensitive habitats to the extent feasible. DTSC shall be responsible for enforcing compliance with design and all preconstruction measures.	Design submittals	During the preparation of the Construction/ Remedial Action Work Plan as part of the design process, a qualified biologist will coordinate to ensure that the footprints of construction zones, drill pads, staging areas, and access routes are designed to avoid disturbance of sensitive habitats (floodplain and riparian areas, wetlands, waters of the US, desert washes, and desert riparian) to the extent feasible. The draft and final work plans are planned for submittal in 2012.	During the preparation of the Construction/ Remedial Action Work Plan as part of the design process, a qualified biologist will coordinate to ensure that the footprints of construction zones, drill pads, staging areas, and access routes are designed to avoid disturbance of sensitive habitats (floodplain and riparian areas, wetlands, waters of the US, desert washes, and desert riparian) to the extent feasible. The draft Construction/ Remedial Action Work Plan is planned for submittal in late 2013, concurrently with the 90% design.	CH2M HILL biologist Steve Long and E2 biologist Russell Huddleston participated in a field review of planned remedial facilities with the design team on April 7-10, 2014. An additional field review of planned remedial facilities was conducted by CH2M HILL biologist Melissa Fowler and E2 biologist Russell Huddleston on August 6-8, 2014. PG&E biologist Virginia Strohl also led the office reviews of planned facilities and footprints. The purpose of the field review along with in- office reviews was to ensure the footprints of planned facilities, including access routes and construction footprints, are designed to avoid disturbance of sensitive habitats to the extent feasible. The Construction/Remedial Action Work Plan was submitted on September 8, 2014 as part of the 90% design document.	
Biological Resources	BIO-1	If during the design process it is shown that complete avoidance of habitats under USACE jurisdiction is not feasible, the Section 404 permitting process shall be completed, or the substantive equivalent per CERCLA Section 121(e)(1). In either event, the acreage of affected jurisdictional habitat shall be replaced and/or rehabilitated to ensure "no-net-loss." Before any ground-disturbing project activities begin in areas that contain potentially jurisdictional wetlands, the wetland delineation findings shall be documented in a detailed report and submitted to USACE for verification as part of the formal Section 404 wetland delineation process and to DTSC. For all jurisdictional areas that cannot be avoided as described above, authorization for fill of wetlands and alteration of waters of the United States shall be secured from USACE through the Section 404 permitting process before project implementation. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods agreeable to USACE and consistent with applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. Alternately, if USACE declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the substantive equivalent of the Section 404 permitting process shall be complied with by ensuring that the acreage of jurisdictional wetland affected is be replaced on a "no-net-loss" basis in accordance with the substantive provisions of USACE regulations. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods consistent with USACE methods, and consistent with the purpose and intent of applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be	Jurisdictional Delineation of Waters and Wetlands Report	During the preliminary (30%) design, it has been determined that complete avoidance of habitats under USACE jurisdiction (e.g., Bat Cave Wash) is not feasible. PG&E will work with the USACE to determine and complete the Section 404 permitting process or the substantive equivalent per CERCLA Section 121(e)(1). It is anticipated that a wetland delineation will be conducted in the Spring of 2012.	Figure 2.4-5 in the 60% BOD Report shows the overlaps between planned remedy infrastructure and the USACE jurisdictional waters/wetlands. As shown in Figure 2.4-5, complete avoidance of washes is not feasible due to the need to install remediation and monitoring wells in washes (e.g., a wash in the Upland, Bat Cave Wash). On February 12, 2013, PG&E consulted with Mr. Gerardo Salas of USACE Los Angeles District in Los Angeles regarding the application of the CERCLA 121(e)(1) permit exemption to the Topock remediation project. PG&E will continue to coordinate with USACE on this matter, including on the substantive requirements of CWA Section 404.	On February 13-17, 2012, a wetland delineation was conducted to determine and map the extent of wetlands and other waters of the U.S. located within the EIR project area. Additional wetland delineation was conducted on July 16-17 and December 12-13, 2012, in study areas identified in the alternative freshwater evaluation. A report titled "*Wetlands and Waters of the United States Final Delineation Report for the Topock Compressor Station Groundwater Remediation Project, San Bernardino County, California"* (CH2M HILL 2014c) was prepared to summarize results of the above delineation efforts and submitted to DTSC and DOI on April 18, 2014. The report is also included in Appendix A3 of the 90% BOD Report. On July 10, 2013, the USACE confirmed that CERCLA 121(e)(1) permit exemption applies to the Topock remediation project, and therefore, PG&E is not required to comply with the administrative and procedural elements of Section 404 of the Clean Water Act; however, PG&E is obligated to comply with the substantive elements that would normally be required by a permit. The USACE also stated that it therefore will not verify the wetlands and waters delineation. Therefore, PG&E is not seeking verification from the USACE. Rather, PG&E assumes that the jurisdictional waters and wetlands delineated and identified as such in the aforementioned report are all the jurisdictional waters under Section 404 of the	On July 10, 2013, USACE issued a letter (USACE 2013a) that confirmed that a Section 404 permit is not required for the Topock remediation project because the site is exempted under CERCLA 121(e)(1). Additionally, USACE confirmed that it will not verify a jurisdictional delineation for this action because a permit is not required (G. Salas USACE, email communication to V. Nez PG&E, July 12, 2013). The wetland delineation report (CH2M HILL 2014c) was completed on April 18, 2014.

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		implemented. In any event, a report shall be submitted to DTSC to document compliance with these mandates.				CWA. The locations of jurisdictional waters have been incorporated into the design. At the 90% design stage, the final remedy avoids almost all permanent impacts within USACE jurisdictional areas with the following exceptions. There is one well, IRL-4, and one or two associated arsenic monitoring wells that will occur within a jurisdictional waters of the US. There is also a freshwater pipeline that will be installed within an existing unpaved access road within the 100-year floodplain of the Colorado River. However, complete avoidance of other jurisdictional non-wetland waters is not feasible. It has been determined that in order to meet the goals of protection of human health and the environment, to meet the RAOs for the remedy, to monitor remedy performance, to gather data for demonstration of compliance, as well as in response to resolution of design comments with the Tribes, infrastructure (remediation, monitoring wells, and associated piping/conduits) must be installed in certain washes. There are no practicable alternatives to locating certain infrastructure within waters of the United States. Figure 2.4-5 in the 90% BOD Report shows the unavoidable overlaps between planned remedy infrastructure and the USACE jurisdictional waters. In such cases where complete avoidance is not feasible, certain best management practices (BMPs) will be implemented to avoid and minimize temporary and permanent impacts for activities occurring within jurisdictional wetlands and non-wetland waters of the U.S. Although the USACE did not provide a list of measures that may be taken to reduce impacts to jurisdictional waters and wetlands, the California Department of Fish and Wildlife (CDFW) requires compliance with avoidance and mitigation measures (AMMs) for all work conducted in CDFW jurisdictional washes. The geographic extent of CDFW's jurisdiction is broader than the jurisdictional extent of the USACE under CWA 404 and thus, avoidance and mitigation measures applied to CDFW jurisdictional waters would as a geographic consequence also be applied to CWA 404 waters. While Arizona does not have a similar state program, PG&E will also implement the		

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						same AMMs in Arizona identified by CDFW for California as well to ensure appropriate protection to CWA 404 jurisdictional areas in the project area, including those in Arizona. In addition to the CDFW AMMs, PG&E has identified additional BMPs for implementation during remedy construction, operation and maintenance, as well as decommissioning. The additional BMPs are described in the *Protocol for Compliance with EIR Mitigation and Monitoring Reporting Program BIO-1 and Applicable or Relevant and Appropriate Requirement (ARAR) #32 at the Topock Compressor Station* (see **Exhibit 6.1-1** presented at the end of this table). A Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014o) was also prepared and included in an appendix of the Construction/Remedial Action Work Plan.	
Biological Resources	BIO-1	If during the design process it is shown that complete avoidance of habitats under CDFG jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, a Section 1602 streambed alteration agreement shall be obtained from CDFG and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a no-net-loss basis in accordance with CDFG regulations and, if applicable, as specified in the streambed alteration agreement, if needed. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to CDFG and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to CDFG, BLM, and USFWS that is agreeable to these agencies, or, alternately, through the implementation of a habitat restoration plan consistent with the substantive policies of CDFG, BLM, and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan. Alternately, if CDFG declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, and during the design process it is shown that complete avoidance of	Havasu National Wildlife Refuge Habitat Restoration Plan, Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats	During the preliminary (30%) design, it has been determined that complete avoidance of habitats under CDFG jurisdiction (e.g., Bat Cave Wash) is not feasible. PG&E will work with the CDFG to determine and complete the Section 1600 permitting process or the substantive equivalent per CERCLA Section 121(e)(1).	Figure 2.4-5 in the 60% BOD Report shows the overlaps between remedy infrastructure and the CDFW jurisdictional waters/wetlands. As shown in Figure 2.4-5, complete avoidance of washes is not feasible due to the need to install remediation and monitoring wells, and associated pipes and components in washes (e.g., a wash in the Upland, Bat Cave Wash). The CDFG is now the California Department of Fish and Wildlife, and thus is referred to as CDFW in this report. On December 11, 2012, PG&E consulted with CDFW District Regional Manager and his staff at the Blythe, California office regarding the substantive requirements of the CDFW Section 1602 and the application of the CERCLA 121(e)(1) permit exemption to the Topock remediation project. On February 21, 2013, CDFW staff from the Blythe office conducted a field review of the project. On March 6, 2013, the CDFW issued a letter to PG&E confirming that CERCLA 121(e)(1) applies to response actions conducted onsite at Topock, specifically soil and groundwater investigation activities and remedial actions at the site (CDFW 2013). As a result, no Lake or Stream Bed Alteration Agreement is required by CDFW. However, PG&E must still comply with substantive elements CDFW would require in such an Agreement for the duration of the project. In this case, the substantive elements are the avoidance and minimization measures	During the design, a process similar to the above was also conducted to avoid and minimize impacts to CDFW jurisdictional waters/wetlands. CDFW jurisdictional waters in the project area were delineated and mapped. A technical memorandum titled *Riparian Vegetation and California Department of Fish and Wildlife Jurisdiction for the Topock Compressor Station Groundwater Remediation Project* (CH2M HILL 2014i) was prepared to summarize the delineation results. The memo was submitted to the CDFW on 5/9/14, and to DTSC on 5/21/14, and is also included in Appendix A3 of the 90% BOD Report. The locations of jurisdictional waters have been incorporated into the design. At the 90% design stage, the final remedy avoids almost all permanent impacts within USACE jurisdictional areas with the following exceptions. There is one well, IRL-4 and one or two associated arsenic monitoring wells that will occur within a jurisdictional waters of the US. There is also a freshwater pipeline that will be installed within an existing unpaved access road within the 100-year floodplain of the Colorado River. However, complete avoidance of other CDFW jurisdictional non-wetland waters is not feasible for the same reasons described above for the USACE jurisdictional non-wetland waters. Figure 2.4-5A in the 90% BOD Report	On March 6, 2013, CDFW issued a letter confirming that CERCLA 121(e)(1) permit exemption applies to response actions conducted onsite as part of the Topock remediation project, and specified the substantive requirements in the form of AMMs that PG&E must comply with for the duration of the project. A technical memorandum summarizing the results of delineating CDFW jurisdictional waters in the project area (CH2M HILL 2014i) was submitted to CDFW on May 9, 2014, and to DTSC on May 21, 2014. The Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014o) and the Havasu National Wildlife Refuge Habitat Restoration Plan (CH2M HILL 2014n) were submitted with the Construction/Remedial Action Work Plan on September 8, 2014.

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		habitats under CDFG jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, the substantive mandates of a streambed alteration agreement shall be implemented, and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a "no-net-loss" basis in accordance with CDFG regulations and, if applicable. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to CDFG and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan developed consistent with the substantive policies of CDFG, BLM and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.			(AMMs) attached to the March 6, 2013 letter (this letter can be viewed or downloaded from the DTSC Topock website at www.dtsc-topock.com), and any additional measures PG&E's biologist determines to be necessary.	shows the unavoidable overlaps between planned remedy infrastructure and the CDFW jurisdictional waters. A Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats and a Havasu National Wildlife Refuge Habitat Restoration Plan were prepared and included as appendices of the Construction/Remedial Action Work Plan.	
Biological Resources	BIO-2a	**Disturbance of Special-Status Birds and Loss of Habitat.** To the extent feasible, the project implementation plans shall be designed to minimize removal of habitat for special-status birds. During the design process and before ground disturbing activities (except within the East Ravine as described in the Revised Addendum and unless otherwise required as noted below), a qualified biologist shall coordinate with PG&E to ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on habitat and nesting habitat for other special-status species, to the extent feasible. DTSC will ensure compliance with all preconstruction and construction phase avoidance measures identified during this process and included in any design plans. Vegetation removal and other activities shall be timed to avoid the nesting season for special-status bird species that may be present. The nesting cycle for most birds in this region spans March 15 through September 30. **Preconstruction Measures**: Preconstruction breeding season surveys shall be conducted during the general nesting period, which encompasses the period from March 15 through September 30, if the final design of the project (including East Ravine investigation Sites I, K and L) could result in disturbance or loss of active nests of special-status bird species. If vegetation removal or other disturbance related to project implementation is required during the nesting season, focused surveys for active nests of special-status birds shall be conducted before such activities begin. A qualified biologist	Avoidance and Minimization Plan; Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (part of CIMP); Plan for Decommissioning of Remedy Facilities and Restoration	A qualified biologist will coordinate to ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on habitat and nesting habitat for other special-status species, to the extent feasible, at the intermediate (60%) stage. An Avoidance and Minimization Plan for special-status birds will be developed in consultation with the USFWS, and is subject to agreement from DTSC.	The Yuma clapper rail/California black rail surveys consist of six focused surveys between March 14 and May 19, 2012.The southwestern willow flycatcher (SWFL) surveys were conducted May 21 through 25 and June 4 through 8; June 18 through 22; and June 26 through 30, 2012. The 2012 SWFL survey report was submitted to BLM and USFWS on January 31, 2013 (CH2M HILL 2013a). The results of the Yuma clapper rail/California black rail survey will be summarized in a forthcoming report. An Avoidance and Minimization Plan for special status birds is under preparation, in consultation with the USFWS.	PG&E submitted the Final Bird Impact Avoidance and Minimization Plan (CH2M HILL 2014d) for disturbance of special-status birds and loss of habitat for the Topock remediation project on April 30, 2014. The plan is also included as an appendix of the Construction/ Remedial Action Work Plan. Results of the 2012 Yuma clapper rail/ California black rail survey were summarized in a report titled *2012 Focused Survey for the Yuma clapper rail and the California black rail at the PG&E Groundwater Remediation Project Site, Needles, California* (CH2M HILL 2013g)". The SWFL surveys were conducted on June 2-6, June 16-20, and June 29-July 3, 2014. Surveys for the western yellow-billed cuckoo were conducted June 16-20, June 29-July 3, and August 4-7,2014.	The Final Bird Impact Avoidance and Minimization Plan (CH2M HILL 2014d) was submitted on April 30, 2014.

TABLE 6.1-1
Summary of Compliance with EIR Mitigation Measures
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PG&E Topock Compressor Station, Needles, California

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		shall conduct preconstruction surveys to identify active nests that could be affected. The appropriate area to be surveyed and the timing of the survey may vary depending on the activity and species that could be affected. For the Yuma clapper rail, the preconstruction surveys shall specifically identify habitat within 300 feet of construction areas, in accordance with substantive policies of USFWS including those set out in USFWS protocols. **Construction Measures**: Before the initiation of project elements that could result in disturbance of active nests or nesting pairs of other special-status birds, a qualified biologist shall be consulted to identify appropriate measures to minimize adverse impacts during the construction phase of the project. If deemed appropriate for the final project design because of the potential for impacts, minimization measures will include focusing construction activities that must be conducted during the nesting season to less- sensitive periods in the nesting cycle, implementing buffers around active nests of special-status birds to the extent practical and feasible to limit visual and noise disturbance, conducting worker awareness training, and conducting biological monitoring (including noise monitoring to determine if construction noise at the edge of suitable nesting habitat is elevated above 60 dBA Leq or ambient levels). An avoidance and minimization plan for special status bird species, as defined in Table 4.3-3 of the EIR and those species protected under the federal Migratory Bird Treaty Act, including the Yuma clapper rail, shall be developed and implemented in consultation with USFWS, and agreed upon by DTSC. Avoidance and impact minimization measures, such as prohibiting construction near or in sensitive bird habitat, limiting construction during breeding seasons, and requiring an on-site biological monitor, shall be included in the design plan and implemented to the extent necessary to avoid significant impacts on sensitive bird species.					

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Biological Resources	BIO-2b	**Disturbance of Desert Tortoise and Loss of Habitat.** **Preconstruction Measures:** In areas where impacts to potential desert tortoise habitat are unavoidable, measures outlined in the Programmatic Biological Assessment (PBA) and in the USFWS letter concurring with the PBA, shall be implemented, as described below. To the extent feasible, project construction shall be designed to minimize removal of habitat for the desert tortoise. Before any ground-disturbing project activities begin, and except within the East Ravine for which potential effects to the tortoise have been considered per the PBA), a USFWS-authorized desert tortoise biologist shall identify potential desert tortoise habitat in areas that could be affected by the final project design. Through coordination with the authorized biologist, PG&E shall ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on potential desert tortoise habitat to the extent feasible. These measures include the presence of a USFWS-authorized desert tortoise biologist onsite or designated agent in accordance with the PBA who will examine work areas and vehicles for the presence of desert tortoises, and who will conduct preconstruction desert tortoise surveys in areas where unavoidable impacts to tortoise habitat would occur. If feasible, the preconstruction desert tortoise surveys would coincide with one of the two peak periods of desert tortoise activity (i.e., if feasible, the surveys should be conducted in either the period from April through May, or from September through October). The preconstruction surveys shall be in full accordance with the substantive requirements of USFWS protocols. **Construction Measures**: Before the initiation of project elements that could result in disturbance of desert tortoises or desert tortoise habitat, a USFWS-authorized desert tortoise biologist shall be consulted to identify appropriate measures to minimize adverse impacts. Minimization measures are likely to include micro-siting structures, pipelines, and access roads in previously disturbed areas or in areas with sparse scrub vegetation, conducting worker awareness	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (part of CIMP); Plan for Decommissioning of Remedy Facilities and Restoration	PG&E, USFWS, and DOI are coordinating on the PBA for the final groundwater remedy. Goal is to complete the PBA in time for the completion of ESA Section 7 consultation prior to the approval of the Construction/Remedial Action Work Plan. Measures outlined in the forthcoming PBA and associated USFWS determination letter will be implemented before and during construction activities.	On September 25, 2012, the USFWS authorized two biologists, Melanie Day and Gabriel Valdes, to conduct activities described in this mitigation measure, pursuant to the PG&E Topock groundwater remediation project. Specifically, these two authorized biologists may survey, provide work area and vehicles inspection, and direct (pre)construction activities to avoid impacts on desert tortoise or their potential habitat, and to provide worker's awareness training for the groundwater remediation project. Gabriel Valdes identified the potential desert tortoise habitat shown in Figure 2.4-10 in the 60% BOD Report. Through coordination with the biologists (Gabriel Valdes and Melanie Day), the footprints of remediation wells, monitoring wells, piping, electrical transformers, access routes and pathways have been designed to avoid direct and indirect effects on potential desert tortoise habitat. PG&E, USFWS, and DOI continue to coordinate on the PBA for the final groundwater remedy. The goal is to complete the PBA in time for the completion of ESA Section 7 consultation prior to the approval of the Construction/Remedial Action Work Plan. Measures outlined in the forthcoming PBA and associated USFWS determination letter will be implemented before and during construction activities.	On April 1-2 and May 12-13, 2013, USFWS authorized biologist Gabriel Valdes conducted additional protocol surveys for desert tortoise in support of the design including the freshwater supply sites. Gabriel Valdes identified the potential desert tortoise habitat shown in Figure 2.4-10 in the 90% BOD Report. Through coordination with the biologists, the footprints of remediation wells, monitoring wells, piping, electrical transformers, access routes and pathways have been designed to avoid direct and indirect effects on potential desert tortoise habitat. PG&E, USFWS, BLM, and DOI coordinated on the PBA for the final groundwater remedy. This ESA Section 7 consultation was concluded with receipt of USFWS concurrency letter on July 7, 2014 which preceded the approval of the Construction/Remedial Action Work Plan. Measures outlined in the PBA and associated USFWS determination letter will be implemented before and during construction activities.	

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Biological Resources	BIO-2c	**Disturbance of Special-Status Species and Loss of Habitat Caused by Decommissioning.** To avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities, an avoidance and minimization plan shall be developed and implemented through consultation with CDFW, BLM, and USFWS. These measures shall be based on surveys conducted prior to decommissioning, and during the breeding season (as previously defined in this EIR for each species or suite of species). Restoration of any disturbed areas shall include measures to achieve no net loss of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to CDFW, BLM, and USFWS that is agreeable to these agencies. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.	Avoidance and Minimization Plan	During planning of the IM-3 Decommissioning and Site Restoration Plan, an Avoidance and Minimization Plan and a Habitat Restoration Plan will be developed and implemented through consultation with CDFW, BLM, and USFWS.	The IM-3 Decommissioning Work Plan will describe the general procedures for restoration of the land and habitats. The Avoidance and Minimization Plan and Habitat Restoration Plan associated with decommissioning activities will be based on surveys conducted prior to decommissioning, and during the breeding season; therefore these Plans will be prepared in the future, prior to decommissioning (note that PG&E will prepare a separate Habitat Restoration Plan in compliance with the Consent Decree; this Plan will be developed in coordination with the USFWS Havasu National Wildlife Refuge (HNWR) Manager and submitted with the Construction/Remedial Action Work Plan).	<u>Avoidance and Minimization Associated with Decommissioning of IM-3 Facilities and Site Restoration</u> An Avoidance and Minimization Plan associated with the decommissioning of IM-3 facilities will be developed based on surveys conducted prior to decommissioning, and during the breeding season; therefore, this Plans will be also prepared in the future, prior to decommissioning. <u>Avoidance and Minimization Associated with Decommissioning of Remedial Facilities and Site Restoration</u> In compliance with this mitigation measure, an Avoidance and Minimization Plan associated with decommissioning of remedial facilities will be developed based on surveys conducted prior to decommissioning, and during the breeding season; therefore, this Plan will be also prepared in the future, prior to decommissioning. As required by the EIR MMRP, general procedures and protocols for restoring the environment to its preconstruction conditions upon decommissioning of remedial facilities were developed and included as part of the CIMP (CUL-1a-8e). Also in compliance with the CD, a separate Habitat Restoration Plan for the Refuge was prepared and included as an appendix of the Construction/Remedial Action Work Plan.	

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Biological Resources	BIO-3a	**Potential Impacts to Aquatic Habitat Related to Turbidity, Erosion, Sedimentation, and Overall Water Quality during Construction of the Intake Structure.** Hydrology & Water Quality Mitigation Measure HYDRO-1 shall be implemented in order to reduce water quality impacts related to erosion and pollutant runoff through implementation of BMPs. In addition, installing the cofferdam and dewatering a portion of the proposed intake structure site during fish screen construction may result in fish stranding. PG&E and its contractor shall coordinate with a qualified fisheries biologist to develop and implement a fish rescue plan. The fish rescue effort would be implemented during the dewatering of the area behind the cofferdam and would involve capturing those fish and returning them to suitable habitat within the river. The fish rescue plan shall identify and describe the following items: collection permits needed, fish capture zones, staffing, staging areas, fish collection and transport methods, species prioritization, resource agency contacts, fish handling protocols, fish relocation zones, site layout and progression of dewatering and fish rescue, and records and data. To ensure compliance, a fisheries biologist shall be present on-site during initial pumping (dewatering) activities and to oversee the fish rescue operation.		No further action is required. The preliminary (30%) design does not include a river water intake structure.	In response to comments on the 30% design submittals, PG&E prepared a technical memorandum to present additional details on three freshwater sources (groundwater from California, groundwater from Arizona, and Colorado River water). No further action is required. The intermediate (60%) design does not include a river water intake structure.	No further action is required. The pre-final (90%) design does not include a river water intake structure.	
Biological Resources	BIO-3b	**Potential Loss or Degradation of Aquatic Habitat.** To restore, replace, or rehabilitate habitat impacted by the intake structure, PG&E shall implement the measures described below. Unless as provided below, PG&E shall confer with CDFW regarding potential disturbance to fish habitat and shall obtain a streambed alteration agreement, pursuant to Section 1602 of the California Fish and Game Code, for construction work associated with intake structure construction; PG&E shall also confer with CDFW pursuant to the California Endangered Species Act (CESA) regarding potential impacts related to the loss of habitat or other operational impacts on state-listed fish species, respectively. PG&E shall comply with all requirements of the streambed alteration agreement and any CESA permits to protect fish or fish habitat or to restore, replace, or rehabilitate any important habitat on a "no-net-loss" basis. Alternatively, if CDFW declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the project proponent shall consult with CDFW regarding potential disturbance to fish habitat and shall meet the substantive policies of a streambed alteration agreement and of the CESA for construction work associated with intake structure construction and operations. PG&E shall comply with all substantive requirements of the streambed alteration agreement and CESA to protect fish and fish habitat or to restore, replace, or rehabilitate any important habitat on a "no-net-loss" basis and to operate the facility in accordance with CESA to ensure no net loss of habitat function.		No further action is required. The preliminary (30%) design does not include a river water intake structure.	In response to comments on the 30% design submittals, PG&E prepared a technical memorandum to present additional details on three freshwater sources (groundwater from California, groundwater from Arizona, and Colorado River water). No further action is required. The intermediate (60%) design does not include a river water intake structure.	No further action is required. The pre-final (90%) design does not include a river water intake structure.	

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Biological Resources	BIO-3b	Additionally, PG&E shall consult with USACE regarding the need to obtain permits under section 404 of the CWA and section 10 of the Rivers and Harbors Act. In conjunction with these permitting activities, the USACE must initiate consultation with USFWS under Section 7 of the federal ESA regarding potential impacts of the proposed project on federally listed fish species due to the loss of habitat on federally listed fish species. PG&E shall implement any additional measures developed through the ESA Section 7 processes, or its equivalent, to ensure "no-net loss" of habitat function. Alternatively, if USACE and/or USFWS decline to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, PG&E shall confer with USFWS regarding potential disturbance to federally listed fish species and federally listed fish species habitat and shall meet the substantive mandates under Section 7 of the federal ESA regarding potential impacts to fish or to habitat of federally listed fish species. PG&E shall implement any additional measures developed through that processes, including compliance with the substantive requirements of all of what would be permit conditions if not exempt pursuant to CERCLA, and to ensure "no-net-loss" of habitat function. Because the type and extent of habitat potentially affected is unknown, PG&E shall have an instream habitat typing survey conducted in the area potentially affected by the intake construction. Further, cooperation with USFWS and other fisheries biologists shall determine suitable and acceptable location(s) for the intake structure(s) to avoid the spawning habitat of special-status fish species. PG&E shall avoid habitat modifications, especially to habitat that is preferred by native fishes for spawning or rearing including side channels, cobble or gravel bars, and shallow backwaters. If these habitat types cannot be avoided, any disturbed habitat will be restored or replaced to achieve "no-net-loss" of habitat types and values as described above.	Instream Habitat Typing Survey Report	No further action is required. The preliminary (30%) design does not include a river water intake structure.	In response to comments on the 30% design submittals, PG&E prepared a technical memorandum to present additional details on three freshwater sources (groundwater from California, groundwater from Arizona, and Colorado River water). As part of the preparation of the technical memorandum, an instream habitat survey was conducted on April 4, 2012 to determine the preferred locations for spawning and rearing of the razorback sucker and bonytail chub. Survey results were presented in a technical memorandum entitled *Instream Habitat Typing Survey, Topock Compressor Station, Colorado River* (CH2M HILL 2012a). The report was provided to DTSC on May 25, 2012, and is included in Appendix A6 of this BOD report.	No further action is required. The pre-final (90%) design does not include a river water intake structure.	The Instream Habitat Typing Survey Technical Memorandum (CH2M HILL 2012a) was completed on May 25, 2012.

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Biological Resources	BIO-3c	**Potential Fish Entrainment and Impingement during Operation of the Intake Structure.** Both screened and unscreened diversions can entrain larval life stages of fish. For example, adverse effects to early life stages of fish could occur if diversions coincide with planktonic larval life stages that occur during summer months, a period of high entrainment vulnerability. Prior to operation of the intake structure, PG&E shall consult with USFWS and CDFW to determine the most vulnerable time of the year for entrainment or impingement of razorback sucker and bonytail chub eggs or larvae. PG&E shall install a state-of-the-art positive-barrier fish screen that would minimize fish entrainment and impingement at the intake structure. The fish screen shall be designed in accordance with CDFW and the National Marine Fisheries Service criteria, with specific consideration given to minimizing harm to fish eggs and other early life stages. To ensure that the fish screen operates as intended and reduce the risk of impacts, long-term monitoring of the operations and maintenance of the positive-barrier screen shall be conducted. Monitoring at the onset of diversions through the intake shall include approach velocity measurements immediately after the positive-barrier screen operations begin, with fine-tuning of velocity control baffles or other modifications as necessary, to achieve uniform velocities in conformance with the screen criteria established by regulatory agencies.		No further action is required. The preliminary (30%) design does not include a river water intake structure.	In response to comments on the 30% design submittals, PG&E prepared a technical memorandum to present additional details on three freshwater sources (groundwater from California, groundwater from Arizona, and Colorado River water). No further action is required. The intermediate (60%) design does not include a river water intake structure.	No further action is required. The pre-final (90%) design does not include a river water intake structure.	
Cultural Resources	CUL-1a	**During Design, Construction, O&M, and Decommissioning Implement Measures to Avoid, Minimize, or Mitigate Impacts on Cultural Resources.** Establishment of a cultural impact mitigation program and a Corrective Measures Implementation Workplan (CMI Workplan), with specific activities stipulated for each phase of the project, will reduce the potential for impacts on historical resources within the project area, and will help preserve the values of and access to the Topock Cultural Area for local Tribal users. As detailed below, measures will be implemented to avoid known resources, re-use existing disturbed areas to the extent feasible, allow for Tribal input to the final design and maintain access for Tribal users during design, construction, operation, and decommissioning activities, as appropriate. During construction, a Worker Education Program and regular archaeological and Tribal monitoring will be implemented, and measures intended to reduce the potential for incursion by outside parties will be strengthened. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation (dated December 31, 2010).	Corrective Measure Implementation Work Plan (CMI) and Cultural Impact Mitigation Program (CIMP)	The Corrective Measure Implementation Work Plan (CMI Work Plan) was completed in November 2011. Work on the Cultural Impact Mitigation Program (CIMP) commenced in May 2011, the CIMP will be submitted with the final design (due 2012) as directed.	Work on the CIMP commenced in May 2011, and the CIMP will be submitted with the 90% design (due late 2013).	PG&E started work on the CIMP in May 2011, in coordination with Interested Tribes during face- to- face meetings or teleconference calls held once per month. On July 8, 2013, PG&E provided a preliminary draft CIMP (including the IM-3 Decommissioning Plan) to Interested Tribes. Tribes provided comments on the draft CIMP in October 2013. PG&E reviewed and discussed select comments and responses with the Tribes during the March and April 2014 Tribal Monthly Updates (TMUs). At DTSC's and Tribes' request, the CIMP (PG&E 2014) was submitted on May 1, 2014, in advance of the 90% design (see paragraph below for submittal dates related to the IM-3 Decommissioning Plan). PG&E incorporated select Tribes' comments in the May 1, 2014 CIMP, and sent Tribes a letter to explain why certain comments were not incorporated. <u>IM-3 Decommissioning Plan (Appendix B of CIMP)</u> A preliminary draft IM-3 Decommissioning Plan was submitted to the Fort Mojave Indian Tribe (FMIT) in April 2013. The FMIT provided comments on the preliminary draft Plan in June 2013. PG&E updated the draft Plan and	The Revised Groundwater CMI/RD Work Plan (CH2M HILL 2011a) was completed on November 2, 2011.

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						submitted it to Interested Tribes as an appendix to the CIMP on July 8, 2013. The FMIT and the Hualapai Tribe provided comments on the updated Plan in October 2013. PG&E sent letters to respond to the Tribes' comments on July 8, 2014 and discussed the responses during the July TMU. PG&E incorporated select Tribes' comments and submitted a revised Plan with the 90% design on September 8, 2014.	
Cultural Resources	CUL-1a-1	During development of the final design and the construction, operation, and decommissioning phases of the project, PG&E shall carry out and require all subcontractors to carry out all investigative, testing, and remediation activities, including all supporting operations and maintenance activities, in ways that avoid, minimize, and mitigate significant adverse effects to historically significant cultural and historic resources, consistent with the CEQA Guidelines, and including the Topock Cultural Area, to the maximum extent feasible as determined by DTSC.	Training material for cultural resources	Implementation of this measure will be carried out in a manner that respects cultural and historic resources, to the maximum extent feasible as determined by DTSC.	PG&E remediation resources specialist Glenn Caruso participated in field reviews of planned remedial facilities with the design team on April 23-24 and June 20, 2012. The purpose of these field reviews along with in-office reviews is to ensure that the footprints of planned facilities are designed in ways that avoid, minimize, and mitigate significant adverse effects to historically significant cultural and historic resources.	PG&E Cultural Resources Expert Glenn Caruso participated in field reviews of planned remedial facilities and construction footprints with the design team on April 7-10, 2014. He also led in-office reviews of locations of planned facilities and construction footprints. The purpose of these field reviews along with in-office reviews is to ensure that the footprints of planned facilities are designed in ways that avoid, minimize, and mitigate significant adverse effects to historically significant cultural and historic resources.	
Cultural Resources	CUL-1a-2	As part of the CMI Workplan, PG&E shall develop a written access plan to preserve Tribal members' access to, and use of, the project area for religious, spiritual, or other cultural purposes. This plan will allow access to the extent PG&E has the authority to facilitate such access, and be consistent with existing laws, regulations, and agreements governing property within the project area. The access plan may place restrictions on access into certain areas, such as the Compressor Station and the existing evaporation ponds, subject to DTSC review with regard to health and safety concerns and to ensure noninterference with approved remediation activities. This access plan may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the related stipulation (General Principle I.C) contained in the Programmatic Agreement (Appendix PA). PG&E shall demonstrate a good faith effort to coordinate with Interested Tribes[1] by including communication logs as part of the CMI Workplan. *[1]"Interested Tribes" means, for purposes of this EIR and the mitigation measures contained herein, the six Tribes that have substantially participated in the various administrative processes surrounding remediation of the site with DTSC, PG&E, and DOI, including throughout development of the final remedy. Interested Tribes include the Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Fort Yuma-Quechan Indian Tribe, and Hualapai Indian Tribe.*	Access Plan; Communication Log with Tribes (part of the EIR mitigation measure compliance reports)	In its June 17, 2011 comment on the Draft CMI Work Plan, DTSC stated that "Although DTSC specified that the site access and security plan are to be developed as part of the CMI Work Plan, DTSC acknowledges that the full scope of the plan cannot be accomplished without completion of the design. Therefore, DTSC agrees that PG&E can provide conceptual ideas within the CMI Work Plan for the development of a detailed plan as part of the final design." At the time of this writing, PG&E has been in contact with the BLM who has responsibility for preparing the Access Plan required by the PA. BLM has indicated that they are planning to complete their Access Plan by Fall 2011. Given the majority of land within the area is federal land, PG&E is waiting for BLM to complete their Access Plan in order to avoid the potential for inconsistencies. PG&E will then prepare an Access Plans for the lands not under federal management, for submittal with the final design (target late 2012).	PG&E has initiated work on an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan, for submittal with the final design (target 2013). Communication logs with Tribes are submitted to DTSC quarterly as part of the quarterly EIR mitigation measures compliance reports (see Table 6.1-2 in the 60% BOD Report)	On October 21, 2013, PG&E provided the Tribes a draft of the Access Plan for lands not under federal management for review and comment. Tribal comments were received on November 22, 2013. PG&E has updated and discussed the plan at the July 24, 2014 TMU. The Access Plan is included as an appendix of the Construction/Remedial Action Work Plan. Communication logs with Tribes are submitted to DTSC quarterly as part of the quarterly EIR mitigation measures compliance reports (the last quarterly report was submitted on July 31, 2014; the next quarterly report is due October 31, 2014).	

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Cultural Resources	CUL-1a-3	PG&E shall enhance existing measures to prevent and reduce incursions from recreational and/or other outside users from affecting unique archeological and historically significant resources, including resources within the Topock Cultural Area, by:		This mitigation measure will be met through actions taken to comply with CUL-1a-3a through 3d (see below).	This mitigation measure will be met through actions taken to comply with CUL-1a-3a through 3d (see below).	This mitigation measure will be met through actions taken to comply with CUL-1a-3a through 3d (see below).	
Cultural Resources	CUL-1a-3a	a. Retaining a Qualified Cultural Resource Consultant to implement the Mitigation Monitoring and Reporting Program (MMRP) and conducting yearly inspections (or less frequently upon approval by DTSC) of identified historical resources, including inspections of the Topock Cultural Area, to determine if substantial adverse changes have occurred relative to the condition of the historical resources during the past year or prior to the implementation of the proposed project. PG&E shall offer to retain a Tribal monitor at historic rates of compensation or Tribal representatives designated by the Tribal Council or chairperson, if so requested, to accompany the Qualified Cultural Resources Consultant during the inspections. The Qualified Cultural Resource Consultant shall be a person who is acceptable to DTSC and who is also a qualified archaeologist with a graduate degree in archaeology, anthropology or closely related field, plus at least 3 years of full-time professional experience in general North American archaeological research and fieldwork, with expertise/experience in the Southwest preferred.	Annual cultural resources monitoring report	PG&E has retained qualified cultural resources consultants for implementation of the MMRP, subject to DTSC's approval.	On January 27, 2012, PG&E nominated Applied Earthworks, Inc. (AE) as the qualified cultural resource consultant for the groundwater remedy project and requested DTSC's consideration and approval of AE. On March 2, 2012, DTSC accepted PG&E's nomination and approved AE as the qualified cultural resource consultant for the groundwater remedy project. In 2012, the Annual Cultural Monitoring event was conducted November 5 through 7, 2012.	The 2013 annual report titled "*Topock Compressor Station Groundwater Remediation Project: Condition Assessments at Sixty-Nine Archaeological and Historical Sites"* (AE 2014) was submitted to DTSC on March 12, 2014.	DTSC accepted PG&E's nomination and approved AE as the qualified cultural resource consultant for the groundwater remedy project on March 2, 2012. PG&E has offered to retain Tribal monitors at historic rates of compensation.
Cultural Resources	CUL-1a-3b	b. Developing a site security plan as part of the CMI Workplan. The site security plan shall include, but not be limited to, instructions for PG&E personnel to inspect the project site routinely during construction and report any human-caused disturbance to project facilities and the surrounding environment to DTSC and the appropriate landowner, such as BLM, USFWS, or FMIT, as appropriate, depending on the ownership of the property involved in the incursion. Notification shall be within a specified period, as established in the site security plan for the event, and shall also be summarized as part of the periodic implementation status report, as approved by DTSC for remedy implementation. This measure does not impose any obligation on PG&E to perform law-enforcement duties on federal or private lands, but is intended to provide increased observation of potential intrusions into the project area during construction and operation of the final remedy that may impact significant cultural resources. PG&E staff, or assigned agents, should be instructed to report any outside disturbance to the environment personally observed over the course of the working day. Information shall be reported within a specific period, as established in the site security plan, to DTSC and the appropriate landowners, such as BLM, USFWS, or FMIT, depending on the ownership of the property intruded upon. The site security plan may also include the use of PG&E security cameras at major ingress/egress gates into the project site. Finally, if requested by the FMIT the plan may include the use of private security personnel to patrol the FMIT-owned parcel within the project area to prevent outside incursions.	Site security plan	In its June 17, 2011 comment on the Draft CMI Work Plan, DTSC stated that "Although DTSC specified that the site access and security plan are to be developed as part of the CMI Work Plan, DTSC acknowledges that the full scope of the plan cannot be accomplished without completion of the design. Therefore, DTSC agrees that PG&E can provide conceptual ideas within the CMI Work Plan for the development of a detailed plan as part of the final design." PG&E provided concepts of security provisions in the CMI Work Plan (Section 4.2.3). PG&E will prepare a site security plan for submittals as part of the final design (target late 2012).	Work on the site security plan has begun. The site security plan is planned for submittal as part of the 90% design (target late 2013).	A site security plan titled *"Groundwater Remedial Action Site Security Plan"* is included in an appendix of the Construction/Remedial Action *Work Plan.* Also, PG&E will summarize any reports of human-caused disturbance to project facilities and the surrounding environment in the EIR mitigation monitoring compliance reports to be prepared quarterly during construction and annually during operations.	A site security plan titled *Groundwater Remedial Action Site Security Plan* is included as an appendix of the Construction/Remedial Action Work Plan, submitted on September 8, 2014.

TABLE 6.1-1
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PG&E Topock Compressor Station, Needles, California

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Cultural Resources	CUL-1a-3c	c. Coordinating with BLM and San Bernardino County to facilitate an outreach effort to the staff at Moabi Regional Park, requesting that they communicate to visitors the parts of the project area that are off limits to off-road vehicle usage because of health and safety concerns, public lands management plans, or landowner requests. PG&E shall make a good faith effort to involve the surrounding Tribes in this outreach effort, providing Interested Tribes with the opportunity to comment on outreach materials or provide a Tribal cultural resources specialist the opportunity to participate in the outreach activities. As part of this outreach effort, PG&E shall work with Park Moabi and offer to design, develop, and fund the installation of an informational kiosk within Park Moabi that informs visitors of the work being done at the project site. PG&E shall involve the Tribes to the maximum extent feasible, as determined by DTSC, in the design and development of the informational kiosk.	Design submittals	PG&E is currently in the process of implementing this mitigation measure.	PG&E is currently in the process of implementing this mitigation measure and has discussed with Interested Tribes at the monthly meetings on November 22, 2011, December 22, 2011, January 26, 2012, and March 22, 2012. To date, Tribal inputs have been received for this measure. PG&E is coordinating with BLM and San Bernardino County on constructing an information kiosk within Park Moabi and posting signage to communicate restrictions to off-road vehicle usage in part of the project area and inform visitors of the work being done at the site.	PG&E has prepared a protocol for a) outreach to Moabi Regional Park staff regarding communication to visitors about the restrictions for off-road vehicle use, and b) establishing an information kiosk.	
Cultural Resources	CUL-1a-3d	d. Posting signage to indicate those parts of the project area that are off limits to off-road vehicle usage due to possible health and safety concerns and to reduce potential damage to environmental resources. If agreed to by land owners and/or local, state, or federal management entities within the project area, PG&E shall work with the relevant land owner or land management entity to develop, design, and fund the installation of easily visible and clear signage. This may include coordination with BLM to install signage noting the designation of the area as an Area of Critical Environmental Concern owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.	Design submittals	PG&E will seek to work with land owners and land management entities (BLM, the Refuge, USFWS) during the design so that the signage can be established prior to commencing construction activities; implementation of this measure may take longer, however, depending upon requirements of land owners and land management entities.	PG&E will seek to work with land owners and land management entities (BLM, the Refuge, USFWS) during the design so that the signage can be established prior to commencing construction activities; implementation of this measure may take longer, however, depending upon requirements of land owners and land management entities.	PG&E has prepared a protocol to establish signage to indicate areas that are off limits to off-road vehicle usage in coordination with BLM.	
Cultural Resources	CUL-1a-4	PG&E shall work with representative members of the Interested Tribes to convene and retain a multidisciplinary panel of independent scientific and engineering experts as part of a Technical Review Committee (TRC). The TRC shall be made up of not more than five multidisciplinary experts who will be on call to review project-related documents, participate in project-related meetings, and advise interested Tribal members on technical matters relating to the final design and remedy. The TRC shall include only persons with technical expertise, including but not limited to geology, hydrology, water quality, engineering, paleontology, toxicology, chemistry, biology, or botany. Before July 1, 2011, PG&E shall post an open grant or Request for Qualifications (RFQ) and retain members of the TRC at rates comparable to those paid historically to Tribal experts by PG&E for the remediation project. TRC members shall be selected by majority vote of one representative from each participating Interested Tribe. PG&E shall provide Interested Tribes at least 30-days' notice of the meeting to select TRC members and to review TRC candidate qualifications. For the purposes of contracting, the grant may be awarded to one Tribal government to manage or, alternatively, PG&E may reimburse the Tribe or TRC members directly. The entirety of the monies shall be used to fund the scientific and engineering	EIR mitigation measures compliance reports (quarterly during design/ construction, annual during operation)	In compliance with this measure, PG&E posted a Request for Qualifications on several job boards, TRC members have been retained, and the TRC has been convened.	In March 2012, PG&E expanded the TRC scope to include review of documents related to the soil investigation at locations outside the Compressor Station. As directed by this measure, an annual activity report was submitted to DTSC on June 29, 2012. In addition, TRC activities are summarized and included in the quarterly EIR mitigation measures compliance reports.	As directed by this measure, the second annual activity report titled *"Annual Report Technical Review Committee Activities, Topock Compressor Station Groundwater Remediation Project, San Bernardino County, California"* (HDR 2013) was submitted on November 26, 2013. In addition, TRC activities are summarized and included in the quarterly EIR mitigation measures compliance reports (the last quarterly report was submitted on July 31, 2014; the next quarterly report is due October 31, 2014).	The TRC was convened on July 1, 2011. The first annual activity report was submitted on June 29, 2012. The second annual activity report was submitted on November 26, 2013.

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		team exclusively, and shall not be used to fund other Tribal government expenses or used to support legal counsel. A stipulation of the open grant shall be that the scientific and engineering team shall provide all deliverables and results to all involved Tribes, despite a possible contract agreement with only one Tribe or with PG&E. Upon conclusion of the construction phase of the project, the necessity and dollar value of the TRC shall be assessed by PG&E and, with the approval of DTSC, shall either be extended, reduced, or terminated under the operations and maintenance phase. An annual activity report shall be sent to DTSC for review and to ensure PG&E is in compliance.					
Cultural Resources	CUL-1a-5	Should any indigenous plants of traditional cultural significance and listed in Appendix PLA of this FEIR be identified within the project area, PG&E shall avoid, protect, and encourage the natural regeneration of the identified plants when developing the remediation design, final restoration plan, and IM-3 decommission plan. In the event that impacts on the identified plants cannot be avoided and such plants will be displaced, PG&E shall retain a qualified botanist who shall prepare a plant transplantation/monitoring plan which can be included as part of the Cultural Impact Mitigation Program (CIMP) referenced in CUL-1a-8 either by (1) transplanting such indigenous plants to an on-site location, or (2) providing a 2:1 ratio replacement to another location decided upon between PG&E and members of the Interested Tribes. Plans to transplant or replace such plants shall be approved by DTSC. In coordination with the qualified botanist, PG&E shall monitor all replanted and replacement plants for at least 3 5 years, and shall ensure at least a 75 percent survivorship during that time. This mitigation measure is not meant to replace or subsume any actions required by state or federal entities with regard to the protection of species listed as rare, threatened, or endangered.	Mitigation and monitoring plan for culturally sensitive plants	A floristic survey was completed on November 1 through 8, 2011 to establish a comprehensive inventory of plant species that occur in the EIR project area, identify sensitive plants species and to comply with this mitigation measure, which requires PG&E to avoid, protect, and encourage the regeneration of ethnobotanically significant plants listed in Appendix PLA of the EIR. The survey methodology is summarized in a technical memorandum entitled "*Topock Groundwater Remediation Project, Floristic Survey Methodology*" (CH2M HILL 2011c) and is included in Appendix A3 of this Basis of Design Report. Another round of floristic survey will held in the Spring 2012, however, the exact timing of the survey will be determined by a qualified botanist. A map will be prepared to document the survey results.	A continuation of the Fall 2011 floristic survey was conducted from March 12 to 20, 2012. Additional floristic survey was conducted from March 12 through 14 2013. On March 29, 2013 PG&E submitted two reports related to plant surveys: a) The first report titled "Topock Groundwater Remediation Project Floristic Survey Report" summarizes the floristic survey results from 2011 and 2012; this report is included in Appendix A5 of this BOD report. Results from 2013 are planned to be included in the next design deliverable associated with the freshwater source details. b) The second report titled "Topock Groundwater Remediation Project Ethnobotany Survey Report" summarizes the survey results for ethnobotanically sensitive plants from 2011 and 2012; this report is included in Appendix A7 of this BOD report. Results from 2013 are planned to be included in the next design deliverable associated with the freshwater source details. In addition, PG&E is working with interested Tribes on the plant transplantation/monitoring plan required under this measure, as part of the CIMP.	A Revised Floristic Survey Report (CH2M HILL 2013h) summarizing survey results from 2011 through 2013, including freshwater supply sites, was submitted on December 30, 2013. The report is also included in Appendix A5 of the 90% BOD. A Revised Ethnobotany Survey Report (CH2M HILL 2014e) summarizing survey results from 2011 through 2013 was submitted on January 15, 2014. The report is also included in Appendix A7 of the 90% BOD. The *Supplemental Ethnobotanical Plant Surveys for the Pacific Gas and Electric Company's Topock Compressor Station, San Bernardino, California* report (CH2M HILL 2014f) summarizing the December 2013 Survey results was submitted on February 28, 2014. The supplemental report is also included in Appendix A7 of the 90% BOD. In compliance with this measure, a mitigation and monitoring plan for culturally sensitive plants was prepared and included as Appendix A of the CIMP.	The survey methodology technical memorandum was completed on October 31, 2011, and provided to Interested Tribes on November 8, 2011. The revised Final Floristic Survey Report was completed on December 30, 2013. The revised Final Ethnobotany Survey Report was completed on January 15, 2014. A supplemental report was completed on February 28, 2014. A mitigation and monitoring plan for culturally sensitive plants was prepared and included as Appendix A of the CIMP.

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Cultural Resources	CUL-1a-6	All additional phone calls and alarms associated with remediation activities or facilities shall not be routed through PG&E's existing alarm system utilized at the compressor station. The notification system for remediation-related alerts and/or phone calls shall not introduce additional noise to the project area, to the maximum extent feasible, provided there is ongoing compliance with applicable safety regulations or standards of the Federal Energy Regulatory Commission, Occupational Safety and Health Administration, and other agencies. (See Mitigation Measure NOISE-3 for additional mitigation related to the Topock Cultural Area).	Design submittals	The requirement of this mitigation measure has been incorporated into the design criteria as presented in Appendix C of this Basis of Design Report for the preliminary design. In addition, the detailed specification for phone calls and alarms associated with remediation activities will also be included the intermediate (60%) design.	The requirement of this mitigation measure has been incorporated into the design criteria as presented in Appendix C of the BOD Report for the intermediate (60%) design.	The requirement of this mitigation measure has been incorporated into the design criteria as presented in Appendix C of the BOD Report for the pre-final (90%) design.	
Cultural Resources	CUL-1a-7	Nighttime construction-related activities shall be limited to work that cannot be disrupted or suspended until the following day, such as, but not limited to, well drilling and development or decommissioning activities. Lighting considerations, including the potential use of solar power for some lighting, shall be included as part of the remedial design plan to be developed with involvement of Interested Tribes and the U.S. Department of the Interior. To minimize construction and operations-related lighting impacts, the lighting in the remedial design plan shall include, at a minimum: (1) shrouding/shielding for portable lights needed during construction and operational activities; (2) installation of portable lights at the lowest allowable height and in the smallest number feasible to maintain adequate night lighting for safety; (3) shielding and orientation of lights such that off-site visibility of light sources, glare, and light from construction activities is minimized to the extent feasible. No additional permanent poles shall be installed for lighting. This mitigation measure is not meant to replace or subsume any actions required by the County or state or federal entities with regard to lighting required for minimum security and safety purposes.	Design submittals	The requirement of this mitigation measure has been incorporated into the design criteria as presented in Appendix C of this Basis of Design Report for the preliminary design (see C.5.2). In addition, the detailed specification for lighting will also be included the intermediate (60%) design.	The requirement of this mitigation measure has been incorporated into the design criteria as presented in Appendix C of the BOD Report for the intermediate (60%) design. PG&E discussed this measure with interested Tribes in the monthly meetings on April 26, 2012, July 27, 2012, October 25, 2012, and November 9, 2012.	The requirement of this mitigation measure has been incorporated into the design criteria as presented in Appendix C of the BOD Report for the pre-final (90%) design.	
Cultural Resources	CUL-1a-8	Prior to commencement of construction, PG&E shall submit as part of the final Remedial Design, a CIMP developed in coordination with Interested Tribes for DTSC's review and approval. The CIMP may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the Programmatic Agreement (Appendix PA). The CIMP shall include, at a minimum and to DTSC's satisfaction, the following:	CIMP	Work on the CIMP commenced in May 2011. The CIMP will be submitted as part of final design as directed.	Work on the CIMP is ongoing. PG&E has been working collaboratively with interested Tribes on various sub-measures under the CIMP. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	PG&E started work on the CIMP in May 2011, in coordination with Interested Tribes during face- to- face meetings or teleconference calls held once per month. On July 8, 2013, PG&E provided a preliminary draft CIMP (including the IM-3 Decommissioning Plan) to Interested Tribes. Tribes provided comments on the draft CIMP in October 2013. PG&E reviewed and discussed select comments and responses with the Tribes during the March and April 2014 TMUs. At DTSC's and Tribes' request, the CIMP (PG&E 2014) was submitted on May 1, 2014, in advance of the 90% design (see paragraph below for submittal dates related to the IM-3 Decommissioning Plan). PG&E incorporated select Tribes' comments in the May 1, 2014 CIMP, and sent Tribes a letter to explain why certain comments were not incorporated.	

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						IM-3 Decommissioning Plan (Appendix B of CIMP) A preliminary draft IM-3 Decommissioning Plan was submitted to the FMIT in April 2013. The FMIT provided comments on the preliminary draft Plan in June 2013. PG&E updated the draft Plan and submitted to Interested Tribes as an appendix to the CIMP on July 8, 2013. The FMIT and the Hualapai Tribe provided comments on the updated Plan in October 2013. PG&E sent letters to respond to the Tribes' comments on July 1 and discussed the responses during the July TMU. PG&E incorporated select Tribes' comments and submitted a revised Plan with the 90% design on September 8, 2014.	
Cultural Resources	CUL-1a-8a	a. Protocols for continued communication. Consistent with past practice and the communication processes previously entered into by PG&E with Interested Tribes, the company shall continue to communicate with Interested Tribes during the design, construction, operation, and decommissioning of the project. Prior to implementation of construction, PG&E shall communicate with Interested Tribes that place cultural significance on the Topock Cultural Area. Outreach efforts between the Tribes and PG&E shall be communicated by PG&E to DTSC quarterly during the design and construction phase for review and input, and annually during project operations.	EIR mitigation measures compliance reports (quarterly during design/ construction, annual during project operation)	Outreach efforts have been and are ongoing. Table 7-2 of the 30% BOD Report contains a log of Tribal communications for the specified time period. With the completion of the CMI Work Plan in November 2011, PG&E will start to submit quarterly reports to DTSC, starting with the first report (Q4 2011) in January 2012.	Outreach efforts have occurred and are ongoing. Protocols for continued communication are being developed as part of the CIMP. This measure was discussed with interested Tribes at the monthly meeting on May 24, 2012 and December 4, 2012. As required by DTSC, a log of communications with interested Tribes has been maintained and included in the quarterly EIR mitigation measure compliance reports since January 2012. The last quarterly report was submitted to DTSC on January 31, 2013. Table 6.1-2 of the 60% BOD Report contains a log of Tribal communications since the start of Q1 2013 through March 19, 2013.	Outreach efforts have occurred and are ongoing (e.g., monthly TMUs). Protocols for continued communication were developed and included as part of the CIMP. As required by DTSC, a log of communications with interested Tribes has been maintained and included in the quarterly EIR mitigation measure compliance reports since January 2012. The last quarterly report was submitted on July 31, 2014; the next quarterly report is due October 31, 2014.	
Cultural Resources	CUL-1a-8b	b. Protocols for the appropriate treatment of archaeological materials that may be disturbed or discovered during implementation of the final remedy, including protocols for the repatriation of significant items of cultural patrimony that may be recovered during the project, and protocols for the curation of cultural materials recovered during the project. Treatment of archaeological sites may include data recovery or capping. If data recovery is proposed, a Research Design following California Office of Historic Preservation guidelines or federal guidelines, as applicable, shall be prepared and reviewed and approved by DTSC.	CIMP	The required protocols will be developed and included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on June 28, 2012 and December 4, 2012. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for the appropriate treatment of archaeological materials that may be disturbed or discovered during implementation of the final were developed and included as part of the CIMP.	

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Cultural Resources	CUL-1a-8c	c. Protocols for the review of cultural resource-related documents throughout the design, construction, and operational phases.	CIMP	Draft protocols for review of cultural resource-related documents were included in the CMI Work Plan (Section 4.8), and will also be included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on June 28, 2012, August 23, 2012, September 19, 2012, September 27, 2012, and January 15, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for the review of cultural resource-related documents throughout the design, construction, and operational phases were developed and included as part of the CIMP.	
Cultural Resources	CUL-1a-8d	d. Protocols for the review of project design documents before the beginning of construction, including reviews of project design documents throughout the design process (e.g., Preliminary [approximately 30% completed], Intermediate [approximately 60% completed] and Pre-final design).	CIMP	Draft protocols for review of cultural resource-related documents were included in the CMI Work Plan (Section 4.8), and will also be included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meetings on February 23, 2012, March 22, 2012, April 26, 2012, May 24, 2012, and January 15, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for the review of project design documents were developed and included as part of the CIMP.	
Cultural Resources	CUL-1a-8e	e. Protocols for the appropriate methods to be used to restore the environment to its preconstruction condition upon decommissioning of individual groundwater remedy facilities.	CIMP	The required protocols will be developed and included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with Interested Tribes at the monthly meeting on January 15, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for the appropriate methods to be used to restore the environment to its preconstruction condition upon decommissioning of individual groundwater remedy facilities were developed and included as part of the CIMP.	
Cultural Resources	CUL-1a-8f	f. A plan for the decommissioning and removal of the IM-3 Facility and proposed restoration of the site (to be an appendix to the CIMP).	Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration	The plan for the decommissioning and removal of the IM-3 Facility and Site Restoration will be included as an appendix to the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	The plan for the decommissioning and removal of the IM-3 Facility and site restoration was developed and included in Appendix B of the CIMP and also as an appendix of the Construction/Remedial Action Work Plan.	

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Cultural Resources	CUL-1a-8g	g. Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site.	CIMP	Discussions regarding repatriation of soils have been and are ongoing since early 2011. The required protocols will be developed and included in the CIMP. The CIMP will be submitted with the final design as directed.	Discussions regarding protocols for the repatriation of soils have been and are ongoing since early 2011. Agencies and Tribal members reviewed and provided inputs on the draft *Management Protocol for Handling and Disposition of Displaced Site Material*, as well as participated in conference calls (January 9, 2012, April 10, 2012, June 15, 2012, and August 2012) to discuss comments. A revised protocol along with responses to comments (RTCs) was sent to Agencies and Tribes for review on August 28, 2012. FMIT sent a comment letter on the revised protocol and RTCs on September 7, 2012. DTSC responded to FMIT on September 18, 2012. Tribes and Agencies met on October 16, 2012 to further discuss RTC process. Subsequent to this meeting, DTSC issued directives for implementation of an updated RTC process. On January 14, 2013, the revised protocol was reissued along with updated RTCs (that reflected the updated RTC process) as part of the Final Soil RCRA Facility Investigation/Remedial Investigation Work Plan (CH2M HILL 2013b). The revised protocol is also included in Appendix B of the Soil Management Plan (Volume 4 of the Draft O&M Manual), and will again be included in the CIMP. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	The revised *Management Protocol for Handling and Disposition of Displaced Site Material* was included in Appendix C of the CIMP, Appendix B of the Soil Management Plan (Volume 4 of the Revised O&M Manual), and also as an appendix of the Construction/Remedial Action Work Plan. Detailed procedures to implement the management protocol are included in the Soil Management Plan.	
Cultural Resources	CUL-1a-8h	h. Protocols for the appropriate methods, consistent with Mitigation Measure NOISE-3, to reduce auditory impacts.	CIMP	The required protocols will be developed and included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval. This measure was discussed with interested Tribes at the monthly meeting on February 19, 2013.	Protocols for the appropriate methods, consistent with Mitigation Measure NOISE-3, to reduce auditory impacts, were developed and included as part of the CIMP.	

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Cultural Resources	CUL-1a-8i	i. Protocols for the appropriate methods, consistent with Mitigation Measures AES-1 and AES-2, to reduce visual intrusions.	CIMP	The required protocols will be developed and included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on June 28, 2011, October 25, 2012, November 9, 2012, and March 19, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for the appropriate methods, consistent with Mitigation Measures AES-1 and AES-2, to reduce visual intrusion were developed and included as part of the CIMP.	
Cultural Resources	CUL-1a-8j	j. Protocols for Tribal notification in advance of project-related activities that the Interested Tribes may feel have the potential to cause adverse impacts to sensitive cultural resources.	CIMP	The required protocols will be developed and included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with Interested Tribes at the monthly meeting on September 27, 2012, October 10, 2012, November 9, 2012, and March 19, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for Tribal notification in advance of project-related activities were developed and included as part of the CIMP.	
Cultural Resources	CUL-1a-8k	k. Protocols to be followed by project personnel to accommodate, if feasible as determined by DTSC, key Tribal ceremonies that involve the Topock Cultural Area.	CIMP	Project personnel will accommodate, if feasible as determined by DTSC, key Tribal ceremonies that involve the Topock Cultural Area, provided that such Tribal ceremonies may not interfere with the expeditious implementation of the remedy or create health and safety concerns. This protocol will be included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on May 24, 2012, September 27, 2012, October 10, 2012, November 9, 2012, and February 19, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols to be followed by project personnel to accommodate key Tribal ceremonies that involve the Topock Cultural Area were developed and included as part of the CIMP.	

TABLE 6.1-1
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Cultural Resources	CUL-1a-8l	l. Provisions affording sufficient Tribal monitors to observe ground-disturbing activities and/or other scientific surveying (e.g., biological surveys) that may occur in preparation for construction activities. Ground-disturbing activities include trenching, excavation, grading, well excavation/drilling, decommissioning of the IM-3 Facility and subsurface pipeline, or other construction-related activities.	CIMP	Tribal monitors will be invited to observe ground-disturbing activities. This provision will be included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on May 24, 2012, December 18, 2012, and February 19, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for Tribal monitors to observe ground- disturbing activities were developed and included as part of the CIMP.	
Cultural Resources	CUL-1a-8m	m. Provisions of reasonable compensation for Tribal monitors consistent with historic rates.	CIMP	Tribal monitors will receive reasonable compensation consistent with agreed upon historic rates. This provision will be included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on May 24, 2012, December 18, 2012, and March 19, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Provisions required in this mitigation measure were developed and included as part of the CIMP.	
Cultural Resources	CUL-1a-8n	n. Locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction.	CIMP	Locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction will be included in the CIMP.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on April 26, 2012, August 23, 2012, September 19, 2012, and March 19, 2013. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for protective measures for archaeological/historical sites during construction were developed and included as part of the CIMP.	

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Cultural Resources	CUL-1a-8o	o. Protocols for the reporting of discoveries of cultural importance consistent with existing statutes and regulations.	CIMP	The required protocols will be developed and included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on June 28, 2012, September 27, 2012, October 10, 2012, and November 9, 2012. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for the reporting of discoveries of cultural importance were developed and included as part of the CIMP.	
Cultural Resources	CUL-1a-8p	p. Protocols for the inspection of remediation facilities and/or staging areas throughout the construction phase.	CIMP	The required protocols will be developed and included in the CIMP. The CIMP will be submitted with the final design as directed.	Work on the CIMP is ongoing. The CIMP outline was discussed with interested Tribes on March 23 2012. PG&E has and will continue to discuss with and solicit inputs from interested Tribes on various mitigation measures under the CIMP. This measure was discussed with interested Tribes at the monthly meeting on June 28, 2012 and December 4, 2012. A draft CIMP will be provided to interested Tribes for review prior to submittal to DTSC for review and approval.	Protocols for the inspection of remediation facilities and/or staging areas during construction were developed and included as part of the CIMP.	

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Cultural Resources	CUL-1a-9	During selection of the design and specific locations for physical remediation facilities, PG&E shall, in communication with the Interested Tribes (and subject to their review), and to the maximum extent feasible, as determined by DTSC, give: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, such as but not limited to wells and pipelines, but not including IM-3 facilities. "Disturbed" areas in this context means those areas outside of documented archaeological site boundaries that have experienced ground disturbance in the last 50 years. PG&E shall produce an aerial map of these disturbed areas to guide project design, and PG&E shall make a good faith effort to provide Tribes with an opportunity to review and comment on the information displayed on the map in determining "disturbed" areas.	Aerial map of disturbed areas	As directed, PG&E prepared an aerial map of disturbed areas to guide project design and made a good faith effort to provide Tribes with an opportunity to review and comment. PG&E provided the disturbed areas map to Interested Tribes for review and comment on May 26, 2011. Written comments on the map were received from the FMIT on July 5, 2011 and the Hualapai Tribe on July 1, 2011. PG&E responded to the Hualapai and the FMIT in July 2011 with an invitation to a site walk for discussion of the comments and ground-truth the map. To date, three Tribes have attended site walks/onsite meetings to discuss the map -- the site walk/meeting with the Colorado River Indian Tribes (CRIT) occurred on June 7, 2011, the site walk/meeting with the FMIT occurred on October 4, 2011, and the site walk/meeting with the Hualapai Tribe occurred on October 26, 2011. Additional discussions regarding the aerial map are planned. A current version of the aerial map is included in Appendix A2 of this Basis of Design Report. In compliance with the directive to give priority to re-use of existing physical improvements and to previously disturbed areas for new physical improvements, the preliminary (30%) design proposes the following: • The freshwater supply for the remedy will be the existing HNWR-1 well. If needed, this water supply can be supplemented by the current Compressor Station water supply (by existing Topock-2 and Topock-3 wells in Arizona). • The freshwater supply storage will be the existing water storage tanks at the Compressor Station. • The remedy-produced water treatment plant will be located entirely within the footprint of Compressor Station and much of it will replace existing structures within the maintenance shop area.	The design has been and is carried out in a manner that gives: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, including but not limited to wells and pipelines, but not including IM-3 facilities. In compliance with the directive to give priority to re-use of existing physical improvements and to previously disturbed areas for new physical improvements, the intermediate (60%) design proposes the following: • All existing monitoring wells have been incorporated into the monitoring well network for the remedy, thereby reducing the need for drilling new monitoring wells. • The freshwater supply for the remedy will be the existing HNWR-1 well. • The freshwater supply storage will be the existing water storage tanks at the Compressor Station. • The remedy-produced water treatment plant and the freshwater pre-injection treatment system will be located entirely within the footprint of Compressor Station. • The central maintenance facility for the remedy will be located entirely on PG&E property, at the Transwestern Bench. By centralizing maintenance functions into one location, this reduces the footprint of remedy structure outside of PG&E property.	The aerial map of disturbed areas was updated to include areas with planned facilities associated with freshwater supply in Arizona, and areas west of Moabi Regional Park associated with soil storage. The updated map is included in Appendix A2 of the 90% BOD Report. In compliance with the directive to give priority to re-use of existing physical improvements and to previously disturbed areas for new physical improvements, the pre-final (90%) design proposes the following: • All existing monitoring wells have been incorporated into the monitoring well network for the remedy, thereby reducing the need for drilling new monitoring wells. • The piping corridor is located almost entirely in existing roadways, right- of-ways and previously disturbed areas. • Most of the existing access roads have been incorporated into the 90% design. • The remedy-produced water conditioning plant and the contingent systems (arsenic treatment and dissolved metals removal) are located entirely within the footprint of the Compressor Station. • The operation building and carbon storage/amendment facilities are located on the existing Transwestern Bench and MW-20 Bench. • All of the proposed soil storage and construction staging areas are located on previously disturbed areas. • The main construction headquarters and staging area is located on previously disturbed areas at Moabi Regional Park.	A current version of the aerial map of disturbed areas was submitted on November 18, 2011. An update of the aerial map of disturbed areas is included in Appendix A2 of the 90% BOD Report.

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Cultural Resources	CUL-1a-10	PG&E shall consider the location of Loci A, B, and C of the Topock Maze during the design and approval of the physical facilities necessary for the final remedy and is prohibited from creating any direct physical impact on the Topock Maze, as it is manifested archaeologically. Through the design, PG&E shall prevent all indirect (e.g. noise, aesthetics) impacts on the Topock Maze, to the maximum extent feasible as determined by DTSC.	Design submittals	The design has been and is carried out in a manner that excluded direct impacts on Loci A, B, and C of the Topock Maze. Prevention of indirect impacts to the Maze will be incorporated into the design to the maximum extent feasible as determined by DTSC.	The design has been and is carried out in a manner that avoids any direct impacts on Loci A, B, and C of the Topock Maze. PG&E Remediation Resources Specialist Glenn Caruso participated in field reviews of planned remedial facilities with the design team on April 23-24 and June 20, 2012. The purpose of these field reviews along with in-office reviews is to ensure that the footprints of planned facilities do not create direct physical impact on the Topock Maze, as it is manifested archaeologically. There are no remedy facilities inside the Topock Maze. Prevention of indirect impacts to the Maze will be incorporated into the design to the maximum extent feasible as determined by DTSC.	The design was carried out in a manner that avoids any direct impacts on Loci A, B, and C of the Topock Maze. PG&E Cultural Resources Expert Glenn Caruso participated in field review of planned remedial facilities and temporary construction footprints with the design team on April 7-10, 2014. Glenn Caruso also led in-office reviews of planned facilities and temporary construction-related footprints. The purpose of the field review along with in-office reviews is to ensure that project footprints do not create direct physical impact on the Topock Maze, as it is manifested archaeologically. There are no remedy facilities inside the Topock Maze. Prevention of indirect impacts (e.g., noise, aesthetics) to the Maze has been incorporated into the design as follows: <u>Noise/Vibration</u> a) In compliance with EIR mitigation measure NOISE-1a, there is no proposed remediation or new monitoring wells within 45 feet of vibration-sensitive receptors (i.e., homes/ structures) or within 30 feet and 275 feet of vibration-sensitive land uses (i.e., homes) in California and Arizona, respectively. b) During the design, PG&E conducted site visits with Agencies, Tribes, and Stakeholders to view and obtain inputs on locations of planned facilities including new remediation, new monitoring wells, and piping corridors. c) In response to Tribes' comments on the 60% design, PG&E moved all remedy wells and vaults from the west side of NTH to the east side. In addition, PG&E will not use the east side (side that is closer to Maze A) of the TCS evaporation ponds for remedy construction staging. d) As indicated in the 60% RTC #319, the Noise Engineer has reviewed the selection of aboveground transformers and air conditioning units for the enclosures of aboveground communication/control panels for conformance with the project noise design criteria (Appendix C of the 90% BOD Report). e) Mitigation measure NOISE-2 to reduce auditory impacts related to project-generated construction-related noise has been incorporated into the Construction/Remedial Action Work Plan (Section 4) for implementation during construction.	

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						f) PG&E has developed protocols to reduce auditory impacts, consistent with EIR mitigation measure NOISE-3, as part of the CIMP, and has included those protocols in the Construction/Remedial Action Work Plan (Section 4) for implementation. <u>Aesthetics</u> a) During the design, PG&E conducted site visits with Agencies, Tribes, and Stakeholders to view and obtain inputs on locations of planned remedial facilities. b) PG&E implemented additional design protocols to reduce visual intrusions, as outlined in Section 2.9.2 of the CIMP. c) PG&E has and will continue to provide opportunities for Agency, Tribal, and Other Stakeholder input on the visual nature of project design through inclusion of visualizations of select remedy components in design documents (CIMP protocol, see Section 2.9.3). d) PG&E has developed protocols to reduce visual intrusion, consistent with mitigation measures AES-1 and AES-2, as part of the CIMP, and has included these protocols in the Construction/Remedial Action Work Plan (Section 4) for implementation.	
Cultural Resources	CUL-1a-11	PG&E shall provide an open grant for two part-time cultural resource specialist/project manager positions during the design and construction phases of the remediation project. The positions shall be filled by qualified members of an Interested Tribe as nominated by a majority vote of their Tribal Council(s) and appointed by DTSC's project manager if more than two members are nominated. The award of the grants is for continued involvement in review of project documents and participation in project-related meetings, including TRC meetings, at rates of historic compensation. Additionally, in light of FMIT's ownership of land in the project area and historical involvement in the environmental process, additional funding is guaranteed for one full-time FMIT position upon submission of an application by a qualified FMIT member who shall be appointed by the FMIT council, provided such funding is not duplicative of the services and funding provided by PG&E pursuant to the Settlement Agreement between PG&E and the FMIT in Fort Mojave Indian *Tribe v. Dept. of Toxic Substances Control, et al.*, Case No. 05CS00437 for a position with the FMIT's AhaMakav Culture Society. The payment of grant monies shall be timed to the awarded Tribes' fiscal cycles so that the Tribes are not forced to front funds for long periods of time. These positions shall act as cultural resources contacts and project managers for interactions between the Tribes, PG&E,	Administrative step - no technical document required	A notice of the open grant for funding of two part-time cultural resource specialist/project manager positions was sent to Interested Tribes by a letter dated April 20, 2011. To date, PG&E has not received any responses to the April 20, 2011 letter from Tribes.	As of the submittal of the 60% design, PG&E has funded a second project manager position for the Cocopah Indian Tribe. The first funded position was for the Chemehuevi Indian Tribe.	There was no change since the 60% design.	As of the time of this writing, PG&E has funded a second project manager position for the Cocopah Indian Tribe. The first funded position was for the Chemehuevi Indian Tribe.

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		and DTSC to ensure coordination for review and comment of subsequent project and/or environmental documents related to the design and implementation of the groundwater remediation project to avoid, reduce, or otherwise mitigate impacts on historical resources, as defined by CEQA. This funding is separate from provisions for Tribal monitor positions and shall not be used for routine Tribal business or legal counsel. For review and approval, PG&E shall provide DTSC with the names of the selected grant recipients and an annual report that summarizes activities associated with the grant program. Upon the conclusion of the construction phase of the project, the necessity and dollar value of the grant program shall be assessed by PG&E and, with the approval of DTSC, shall either be extended or terminated under the operations and maintenance phase.					
Cultural Resources	CUL-1a-12	PG&E shall provide sufficient opportunity, as determined by DTSC, for Interested Tribes to provide a traditional healing/cleansing ceremony (or ceremonies) before and after ground disturbing construction activities occur.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	PG&E will offer interested Native American Tribes the opportunity to provide a traditional healing/cleansing ceremony (or ceremonies) before and after ground disturbing activities occur.	PG&E will offer interested Native American Tribes the opportunity to provide a traditional healing/cleansing ceremony (or ceremonies) before and after ground disturbing activities occur.	PG&E will offer interested Native American Tribes the opportunity to provide a traditional healing/cleansing ceremony (or ceremonies) before and after ground disturbing activities occur.	
Cultural Resources	CUL-1a-13	PG&E shall, in communication with Interested Tribes, develop as part of the CMI Workplan, a worker cultural sensitivity education program. The program shall be implemented before commencement of construction and throughout construction and operations as personnel are added. This program may include information provided directly by Tribal entities either in written form or on video, in a manner consistent with Appendix C in the existing BLM Programmatic Agreement. The worker cultural sensitivity education program shall ensure that every person working on the project as an employee or contractor, before participating in design or outdoor activities at the project site, is informed regarding: the cultural significance of the Topock Cultural Area, appropriate behavior to use within the Topock Cultural Area, activities that are to be avoided in the Topock Cultural Area, and consequences in the event of noncompliance.	Worker Cultural Sensitivity Education Program	As described in the CMI Work Plan (Section 4.2.1), the education on cultural/historical resources sensitivity for Topock currently occurs via periodic training and project initiation meetings. Sensitivity training classes are conducted at least annually, and are attended by all workers available to participate. Sensitivity training/education is also provided at project initiation meetings, typically held at the site prior to field work. The training is provided by the Site Operations Manager, the Project Archaeologist, and Interested Tribal members who attend the meetings. In compliance with this measure, a training/education manual will be prepared using existing and new material, as available.	As described in Section 4.2.1 of the CMI/RD Work Plan (CH2M HILL 2011a), the education on cultural/historical resources sensitivity for Topock currently occurs via periodic training and project initiation meetings. Sensitivity training classes are conducted at least annually, and are attended by all workers available to participate. Sensitivity training/education is also provided at project initiation meetings, typically held at the site prior to field work. The training is provided by the Site Operations Manager, the Project Remediation Resources Specialist, and Interested Tribal members who attend the meetings. In compliance with this measure, PG&E and Tribes are collaborating on a training/ education manual to educate workers. This measure was discussed with interested Tribes at the monthly meeting on April 26, 2012, August 23, 2012 and September 19, 2012.	PG&E has prepared, in coordination with agencies and Tribes, educational materials used in Orientation sessions for the Topock project. In addition, PG&E has prepared, in compliance with this measure, a protocol for the development of a cultural sensitivity education program to educate workers (included as an appendix to the Construction/ Remedial Action Work Plan). Implementation of this protocol is underway.	

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Cultural Resources	CUL-1b and 1c	**During Design, Construction, O&M, and Decommissioning Consider the Location of Historical Resources and Implement Measures to Avoid Resources to the Extent Feasible.** The following actions will reduce the potential for impacts on identified historically significant resources (other than the Topock Cultural Area, which is separately addressed in CUL-1a) within the project area. As detailed below, these actions include consideration of the location of historical resources, preparation of a cultural resources study, and preparation of a treatment plan. Monitoring of ground-disturbing activities during project construction will further protect historically significant resources. Protective actions are also described pertaining to the discovery of any previously unidentified potentially significant cultural resources.	Design submittals	This mitigation measure will be met through actions taken to implement CUL-1b/c-1 through c-4 (see below). In addition, the aerial map of disturbed areas (CUL-1a-9) provides a first cut at protecting and avoiding archaeological and historical sites.	This mitigation measure will be met through actions taken to implement CUL-1b/c-1 through c-4 (see below). In addition, the aerial map of disturbed areas (CUL-1a-9) provides a first cut at protecting and avoiding archaeological and historical sites. PG&E remediation resources specialist Glenn Caruso participated in field reviews of planned remedial facilities with the design team on April 23-24 and June 20, 2012. The purpose of these field reviews along with in office reviews is to ensure that the footprints of planned facilities are designed in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible.	This mitigation measure will be met through actions taken to implement CUL-1b/c-1 through c-4 (see below). In addition, the aerial map of disturbed areas (CUL-1a-9) provides a first cut at protecting and avoiding archaeological and historical sites. PG&E Cultural Resources Expert Glenn Caruso participated in field review of planned remedial facilities and temporary construction footprints with the design team on April 7-10, 2014. Glenn Caruso also led in-office reviews of planned facilities and temporary construction-related footprints. The purpose of the field review along with in-office reviews is to ensure that project footprints are designed in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible.	
Cultural Resources	CUL-1b/c-1	PG&E shall consider the locations of the identified historic resources described above (EIR Table 4.4-3) during the design of the physical improvements necessary for the proposed project and avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible, as determined by DTSC. The final design plans for the project will be submitted to DTSC for review and approval.	Design submittals	The design has been and is carried out to avoid impacts to historical and archaeological resources to the maximum extent practicable as determined by DTSC. The final design will be submitted to DTSC as directed.	PG&E remediation resources specialist Glenn Caruso participated in field reviews of planned remedial facilities with the design team on April 23-24 and June 20, 2012. The purpose of these field reviews along with in office reviews is to ensure that the footprints of planned facilities are designed in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible.	PG&E Cultural Resources Expert Glenn Caruso participated in field review of planned remedial facilities and temporary construction footprints with the design team on April 7-10, 2014. Glenn Caruso also led in-office reviews of planned facilities and temporary construction-related footprints. The purpose of the field review along with in-office reviews is to ensure that project footprints are designed in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible.	
Cultural Resources	CUL-1b/c-2	During preparation of the final design, and consistent with CUL-1 a-3, PG&E shall retain a Qualified Cultural Resources Consultant to prepare a cultural resources study that assesses the potential for the construction, operations, or decommissioning of specific proposed improvements to result in significant impacts on identified historically significant resources described in Impacts CUL-1b and CUL-1c. This may include a geoarchaeological investigation and/or non-destructive remote-sensing surveys of potentially disturbed areas to determine if a potential exists for buried historical and archaeological resources. “Significant impacts” as used here means the potential for construction to demolish or materially alter in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR. The study will be submitted to DTSC for review and evaluation to determine if existing mitigation measures are appropriate.	Cultural resources study/Geoarchaeological investigation report	Consistent with CUL-1a-3, PG&E has retained qualified cultural resources consultants to prepare a cultural resources study. The study will commence at the intermediate (60%) design stage, after the locations of remedial facilities are confirmed.	This measure was discussed with interested Tribes at the monthly meeting on April 26, 2012. Geoarchaeological investigations were conducted on June 5-8, 2012 by Dr. Roland Brady of Brady and Associates Geological Services (BAGS) and Pat Maloney of Applied Earthworks (AE); Pat Maloney is the qualified cultural resources consultant. Participants from Interested Tribes include Wirlene Fischer-Holt (CRIT), Dr. Leo Leonhart (Consultant to the FMIT), and Dr. Margaret Eggers (TRC). A geoarchaeological investigation report is forthcoming.	The geoarchaeological investigation report titled *Geoarchaeological Assessment for the Topock Remediation Project, Mohave County, AZ, and San Bernardino County, CA* was completed and submitted to DTSC on February 28, 2014 (BAGS and AE 2014). The information in this report has been used to inform the design (i.e., via reviews by PG&E Cultural Resources Expert) and incorporated into the Construction/Remedial Action Work Plan as protocols to be followed during construction activities (Section 4).	The geoarchaeological investigation report (BAGS and AE 2014) was completed on February 28, 2014.

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Cultural Resources	CUL-1b/c-3	If the cultural resources study determines that the construction of physical improvements would result in significant impacts on identified historically significant resources described in Impacts CUL-1b and CUL-1c, and avoidance of the resource is not feasible, PG&E shall prepare a treatment plan that identifies measures to reduce these impacts (see above description of the CIMP) for DTSC's review and approval. The treatment plan shall identify which criteria for listing on the CRHR contribute to the affected resource's significance and which aspects of significance would be materially altered by construction, operations, or decommissioning and shall provide for reasonable efforts to be made to permit the resource to be preserved in place or left in an undisturbed state. Methods of accomplishing this may include capping or covering the resource with a layer of soil. To the extent that a resource cannot feasibly be preserved in place or left in an undisturbed state, excavation as mitigation shall be restricted to those parts of the resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a historically significant resource if the treatment plan determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource. The plan shall require communication with all Interested Tribes with regard to their perspectives and wishes for the treatment of the resources.	Cultural resources treatment plan	Implementation of this measure is dependent upon the cultural resources study conducted under CUL-1b/c-2.	This measure was discussed with Interested Tribes at the monthly meeting on October 25, 2012 and November 9, 2012.	A Cultural Resources Treatment Plan will be prepared and submitted to DTSC shortly after submission of the 90% design.	
Cultural Resources	CUL-1b/c-4	Consistent with CUL-1a-3a above, PG&E shall retain a Qualified Cultural Resources Consultant to observe ground-disturbing activities and shall be required to request the participation of Tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction (see the description of the CMI Workplan, above). The Qualified Cultural Resources Consultant shall provide training to construction personnel on the locations of identified resources, values associated with the identified resources, responsibility for reporting suspected historic resources, and procedures for suspension of work in the immediate vicinity of the discovery, and shall use exclusionary fencing, flagging, or other appropriate physical barriers to mark the boundaries of identified resources. The Qualified Cultural Resources Consultant shall invite participation from Interested Tribal members to participate in the training. In the event that previously unidentified potentially significant cultural resources are discovered during ground-disturbing activities, the Qualified Cultural Resources Consultant shall have the authority to divert or temporarily halt ground-disturbing activities in the area of discovery to allow evaluation of the potentially significant cultural resources. If such discoveries occur on land managed by a federal agency, Stipulation IX (Discoveries) of the Programmatic Agreement shall apply and are deemed adequate by DTSC. If a discovery occurs on other lands within the project area, the Qualified Cultural Resources Consultant shall contact		Consistent with CUL-1a-3, PG&E has retained qualified cultural resources consultants to observe ground-disturbing activities and provide training as required.	Consistent with CUL-1a-3, PG&E has retained AE, a consulting firm with qualified cultural resources consultants, to observe ground-disturbing activities and provide training as required. This measure was discussed with Interested Tribes at the monthly meeting on October 25, 2012 and November 9, 2012.	Consistent with CUL-1a-3, PG&E has retained AE, a consulting firm with qualified cultural resources consultants, to observe ground-disturbing activities and provide training as required.	PG&E has retained AE, a consulting firm with qualified cultural resources consultants, to observe ground-disturbing activities and provide training as required.

TABLE 6.1-1
Summary of Compliance with EIR Mitigation Measures
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		the PG&E and DTSC project managers at the time of discovery and, in consultation with DTSC and Tribal monitors, shall evaluate the resource before construction activities will be allowed to resume in the affected area. For significant cultural resources, and before construction activities are allowed to resume in the affected area, the resource(s) shall be recovered with coordination of the Tribal monitors and DTSC. Recovery may include a Research Design and/or Data Recovery Program submitted to DTSC for review and approval. The Qualified Cultural Resources Consultant (and Tribal monitors) shall determine the amount of material to be recovered for an adequate sample for analysis or data recovery. Any concerns or recommendations regarding the ground-disturbing activities or the handling of cultural resources shall be directed to the Qualified Cultural Resources Consultant or PG&E's site supervisor.					
Cultural Resources	CUL-2	**During Project Design Consider the Location of Unique Archaeological Resources and Avoid Resources to the Maximum extent Feasible.** Cultural resources that qualify as unique archaeological sites in the project area would probably also meet one or more of the criteria for historical resources and would be subject to Mitigation Measures CUL-1b/c-2 and CUL-1b/c-3. The mitigation measures under this identified impact are the same as listed for Impact CUL-1b and CUL-1c. These mitigation measures would reduce the potential for impacts on unique archaeological resources.	Cultural resources study/ Geoarchaeological investigation report; Cultural resources treatment plan	The requirements of this mitigation measure will be met by implementation of CUL-1b/c-2 and CUL-1b/c-3.	The requirements of this mitigation measure will be met by implementation of CUL-1b/c-2 and CUL-1b/c-3. This measure was discussed with interested Tribes at the monthly meeting on May 24, 2012.	The requirements of this mitigation measure have been met by implementation of CUL-1b/c-2 and CUL-1b/c-3.	
Cultural Resources	CUL-3	**Conduct Survey and Construction Monitoring**. A **paleontological investigation**, **including a detailed survey of the project area** by a qualified paleontologist, shall be conducted to refine the potential impacts on unique paleontological resources within the final design area and determine whether preconstruction recovery of sensitive resources and/or construction monitoring would be warranted. If construction monitoring is determined to be warranted, ground-altering activity would be monitored by a qualified paleontologist to assess, document, and recover unique fossils. Monitoring shall include the inspection of exposed surfaces and microscopic examination of matrix in potential fossil bearing formations. In the event microfossils are discovered, the monitor shall collect matrix for processing. In the event paleontological resources are encountered during earthmoving activities, recovered specimens shall be prepared by the paleontologist to a point of identification and permanent preservation. PG&E shall retain a Qualified Paleontologist to observe ground-disturbing activities where determined necessary based on the results of the paleontological investigation and shall be required to request the participation of Tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction (see above description of the CMI Workplan).	Paleontological investigation report	PG&E has retained a paleontologist to conduct the investigation, planning for this investigation is currently underway. A draft report has been prepared and is being reviewed by PG&E.	This measure was discussed with interested Tribes at the monthly meeting on January 26, 2012. A paleontological investigation was conducted on July 25, 2012. The outcome of the survey was provided in a report completed in December 2012; this report is currently being revised to incorporate comments received.	The paleontological investigation results were summarized in a report titled "*Paleontological Resources Management Plan: MMRP CUL-3*" (Parus 2014) and submitted to DTSC on February 28, 2014. The plan is also included in an appendix of the Construction/Remedial Action Work Plan.	The paleontological investigation report (Parus 2014) was completed on February 28, 2014.

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		Paleontological resources of scientific value shall be identified and curated into an established, accredited, professional museum repository in the region with permanent retrievable paleontological storage. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation.					
Cultural Resources	CUL-4	**With Discovery of Human Remains or Burials Suspend Work, Protect Remains, and Comply with Local, State, and Federal Laws Regarding Discoveries During Ground-Disturbing Activities.** Ground-disturbing activities may disturb as-yet undiscovered human remains or Native American burials and associated grave goods. PG&E shall retain a Qualified Cultural Resource Consultant and request designated Tribal monitor(s) to train construction personnel in the identification of human remains so that they may aid in the identification of such resources (see above description of the CIMP). A Qualified Cultural Resource Consultant and Tribal monitor(s) shall be in place to adequately oversee all ground-disturbing activities. In the event human remains are uncovered over the course of project construction, operation and maintenance, and/or decommissioning activities, the following procedures shall be followed to ensure compliance with all applicable local, state, and federal laws.	Training material for the identification of human remains	PG&E will retain Qualified Cultural Resources Consultants prior to construction to prepare training material for the identification of human remains, provide training and oversee ground-disturbing activities as required. All of the provisions of this measure will remain in effect during construction, and will be implemented as directed in the event any human remains are uncovered during construction.	PG&E has retained AE and prior to construction monitoring AE will prepare training material for the identification of human remains, provide training and oversee ground-disturbing activities as required by this mitigation measure. All of the provisions of this measure will remain in effect during construction, and will be implemented as directed in the event any human remains are uncovered during construction.	PG&E has retained AE as the qualified cultural resource consultant and prior to construction monitoring, AE will prepare training material for the identification of human remains, provide training, and oversee ground-disturbing activities as required by this mitigation measure. All of the provisions of this measure will remain in effect during construction, and will be implemented as directed in the event any human remains are uncovered during construction. Procedures for implementing this measure are included in an appendix of the Construction/ Remedial Action Work Plan.	
Cultural Resources	CUL-4f	f) The construction contractor shall immediately suspend work within the vicinity of the discovery and determine if the remains discovered are human or nonhuman. This determination shall be made by the Qualified Cultural Resources Consultant, a qualified archaeologist and/or physical anthropologist with expert skill in the identification of human osteological (bone) remains.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions taken under CUL-4.	
Cultural Resources	CUL-4g	g) The Qualified Cultural Resources Consultant (and Tribal monitor), or construction contractor, shall protect discovered human remains and/or burial goods remaining in the ground from additional disturbance.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions taken under CUL-4.	

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Cultural Resources	CUL-4h	h) The Qualified Cultural Resources Consultant, archaeologist, or construction site supervisor shall contact the San Bernardino County Coroner, and the PG&E and DTSC project managers immediately. In California, all subsequent action shall conform to the protocols established in the Health and Safety Code and regulations. In Arizona, the Qualified Cultural Resources Consultant or PG&E construction site supervisor will follow Arizona laws and the implementing regulations. Human remains found on federal land would require the notification of the BLM Havasu City field office and compliance with applicable federal laws and regulations, including the Native American Graves Protection and Repatriation Act if the remains are determined to be of Native American origin. The Qualified Cultural Resources Consultant shall coordinate the interaction between Interested Tribes, PG&E, the County, and DTSC to determine proper treatment and disposition of any remains.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions taken under CUL-4.	
Cultural Resources	CUL-4i	i) The San Bernardino County Coroner will determine if the remains are of recent origin and if an investigation of the cause of death is required (California Health and Safety Code Section 7050.5). If the coroner determines that the human remains are not Native American and not evidence of a crime, project personnel shall coordinate with the Qualified Cultural Resources Consultant (s) to develop an appropriate treatment plan. This may include contacting the next of kin to solicit input on subsequent disposition of the remains. If there is no next-of-kin, or recommendations by the next-of-kin are considered unacceptable by the landowner, the landowner will reinter the remains with appropriate dignity in a location outside the project area and where they would be unlikely to be disturbed in the future.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions taken under CUL-4.	
Cultural Resources	CUL-4j	j) In the event that the San Bernardino County Coroner determines that the human remains are Native American and not evidence of a crime, project personnel shall contact the NAHC so that a most likely descendent (MLD) can be identified as required under California Public Resources Code Section 5097.98.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions taken under CUL-4.	
Cultural Resources	CUL-4k	k) The MLD(s) shall inspect the area in which the human remains were found and provide treatment recommendations to the landowner and PG&E site manager in accordance with the provisions of PRC Section 5097.98. The treatment may include reburial, scientific removal of the discovered human remains and relinquishment to the MLD(s), nondestructive analysis of human remains and/or other culturally appropriate treatment. If the MLD(s) so requests, the landowner would reinter the remains with the appropriate dignity in a location outside the area of disturbance in a location unlikely to be disturbed in the future.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions taken under CUL-4.	

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Cultural Resources	CUL-4l	l) To the maximum extent feasible, Mitigation Measure CUL-4 shall be implemented in a manner that is consistent with mitigation required by local, state, and federal requirements.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions to be taken under CUL-4.	This requirement will be met by actions to be taken under CUL-4.	
Geology & Soils	**GEO-1a**	**Construction, Operation and Maintenance, and Decommissioning Impacts Related to Erosion of Soils.**					
Geology & Soils	GEO-1a-a	a) A DTSC-approved grading and erosion control plan, prepared by a California Registered Civil Engineer, shall be completed prior to implementation of any grading in areas of the site where there is a potential for substantial erosion or loss of top soils. The plan shall outline specific procedures for controlling erosion or loss of topsoil during construction, operation and maintenance, and decommissioning.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	A grading and erosion control plan will be prepared and included in the Construction/ Remedial Action Work Plan for DTSC review and approval.	A grading and erosion control plan will be prepared and included in the Construction/ Remedial Action Work Plan, which will be submitted as part of the final design for DTSC review and approval.	Grading plans including erosion control are included in Appendix D of the 90% BOD. Erosion control measures to be implemented during construction are also included in the Construction/Remedial Action Work Plan.	
Geology & Soils	GEO-1a-b	b) To ensure soils do not directly or indirectly discharge sediments into surface waters as a result of construction, operation and maintenance, or decommission activities, PG&E shall develop a SWPPP as discussed in mitigation measure HYDRO-1 of the "Hydrology and Water Quality" section of this EIR. The SWPPP shall identify best management practices (BMPs) that would be used to protect stormwater runoff and minimize erosion during construction. PG&E shall prepare plans to control erosion and sediment, prepare preliminary and final grading plans, and shall prepare plans to control urban runoff from the project site during construction, consistent with the substantive requirements of the San Bernardino County Building and Land Use Services Department for erosion control.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	PG&E will prepare a BMP Plan prior to construction activities that will be included in the Construction/Remedial Action Work Plan.	PG&E will prepare a BMP Plan prior to construction activities that will be included in the Construction/Remedial Action Work Plan, to be submitted concurrently with the 90% design.	In compliance with mitigation measure HYDRO-1, a BMPs Plan for construction activities was prepared and is included in Section 4.10 of the Construction/Remedial Action Work Plan, as well as an appendix. In addition, an industrial SWPPP was also prepared in compliance with mitigation measure HYDRO-1 and included in Appendix E of the O&M Plan (Volume 1 of the O&M Manual). The SWPPP includes BMPs related to operation and maintenance activities of the remedy.	
Geology & Soils	GEO-1a-c	c) During road preparation activities, loose sediment shall be uniformly compacted consistent with the substantive San Bernardino County Building and Land Use Services Department requirements to aid in reducing wind erosion. Ongoing road maintenance including visual inspection to identify areas of erosion and performing localized road repair and regrading, installation and maintenance of erosion control features such as berms, silt fences, or straw wattles, and grading for road smoothness shall be performed as needed to reduce potential for erosion.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed, to aid in reducing wind erosion.	This measure will be implemented as directed to aid in reducing wind erosion.	This measure will be implemented as directed to aid in reducing wind erosion (see BMPs Plan, in Section 4.10 and an appendix of the Construction/Remedial Action Work Plan). Section 6.4 of the O&M Plan (Volume 1 of the O&M Manual) discusses general guidelines for maintenance of access roads and pathways, from visual assessment, local repairs, soil stabilization, and installation/maintenance of erosion controls, to grading.	
Geology & Soils	GEO-1a-d	d) Regarding the potential for contaminated soils to be eroded and contribute contamination into receiving waters, Mitigation Measures GEO-2 and HAZ-2 shall be implemented. Mitigation Measure GEO-2 provides the provisions for mitigating erosion through BMPs which shall be implemented. Mitigation Measure HAZ-2 provides the provisions for safe work practices and handling of contaminated soils as investigation derived wastes.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This mitigation measure will be met through actions to be taken to implement Mitigation Measures GEO-2 and HAZ-2 to prevent contaminated soils to be eroded and contribute contamination into receiving waters.	This mitigation measure will be met through actions to be taken to implement Mitigation Measures GEO-2 and HAZ-2 to prevent contaminated soils to be eroded and contribute contamination into receiving waters.	This mitigation measure will be met through actions to be taken to implement Mitigation Measures GEO-2 and HAZ-2 to prevent contaminated soils from being eroded and contributing contamination into receiving waters.	

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Geology & Soils	**GEO-1b**	**Construction, Operation and Maintenance, and Decommissioning Impacts Related to Differential Compaction of Soils.**					
Geology & Soils	GEO-1b-a	a) BMPs shall be implemented during construction, operation and maintenance, and decommissioning activities to minimize impacts on the affected areas. Such BMPs could include, but would not be limited to, the following: uniform compaction of roadways created for accessing the project area as per San Bernardino County Building and Land Use Services Department requirements, returning areas adversely affected by differential compaction to preexisting conditions when these areas are no longer needed, and continuing maintenance of access roads, wellhead areas, and the treatment plant areas.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. The BMPs will be identified in the Corrective Measure Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (part of CIMP); Closure Plan for Decommissioning of Remedy Facilities and Restoration, as appropriate.	This measure will be implemented as directed. The BMPs will be identified in the Construction/Remedial Action Work Plan and Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration which will be submitted as part of the 90% design, as well as the Closure Plan for Decommissioning of Remedy Facilities and Restoration, which will be submitted prior to decommissioning.	This measure will be implemented as directed (see BMPs Plan Section 4.10 and in an appendix of the Construction/Remedial Action Work Plan; Section C2.2, Earthwork, in Appendix C (Design Criteria) of the 90% BOD; and Section 7.4, (Access Road and Pathway Maintenance, of the O&M Plan (O&M Manual Volume 1).	
Geology & Soils	GEO-1b-b	b) Work area footprints shall be minimized to the greatest extent feasible to limit the areas exposed to differential compaction. Where possible, existing unpaved access roads and staging/working areas shall be reused and maintained for different stages of the construction. New graded areas for staging or for access roads shall be compacted to a uniform specification, typically on the order of 90 to 95% compaction and consistent with substantive San Bernardino County Building and Land Use Services Department requirements to reduce differential compaction and subsequent erosion of site soils.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed, to minimize work area footprints to the greatest extent feasible.	This measure will be implemented as directed, to minimize work area footprints to the greatest extent feasible.	This measure has been and will be continue to be implemented as directed. PG&E will strive to minimize work area footprints to the maximum extent feasible, while maintaining a safe work zone and environment for all staffs, contractors, as well as monitors and observers. As discussed in CUL-1a-9, all of the soil storage and construction staging areas proposed in the 90% design are located on existing and/or previously used staging areas, as well as previously disturbed areas. All trench sections underneath roadways and shoulders are designed to be compacted to 95% and all other areas to at least 90%.	
Geology & Soils	GEO-1b-c	c) After the completion of the operation and maintenance phase, the disturbed areas which result in increased potential for compaction shall be returned to their respective preexisting condition by regrading consistent with the preconstruction slopes as documented through surveys that may include topographic surveys or photo surveys. The areas will be returned to the surrounding natural surface topography and compacted consistent with unaltered areas near the access roads or staging areas in question. The habitat restoration plan outlined in mitigation measure BIO-1 shall include restoration of native vegetation or other erosion control measures where revegetation would be infeasible or inadequate, for purposes of soil stabilization and erosion control of the project area.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. The Habitat Restoration Plan, developed in compliance with BIO-1, will include the requirements under this measure.	This measure will be implemented as directed. The forthcoming Habitat Restoration Plan, to be developed in compliance with BIO-1, will include the requirements under this measure.	**Resurfacing to Preconstruction Condition** These requirements are included in the restoration guidelines for both the Plan for Decommissioning and Removal of the IM-3 Facility and Site Restoration (see Sections 8.1.2 and 8.1.3 of Appendix B of the CIMP) and measure CUL-1a-8e, Protocols for Restoring the Environment to its Preconstruction Conditions (see Sections 2.5.3 and 2.5.4 of the CIMP). **Habitat Restoration and Revegetation** In compliance with BIO-1, the Havasu National Wildlife Refuge Habitat Restoration Plan and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (both provided as appendices to the Construction/ Remedial Action Work Plan) include measures to address restoration of native vegetation.	

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Hazardous Materials	**HAZ-1a**	**Spills or Releases of Contaminants during Operation and Maintenance Activities.**					
Hazardous Materials	HAZ-1a-a	a) PG&E shall store, handle, and transport hazardous material in compliance with applicable local, state, and federal laws.	O&M Plan	This measure will be implemented as directed.	This measure will be implemented as directed. Storage and handling of hazardous materials will be discussed in the Hazardous Materials Business Plan (HMBP), the outline for which is presented in Appendix F of the O&M Plan, with the complete HMBP to be submitted as part of the 90% design.	This measure will be implemented as directed. Storage and handling of hazardous materials are discussed in the HMBP (Appendix F of the O&M Plan).	
Hazardous Materials	HAZ-1a-b	b) All chemical storage and loading areas shall be equipped with proper containment and spill response equipment. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response.	O&M Plan	This measure will be implemented as directed.	This measure will be implemented as directed. Secondary containment for hazardous materials is described in the design criteria and drawings which are presented in Appendices C and D, respectively, of this BOD Report for the 60% design. Storage and handling of hazardous materials will be discussed in the HMBP, the outline for which is presented in Appendix F of the O&M Plan (Volume 1), with the complete HMBP to be submitted as part of the 90% design.	This measure will be implemented as directed. Secondary containment for hazardous materials is described in the design criteria and drawings which are presented in Appendices C and D, respectively, of the BOD Report for the 90% design. Storage and handling of hazardous materials are discussed in the HMBP (Appendix F of the O&M Plan).	
Hazardous Materials	HAZ-1a-c	c) A project-specific HMBP, chemical standard operating procedure (SOP) protocols and contingency plans shall be developed to ensure that proper response procedures would be implemented in the event of spills or releases. Specifically, the HMBP and SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required personal protective equipment, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response. The field manager in charge of operations and maintenance activities shall be responsible for ensuring that these procedures are followed at all times.	Project-specific HBMP; O&M Plan	This measure will be implemented as directed. A project-specific HMBP, chemical standard operating procedure (SOP) protocols and contingency plans will be developed to ensure that proper response procedures would be implemented in the event of spills or releases.	This measure will be implemented as directed. Storage and handling of hazardous materials and spill response procedures will be discussed in the HMBP, the outline for which is presented in Appendix F of the O&M Plan (Volume 1), with the complete HMBP to be submitted as part of the 90% design.	This measure will be implemented as directed. Storage and handling of hazardous materials and spill response procedures will be discussed in the HMBP (Appendix F of O&M Plan).	
Hazardous Materials	**HAZ-1b**	**Spill or Release of Contaminants during Construction and Decommissioning Activities.**					

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Hazardous Materials	HAZ-1b-a	a) Fueling areas and maintenance areas would be supplied with proper secondary containment and spill response equipment.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. Fueling areas and maintenance areas will be supplied with proper secondary containment and spill response equipment.	This measure will be implemented as directed. Fueling areas and maintenance areas will be supplied with proper secondary containment and spill response equipment. BMPs/SOPs for fueling during construction will be described in the BMP Plan, which will be submitted at the 90% design stage as part of Corrective Measure Construction/Remedial Action Work Plan and Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration.	This measure will be implemented as directed. Fueling areas and maintenance areas will be supplied with proper secondary containment and spill response equipment. BMPs/SOPs for fueling during construction are described in the BMPs Plan in an appendix of the Construction/ Remedial Action Work Plan. Appendix C of the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration contains a safe fueling and fuel handling policy for activities during implementation of the Work Plan.	
Hazardous Materials	HAZ-1b-b	b) PG&E shall develop fueling SOP protocols and a contingency plan that would be implemented at all fueling areas on-site. The SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required PPE, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. Potential measures include but are not limited to, fuel storage in bermed areas, performing vehicle maintenance in paved and bermed areas, and availability of spill kits for containment and cleanup of petroleum releases. The field manager in charge of construction and decommissioning activities shall be responsible for ensuring that these procedures are followed at all times.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. Fueling SOP protocols and a contingency plan will be developed for implementation at fueling areas on-site during construction.	This measure will be implemented as directed. Fueling areas and maintenance areas will be supplied with proper secondary containment and spill response equipment. BMPs/SOPs for fueling during construction will be described in the BMP Plan, which will be submitted at the 90% design stage as part of Corrective Measure Construction/Remedial Action Work Plan and Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration.	This measure will be implemented as directed. Fueling areas and maintenance areas will be supplied with proper secondary containment and spill response equipment. BMPs/SOPs for fueling during construction are described in the BMPs Plan in an appendix of the Construction/ Remedial Action Work Plan. Appendix G (Construction BMPs Plan) of the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration contains BMPs for storage and handling of hazardous materials.	
Hazardous Materials	HAZ-1b-c	c) PG&E shall comply with local, state, and federal regulations related to the bulk storage and management of fuels.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed, for compliance with local, state, and federal regulations related to the bulk storage and management of fuels.	This measure will be implemented as directed. Fueling areas and maintenance areas will be supplied with proper secondary containment and spill response equipment. BMPs/SOPs for fueling during construction will be described in the BMP Plan, which will be submitted at the 90% design stage as part of Corrective Measure Construction/Remedial Action Work Plan and Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration.	This measure will be implemented as directed. Fueling areas and maintenance areas will be supplied with proper secondary containment and spill response equipment. BMPs/SOPs for fueling during construction are described in the BMPs Plan in Section 4 as well as an appendix of the Construction/Remedial Action Work Plan. Appendix G (Construction BMPs Plan) of the IM3 Decommissioning Plan contains BMPs addressing waste and materials storage and handling areas.	

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Hazardous Materials	HAZ-2	**Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil** -- Before initiating ground-disturbing operations, a health and safety plan shall be developed and implemented by qualified environmental professionals to ensure health and safety precautions are being met. It is not possible to prepare the health and safety plan at this stage of the planning process because final construction plans and other design documents have not been finalized in sufficient detail. However, at a minimum, the health and safety plan shall include procedures to mitigate potential hazards, and such procedures shall include the use of PPE, measures that provide protection from physical hazards, measures that provide protection from chemical hazards that may be present at the site, decontamination procedures, and worker and health and safety monitoring criteria to be implemented during construction. The worker health and safety plan shall include protective measures and PPE that are specific to the conditions of concern and meet the requirements of the U.S. Occupational Safety and Health Administration's (OSHA's) construction safety requirements and Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). In accordance with OSHA requirements, appropriate training and recordkeeping shall also be a part of the health and safety program. The worker health and safety plan shall be certified by a Certified Industrial Hygienist in accordance with OSHA regulations. The worker health and safety plan shall be explained to the construction workers and all workers shall be required to sign the plan, which will be kept on the construction site at all times. Worker safety training shall occur prior to initiation of ground disturbing activities. Training shall include the review of all health and safety measures and procedures. All workers and engineering inspectors at the site shall provide written acknowledgement that the soils management plan (discussed below), worker health and safety plan, and community health and safety plan were reviewed and training was received prior to commencement of construction activities. The following are specific elements and directives that shall be included in the health and safety plan and implemented by PG&E during construction, operation and maintenance, and decommissioning of this project:	Health and Safety Plan	This mitigation measure will be implemented as directed. A health and safety plan will be developed for O&M activities and will be submitted with the O&M Plan. Similarly, a health and safety plan will be developed for construction activities and will be submitted with the Construction/Remedial Action Work Plan. The plans will be implemented by qualified environmental professionals.	This mitigation measure will be implemented as directed. A health and safety plan will be developed for O&M activities and will be submitted at the 90% design stage. Similarly, a health and safety plan will be developed for construction activities and will be submitted with the Construction/Remedial Action Work Plan at the 90% design stage. The plans will be implemented by qualified environmental professionals.	This mitigation measure will be implemented as directed. A health and safety plan for O&M activities was developed and is included in Volume 5 of the O&M Manual. Similarly, a health and safety plan for construction activities was developed and is included in an appendix of the Construction/Remedial Action Work Plan.	
Hazardous Materials	HAZ-2a	a. Vehicles traveling on unpaved roadways or surfaces would be directed to avoid traveling in areas where contaminated soils are known to be present; vehicle speeds shall be controlled (e.g., limited to 15 mph or slower) to limit generation of dust; measures, such as wetting of surfaces, will be employed to prevent dust generation by vehicular traffic or other dust-generating work activities.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. Vehicle movement will be controlled to avoid traveling in areas where contaminated soils are known to be present, and limit speeds to limit generation of dust.	This measure will be implemented as directed. Vehicle movement will be controlled to avoid traveling in areas where contaminated soils are known to be present, and speeds will be limited to limit generation of dust.	This measure will be implemented as directed, and included in the health and safety plans. Vehicle movement will be controlled to avoid traveling in areas where contaminated soils are known to be present, and speeds will be limited to limit generation of dust.	

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Hazardous Materials	HAZ-2b	b. Pre-mobilization planning shall occur during which the likelihood of encountering contaminated soils shall be reviewed along with the HMBP, site-specific health and safety plan, and SOPs so that the procedures are followed and the contingencies for handling contaminated soils are in-place prior to implementing the field operations.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. Pre-mobilization planning will be used to review the likelihood of encountering contaminated soils, the HMBP, site-specific health and safety plan, and SOPs so that the procedures are followed and the contingencies for handling contaminated soils are in-place.	This measure will be implemented as directed. Pre-mobilization planning will be used to review the likelihood of encountering contaminated soils, the HMBP, site-specific health and safety plan, and SOPs so that the procedures are followed and the contingencies for handling contaminated soils are in-place.	This measure will be implemented as directed, and included in the health and safety plans. Pre-mobilization planning will be used to review the likelihood of encountering contaminated soils, the HMBP, site-specific health and safety plan, and SOPs so that the procedures are followed and the contingencies for handling contaminated soils are in-place.	
Hazardous Materials	HAZ-2c	c. Should evidence of contaminated soil be identified during ground disturbing activities (e.g., noxious odors, discolored soil), work in this area will immediately cease until soil samples can be collected and analyzed for the presence of contaminants by the site supervisor or the site safety officer. Contaminated soil shall be managed and disposed of in accordance with a project-specific health and safety plan and soil management plan. The health and safety plan and soil management plan shall be approved by DTSC before beginning any ground disturbing activities. While the project is exempt from the requirements of the San Bernardino County Division of Environmental Health, the health and safety plan and soil management plan shall be prepared in general accordance with the substantive requirements of this agency.	Health and Safety Plan; Soil Management Plan (Volume 4 of O&M Manual)	This measure will be implemented as directed. A Health and Safety Plan and a Soil Management Plan will be prepared as part of the Construction/Remedial Action Work Plan and submitted to DTSC.	This measure will be implemented as directed. Project-specific Health and Safety Plans for construction and O&M activities will be prepared and submitted to DTSC at the 90% design stage. A Soil Management Plan (SMP) is included in Volume 4 of the O&M Manual, which is Appendix L to the 60% BOD report. The SMP includes procedures and protocols for the management and disposal of potentially contaminated soil displaced during drilling, construction, O&M of the groundwater remedy, and the decommissioning and removal of the IM-3 system.	This mitigation measure will be implemented as directed. A health and safety plan for O&M activities was developed and is included in Volume 5 of the O&M Manual, which is Appendix L to the 90% BOD. Similarly, a health and safety plan for construction activities was developed and is included in an appendix of the Construction/Remedial Action Work Plan. A Soil Management Plan (SMP) is included in Volume 4 of the O&M Manual. The SMP includes procedures and protocols for the management and disposal of displaced soil, including potentially contaminated soil, during drilling, construction, O&M of the groundwater remedy, and the decommissioning and removal of the IM-3 system.	
Hazardous Materials	HAZ-2d	d. In the event that drilling sites must be located within areas of suspected soil contamination, the appropriate PPE shall be worn by all personnel working in these areas and methods specified in the health and safety plan used to control the generation of dust. When working in these areas, personnel shall be required to follow all guidance presented in the site-specific health and safety plan and soil management plan. The site-specific health and safety plan shall include provisions for site control such as, but not limited to, delineation of the exclusion, contaminant reduction and support zones for each work area, decontamination procedures, and procedures for the handling of contaminated soils and other investigation derived wastes. Soil that is excavated shall be loaded directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins. Suspected contaminated soils shall be segregated from suspected uncontaminated soils.	Health and Safety Plan	This measure will be implemented as directed. A Health and Safety Plan will be prepared as part of the Construction/Remedial Action Work Plan and submitted to DTSC.	This measure will be implemented as directed. Project-specific Health and Safety Plans for construction and O&M activities will be prepared and submitted to DTSC at the 90% design stage.	This mitigation measure will be implemented as directed. A health and safety plan for O&M activities was developed and is included in Volume 5 of the O&M Manual. Similarly, a health and safety plan for construction activities was developed and is included in an appendix of the Construction/Remedial Action Work Plan.	
Hazardous Materials	HAZ-2e	e. Personnel working at the site shall be trained in Hazardous Waste Operations.	Health and Safety Plan	This measure will be implemented as directed. A Health and Safety Plan will be prepared as part of the Construction/Remedial Action Work Plan, and will include requirement for training of personnel working at the site in Hazardous Waste Operations.	This measure will be implemented as directed. Project-specific Health and Safety Plans for construction and O&M activities will be prepared and submitted to DTSC at the 90% design stage, and will include requirement for training of personnel working at the site in Hazardous Waste Operations.	This mitigation measure will be implemented as directed. A health and safety plan for O&M activities was developed and is included in Volume 5 of the O&M Manual. Similarly, a health and safety plan for construction activities was developed and is included in an appendix of the Construction/Remedial Action Work Plan.	

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Hazardous Materials	HAZ-2f	f. All soil excavated and placed in roll-off bins or trucks for transportation off-site shall be covered with a tarp or rigid closure before transporting, and personnel working in the area shall be positioned upwind of the loading location.	Soil Management Plan (Volume 4 of O&M Manual)	This measure will be implemented as directed. A Soil Management Plan will be prepared as part of the Construction/Remedial Action Work Plan, and will include requirement for soil excavated and placed in roll-off bins or trucks for transportation off-site to be covered with a tarp or rigid closure before transporting.	This measure will be implemented as directed. A Soil Management Plan (SMP) is included in Volume 4 of the O&M Manual, which is Appendix L to the 60% BOD report. The SMP includes requirement for soil excavated and placed in roll-off bins or trucks for transportation off-site to be covered with a tarp or rigid closure before transporting.	This measure will be implemented as directed. An SMP is included in Volume 4 of the O&M Manual, which is Appendix L to the 90% BOD report. The SMP includes requirement for soil excavated and placed in roll-off bins or trucks for transportation off-site to be covered with a tarp or rigid closure before transporting (see Section 4.6 of the SMP).	
Hydrology and Water Quality	HYDRO-1	**Exceedance of Water Quality Standards.** The project shall implement BMPs to meet the substantive criteria of NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ NPDES No. CAS000002 (General Permit) (SWRCB 2009) as well as all other applicable federal, state, and local permit and regulatory requirements, even if a permit is not required pursuant to CERCLA, for purposes of ensuring the protection of receiving water quality. As such, a BMP plan shall be prepared and implemented for the project prior to construction and decommissioning phase activities. Impacts on water quality from pollutants, including soils from erosion, shall be controlled through use of the following types of BMPs, which shall be incorporated into the appropriate project-specific BMP plan. The General Permit requirements include specific BMPs as well as numeric effluent levels (NELs) and numeric action levels (NALs) to achieve the water quality standards (SWRCB 2009:3). Types of BMPs cited in the General Permit (SWRCB 2009:7) include: a) Scheduling of Activities; b) Prohibitions of Practices; c) Maintenance Procedures; d) Other Management Practices to Prevent or Reduce Discharge of Pollutants to Waters of the United States; e) Treatment Requirements; and f) Operating Procedures and Practice to Control Site Runoff, Spillage or Leaks, Sludge or Waste Disposal, or Drainage from Raw Materials Storage. Visual inspections and monitoring and sampling are required under the General Permit to evaluate the effectiveness of the BMPs and to determine whether modifying BMPs or implementing additional BMPs is required. The BMP designations cited below are based on those used by the California Stormwater Quality Association Construction BMP Handbook (California Stormwater Quality Association 2003) and are consistent with the types of BMPs referenced in the General Permit: g) Scheduling (SS-1): Proper scheduling assists in identifying ways to minimize disturbed areas, which allows for a reduction in the active project area requiring protection and also minimizes the length of time disturbed soils are exposed to erosive processes. h) Preservation of Existing Vegetation (SS-2): Preserving existing vegetation to the maximum extent practicable facilitates protection of surfaces from erosion and can also help to control sediments. Sensitive areas should also be clearly identified and	BMP Plan	This measure will be implemented as directed. PG&E will prepare a BMP Plan prior to construction activities which will be included in the Construction/Remedial Action Work Plan.	This measure will be implemented as directed. PG&E will prepare a BMP Plan prior to construction activities (at the 90% design stage) which will be included in the Construction/Remedial Action Work Plan. On December 27, 2011, the Superior Court issued a judgment in response to litigation, and the State Water Board will be amending Order 2009-0009-DWQ (as modified by Order No. 2010-00014-DWQ) in accordance with the related peremptory writ of mandate. As a result, the Numeric Effluent Limits (NELs) are no longer in effect. In addition, further amendments to the permit are possible.	This measure will be implemented as directed. A BMP Plan was prepared and included in an appendix of the Construction/Remedial Action Work Plan. On July 17, 2012, the State Water Resources Control Board amended Order 2009-009-DWQ by adopting Order No. 2012-0006-DWQ NPDES NO. CAS000002. Order 2012-006-DWQ requires effluent monitoring and reporting for pH and turbidity in storm water discharges. The monitoring will be used to evaluate whether numeric action levels (NALs) and numeric effluent limitations (NELs) for Active Treatment Systems included in the Construction General Permit are exceeded. The Permit contains only narrative effluent limitations and does not contain numeric effluent limitations, except for Active Treatment Systems (ATSs).	

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		protected. i) Hydraulic Mulch (S S-3), Straw Mulch (S S-6), and Wood Mulching (SS-8): Using various mulches is a method for temporarily stabilizing soil and can be used on surfaces with little or no slope. j) Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats (SS-7): These erosion control methods can be used on flat or, usually, sloped surfaces, channels, and stockpiles. k) Stabilized Construction Entrance/Exit (TC-1): A graveled area or pad located at points where vehicles enter and leave a construction site can be built. This BMP provides a buffer area where vehicles can drop their mud and sediment to avoid transporting it onto public roads, to control erosion from surface runoff, and to help control dust. l) Runoff Control Measures (SS-9, SS-10, and SC-10): These include graded surfaces to redirect sheet flow, diversion dikes or berms that force sheet flow around a protected area, and stormwater conveyances (swales, channels, gutters, drains, sewers) that intercept, collect, and redirect runoff. Diversions can be either temporary or permanent. Temporary diversions include excavation of a channel along with placement of the spoil in a dike on the downgradient side of the channel, and placement of gravel in a ridge below an excavated swale. Permanent diversions are used to divide a site into specific drainage areas, should be sized to capture and carry a specific magnitude of storm event, and should be constructed of more permanent materials. A water bar is a specific kind of runoff diversion that is constructed diagonally at intervals across a linear sloping surface such as a road or right-of-way that is subject to erosion. Water bars are meant to interrupt accumulation of erosive volumes of water through their periodic placement down the slope, and divert the resulting segments of flow into adjacent undisturbed areas for dissipation. m) Silt Fence (SC-1): A temporary sediment barrier consisting of fabric is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows. n) Gravel Bag Berm (SC-6) and Sand/Gravel Bag Barrier (SC-8): A temporary sediment barrier consisting of gravel-filled fabric bags is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows. o) Desilting Basin (SC-2) and Sediment Trap (SC-3): Constructing temporary detention structures facilitates the removal of sediment from waters. The devices provide time for sediment particles to settle out of the water before runoff is discharged. Secondary concerns include potential pollutants from inappropriate material storage and handling procedures and nonstormwater discharges. These will be addressed through the following types of BMPs, which shall be incorporated into the stormwater BMP plan:					

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		p) Material Delivery and Storage (WM-1): Provide covered storage for materials, especially toxic or hazardous materials, to prevent exposure to stormwater. Store and transfer toxic or hazardous materials on impervious surfaces that will provide secondary containment for spills. Park vehicles and equipment used for material delivery and storage, as well as contractor vehicles, in designated areas. q) Spill Prevention and Control (WM-4): Ensure that spills and releases of materials are cleaned up immediately and thoroughly. Ensure that appropriate spill response equipment, preferably spill kits preloaded with absorbents in an overpack drum, is provided at convenient locations throughout the site. Spent absorbent material must be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as nonhazardous. r) Solid Waste Management (WM-5): Provide a sufficient number of conveniently located trash and scrap receptacles to promote proper disposal of solid wastes. Ensure that the receptacles are provided with lids or covers to prevent windblown litter. s) Hazardous Waste Management (WM-6): Provide a sufficient number of proper receptacles to promote proper disposal of hazardous wastes. t) Concrete Waste Management (WM-8): Dispose of excess concrete in specific concrete washout facilities. u) Sanitary/Septic Waste Management (WM-9): Locate sanitary and septic waste facilities away from drainage courses and traffic areas. Maintain the facilities regularly. v) Vehicle and Equipment Cleaning (NS-8): Clean vehicles and equipment that regularly enter and leave the construction site. w) Vehicle and Equipment Fueling (NS-9): Fuel vehicles and equipment off- site whenever possible. If off-site fueling is not practical, establish a designated on-site fueling area with proper containment and spill cleanup materials. x) Vehicle and Equipment Maintenance (NS-10): Use off-site maintenance facilities whenever possible. Any on-site maintenance areas must be protected from stormwater runoff and on-site flooding.					

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Hydrology and Water Quality	HYDRO-1	In addition to BMPs implemented to avoid or reduce impacts from the construction and decommissioning phases, BMPs shall also be implemented to avoid or reduce impacts from the operations and maintenance phases. To address potential violation of water quality standards caused by insufficient treatment, system failure at concentrations in excess of water quality standards, proper design shall include contingency measures such as safeguards to shut down the extraction wells in case of pipeline failure or malfunction. In addition, operation of the proposed project will be governed by and follow an operations and maintenance plan. PG&E will comply with all applicable water quality standards, the General Permit, and any SWRCB or RWQCB resolutions identified as ARAR, as well as a corrective action monitoring program. Under the corrective action monitoring program, data will be collected to measure performance of the remedy, compliance with standards, and progress of the remedial action as a part of the project description. In addition, the project will be operated to continually assess performance issues and to modify the type, method, and configuration of the treatment delivery systems to enhance performance of the remedy to attain the cleanup goals and to respond to site conditions and performance issues as described in the project description.	O&M Plan	This measure will be implemented as directed. An O&M Plan will be developed and will include BMPs to avoid or reduce impacts from the operations and maintenance phases, and a monitoring program in compliance with applicable water quality standards, the General Permit, and identified ARARs.	This measure will be implemented as directed. The Contingency Plan (Volume 3) of the O&M Manual, which is included in the 60% design, includes BMPs to avoid or reduce impacts from the operations and maintenance phases. The Sampling and Monitoring Plan (Volume 2) of the O&M Manual includes a monitoring program in compliance with applicable water quality standards, and identified ARARs. The O&M SWPPP (Appendix E of the O&M Plan) will include a storm water monitoring program in compliance with the General Permit. The outline for the O&M SWPPP is included in the Draft O&M Manual at the 60% design stage; the complete SWPPP will be provided at the 90% design stage.	This measure will be implemented as directed. The Contingency Plan (Volume 3) of the O&M Manual), which is included in the 90% design, includes BMPs to avoid or reduce impacts from the operations and maintenance phases. The Sampling and Monitoring Plan (Volume 2) of the O&M Manual) includes a monitoring program in compliance with applicable water quality standards, and identified ARARs. The O&M (or industrial) SWPPP (Appendix E of the O&M Plan) includes a storm water monitoring program in compliance with the new Statewide Industrial Storm Water General Permit, which will become effective on July 1, 2015.	
Hydrology and Water Quality	HYDRO-1	A SWPPP will also be prepared for the proposed project, which will contain BMPs related to industrial activities (industrial SWPPP). The BMPs are designed to reduce pollutants in discharges that may affect receiving water quality during operations and maintenance of the proposed project. As noted above, BMP designations are based on those used by the *California Stormwater Quality Association Construction BMP Handbook* (California Stormwater Quality Association 2003) and those referenced in the General Permit The SWPPP will incorporate BMPs such as the following: y) Good Housekeeping: Maintain facility in a clean manner and train facility personnel to contribute to a safe, clean, and orderly environment by properly disposing of trash in designated containers, storing materials in appropriate locations, and keeping equipment clean and in good working condition. z) Preventative Maintenance: Prevent or minimize release of pollutants. Develop Standard Operating Procedures for operation and maintenance of facility components and train employees to follow the procedures. aa) Non-Stormwater Discharges (SC-10): Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Conduct regular inspections of high priority areas. bb) Spill Prevention, Control, and Cleanup (SC-1 1): Store materials properly to prevent spills from entering the storm drain system or surface waters. Ensure that spill cleanup materials are located on-site and are easily accessible. Clean up leaks and spills immediately using proper absorbent materials.	Stormwater Pollution Prevention Plan (SWPPP)/ BMP Plan and Monitoring and Reporting	This measure will be implemented as directed. An industrial Storm Water Pollution Prevention Plan (SWPPP) will be developed as part of the O&M Plan and implemented to reduce pollutants in discharges that may affect receiving water quality during operations and maintenance of the remedy	This measure will be implemented as directed. The O&M SWPPP outline is included as Appendix E of the O&M Plan. The complete SWPPP will be submitted at the 90% design stage. The SWPPP will be developed in compliance with the Industrial Storm Water General Permit Order 97-03-DWQ (General Industrial Permit), or the relevant applicable requirements.	This measure will be implemented as directed. The industrial SWPPP was developed and included in Appendix E of the O&M Plan. The O&M (or industrial) SWPPP (Appendix E of the O&M Plan) includes a storm water monitoring program in compliance with the new Statewide Industrial Storm Water General Permit which will become effective on July 1, 2015.	

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		Absorbents used to clean up hazardous materials must be disposed of as hazardous waste. Educate employees about spill prevention and cleanup. cc) Vehicle and Equipment Fueling (SC-20): Maintain clean fuel-dispensing areas using dry cleanup methods, such as sweeping or using rags and absorbents for leaks and spills. Cover the fueling area to prevent contact with stormwater. Train personnel in pollution prevention, focusing on containment of spills and leaks. dd) Outdoor Loading/Unloading (SC-30): Load and unload chemicals during dry weather, if possible, and load and unload in designated areas. Check equipment regularly for leaks. ee) Outdoor Liquid Container Storage (SC-3 1): Cover the storage area with a roof and provide secondary containment. Inspect storage areas regularly for leaks or spills. ff) Outdoor Equipment Operations (SC-32): Perform activities during dry weather, cover the work area with a roof, and use secondary containment. Train employees in proper techniques for spill containment and cleanup. gg) Waste Handling and Disposal (SC-34): Cover storage containers with leak-proof lids, check for leaks weekly, and clean storage areas regularly. Ensure that wastes are disposed of properly. hh) Tank Design System: Ensure that tank systems have sufficient strength to avoid collapse, rupture, or failure and that they are protected against physical damage and excessive stress. Provide adequate secondary containment.					
Hydrology and Water Quality	HYDRO-1	In conformance with the substantive requirements of General Permit (Order No. 2009-0009-DWQ, a monitoring and reporting program will be implemented to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary, to continue to reduce pollutants and impacts on receiving waters. The monitoring program shall include the following minimum elements as per the General Permit: ii) quarterly, nonstormwater visual inspections, jj) storm-related visual inspections within 2 business days of a qualifying rain event (producing precipitation of one-half inch or more of discharge), kk) visual inspection after a storm event, ll) monitoring of nonvisual pollutants based on the calculated risk level for the project, with Risk Level 2 and 3 requiring a minimum of three samples per day during qualifying rain events (SWRCB 2009: Tables 5 and 6, 22–27), and mm) monitoring and reporting for linear projects as per Table 2.7-1A of the General Permit Results of this monitoring shall be reported annually to DTSC and to the Storm Water Multi-Application Reporting and Tracking System (SMARTS). The annual report shall include a summary and evaluation of all sampling and analysis results, original laboratory reports, and chain of custody forms; a summary of all corrective actions taken during the compliance year; and identification of any compliance activities or	Stormwater Pollution Prevention Plan (SWPPP)/ BMP Plan and Monitoring and Reporting	This measure will be implemented as directed. The SWPPP will include a monitoring and reporting program to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary.	This measure will be implemented as directed. The O&M SWPPP and BMP Plan, which will be submitted at the 90% design stage, will include a monitoring and reporting program to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary. On December 27, 2011, the Superior Court issued a judgment in response to litigation, and the State Water Board will be amending Order 2009-0009-DWQ (as modified by Order No. 2010-00014-DWQ) in accordance with the related peremptory writ of mandate. As a result, the Numeric Effluent Limits (NELs) are no longer in effect. In addition, further amendments to the permit are possible.	This measure will be implemented as directed. The industrial SWPPP and BMP Plan include a monitoring and reporting program to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary. On July 17, 2012, The State Water Resources Control Board amended Order 2009-009-DWQ by adopting Order No. 2012-0006-DWQ NPDES NO. CAS000002. Order 2012-006-DWQ requires effluent monitoring and reporting for pH and turbidity in storm water discharges. The monitoring will be used to evaluate whether numeric action levels (NALs) and numeric effluent limitations (NELs) for Active Treatment Systems included in the Construction General Permit are exceeded. The Permit contains only narrative effluent limitations and does not contain numeric effluent limitations, except for Active Treatment Systems (ATSs).	

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		corrective actions that were not implemented. NEL Violation Reports and/or NAL Violation Reports are required for Risk Level 3 and linear underground/overhead project (LUP) Type 3 Discharges. Should the project meet these criteria, the respective reports shall be submitted within 5 days of the end of the storm event, as per General Permit requirements, and provide the required information identified (SWRCB 2009:26–27 and Table 2.7-1A). The implementation of stormwater plans shall include an education component to train workers on water quality concerns and proper BMP implementation, maintenance, and repair, in addition to stormwater management program training on the construction BMP plan and industrial SWPPP.					
Hydrology and Water Quality	HYDRO-2	**Exceedance of Water Quality Standards and/or Waste Discharge Requirements** - Implement Mitigation Measure HYDRO-1. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling erosion and siltation. Consequently, any impacts associated with erosion and siltation resulting from alterations of drainage and hydrology and water quality during construction, operation and maintenance, and decommissioning.	Stormwater Pollution Prevention Plan (SWPPP)/ BMP Plan and Monitoring and Reporting	This measure will be met through actions to be taken under HYDRO-1.	This measure will be met through actions to be taken under HYDRO-1.	This measure will be met through actions to be taken under HYDRO-1.	
Hydrology and Water Quality	HYDRO-3	**Exceedance of Water Quality Standards and/or Waste Discharge Requirements.** Implement Mitigation Measure HYDRO-1. Mitigation Measure HYDRO- 1 shall be implemented. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling potential pollutants, including sediment, and runoff discharges from the project area. Consequently, any impacts associated with pollutants resulting from alterations of drainage and water quality during construction, operation and maintenance, and decommissioning.	Stormwater Pollution Prevention Plan (SWPPP)/ BMP Plan and Monitoring and Reporting	This measure will be met through actions to be taken under HYDRO-1.	This measure will be met through actions to be taken under HYDRO-1.	This measure will be met through actions to be taken under HYDRO-1.	

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Noise	**Noise-1**	**Short-Term Groundborne Noise and Vibration Levels Caused by Construction Activities near Sensitive Receptors.**					
Noise	Noise-1a	a) Construct new wells a minimum of 45 feet from vibration-sensitive receptors. Avoid constructing wells within 30 feet of vibration- sensitive land uses located in California and 275 feet of vibration- sensitive land uses located in Arizona;	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	The EIR defined the Topock Marina Mobile Home Park or single family residences (page 4.9-20) as vibration-sensitive receptors. Since the EIR does not define vibration-sensitive land uses, PG&E assumes that they are residential and mobile home parks. Based on this definition, none of the remediation wells presented in the preliminary (30%) design are located within 45 feet of vibration-sensitive receptors or within 30 feet and 275 feet of vibration-sensitive land uses in California and Arizona, respectively. Locations of new monitoring wells will be presented in the intermediate (60%) design, these wells will be placed to meet the requirements of this mitigation measure.	The EIR defined the Topock Marina Mobile Home Park or single family residences (page 4.9-20) as vibration-sensitive receptors. Based on the EIR discussion, PG&E assumes that vibration-sensitive land uses are residential and mobile home parks. Based on this definition, none of the proposed remediation or new monitoring wells presented in the 60% design is located within 45 feet of vibration-sensitive receptors or within 30 feet and 275 feet of vibration-sensitive land uses in California and Arizona, respectively.	PG&E understands that NOISE-1 analyzes whether construction may result in the exposure of sensitive receptors to groundborne noise and vibration levels that exceed the applicable standards of the San Bernardino County Development Code (83.01.090) and the Mohave County Zoning Ordinance. Potential significant impacts the measure is designed to mitigate are "annoyance and/or architectural/ structural damage." For the purpose of NOISE-1, the EIR defined the Topock Marina Mobile Home Park or single family residences (page 4.9-20) as vibration-sensitive receptors. Based on this definition, none of the proposed remediation or new monitoring wells presented in the 90% design is located within 45 feet of vibration-sensitive receptors or within 30 feet and 275 feet of vibration-sensitive land uses in California and Arizona, respectively.	
Noise	Noise-1b	b) A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near the entrance so that it is clearly visible to nearby receivers most likely to be disturbed. The coordinator will manage complaints resulting from the construction vibration. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby vibration-sensitive receptors, advising them of the construction schedule.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	Noise disturbance coordinators have been designated to manage communication with nearby vibration-sensitive receptors, and noise/vibration issues and complaints.	Noise disturbance coordinators have been designated to manage communication with nearby vibration-sensitive receptors, and noise/vibration issues and complaints.	PG&E disturbance coordinators (Curt Russell and Chris Smith) have been designated to manage both noise and vibration concerns that may arise during construction. The disturbance coordinators will post their contact information in a conspicuous location near the construction trailer entrance so that it is clearly visible to nearby receivers. The disturbance coordinator will send the construction schedule to nearby vibration-sensitive receptors prior to commencement of that construction work. Should a concern about the actual noise generated by remedy construction arise, PG&E disturbance coordinator will thoroughly investigate and resolve the issue appropriately. A qualified acoustical consultant will evaluate all reoccurring disturbances for compliance with applicable standards. All noise complaints and their resolutions will be recorded, tracked, and reported to DTSC in the quarterly compliance reports.	Disturbance coordinators were designated on November 18, 2011

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Noise	**Noise-2**	**Project-Generated Construction-Related Noise Levels.**					
Noise	Noise-2a	a) Construction equipment shall be properly maintained per manufacturer specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools shall be shrouded or shielded, and all intake and exhaust ports on power equipment shall be muffled or shielded.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. Construction equipment will be maintained and fitted with available noise suppression devices, impact tools will be shrouded or shielded, and all intake and exhaust ports on power equipment will be muffled or shielded.	This measure will be implemented as directed. Construction equipment will be maintained and fitted with available noise suppression devices, impact tools will be shrouded or shielded, and all intake and exhaust ports on power equipment will be muffled or shielded.	This measure will be implemented as directed. Construction equipment will be maintained and fitted with best available noise suppression devices, applicable impact tools will be shrouded or shielded, and all intake and exhaust ports on power equipment will be muffled or shielded.	
Noise	Noise-2b	b) Construction equipment shall not idle for extended periods of time (more than 15 minutes) when not being utilized during construction activities.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. Construction equipment will not be left idle for extended periods of time (more than 15 minutes) when not being used.	This measure will be implemented as directed. Construction equipment will not be left idle for extended periods of time (more than 15 minutes) when not being used.	This measure will be implemented as directed. Construction equipment will not be left idle for extended periods of time (more than 15 minutes) when not being used.	
Noise	Noise-2c	c) Construction activities shall include the use of berms, stockpiles, dumpsters, and or bins to shield the nearest noise-sensitive receptor adjacent to construction activities to within acceptable non-transportation noise level standards. When construction activities are conducted within the distances outlined above (i.e., 1,850 feet and 5,830 feet from California receptors and 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively) relative to noise-sensitive uses in the project area, noise measurements shall be conducted by a qualified acoustical consultant at the nearest noise-sensitive land use relative to the construction activities with a sound level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2) to ensure that construction noise associated with the project component complies with applicable daytime and nighttime noise standards. If noise levels are still determined to exceed noise standards, temporary barriers shall be erected as close to the construction activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards. All acoustical barriers shall be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission Class (STC) rating of 25 or greater as defined by the American Society for Testing and Materials' Test Method E90. Placement, orientation, size, and density of acoustical barriers shall be specified by a qualified acoustical consultant.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	This measure will be implemented as directed. The use of berms, stockpiles, dumpsters, and or bins to shield the nearest noise-sensitive receptor adjacent to construction activities will be implemented. When construction activities are within the distance outline, the additional requirements specified in this measure will be implemented.	This measure will be implemented as directed. PG&E interprets the acceptable non-transportation noise level standards cited in the mitigation measure to be San Bernardino County Development Code 83.01.080; specifically Table 83-2 specifies noise standards for stationary noise sources for residential land use to be 55 A-weighted decibels (dBA) from 7 am-10 pm and 45 dBA from 10 pm-7 am, other Commercial land use to be 60 (dBA) all day, and Industrial land use to be 70 (dBA) all day. In addition, Section (g) of the County Code 83.01.080 lists the noise sources that are exempted from the regulations which include a) motor vehicles not under the control of the commercial or industrial use, b) emergency equipment/vehicles/devices, and c) temporary construction, maintenance, repair, or demolition activities between 7 am and 7 pm, except Sundays and Federal holidays. The use of berms, stockpiles, dumpsters, and/or bins to shield the nearest noise-sensitive receptor adjacent to construction activities will be implemented as needed. When construction activities are within the distance outline, the additional requirements specified in this measure will be implemented.	This measure will be implemented as directed. PG&E interprets the acceptable non-transportation noise level standards cited in the mitigation measure to be San Bernardino County Development Code 83.01.080; specifically Table 83-2 specifies noise standards for stationary noise sources for residential land use to be 55 A-weighted decibels (dBA) from 7 am-10 pm and 45 dBA from 10 pm-7 am, other Commercial land use to be 60 (dBA) all day, and Industrial land use to be 70 (dBA) all day. In addition, Section (g) of the County Code 83.01.080 lists the noise sources that are exempted from the regulations which include a) motor vehicles not under the control of the commercial or industrial use, b) emergency equipment/vehicles/devices, and c) temporary construction, maintenance, repair, or demolition activities between 7 am and 7 pm, except Sundays and federal holidays. Figures in Section 4 of the Construction/ Remedial Action Work Plan identify the noise sensitive receptors and potential construction activities that could trigger noise monitoring in accordance with the EIR mitigation measure Noise-2c. Although night-time construction is not planned, activities that could occur within specified distance from the sensitive receptors are identified on both figures for completeness. Noise monitoring locations will be the boundary of the noise receptors facing the project-related construction activities. The	

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						precise monitoring locations will be determined in the field by a qualified acoustical consultant. The use of berms, stockpiles, dumpsters, and/or bins to shield the nearest noise-sensitive receptor adjacent to construction activities will be implemented as needed, and is included in the Construction/Remedial Action Work Plan. When construction activities are within the distance outline, the additional requirements specified in this measure will be implemented (additional details are provided in the Construction/Remedial Action Work Plan).	
Noise	Noise-2d	d) A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near construction areas so that it is clearly visible to nearby receivers most likely to be disturbed. In addition, mailing of the same information will be sent to nearby receptors and all Tribes. The coordinator will manage complaints resulting from the construction noise. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby noise- sensitive receptors, advising them of the construction schedule.	Construction/Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	Noise disturbance coordinators have been designated to manage communication with nearby vibration-sensitive receptors, and noise/vibration issues and complaints.	Noise disturbance coordinators have been designated to manage communication with nearby vibration-sensitive receptors, and noise/vibration issues and complaints.	PG&E disturbance coordinators (Curt Russell and Chris Smith) have been designated to manage both noise and vibration concerns that may arise during construction. The disturbance coordinators will post their contact information in a conspicuous location near the construction trailer entrance so that it is clearly visible to nearby receivers. The disturbance coordinator will send the construction schedule to nearby noise-sensitive receptors prior to commencement of that construction work. Should a concern about the actual noise generated by remedy construction arise, PG&E disturbance coordinator will thoroughly investigate and resolve the issue appropriately. A qualified acoustical consultant will evaluate all reoccurring disturbances for compliance with applicable standards. All noise complaints and their resolutions will be recorded, tracked, and reported to DTSC in the quarterly compliance reports.	Disturbance coordinators were designated on November 18, 2011
Noise	**NOISE-3**	**Land Use Compatibility of Future Project Noise Levels with Places of Worship and the Topock Cultural Area.** Provided that the proposed project would be required to achieve the normally acceptable exterior noise level standard for places of worship, the following mitigation measure shall be incorporated in the project design:		This mitigation measure will be met through actions taken to implement NOISE-3a and 3b (see below).	This mitigation measure will be met through actions taken to implement NOISE-3a and 3b (see below).	The project has been designed to meet the normally acceptable exterior noise-level standard for places of worship during operation. This mitigation measure also will be met through actions taken to implement NOISE-3a and 3b (see below).	
Noise	NOISE-3a	a) Implement all of the mitigation measures outlined for Impact NOISE- 1 and Impact NOISE-2;		This measure will be met through actions to be taken under mitigation measures outlined for Impact NOISE- 1 and Impact NOISE-2.	This measure will be met through actions to be taken under mitigation measures outlined for Impact NOISE- 1 and Impact NOISE-2.	This measure will be met through actions to be taken under mitigation measures outlined for Impact NOISE- 1 and Impact NOISE-2.	

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Noise	NOISE-3b	b) Upon completion of detailed project design, the determination of remediation activities and the schedule established to achieve these activities shall be communicated to Native American Tribes. PG&E shall maintain a liaison with requesting Tribes to alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis.		This measure will be implemented as directed. A liaison with requesting Native American Tribes will alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis.	This measure will be implemented as directed. A liaison with requesting Native American Tribes will alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis.	This measure will be implemented as directed. A liaison with requesting Native American Tribes will alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis. In addition, the following communication protocols developed as part of the CIMP noise protocol CUL-1a-8h (Section 2.8.4) will also be implemented: All project construction activities will be communicated to nearby noise-sensitive receptors and Interested Tribes. Elements of this communication include: • A detailed project schedule is established and published for all stakeholders. • Monthly notification to agencies and Tribes of scheduled field activities. During periods of extensive construction activity, these notifications will be issued more frequently – weekly and/or daily, as appropriate. • After issuing these notifications, notify the nearby noise-sensitive receptors and Tribes of any schedule changes. • Provide an open-communication process for Tribal representatives to seek more information about Project noise-generating activities. PG&E welcomes Tribal input on timing of Project noise-generating activities and on potential noise-reducing methods. Per CUL-1a-8k, if ceremonies are requested by any Tribe during construction, then PG&E will follow the protocol to accommodate such requests, which could include monitoring to ensure that construction noise does not exceed the normally acceptable exterior noise level standard in San Bernardino County for places of worship. • The contact information for the disturbance coordinator will be posted in a conspicuous location near the construction areas. This information will also be mailed to all nearby noise-sensitive receptors and Interested Tribes. In addition to the communication methods described above, PG&E will also consider posting construction schedule information at the information kiosk (CUL-1a-3c). PG&E may also decide to use other communication		

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						processes, including a Project website (a Project website could list Project activity schedules and other Project related information) that could be accessed by computer or smartphone and/or other simple push applications that apply to mobile devices.	
Water Supply	WATER-1	**Depletion of Groundwater.** To mitigate potentially significant effects on local groundwater levels associated with the freshwater extraction wells, in the event that freshwater is to be supplied from wells rather than from a surface intake, a hydrologic analysis shall be conducted during the design phase of the project to evaluate the proposed pumping rates for extraction, the potential cone of depression, and the extraction effect on any existing wells in proximity. Proximity shall be defined by the cone of depression boundary of any well to be used in the extraction process. Extraction well location and/or extraction rates shall be adjusted during project design based on this analysis to ensure that extraction does not substantially adversely affect the production rates of existing nearby wells (e.g., adversely affect well production such that existing land uses would not be supported). It shall be demonstrated using computer simulations or other appropriate hydrologic analysis that production rates of existing nearby wells will not be substantially affected before the installation of any new freshwater extraction wells.	Alternative Freshwater Sources Evaluation Technical Memorandum	Work on the required hydrologic analysis has commenced and will be reported in the intermediate (60%) design.	A plan for conducting a long-term constant-rate extraction test at HNWR-1 well is included in the *Revised Implementation Plan for Evaluation of Alternative Freshwater Sources* (CH2M HILL 2013c). Upon receipt of agencies' approval, PG&E will implement the plan. Data collected will be used to evaluate compliance with this measure.	A 72-hour constant-rate extraction test at Havasu National Wildlife Refuge (HNWR)-1 well was conducted in February 11-14, 2014 in accordance with the *Final Implementation Plan for Evaluation of Alternative Freshwater Sources* (CH2M HILL, 2013j). In addition, a 72-hour constant-rate extraction test was conducted at the Site B well from February 7 to 10, 2014. Test results indicated that existing nearby wells will not be substantially affected by pumping at the potential freshwater sites. PG&E presented the information to agencies, Tribes, and stakeholders at the March 19, 2014 TWG meeting, and summarized the results in a technical memorandum (CH2M HILL 2014b) for submittal to DTSC and DOI on April 2, 2014.	

Notes:

[1] The intent of this column is to identify what current or future document(s) are intended to satisfy this measure and be transparent on future forthcoming documentation. This column is not intended to document compliance with the mitigation measure.

EXHIBIT 6.1-1

PROTOCOL FOR COMPLIANCE WITH EIR MMRP MITIGATION MEASURE BIO-1 AND ARAR #32 AT THE TOPOCK COMPRESSOR STATION

Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Application of Section 404 of the Clean Water Act to the Project

Pacific Gas & Electric Company (PG&E) has prepared this protocol to identify procedures to be taken to ensure compliance with Section 404 of the Clean Water Act (CWA) and for the Topock Remediation Project (the project) located at the Topock Compressor Station in Needles, California. Section 404 of the CWA is an Applicable or Relevant and Appropriate Requirement (ARAR) for the project. Additionally, the Final Environmental Impact Report (EIR) Mitigation and Monitoring Reporting Program (MMRP; California Department of Toxic Substances Control [DTSC] 2011c) mitigation measure BIO-1 contains applicable mitigation requirements related to CWA Section 404.

The text of MMRP BIO-1 (excerpted) and ARAR #32 are as follows:

> **BIO-1:** "If during the design process it is shown that complete avoidance of habitats under U.S. Army Corps of Engineers (USACE) jurisdiction is not feasible, the Section 404 permitting process shall be completed, or the substantive equivalent per CERCLA Section 121(e)(1). In either event, the acreage of affected jurisdictional habitat shall be replaced and/or rehabilitated to ensure 'no-net-loss' Before any ground-disturbing Project activities begin in areas that contain potentially jurisdictional wetlands, the wetland delineation findings shall be documented in a detailed report and submitted to USACE for verification as part of the formal Section 404 wetland delineation process and to DTSC. For all jurisdictional areas that cannot be avoided as described above, authorization for fill of wetlands and alteration of waters of the United States shall be secured from USACE through the Section 404 permitting process before project implementation. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods agreeable to USACE and consistent with applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented.
>
> Alternatively, if USACE declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the substantive equivalent of the Section 404 permitting process shall be complied with by ensuring that the acreage of jurisdictional wetland affected is replaced on a "no-net-loss" basis in accordance with the substantive provisions of USACE regulations. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods consistent with USACE methods, and consistent with the purpose and intent of applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. In any event, a report shall be submitted to DTSC to document compliance with these mandates."
>
> **ARAR #32**: "This section of the Clean Water Act prohibits certain activities with respect to on-site wetlands and waterways. No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed activity which would have less adverse impact to the aquatic ecosystem." Federal Water Pollution Control Act (Clean Water Act), 33 USC § 1344, 40 CFR 230.10.

Under CWA Section 404, activities that discharge dredged or fill material into waters of the United States typically require a CWA Section 404 permit from the USACE.

PG&E has determined that the Topock Remediation Project would result in a discharge of dredged or fill material into jurisdictional waters and wetlands. However, the project is a CERCLA response action, and therefore the permit exemption at CERCLA Section 121(e)(1) applies to the project's on-site activities.[7] Therefore, PG&E is not required to

[7] *See* 42 U.S.C. 9921(e)(1) ("No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site where such remedial action is selected and carried out in compliance with this section."); DOI Memorandum, dated November 16, 2007.

comply with the procedural permitting requirements under Section 404. Although no CWA Section 404 permit is required for the Project, PG&E must still comply with the substantive requirements of the CWA Section 404.

PG&E received a letter from the USACE Los Angeles District Regulatory Program, dated July 10, 2013 (USACE 2013a), which stated that no permit is required for the Topock Remediation Project because the project is proceeding pursuant to the U.S. Department of the Interior's (DOI) CERCLA authority. Further, the USACE confirmed that no "substantive requirements or applicable conditions" were provided and the USACE would not verify PG&E's wetland delineation because no permit is required for the CERCLA action (USACE 2013b).

Section 404(b)(1) of the CWA requires that alternatives (or proposed actions) be designed to avoid or minimize adverse impacts to aquatic resources and waters of the United States. Compliance with the 404(b)(1) Guidelines can be achieved generally through the use of appropriate and practicable mitigation measures to minimize or compensate for potential adverse impacts of the discharge on the aquatic ecosystem (40 CFR 230.10(d)). Compensatory mitigation is considered after other appropriate and practicable options have been addressed to avoid and minimize adverse impacts to the aquatic environment. "Practicable" is defined in 40 CFR 230.3(q) to mean "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."

Further, Section 404(b)(1) requires the least environmentally damaging practicable alternative be selected. During the course of the groundwater remedy design (including the Alternative Freshwater Source Evaluation), efforts were and will continue to be undertaken to avoid and minimize impacts to jurisdictional waters of the United States. However, it has been determined that in order to meet the goals of protection of human health and the environment, to meet the RAOs for the remedy, to monitor remedy performance, to gather data for demonstration of compliance, as well as in response to resolution of design comments with the Tribes, infrastructure (remediation, monitoring wells, and associated piping/conduits) must be installed in certain washes. There are no practicable alternatives to locating certain infrastructure within waters of the United States. For example, monitoring well Q is sited in a wash because it is designed to monitor the effects of injection from well IRL-4, which was placed in a wash as a result of comment resolution at 30% design. Also, to minimize new infrastructure, the remedy design incorporates all existing monitoring wells into the remedy monitoring program. Some of the existing wells are located in Bat Cave Wash and the East Ravine.

1. Avoidance of Adverse Impacts to Wetlands and Non-Wetland Waters of the U.S.

In order to achieve the goal of no-net loss of jurisdictional waters of the U.S., including wetlands, avoidance and minimization measures (AMMs) will be implemented. PG&E prepared a Final Wetlands and Waters of the U.S. Delineation Report (CH2M HILL 2014c), delineating jurisdictional waters of the U.S., that was submitted to DTSC and DOI in April 2014, and has taken the location of jurisdictional waters of the U.S. into consideration in the design of the groundwater remedy in order to avoid impacts to jurisdictional wetlands and waters of the U.S. to the extent practicable.

During the remainder of the design phase, PG&E's design team will consult the Wetlands and Waters of the U.S. Delineation Report while considering the location of remedy infrastructure. PG&E's design team will prioritize avoidance of all wetland and non-wetland waters of the U.S. During the remainder of the remedy design, PG&E will continue to implement avoidance, to the extent practicable, and impacts to jurisdictional waters would occur only when there is no practicable alternative available.

2. Minimization of Adverse Impacts to Wetlands and Non-Wetland Waters of the U.S.

Consistent with 40 CFR 230.10(d) and Subpart H of Part 40 CFR 230 requirements to minimize the adverse effects of the discharge of dredged or fill material associated with the Topock Remediation Project, PG&E will implement AMMs during the design phase and best management practices (BMPs) during construction of the remedy in order to minimize adverse impacts to wetlands and non-wetland waters of the U.S.

Minimization measures will be implemented to minimize impacts to wetland and non-wetland waters of the United States within the Project area. All efforts will be taken to avoid jurisdictional resources to the extent practicable. Although the USACE did not provide a list of measures that may be taken to reduce impacts to jurisdictional waters and wetlands, the California Department of Fish and Wildlife (CDFW) requires compliance with AMMs in lieu of a Lake or Streambed Alteration Agreement pursuant to CERCLA Section 121(e) for all work conducted in CDFW jurisdictional

washes (CDFW 2013). The geographic extent of CDFW's jurisdiction under California law is broader than the jurisdictional extent of the USACE under CWA 404 and thus avoidance and mitigation measures applied to CDFW jurisdictional waters would as a geographic consequence also be applied to CWA 404 waters. While Arizona does not have a similar state program, PG&E will also implement the same AMMs in Arizona identified by CDFW for California to ensure appropriate protection to CWA 404 jurisdictional areas in the project limits, including those in Arizona. Thirty-four AMMs are to be implemented by PG&E for CDFW jurisdictional washes. Actions taken by PG&E, including in the design phase, to avoid and minimize impacts to jurisdictional wetlands and waters will be recorded in a table and maintained by PG&E for the Project.

Remedy Construction, Operation, Maintenance, and Decommissioning BMPs. During construction, operation, maintenance, and decommissioning, certain best management practices would be implemented to avoid and minimize temporary and permanent impacts for activities occurring within jurisdictional wetlands and non-wetland waters of the U.S. These techniques include flagging or fencing around jurisdictional resources, reducing soil erosion/runoff, sediment controls, spill controls, and other BMPs as described in Best Management Practices and Wetlands Avoidance Measures (see Attachment 1 on the following page) and the CDFW AMMs.

3. Compensatory Mitigation

Under the *2008 Compensatory Mitigation for Losses of Aquatic Resources, Final Rule*, compensatory mitigation requires actions that offset the unavoidable adverse impacts to wetlands, streams, and other aquatic resources authorized by Department of the Army permits. Compensatory mitigation is only considered when all appropriate and practicable steps have been taken to avoid and minimize adverse impacts to the aquatic ecosystem. Compensatory mitigation can be implemented by restoration, enhancement, establishment, or preservation. Restoration involves restoring a previously-existing wetland or aquatic site, enhancement involves improving or enhancing the functions of an existing aquatic site, establishment is the creation of a new aquatic site, and preservation involves an existing aquatic site. Compensatory mitigation can be provided by three methods: permittee-responsible compensatory mitigation, mitigation banks, and in-lieu fee mitigation. Further, compensatory mitigation should be commensurate with the amount and type of impact associated with the project.

PG&E will calculate temporary and permanent impacts to jurisdictional waters of the United States resulting from project activities prior to construction and periodically thereafter if additional impacts occur. Temporary impacts to waters of the United States will be restored on site, where possible. Otherwise, impacts will be treated as permanent impacts.

At the Topock Remediation Project, PG&E plans to implement mitigation bank compensatory mitigation for permanent loss of waters of the U.S. at the project site, where reasonably available. Mitigation banks involve off-site compensation under the direction of a third party who ensures that compensation is completed and that no-net loss of wetlands and non-wetland waters is successful. Mitigation bank credits are the preferred option for successfully providing compensatory mitigation under the Final Rule. Restoration is the preferred method of mitigation, and PG&E will attempt to fund a mitigation bank that provides restoration of wetlands at a 1:1 ratio of impact to wetlands, where possible. If a wetland restoration bank is unavailable then an enhancement or preservation bank, or other appropriate option, would be suitable. PG&E will also provide compensatory mitigation for impacts to non-wetland waters of the U.S. at a 1:1 ratio.

ATTACHMENT 1 TO PROTOCOL FOR PG&E COMPLIANCE WITH EIR MMRP MITICATION MEASURE BIO-1 AND ARAR #32 AT THE TOPOCK COMPRESSOR STATION

Best Management Practices and Wetlands Avoidance Measures

The potential impacts to jurisdictional waters associated with implementation of the Final Groundwater Remedy at the Topock Compressor Station may be permanent or temporary. Permanent impacts are those that are associated with the construction of the new remedy facilities themselves, which will remain in place during the operation phase until decommissioning and removal. These facilities include new wells, pipelines, and ancillary facilities (e.g., drainage features, remote monitoring equipment, and security fencing). Temporary impacts are those that are associated with construction activities that may require removal of vegetation or soil disturbance from construction activities (i.e., access roads) but will not result in permanent modifications to the bed, bank or channel of waterways.

The following wetland avoidance measures and Best Management Practices (BMPs) will be employed for the Topock Final Remedy Project:

1. A delineation of wetlands and waters of the United States has been prepared for the proposed project area, and submitted to DTSC (CH2M HILL 2014c). This delineation has informed the remedial design and was used to avoid or minimize impacts to sensitive resources. In addition to the mapping of federal jurisdictional wetlands and waters of the U.S., there was also a determination of the areas that are jurisdictional by CDFW under Section 1600. The CERCLA Section 121(e) exemption for the Topock Program obviates the need to secure permits from the U.S. Army Corps of Engineers or from CDFW, however, the substantive requirements of applicable state and federal laws are satisfied. A March 6, 2013 letter from CDFW confirming application of the CERCLA Section 121(e) exemption to the Topock Final Remedy Project and stating that PG&E need not obtain a Lake or Streambed Alteration Agreement, was accompanied by a list of Avoidance and Minimization Measures for the Project.

2. When planned work activities occur near or within jurisdictional wetland and waters, a biological monitor will provide a worker environmental awareness training to construction crews. The training will include information on sensitive biological resources that may occur in construction areas and the requirements to protect those resources. The training will also include information about BMPs to avoid potential indirect impacts to water quality at the project location or in downstream areas as described in the CDFW AMMs. PG&E's construction foreman will be responsible for verifying that all construction workers completed the training prior to beginning work at the project site.

3. Where boundaries of jurisdictional wetlands or waters are found in close proximity to planned construction activities, these features will be clearly demarcated in the field using flagging or brightly colored mesh fencing in order to ensure that they are not inadvertently impacted. The demarcation will be conducted under the supervision of a qualified biologist. The biologist will also survey any vegetation areas prior to clearing or cutting to ensure that there are no sensitive biological resources (such as active bird nests) that might be affected. The pre-construction survey will also include photographic documentation of pre-project conditions.

4. Access routes that pass through jurisdictional wetlands and waters, if needed, will be identified in order to minimize the impacts to perennial vegetation (e.g., trees and shrubs). Where impacts cannot be avoided to arrowweed stands within the historical floodplain, the stems of these plants will be cut to approximately 1 to 1 ½ feet above the ground surface. Then plastic sheeting or a tarp will be placed over the cut stems prior to crossing the area with construction vehicles. This approach will favor ready re-growth of the cut plants after the completion of construction activities. Any protected perennial trees or shrubs that are removed as a result of this project will be mitigated as part of the revegetation planning process.

5. Pre-construction surveys for listed species or actively nesting birds will be conducted immediately prior to the start of construction and after demarcation. Should any listed individuals or active nests be identified, the PG&E biologist will contact the United States Fish and Wildlife Service (USFWS) to determine an appropriate response. Only a biologist with an active Section 10(a) permit will be authorized to remove any individuals from the construction areas to a USFWS-approved release location.

6. The boundaries of the construction work zones and staging (supporting) areas including access routes will follow existing routes as much as possible. All construction work zones will be shown on detail site maps and demarcated in the field. No construction activities, vehicular access, equipment storage, stockpiling, or significant human intrusion will be allowed outside of the designated construction work zone and staging areas.

7. Equipment will not be operated in areas of ponded or flowing water, and no wet excavations will be performed during construction. Construction vehicles and equipment will be checked periodically to ensure that they are in proper working condition and that there are no apparent oil or fuel leaks. Onsite refueling or lubrication of vehicles and cleaning of equipment, or other activities that involve the use of fuels, lubricants, or solvents, will occur only in locations that are away from jurisdictional wetlands and waters.

8. Compliance with the above AMMs within jurisdictional waters will be tracked and reported to DTSC in the quarterly EIR mitigation measures compliance reports.

9. At project completion, the designated biological monitor will return to the site to document the post-construction conditions at the site. Information on the pre-and post-construction conditions will be documented in the Remedial Action Construction Completion Report. Post-construction conditions will be documented with photographs.

TABLE 6.1-2
Summary of Compliance with Cultural Impact Mitigation Program (CIMP) Protocols
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in CIMP Document	Protocols/Relevant Excerpts from Document	Action (Compliance Status) Pre-Final (90%) Design
1	Section 2.1	CUL-1a-8a: Protocols for Continuation of Tribal Communications This protocol requires that communication be consistent with past practices and communication processes previously entered into by PG&E with Interested Tribes, and that PG&E would continue to communicate with Interested Tribes during the design, construction, operation, and decommissioning of the project. Prior to implementation of construction. For examples of communication procedures consistent with past practices, see 2.1. Prior to implementation of construction, PG&E shall communicate with Interested Tribes that place cultural significance on the Topock Cultural Area. Outreach efforts between the Tribes and PG&E shall be communicated by PG&E to DTSC quarterly during the design and construction phase for review and input, and annually during project operations.	PG&E has communicated with the Interested Tribes and will continue to communicate with them during all phases of the Project from design and construction through operation and maintenance as well as decommissioning. Tribes are currently invited to attend monthly meetings to review pieces of the design as they are prepared and to receive updates on the progress of the project. PG&E has also held field meetings with Tribes (e.g., meetings to site well locations, etc. May also see CUL-1a-8d, CUL-1a-8j, and CUL-1a-9) to assist in Tribal understanding of the remedy design. During construction, PG&E will continue to communicate regularly and will also provide updates on field activities so that Tribal monitors may also participate. Outreach efforts are communicated to DTSC on a quarterly basis during design, and will continue to occur quarterly during construction. As required by DTSC, a log of communications with interested Tribes has been maintained and included in the quarterly EIR mitigation measure compliance reports since January 2012.
2	Section 2.2	CUL-1a-8b: Protocols for Appropriate Treatment of Archaeological Materials These protocols include the following components: • Protocols for the appropriate treatment of archaeological materials that may be disturbed or discovered during implementation of the final remedy – Avoidance is preferred (by PG&E and Tribes) means of treatment in a discovery situation. If PG&E recommends that avoidance is not feasible and the Agencies make a determination that it is not feasible, then the protocols of Discovery Plan of the CHPMP will be followed for appropriate treatment of discoveries. • Protocols for the repatriation of significant items of cultural patrimony that may be recovered during the project • Protocols for the curation of cultural materials recovered during the project. • Treatment of archaeological sites, if data recovery is proposed	During design and construction, if discoveries are made, avoidance is the preferred method of treatment of discoveries. If, however, Agencies make a determination that avoidance is not feasible, PG&E will provide treatment of archaeological materials as outlined in Appendix C (Discovery Plan) of the CHPMP. As described in the protocol, during design and construction, Native American human remains and/or archaeological materials from Federal or Tribal land that are funerary objects, or ceremonial objects, or objects of cultural patrimony will be treated as prescribed in the Native American Graves Protection and Repatriation Act (NAGPRA) and its implementing regulations (43 Code of Federal Regulations [CFR] 10), and as discussed in Section 8.2 (Treatment of Any Human Remains, Funerary Objections, Ceremonial Objects and Items of Cultural Patrimony) and Appendix D (Plan of Action) of the CHPMP (BLM 2012). If data recovery is proposed for treatment of an archaeological site, PG&E will follow the steps outlined in Section 2.2.3 of the CIMP.
3	Section 2.3	CUL-1a-8c: Protocols for the Review of Cultural Resource-Related Documents These protocols apply to the extent that the BLM has not consulted with Tribes under the consultation process in the Programmatic Agreement and referenced in the CHPMP, and include the following: • Review of cultural resource related documents, including timelines and procedures are specified in detail at Section 2.3.2. • PG&E will afford the Tribes an opportunity to review and comment on Project cultural resource-related documents • Standards as stipulated in the Programmatic Agreement Section XI will be implemented. (Section 2.3.4)	To date, the review of cultural resource related documents has occurred under the procedures identified by the Programmatic Agreement and referenced in the CHPMP. Certain EIR-required cultural resource related documents have also been sent to DTSC for review.
4	Section 2.4	CUL-1a-8d: Protocols for the Review of Project Design Documents These protocols provide for the review of the Topock Compressor Station Groundwater Remediation Project (Project) Design Documents at the Preliminary, Intermediate, and Pre-final phases. In general, at the preliminary phase of each design, PG&E will submit the design document to DTSC/DOI who will then submit to reviewers and invite their initial comments. See CIMP Figure 2-1 for a complete overview of the review process during design.	PG&E has followed the protocols outlined in Figure 2-1 of the CIMP regarding the review of design documents at the 30% and 60% design phases. PG&E will continue to follow the protocol for review of the 90% design.
5	Section 2.5	CUL-1a-8e: Protocols for Restoring the Environment to Its Preconstruction Conditions Upon Decommissioning The protocol presents the general approach for restoration of the areas affected by the groundwater remediation facilities. Restoration activities include grading, contouring, and revegetating the site. The restoration approach will be informed by documentation of the pre-construction condition (e.g., ground photographic records, topographic/aerial maps, disturbed area map, archaeological surveys, historical resource surveys, biological surveys). PG&E will seek ways to restore the affected areas to the conditions prior to construction, as closely as possible. Discussions will take place with the Tribes to develop an understanding of the different restoration techniques and expectations for different environments. For additional details, see Sections 2.5.3 (Restoration Guidelines) and 2.5.4 (Habitat Restoration and Revegetation).	A Plan for Decommissioning of Remedy Facilities and Restoration will be completed within 120 days of DOI's certification of completion of the remediation and a determination by DOI that removal of such facilities is protective of human health and the environment. This Restoration Plan will be developed in consultation with the land owners and managers, including FMIT, U.S. Bureau of Reclamation (USBR), and BLM. The BLM will consult with Signatories, Tribes, and Invited Signatories to the PA on the Restoration Plan. PG&E will implement the Plan to restore the site to conditions existing prior to the construction of the groundwater remediation facilities to the maximum extent practicable.
6	Section 2.6	CUL-1a-8f: IM-3 Decommissioning Plan	The IM-3 Decommissioning, Removal, and Restoration Work Plan is included as Appendix B of the CIMP and also as an appendix of the Construction/Remedial Action Work Plan.

TABLE 6.1-2
Summary of Compliance with Cultural Impact Mitigation Program (CIMP) Protocols
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Item No.	Reference Location in CIMP Document	Protocols/Relevant Excerpts from Document	Action (Compliance Status) Pre-Final (90%) Design
7	Section 2.7	CUL-1a-8g: Protocols for Repatriation of Clean Soils During Construction Specifically, the management protocol for Handling and Disposition of Displaced Site Material requires work plans that involve activities that displace site material (and that are finalized subsequent to the development of the protocol) to include the following information: • The process for soliciting and considering the inputs of Tribe(s) regarding the management of the material that is displaced as a result of the work. • Details on material handling and short-term/long-term storage (including an inventory of materials displaced by the work). • Process for assessing contamination assessment. • Final disposition alternatives for displaced material.	The Soil Management Plan (SMP) (Volume 4 of the O&M Manual) contains procedures and protocols for the management and disposal of displaced soil including potentially contaminated soil, during drilling, construction, operation, and maintenance of the remedy as well as decommissioning of IM-3 facilities. The procedures and protocols included soil and waste characterization, screening and classification of soils, handling and short-term storage of soils, long-term storage of soils, transportation and disposal of hazardous wastes, and record keeping. Additional procedures and protocols for handling, management, and disposal of other waste streams that could be generated from remedy construction and start-up are included in the Waste Management Plan in an appendix of the Construction/Remedial Action Work Plan.
8	Section 2.8	CUL-1a-8h: Noise Protocols Pre-Construction (Section 2.8.3) a) Establish a disturbance coordinator, who will coordinate both noise and vibration concerns that may arise during construction. b) Identify and coordinate activities where Noise-2 requires noise monitoring. Noise-2 states that noise monitoring will be conducted when construction activities are conducted within 1,850 feet and 5,830 feet from California receptors and 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively. c) If noise monitoring during construction is required, noise monitoring locations will be selected in coordination with the Tribes. The EIR MMRP requires that noise measurements be conducted at the nearest noise-sensitive land use relative to the construction activities. d) Examples of noise barriers that could be used during construction to mitigate noise concerns (e.g., berms, stockpiles, dumpsters, bins, and engineered acoustical barriers), and approaches for implementation, will be included in the Construction/Remedial Action Work Plan for review and comment by Tribes and agencies. In the unlikely event that engineered acoustical barriers are required during construction, they will comply with requirements of the EIR. Construction (Section 2.8.3) e) If noise monitoring finds that the relevant noise thresholds are exceeded, temporary noise barriers will be erected. f) Maintain all construction equipment according to manufacturer guidelines. Equipment will be fitted with the best available noise suppression devices. All impact tools will be shrouded or shielded, and all intake or exhaust ports on power equipment will be muffled or shielded. g) Construction equipment will not be allowed to idle for extended periods of time (more than 15 minutes) when not being used for construction. h) Should a concern about the actual noise generated by remedy construction arise, PG&E disturbance coordinator will thoroughly investigate and resolve the issue appropriately. A qualified acoustical consultant (INCE Board Certified or Professional Engineer in Acoustics) will evaluate all reoccurring disturbances for compliance with applicable standards. Noise measurements will be in accordance with the Topock Sound Measurement Protocol in the Basis of Design Report and the forthcoming Remedial Action Work Plan. All noise complaints and its resolutions will be recorded, tracked, and reported to DTSC in the quarterly compliance reports. Operation and Maintenance (Section 2.8.3) i) Should a concern about the actual noise generated by remedy operation arise, PG&E disturbance coordinator will thoroughly investigate and resolve the issue appropriately. A qualified acoustical consultant will evaluate all reoccurring disturbances for compliance with applicable standards. Noise measurements will be in accordance with the Topock Project Sound Measurement Protocol. All noise complaints and their resolutions will be recorded, tracked, and reported to DTSC in the quarterly compliance reports. j) If a new well needs to be installed or an existing well has to rebuilt during the operation phase, these activities are considered short-term construction activities and all noise protocols for pre-construction and construction phases will apply. Decommissioning (Section 2.8.3) k) Decommissioning are considered short-term construction activities. All noise protocols for pre-construction and construction phases will also apply to the decommissioning phase. Communication (Section 2.8.4) -All Project construction activities shall be communicated to nearby noise-sensitive receptors and Interested Tribes. Elements of this communication include: • A detailed project schedule is established and published for all stakeholders. • Monthly notification to agencies and Tribes of scheduled field activities. During periods of extensive construction activity, these notifications will be issued more frequently – weekly and/or daily, as appropriate. • After issuing these notifications, notify the nearby noise-sensitive receptors and Tribes of any schedule changes. • Provide an open-communication process for Tribal representatives to seek more information about Project noise-generating activities. PG&E welcomes Tribal input on timing of Project noise-generating activities and on potential noise-reducing methods. • The contact information for the disturbance coordinator will be posted in a conspicuous location near the construction areas. This information will also be mailed to all nearby noise-sensitive receptors and Interested Tribes. In addition to the communication methods described above, PG&E will also consider posting construction schedule information at the information kiosk (CUL-1a-3c). PG&E may also decide to use other communication processes, including a Project website (a Project website could list Project activity schedules and other Project related information) that	Pre-Construction a) PG&E disturbance coordinators, Curt Russell and Chris Smith, will coordinate both noise and vibration concerns that may arise during construction. b) Noise monitoring locations will be the boundary of noise receptors as defined by EIR MMRP NOISE-2 facing the project-related construction activities. The precise monitoring locations will be determined in the field by a qualified acoustical consultant in coordination with the Tribes. c) Section 4 of the Construction/Remedial Action Work Plan contains examples of noise barriers that could be used during construction to mitigate noise concerns. Protocols during construction, operation and maintenance, and decommissioning will be adhered to during implementation of each phase. Compliance actions will be documented and reported to DTSC in the quarterly compliance reports. Communication (Section 2.8.4) • A detailed construction schedule is established and included in the Construction/Remedial Action Work Plan for review by agencies, stakeholders, and Tribes. • Monthly notification to agencies and Tribes of scheduled field activities has been and will continue to be sent by PG&E (Curt Russell or his designee). During periods of extensive construction activity, these notifications will be issued more frequently – weekly and/or daily, as appropriate. This element has been incorporated into the overall communication framework for construction and start-up (see Table 2.3-1 of the Construction/Remedial Action Work Plan). • After issuing these notifications, PG&E will notify the nearby noise-sensitive receptors and Tribes of any schedule changes. Nearby noise-sensitive receptors are residents of the mobile home park at Moabi Regional Park and the Topock Marina, as well as private residents in Topock Marina area. When construction activities occurred within 1850 feet of noise-sensitive receptors to the east, PG&E will post contact information in a conspicuous location near construction areas so that it is clearly visible to nearby sensitive receptors. In addition, mailing of the same information will be sent to those receptors and all Tribes (see Table 2.3-1 of the Construction/Remedial Action Work Plan). • Provide an open-communication process for Tribal representatives to seek more information about Project noise-generating activities. PG&E welcomes Tribal input on timing of Project noise-generating activities and on potential noise-reducing methods. Per CUL-1a-8k, if ceremonies are requested by any Tribe during construction, then PG&E will follow the protocol to accommodate any requests for Tribal ceremonies, which could include monitoring to ensure that construction noise does not exceed the normally acceptable exterior noise level standard in San Bernardino County for places of worship. • The contact information for the Project disturbance coordinators (Curt Russell and Chris Smith) will be posted in a conspicuous location near the construction areas. This information will also be mailed to all nearby noise-sensitive receptors and Interested Tribes. Nearby noise-sensitive receptors include residents at Moabi Regional Park and the Topock Marina area.

TABLE 6.1-2
Summary of Compliance with Cultural Impact Mitigation Program (CIMP) Protocols
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PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in CIMP Document	Protocols/Relevant Excerpts from Document	Action (Compliance Status) Pre-Final (90%) Design
		could be accessed by computer or smartphone and/or other simple push applications that apply to mobile devices.	
9	Section 2.9	CUL-1a-8i: Protocols for the Appropriate Methods, consistent with Mitigation Measures, AES-1 and AES-2, to Reduce Visual Intrusion Additional Design Protocols that PG&E May Employ to Reduce Visual Intrusions (Section 2.9.2) In addition to the specific requirements identified in AES-1 and AES-2, PG&E may employ various feasible design concepts identified by PG&E, Tribes, or other interested parties prior to implementation of a Project activity to reduce visual intrusions of the Project design. Potential design concepts include: • Construction of aboveground facilities within existing facilities, when appropriate. • Building designs that are harmonious with existing buildings and nearby landforms, including low profiles when available. • Flush-mount or below-ground installations whenever feasible. • Construction within existing transportation corridors. • Working only within previously-disturbed sites, whenever possible. • Placing aboveground facilities away from traffic, where feasible (i.e., areas where the introduction of the facilities would not create safety issues or visual impacts), to reduce the need for traffic barricades. • Design the lighting associated with above ground facilities to minimize glare and to focus lighting within a facility (e.g., using shields on lighting to reflect light downward and focused within a facility). Opportunity for Agency, Tribal, and Other Stakeholder Input on the Visual Nature of Project Design (Section 2.9.3) Within the design packages, PG&E will include visualizations of various design features described within the text and drawings in the package. Although the visualizations will not be comprehensive of the entire project, they will include many of the aboveground facilities that may be visible to stakeholders after construction. Potential Temporary Visual Intrusions Identified During Remedy Implementation (Section 2.9.4) During the course of remedy implementation, if agencies, Tribes, or other stakeholders identify temporary visual intrusions that should be addressed by PG&E, they should notify the Project Disturbance Coordinator(s), who will be responsible for resolving the issue or coordinating resolution of the issue with the Tribes, DTSC, other agencies, and/or stakeholders.	See response to EIR mitigation measures AES-1 and AES-2 in Table 6.1-1 for compliance actions. Examples of where the additional protocols were employed during the design to reduce visual intrusions: Building designs that are harmonious with existing buildings and nearby landforms, including low profiles when available. For example, the remedy building inside the compressor station and the TW Bench are designed to be compatible with existing buildings and/or the environment. Flush-mount or below-ground installations whenever feasible. For example, most well head completion is flush-mount and most piping installations are below ground. Construction within existing transportation corridors. For example, the majority of piping corridors are within existing roads. Working only within previously-disturbed sites, whenever possible. For example, all proposed construction staging areas and yard are located in previously-disturbed areas. Design the lighting associated with above ground facilities to minimize glare and to focus lighting within a facility (e.g., using shields on lighting to reflect light downward and focused within a facility). This design concept is followed in all building design for the project. Opportunity for Agency, Tribal, and Other Stakeholder Input on the Visual Nature of Project Design (Section 2.9.3) As was done at the 60% design stage, visualizations of various design components are provided in the 90% BOD Report to facilitate review. In addition, photos of typical construction equipment are provided in the Construction/Remedial Action Work Plan to facilitate review of the document. Potential Temporary Visual Intrusions Identified During Remedy Implementation (Section 2.9.4) During the course of remedy implementation, if agencies, Tribes, or other stakeholders identify temporary visual intrusions that should be addressed by PG&E, they should notify Curt Russell and Chris Smith, the Project Disturbance Coordinator(s), who will be responsible for resolving the issue or coordinating resolution of the issue with the Tribes, DTSC, other agencies, and/or stakeholders.
10	Section 2.10	CUL-1a-8j: Protocols for Tribal Notification in advance of Project-Related Activities Protocols for Tribal notification in advance of project-related activities that the Interested Tribes may feel have the potential to cause adverse impacts to sensitive cultural resources - PG&E will take care in these advance notifications to identify the field activities that have the potential to be ground disturbing. Examples of field activities which may include potentially ground-disturbing aspects include grading, trenching, boring, drilling, or other excavation for new injection, extraction or monitoring wells. In addition, construction of new pipelines, new treatment facilities, new access roads, new staging areas, other new transportation facilities, or other new Project components may include ground-disturbing aspects. PG&E will use communication methods specified in Section 2.10, and will provide two weeks advance notice of covered activities when possible.	PG&E has provided advance notice of ground-disturbing activities to Tribes during pre-construction phases such as the Freshwater Implementation Plan and Utility Potholing. PG&E also sends monthly emails to Tribes and Agencies that outline the field activities occurring at the Topock Compressor Station for the month. PG&E provides a two week advance notice where possible. PG&E will continue to provide advance notice to Tribes during any other ground-disturbing activities that may occur pre-construction. PG&E will also continue to follow this protocol during construction of the remedy and during operation, maintenance, and decommissioning.
11	Section 2.11	CUL-1a-8k: Protocols to Accommodate Tribal Ceremonies or Activities involving the Topock Cultural Area Protocols to be followed by project personnel to accommodate, if feasible as determined by DTSC, key Tribal ceremonies that involve the Topock Cultural Area. Under the protocol, any Tribe(s) wishing to perform such a ceremony may contact PG&E's Site Manager at the Topock Compressor Station by telephone, email, or in writing to discuss the specific request. PG&E will communicate directly with the requester (by telephone or in person) as soon as the request has been evaluated. PG&E will indicate if all of the requests can be accommodated and, if not, suggest alternatives that PG&E can accommodate. The requestor and PG&E will also discuss the details of other services that PG&E may agree to provide for the benefit of the ceremonial activity, including, power, water, parking, signage, or other support. PG&E will also identify any reasonable and necessary stipulations regarding health and safety, logistical, communication, or site access procedures to be followed in the Topock Compressor Station Groundwater Remediation Project (Project) Area. One stipulation will clearly state that the Topock Compressor Station is excluded, and that access to it cannot be provided.	No requests to conduct Tribal ceremonies have been submitted. If ceremonies are requested during design, construction, operation and maintenance, then PG&E will follow the protocol to accommodate any requests for Tribal ceremonies.

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Item No.	Reference Location in CIMP Document	Protocols/Relevant Excerpts from Document	Action (Compliance Status) Pre-Final (90%) Design
12	Section 2.12	CUL-1a-8l: Protocols for Tribal Monitors to Observe Ground Disturbance Activities Provisions affording sufficient Tribal monitors to observe ground disturbing activities and/or other scientific surveying (e.g., biological surveys) that may occur in preparation for construction activities. Ground-disturbing activities include trenching, excavation, grading, well excavation/drilling, decommissioning the IM-3 Facility and subsurface pipeline, or other construction-related activities. Pacific Gas and Electric Company (PG&E) will notify the Interested Tribes (Tribes) as defined by the Environmental Impact Report (EIR) of planned ground-disturbing activities and other scientific surveying that is conducted in anticipation of construction activities. This provides the opportunity for Tribes to send Tribal monitors to the site to observe these activities, if they wish. While on site, Tribal monitors will have the opportunity to discuss their concerns directly with the PG&E project team while the activities are proceeding, as well as reporting their observations and any issues of concern directly to the Tribe(s) that they represent. Sufficient time (a minimum of 1 week notice) will be allowed between the notification and the beginning of the field activity that the Tribe(s) will be able to prepare adequately without undue haste and arrange for one or more monitors.	PG&E has provided notification to Tribes in advance of ground-disturbing activities during the design phase, including during the Alternative Freshwater Evaluation and Utility potholing activities. PG&E will continue to notify Tribes in accordance with the protocol throughout the remainder of the design, construction, operation and maintenance, and decommissioning.
13	Section 2.13	CUL-1a-8m: Provision of Reasonable Compensation for Tribal Monitors Provisions of reasonable compensation for Tribal monitors consistent with historic rates. PG&E will provide reasonable compensation for Tribal monitors who work on the Project. PG&E will negotiate with Tribes, taking into account the requirements of any pertinent MOUs or other legal agreements, to establish pay rates for monitors consistent with historic rates. The negotiated compensation rates will then be formalized in a separate MOU, or in amendments to an existing MOU, with each Tribe that will be supplying the services of one or more monitors.	PG&E has been operating under MOUs and has provided compensation for Tribal monitors currently and will continue to provide compensation during construction, operation and maintenance, and decommissioning phases.
14	Section 2.14	CUL-1a-8n: Protocols for Protective Measures for Archaeological/Historical Sites During Construction Locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction. 2.14.1 Pre-Construction Measures to Identify Sites Requiring Protection. Pre-construction planning efforts will: (1) identify the location and boundaries of any archaeological, historical, and other cultural sites requiring protective measures during construction; and (2) establish zones within which construction may proceed. PG&E and BLM will consult with the Tribes during this process. 2.14.2 Identification of Protective Measures Prior to Construction. Avoidance will be implemented. Avoidance of known cultural sites/sensitive areas may be accomplished by using existing or approved routes of travel, and by carefully avoiding archaeological and historical sites when selecting laydown, access, and temporary work areas appurtenant to construction activities. 2.14.3 Measures to Identify New Sites Requiring Protection during Construction. PG&E's qualified archaeologist would inspect and evaluate any previously unidentified or suspected archaeological or historical resources found during construction, operation, or decommissioning. If resources are discovered, earth-disturbing activities will be temporarily suspended at the location of the find. The find will then be treated by modifying the extent of the construction zone to avoid and protect the resource(s). Thereafter, earth-moving activities may resume within the modified construction zone. Tribal notification will occur under requirements of the CHPMP and PA. 2.14.4 Implementation of Protective Measures. If warranted, protective measures may be employed on or around the archaeological or historical site to protect the resource from disturbance. These measures may include, but are not limited to, protective coverings of soil or riprap, onsite personnel to prevent access to sensitive areas, use of flagging, blaze orange mesh fencing secured to steel posts, bollards, natural barriers of rocks or piled brush, cables suspended between secure posts, and/or signage (e.g., "This Area Closed" or "Exclusion Zone: Keep Out"). Any such measures will be temporary (only as needed during construction), and will, to the extent practicable, not call undue attention to the nature of the resource being protected. Ongoing work within the established construction zone may continue. PG&E, in consultation with DTSC and BLM (if Federal and/or Tribal land is involved) and the Tribes, will determine the appropriate protective measures on a case-by- case basis, and may increase or reduce the size of the Environmentally Sensitive Area (ESA) or Exclusion Zone (EZ) if agreed to by representatives of these parties in the field. The protective measures set forth in this section will be thoroughly covered in the Worker Education Program. 2.14.5 Installation and Inspection of Protective Measures during Construction. PG&E's qualified archaeologists will monitor the installation of all protective measures and their removal after construction. Similarly, Tribal Monitors will be notified and invited to monitor the installation of all protective measures and their removal. PG&E construction inspectors will conduct and document systematic inspections of the integrity of protective measures during the entire period of construction activity. 2.14.6 Protection of New Sites Discovered during Construction. PG&E's qualified archaeologist will inspect and evaluate any new sites that may be discovered during construction and will notify Tribal Monitors of the discovery. Tribal Monitors will then inspect and evaluate the new site(s). Every effort will be made to avoid adverse effects on the discovered site(s) to the maximum extent practicable. Details on the initial inspection procedures are provided in Section 2.14.6. 2.14.7 Restoration After Removal of Protective Measures. After removal of protective measures (e.g., fencing, poles), the areas will be restored to pre-construction conditions. For details on documentation of pre-construction condition and post-construction condition, see Section 2.14.7.	PG&E will implement the protocols for protective measures for archaeological/historical sites during the construction of the remedy. As stated in the protocol, avoidance is the preferred protective measure and will be implemented where any identified archaeological, historical, or other cultural sites require protective measures during construction. If protective measures are used, the measures identified in Section 2.14.4 would be implemented. PG&E's archaeologist would monitor the installation and removal of all protective measures, and Tribal monitors would also be invited to monitor installation and removal. After removal, restoration would occur to pre-construction conditions.

TABLE 6.1-2
Summary of Compliance with Cultural Impact Mitigation Program (CIMP) Protocols
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in CIMP Document	Protocols/Relevant Excerpts from Document	Action (Compliance Status) Pre-Final (90%) Design
15	Section 2.15	CUL-1a-8o: Protocols for Reporting Discoveries of Cultural Importance Protocols for the reporting of discoveries of cultural importance consistent with existing statutes and regulations. In the event that any previously unidentified or suspected historic or archeological resource, such as human remains and/or associated funerary objects or graves, is discovered during construction, PG&E will immediately notify the DTSC, BLM, and Tribal representatives if the resource is Native American, consistent with the CHPMP and the EIR Chapter 5.1.1. Human remains, items of cultural patrimony, or funerary objects that may be found shall be handled with utmost cultural and religious sensitivity. As specified in Section 2.2.1, avoidance of cultural resources is preferred over excavation, removal, or further disturbance, particularly in discoveries involving human remains, items of cultural patrimony, or funerary objects. Where human remains and funerary objects, ceremonial items, and items of cultural patrimony are discovered, PG&E will implement the reporting protocols provided in Appendix D (Plan of Action [POA]) of the CHPMP and consistent with Mitigation Measure CUL-4 in EIR Chapter 5.1.1. During initial inspection, PG&E's qualified Cultural Resources Consultant (as specified in CUL-1a-3(a)) will document the discovery. Tribal monitors will be invited to assist in the preparation of the documentation and identification of Tribal cultural values. Discoveries identified as having cultural importance will be documented in a culturally sensitive manner acceptable to the Interested Tribe(s). PG&E will consult with the BLM, and BLM will consult with the Tribal representatives if the resource is Native American in nature, to define the nature and extent of any further studies that may be required.	PG&E will follow the protocol for reporting discoveries, in addition to complying with the CHPMP and PA.
16	Section 2.16	CUL-1a-8p: Protocols for Inspecting Remediation Facilities and/or Staging Areas During Construction Protocols for the inspection of remediation facilities and/or staging areas throughout the construction phase. The locations of remediation facilities and staging areas will be examined for cultural resources throughout the construction phase. This process will include advance notification of interested parties, including Interested Tribes, implementation of procedures for the review of Project design documents, selecting previously impacted land wherever feasible for re-use as staging areas and/or for the siting of remediation facilities, and avoiding direct physical impacts to the Topock Maze as it is manifested archaeologically. PG&E's qualified archaeologist, in coordination with the Tribes, will perform background research and field verification to identify and evaluate any cultural, historical, or archaeological resources within the location of remediation facilities and/or staging areas. Any resources present will be avoided to the extent feasible during construction and use of staging areas and/or remediation facilities pursuant to CUL-1b/c and CUL-2. Further, construction monitoring and treatment of any unanticipated discoveries will be as specified in CUL-1b/c-4 and CUL- 1a-8o. Accordingly, archaeological and Native American monitors will be invited to observe all earth-disturbing activities at remediation facilities and/or staging areas during construction. These monitors will at all times comply with Project-wide and job site-specific safety requirements.	PG&E has included Tribes in review of Project design documents at the 30% and 60% phases, and PG&E has selected previously disturbed land for staging areas and siting of remediation facilities wherever feasible. PG&E's remedial design avoids direct impact to the Topock Maze as it is manifested archaeologically. During construction, PG&E will implement the procedures of the protocol to identify and evaluate any cultural, historical, or archaeological resources within the vicinity of staging areas and remediation facilities. Avoidance will then be implemented for any identified resources, and monitoring and treatment in the case of unanticipated discoveries. PG&E will invite Tribal monitors to observe all earth-disturbing activities.

Summary of Compliance with Identified ARARs
(On CD-ROM only)

TABLE 6.2-1
Summary of Compliance with Identified ARARs
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
Chemical-Specific										
1	Federal Chemical-Specific	Federal Safe Drinking Water Act - 42 USC § 300f, et seq.; 40 CFR 141 -- Subpart F– Maximum Contaminant Level Goals (MCLGs)	ARAR Relevant and Appropriate	MCLGs are not federally enforceable drinking water standards, but CERCLA § 121(d) identifies MCLGs as relevant and appropriate requirements.	Remedy Implementation	PG&E	Quarterly progress reports during remedy O&M Other data/reports requested by agencies	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the federal maximum contaminant level goal (MCLG) for Cr(T) of 100 µg/L. There is no federal MCLG for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L Cr(VI) at the conclusion of remedy implementation. Although concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate within the treatment area during remedy implementation, institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the federal MCLG for Cr(T) of 100 µg/L. There is no federal MCLG for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L Cr(VI) at the conclusion of remedy implementation. Although concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate within the treatment area during remedy implementation, institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the federal MCLG for Cr(T) of 100 µg/L. There is no federal MCLG for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L Cr(VI) at the conclusion of remedy implementation. Although concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate within the treatment area during remedy implementation, institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.

TABLE 6.2-1
Summary of Compliance with Identified ARARs
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PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
2	Federal Chemical-Specific	Federal Safe Drinking Water Act - 42 USC § 300g-1; 40 CFR 141 -- Subpart G – National Primary Drinking Water Regulations (MCLs)	ARAR Relevant and Appropriate	These MCLs are relevant and appropriate standards, which establish the maximum permissible level of contaminants (e.g., chromium) in sources (or potential sources) of drinking water. MCLs may be applicable where water at a CERCLA site is delivered through a public water supply system.	Remedy Implementation	PG&E	Quarterly progress reports during remedy O&M Other data/reports requested by agencies	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer below the federal maximum contaminant level (MCL) for Cr(T) of 100 µg/L. There is no federal MCL for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Although concentrations of Cr(VI) and in-situ by-products (e.g., arsenic, manganese) may fluctuate within the treatment area during remedy implementation, institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional controls.	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer below the federal MCL for Cr(T) of 100 µg/L. There is no federal MCL for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Concentrations of Cr(VI) and in-situ by-products (e.g., arsenic, manganese) may fluctuate within the treatment area during remedy implementation. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona, and will be removed to below MCL prior to injection. Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation are localized, will attenuate under site conditions and will return to pre-remedy baseline levels after the end of active remediation. Institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional controls.	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer below the federal MCL for Cr(T) of 100 µg/L. There is no federal MCL for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Concentrations of Cr(VI) and in-situ by-products (e.g., arsenic, manganese) may fluctuate within the treatment area during remedy implementation. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona. Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation and freshwater injection are localized, will attenuate under site conditions and will return to pre-remedy baseline levels after the end of active remediation and the cessation of freshwater injection, respectively. Institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional controls.
3	Federal Chemical-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC §§ 1251-1387; 40 CFR 131.38	ARAR Applicable	These are federally promulgated Water Quality Standards for surface waters. Such water quality standards include specific criteria for water bodies in California, including standards for hexavalent chromium.	Remedy Implementation	PG&E	Quarterly progress reports during remedy O&M Other data/reports requested by agencies	Surface water sampling in the Colorado River near the site show concentrations less than the federal water quality criteria (California Toxics Rule) for Cr(VI) of 11 µg/L. Reducing Cr(VI) concentrations in groundwater by implementation of the remedy will increase the level of certainty that surface water quality will continue to remain below this level. The remedy is designed to prevent migration of contaminants to the Colorado River that would result in an exceedance of California Toxics Rule criteria.	Surface water sampling in the Colorado River near the site show concentrations less than the federal water quality criteria (California Toxics Rule) for Cr(VI) of 11 µg/L. Reducing Cr(VI) concentrations in groundwater by implementation of the remedy will prevent any and all discharges to the Colorado River from the groundwater contamination. The remedy is designed to prevent migration of contaminants to the Colorado River that would result in an exceedance of applicable water quality standards.	Surface water sampling in the Colorado River near the site show concentrations less than the federal water quality criteria (California Toxics Rule) for Cr(VI) of 11 µg/L. Reducing Cr(VI) concentrations in groundwater by implementation of the remedy will prevent any and all discharges to the Colorado River from the groundwater contamination. The remedy is designed to prevent migration of contaminants to the Colorado River that would result in an exceedance of applicable water quality standards, including federal, California, and Arizona standards.

TABLE 6.2-1
Summary of Compliance with Identified ARARs
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
52	California Chemical-Specific	California Safe Drinking Water Act - Title 22, CCR, Div 4, Ch 15, §64431, §64444	ARAR Applicable	Maximum Contaminant Levels (MCLs) which shall not be exceeded in the water supplied to the public. California state MCLs for drinking water standards are more stringent than primary federal standards.	Remedy Implementation	PG&E	Quarterly progress reports during remedy O&M Other data/reports requested by agencies	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the state MCL for Cr(T) of 50 µg/L. There is no state MCL for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Although concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate during remedy implementation, institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the state MCL for Cr(T) of 50 µg/L. There is no state MCL for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate during remedy implementation. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona, and will be removed to below MCL prior to injection. Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation are localized, will attenuate under site conditions and will return to pre-remedy baseline levels after the end of active remediation. Institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the state MCL for Cr(T) of 50 µg/L. The State MCL for Cr(VI) is 10 µg/L. The RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate during remedy implementation. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona. Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation and freshwater injection are localized, will attenuate under site conditions and will return to pre-remedy baseline levels after the end of active remediation and the cessation of freshwater injection, respectively. Institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.

TABLE 6.2-1
Summary of Compliance with Identified ARARs
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
53	California Chemical-Specific	Secondary MCLs list for drinking water - Title 22, CCR, Div 4, Ch 15, §64449	ARAR Relevant and Appropriate	State secondary MCLs for drinking water standards are more stringent than federal standards. These secondary MCLs are relevant and appropriate standards, which establish the maximum permissible level of contaminants in sources (or potential sources) of drinking water. These secondary MCLs would be applicable if water at the site was used as drinking water and delivered through a community water supply system.	Remedy Implementation	PG&E	Quarterly progress reports during remedy O&M Other data/reports requested by agencies	There is no secondary MCL for Cr(VI) or Cr(T). Secondary MCLs are community acceptance standards for constituents that may adversely affect the taste, odor or appearance of drinking water. An institutional control will be enforced throughout the chromium plume area during implementation of the remedial action to prohibit use of the groundwater as a drinking water source.	There is no secondary MCL for Cr(VI) or Cr(T). Secondary MCLs are community acceptance standards for constituents that may adversely affect the taste, odor or appearance of drinking water. Concentrations of in-situ by-products (arsenic, manganese [secondary MCL of 50 µg/L]) may fluctuate within the treatment area during remedy implementation. Institutional control will be enforced throughout the chromium plume area during implementation of the remedial action to prohibit use of the groundwater as a drinking water source. Additionally, there are currently no municipal or private wells in the chromium plume area, to PG&E's knowledge.	There is no secondary MCL for Cr(VI) or Cr(T). Secondary MCLs are community acceptance standards for constituents that may adversely affect the taste, odor or appearance of drinking water. Concentrations of in-situ by-products (arsenic, manganese [secondary MCL of 50 µg/L]) may fluctuate within the treatment area during remedy implementation. Institutional control will be enforced throughout the chromium plume area during implementation of the remedial action to prohibit use of the groundwater as a drinking water source. Additionally, there are currently no municipal or private wells in the chromium plume area, to PG&E's knowledge.
55	California Chemical-Specific	Groundwater and vadose zone protection standards - Title 22, CCR, Div 4.5, Ch 15, Article 6, §66265.94	ARAR Applicable	RCRA hazardous waste Interim Status TSD facilities shall comply and ensure that hazardous constituents entering the groundwater, surface water, and soil from a regulated unit do not exceed the concentration limit from contaminants of concern in the uppermost aquifer underlying the waste management area beyond the point of compliance.	Remedy Implementation	PG&E	Quarterly progress reports during remedy O&M Other data/reports requested by agencies	Compliance with this requirement will be achieved by reducing the concentration of Cr(VI) in the affected aquifer to the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Although concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate during remedy implementation, institutional controls will prevent use of affected groundwater until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation.	Compliance with this requirement will be achieved by reducing the concentration of Cr(VI) in the affected aquifer to the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Although concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate during remedy implementation, institutional controls will prevent use of affected groundwater until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation.	Compliance with this requirement will be achieved by reducing the concentration of Cr(VI) in the affected aquifer to the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Although concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate during remedy implementation, institutional controls will prevent use of affected groundwater until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation.

TABLE 6.2-1
Summary of Compliance with Identified ARARs
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PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
Action-Specific										
31	Federal Action-Specific	Federal Safe Drinking Water Act - 42 USC §300f, et seq. Part C – Protection of Underground Sources of Drinking Water; 40 CFR 144-148	ARAR Applicable	These Underground Injection Control Regulations assure that any underground injection performed on-site will not endanger drinking water sources. Substantive requirements include, but are not limited to, regulation of well construction and well operation. These requirements will be applicable if underground injection is proposed as a part of a site remedy.	Underground injection activities	PG&E	Filing of inventory of injection wells	Injection wells are classified as Class V injection wells and will be registered with USEPA prior to installation. The injection wells will be monitored to ensure they will not endanger drinking water sources. An institutional control will be enforced throughout the chromium plume area during implementation of the remedial action to prohibit use of the groundwater as a drinking water source. All injection wells will be properly closed upon completion of the remedy.	Injection wells are classified as Class V injection wells and will be registered with USEPA prior to installation. The injection wells will be monitored to ensure they will not endanger drinking water sources. An institutional control will be enforced throughout the chromium plume area during implementation of the remedial action to prohibit use of the groundwater as a drinking water source. All injection wells will be properly closed upon completion of the remedy.	Injection wells are classified as Class V injection wells and will be registered with USEPA prior to installation. An institutional control will be enforced throughout the chromium plume area during implementation of the remedial action to prohibit use of the groundwater as a drinking water source. All injection wells will be properly closed upon completion of the remedy.
32	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC § 1344 ; 40 CFR 230.10	ARAR Applicable	This section of the Clean Water Act prohibits certain activities with respect to on-site wetlands and waterways. No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed activity which would have less adverse impact to the aquatic ecosystem.	Activities that occur in the Colorado River or in jurisdictional waters of the United States that result in discharge of dredged or fill material.	PG&E	N/A. No further action required unless design change triggers; reconfirm in design submittals.	The preliminary (30%) design includes facilities in the jurisdictional water of the U.S. (see Figure 2-16 of the 30% BOD Report). PG&E will work with the USACE to ensure compliance with the substantive requirements of Section 404 per CERCLA Section 121(e)(1). It is anticipated that a wetland delineation will be conducted in the Spring of 2012.	The intermediate (60%) design includes facilities in the jurisdictional waters of the U.S. (see Figure 2.4-5 in the 60% BOD Report document). PG&E will work with the USACE to ensure compliance with the substantive requirements of Section 404 per CERCLA Section 121(e)(1). A wetlands delineation was completed in March 2012 and is to be revised in April 2013; results will be summarized in a forthcoming report for DTSC review.	A report titled "*Wetlands and Waters of the United States Final Delineation Report for the Topock Compressor Station Groundwater Remediation Project, San Bernardino County, California"* (CH2M HILL 2014c) was prepared to summarize results of efforts to delineate jurisdictional areas in the project area, and was submitted to DTSC and DOI on April 18, 2014. The report is also included in Appendix A3 of the 90% BOD Report. On July 10, 2013, the USACE confirmed that CERCLA 121(e)(1) permit exemption applies to the Topock remediation project, and therefore, PG&E is not required to comply with the administrative and procedural elements of Section 404 of the Clean Water Act, however PG&E is obligated to comply with the substantive elements of Section 404 of the Clean Water Act. The locations of jurisdictional wetlands and waters have been incorporated into the design. At the 90% design stage, the final remedy avoids almost all permanent impacts within USACE jurisdictional areas with the following exceptions. There is one well, IRL-4 and one or two associated arsenic monitoring wells that will occur within a jurisdictional waters of the US. There is also a freshwater pipeline that will be installed within an existing unpaved access road within the 100-year of the Colorado River. However, complete avoidance of other

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Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
										jurisdictional non-wetland waters is not feasible. It has been determined that in order to meet the goals of protection of human health and the environment, to meet the RAOs for the remedy, to monitor remedy performance, to gather data for demonstration of compliance, as well as in response to resolution of design comments with the Tribes, infrastructure (remediation, monitoring wells, and associated piping/conduits) must be installed in certain washes. There are no practicable alternatives to locating certain infrastructure within waters of the United States. Figure 2.4-5 in the 90% BOD Report shows the unavoidable overlaps between planned remedy infrastructure and the USACE jurisdictional waters. In such cases where complete avoidance is not feasible, certain best management practices (BMPs) will be implemented to avoid and minimize temporary and permanent impacts for activities occurring within jurisdictional wetlands (if any) and non-wetland waters of the U.S. Although the USACE did not provide a list of measures that may be taken to reduce impacts to jurisdictional waters and wetlands, the California Department of Fish and Wildlife (CDFW) requires compliance with avoidance and mitigation measures (AMMs) for all work conducted in CDFW jurisdictional washes. The geographic extent of CDFW's jurisdiction is broader than the jurisdictional extent of the USACE under CWA 404 and thus, avoidance and mitigation measures applied to CDFW jurisdictional waters would as a geographic consequence also be applied to CWA 404 waters. While Arizona does not have a similar state program, PG&E will also implement the same AMMs in Arizona identified by CDFW for California as well to ensure appropriate protection to CWA 404 jurisdictional areas in the project area, including those in Arizona. In addition to the CDFW AMMs, PG&E has identified additional BMPs for implementation during remedy construction, operation and maintenance, as well as decommissioning. The additional BMPs are described in the *Protocol for Compliance with EIR Mitigation and Monitoring*

TABLE 6.2-1
Summary of Compliance with Identified ARARs
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
										Reporting Program BIO-1 and Applicable or Relevant and Appropriate Requirement (ARAR) #32 at the Topock Compressor Station (see **Exhibit 6.1-1** at the end of Table 6.1-1). A Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014o) was also prepared and submitted as an appendix of the Construction/Remedial Action Work Plan.
33	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC § 1342; 40 CFR 122; 40 CFR 125	ARAR Applicable	These National Pollutant Discharge Elimination System (NPDES) requirements regulate discharges of pollutants from any point source into waters of the United States.	Point source discharges to waters of the US.	PG&E	N/A. No further action required unless design change triggers; reconfirm in design submittals.	No further action required. The remedy as presented in the preliminary (30%) design does not result in point source discharges to waters of the United States that will require an NPDES permit.	No further action required. The remedy as presented in the 60% design does not result in point source discharges to waters of the United States that will require an NPDES permit.	No further action required. The remedy as presented in the 90% design does not result in point source discharges to waters of the United States that will require an NPDES permit.
34	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) -40 CFR 122.26	ARAR Applicable	These regulations define the necessary requirements with respect to the discharge of storm water under the NPDES program. These regulations will apply if proposed remedial actions result in storm water runoff which comes in contact with any construction activity from the site remediation.	Ground disturbance as a result of construction is > 1 acre	PG&E	SWPPP, BMP Plans and Monitoring & Reporting, Construction/ Remedial Action Work Plan, Plan for Decommissioning and Removal of IM-3 and Site Restoration, Decommissioning Plan for Remedy Facilities and Restoration	PG&E will prepare a BMP Plan prior to construction activities that will be included in the Construction/Remedial Action Work Plan.	PG&E will prepare a BMP Plan to address construction activities which will be included in the Construction/Remedial Action Work Plan and the IM-3 Decommissioning Work Plan that will be submitted as part of the 90% design. In addition, PG&E will prepare an industrial or O&M SWPPP that will include a storm water monitoring program in compliance with the General Permit. The outline for the O&M SWPPP is included in Appendix E of the O&M Plan (Volume 1) at the 60% design stage; the complete industrial SWPPP will be provided at the 90% design stage.	A BMP Plan for construction activities was prepared and is included as an appendix in the Construction/Remedial Action Work Plan and the IM-3 Decommissioning Work Plan. In addition, an industrial SWPPP was also prepared and included in Appendix E of the O&M Plan (Volume 1). The SWPPP includes BMPs for O&M activities and a storm water monitoring program in compliance with the General Permit.
35	Federal Action-Specific	River and Harbor Act of 1899 - 33 USC §§ 401 and 403	ARAR Applicable	This Act prohibits the creation of any obstruction in navigable waters, in addition to banning activities such as depositing refuse, excavating, filling, or in any manner altering the course, condition, or capacity of navigable waters. These requirements will apply if proposed activities at the Topock site have the potential of affecting any navigable waters on the site.	Activities with the potential to affect any navigable waters on the site	PG&E	N/A. No further action required unless design change triggers; reconfirm in design submittals.	No further action required. The remedy, as presented in the preliminary (30%) design, will not affect navigable waters.	No further action required. The remedy, as presented in the 60% design, will not affect navigable waters.	No further action required. The remedy, as presented in the 90% design, will not affect navigable waters.

TABLE 6.2-1
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Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
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38	Federal Action-Specific	Clean Air Act - USC §§ 7401, et seq. (National Emission Standards for Hazardous Air Pollutants (NESHAP)); 40 CFR 61; 40 CFR 63	ARAR Applicable	NESHAPs are regulations which establish emissions standards for certain hazardous air pollutants (HAPs) identified in the regulations. NESHAPs will apply if remediation activities on the site produce identified HAP emissions.	Activities produce identified HAP emissions	PG&E	N/A. No further action required unless design change triggers; reconfirm in design submittals.	No further action required. The remedy, as presented in the preliminary (30%) design does not include activities subject to NESHAPs.	No further action required. The remedy, as presented in the 60% design does not include activities subject to NESHAPs.	No further action required. The remedy, as presented in the 90% design does not include activities subject to NESHAPs.

TABLE 6.2-1
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Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
39	Federal Action-Specific	Religious Freedom Restoration Act - 42 USC § 2000bb	ARAR Applicable	Pursuant to this Act, the government shall not substantially burden a person's exercise of religion, unless the application of the burden is in furtherance of a compelling government interest, and it is the least restrictive means of furthering that interest. To constitute a "substantial burden" on the exercise of religion, a government action must (1) force individuals to choose between following the tenets of their religion and receiving a governmental benefit or (2) coerce individuals to act contrary to their religious beliefs by the threat of civil or criminal sanctions. If any remedial action selected imposes a substantial burden on a person's exercise of religion, it must be in furtherance of a compelling government interest and be the least restrictive means of achieving that interest.	Activities with the potential to impose a substantial burden on a person's exercise of religion.	DOI/BLM	Design submittals, Construction/ Remedial Action Work Plan, O&M Plan, Progress Reports, Decommissioning Plan	The remedy, as presented in the preliminary (30%) design does not substantially burden a person's exercise of religion. Additionally, in compliance with the PA, a Tribal Access Plan is being developed for Tribal access to areas within the Topock site for traditional religious, cultural, or spiritual purposes during implementation of the Remedy. BLM is also developing a *Cultural and Historic Properties Management Plan* (CHPMP) to avoid, minimize and mitigate potential affects to historic properties, including the Topock TCP during implementation of the Remedy. BLM distributed a draft CHPMP on November 1, 2011. Comments on the draft CHPMP are due December 5, 2011. The BLM is anticipating that the final CHPMP will be issued by January 20, 2012 The preliminary (30%) design was submitted on November 18, 2011. PG&E will prepare future design submittals, a Construction/Remedial Action Work Plan, a Plan for decommissioning, removal, and restoration of IM-3 facility, and a Decommissioning Plan for Remedy Facilities and Restoration. The other documents will be prepared and submitted.	The remedy, as presented in the intermediate (60%) design, does not substantially burden a person's exercise of religion. Additionally, in compliance with the PA, a Tribal Access Plan (BLM 2011) was completed for Tribal access to lands under federal management within the Topock site for traditional religious, cultural, or spiritual purposes during implementation of the Remedy. PG&E has initiated work on an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan, for submittal with the final design (target 2013). BLM also developed the CHPMP to avoid, minimize and mitigate potential affects to historic properties, including the Topock TCP, during implementation of the Remedy. BLM issued the final CHPMP on January 20, 2012. The CHPMP can be modified and updated, as needed, to address new information and ongoing activities related to the project. Therefore, subsequently to the issuance of the CHPMP, BLM continues to hold periodic working meetings on the CHPMP. It should be noted that treatment measures are included in the CHPMP and a treatment plan will continue to be developed throughout the design to address mitigation measures. The intermediate (60%) design was submitted on April 5, 2013. PG&E will prepare and submit future design submittals; a Construction/Remedial Action Work Plan; a plan for decommissioning, removal, and restoration of the IM-3 facility; and a Decommissioning Plan for Remedy Facilities and Restoration.	The remedy, as presented in the 90% design, does not substantially burden a person's exercise of religion. Additionally, in compliance with the PA, a Tribal Access Plan (BLM 2011) was completed for Tribal access to lands under federal management within the Topock site for traditional religious, cultural, or spiritual purposes during implementation of the Remedy. On October 21, 2013, PG&E provided the Tribes a draft of the Access Plan for lands not under federal management for review and comment. Tribal comments were received on November 22, 2013. PG&E has updated and discussed the plan at the July 24, 2014 TMU. The Access Plan is included in an appendix of the Construction/Remedial Action Work Plan. PG&E has initiated work on an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan, for submittal with the final design (target 2013). BLM also developed the CHPMP to avoid, minimize and mitigate potential affects to historic properties, including the Topock TCP, during implementation of the Remedy. BLM issued the final CHPMP on January 20, 2012. The CHPMP can be modified and updated, as needed, to address new information and ongoing activities related to the project. Therefore, subsequently to the issuance of the CHPMP, BLM continues to hold periodic working meetings on the CHPMP. It should be noted that treatment measures are included in the CHPMP and a treatment plan will be prepared and submitted to DTSC shortly after submission of the 90% design.. The 90% design was submitted on September 8, 2014. A Construction/Remedial Action Work Plan and a plan for decommissioning, removal, and restoration of the IM-3 facility were submitted concurrently with the 90% design. In compliance with the CD (Appendix C Scope of Work, Item 9), a Decommissioning Plan for Remedy Facilities will be submitted within 120 days of receipt of DOI's certification of completion of the RA and a determination by DOI that removal of such facilities is protective of human health and the environment.

TABLE 6.2-1
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40	Federal Action-Specific	Endangered Species Act of 1973 - 16 USC §§ 1531-1544;50 CFR 402	ARAR Applicable	The ESA makes it unlawful to remove or "take" threatened and endangered plants and animals and protects their habitats by prohibiting certain activities. Examples of such species in or around the Topock site may include, but are not limited to, southwestern willow flycatcher, Mojave Desert tortoise, Yuma clapper rail, Colorado pike minnow, razorback sucker, and bonytail chub. Any remedial action selected for the Topock site will not result in the take of, or adverse impacts to, threatened and endangered species or their habitats, as determined based on consultation with the Fish and Wildlife Service under section 7 of the ESA.	Extension of existing PBA through December 31, 2017 or construction of remedy, whichever is sooner	DOI/USFWS/ PG&E	PBA, Construction/ Remedial Action Work Plan, Plan for decommissioning, removal, and restoration of IM-3 facility, Plan for Decommissioning of Remedy Facilities and Restoration.	PG&E, USFWS, and DOI are coordinating on the Programmatic Biological Assessment (PBA) for the final groundwater remedy. Goal is to complete the PBA in time for the completion of ESA Section 7 consultation prior to the approval of the Construction/Remedial Action Work Plan.	Preparation of the PBA for the final groundwater remedy and coordination with USFWS and DOI are ongoing. Goal is to complete the PBA in time for the completion of ESA Section 7 consultation prior to the approval of the Construction/Remedial Action Work Plan.	The Final Groundwater Remedy PBA was prepared to support informal consultations for actions to be conducted under the remedial action, including activities located on BLM and U.S. Fish and Wildlife Service administered lands. Coordination with USFWS, BLM, and DOI on the PBA had occurred. This ESA Section 7 consultation was concluded with receipt of USFWS concurrency letter on July 7, 2014 which preceded the approval of the Construction/ Remedial Action Work Plan.
41	Federal Action-Specific	Migratory Bird Treaty Act - 16 USC 703-712	ARAR Applicable	This Act makes it unlawful to "take, capture, kill," or otherwise impact a migratory bird or any nest or egg of a migratory bird. The Havasu National Wildlife Refuge, which is part of the Topock site, was created as a refuge and breeding ground for migratory birds and other wildlife, therefore, there is potential for contact with migratory birds during proposed remediation activities. Any remedial action selected for the Topock site will be designed and implemented so as to not take, capture, kill, or otherwise impact a migratory bird, nest, or egg.	Remedial action for Topock site	PG&E	Construction/ Remedial Action Work Plan, Plan for decommissioning, removal, and restoration of IM-3 facility, Plan for Decommissioning of Remedy Facilities and Restoration	Avoidance and minimization measures will be included in the Construction/Remedial Action Work Plan to the extent necessary to not take, capture, kill, or otherwise impact a migratory bird, nest, or egg.	Avoidance and minimization measures will be included in the Construction/Remedial Action Work Plan, which will be submitted as part of the 90% design, to the extent necessary to not take, capture, kill, or otherwise impact a migratory bird, nest, or egg. Regarding decommissioning activities, the Avoidance and Minimization Plan and Habitat Restoration Plan will be based on surveys conducted prior to decommissioning, and during the breeding season; therefore these Plans will be prepared in the future, prior to decommissioning. The IM-3 Decommissioning Work Plan will describe the general procedures for restoration of the land and habitats.	PG&E submitted the Final Bird Impact Avoidance and Minimization Plan (CH2M HILL, 2014d) on April 30, 2014. The plan is also included as an appendix of the Construction/Remedial Action Work Plan, and Appendix I of the IM-3 Decommissioning Work Plan. Regarding decommissioning activities, the Avoidance and Minimization Plan will be based on surveys conducted prior to decommissioning, and during the breeding season; therefore this Plan will be prepared in the future, prior to decommissioning.

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45	Arizona Action-Specific	Arizona Well Standards - A.A.C. R-12-15-850	ARAR	These requirements on the placement of wells will apply if the selected remedy includes placement of wells in Arizona.	During project design and construction of wells in Arizona	PG&E		The preliminary (30%) design assumes that freshwater supply comes from the existing irrigation well (HNWR-1) on the Refuge in Arizona. If the Refuge irrigation well is not used in the final design, placement of new freshwater supply wells will be needed. In addition, new monitoring wells may also be constructed in Arizona, the locations of the monitoring wells will be presented in the intermediate (60%) design. Wells constructed in Arizona will comply with the Arizona Well Standards	The 60% design assumes that freshwater supply comes from the existing well (HNWR-1) on the Refuge in Arizona, and does not include any new monitoring wells in Arizona. If the Refuge irrigation well is not used in the final design, placement of new freshwater supply wells will be needed. If any new wells are constructed in Arizona they will comply with the Arizona Well Standards.	While the 90% design includes freshwater supply from existing wells in Arizona, these supply wells are part of the alternative freshwater source evaluation (also known as the Fresh Water Implementation Plan [FWIP]). Compliance with ARARs, including the Arizona Well Standards, for the supply wells are included in the FWIP. If additional wells in Arizona are required, they will comply with the Arizona Well Standards.
46	Arizona Action-Specific	Design criteria for treatment units - A.A.C. R18-5-(501-502)	ARAR	These minimum design criteria will apply if the selected remedy includes construction of a groundwater treatment plant.	Construction of wells in Arizona	PG&E		No further action is required. The preliminary (30%) design does not involve the construction of a groundwater treatment plant in Arizona.	No further action is required. The 60% design does not involve the construction of a groundwater treatment plant in Arizona.	No further action is required. The 90% design does not involve the construction of a groundwater treatment plant in Arizona.
47	Arizona Action-Specific	Requirements for wells, groundwater withdrawal, treatment, and reinjection -A.R.S. §45-454.01	ARAR	This statute exempts new well construction, withdrawal, treatment, and reinjection into a groundwater aquifer as a part of a CERCLA Remedial Action from the requirements of the Arizona Groundwater Code, except that they must comply with the substantive requirements of A.R.S. 45-594, 45-595, 45-596, and 45-600. If groundwater that is withdrawn is not reinjected into the aquifer, the groundwater shall be put to reasonable and beneficial use.	Construction of wells in Arizona	PG&E		This remediation project is a CERCLA remedial action. If a new freshwater supply well or additional monitoring wells in Arizona are required they will be constructed in conformance with State construction standards (A.R.S 45-594) by a State-licensed well driller(A.R.S. 45-595). A notice of intention to drill will be filed (A.R.S. 45-596), and a well driller's report will be filed within 30 days of completion of drilling (A.R.S. 45-600). Most of the groundwater that is withdrawn will be reinjected into the aquifer. Any groundwater that is withdrawn but not reinjected into the aquifer shall be put to reasonable and beneficial use.	This remediation project is a CERCLA remedial action. The 60% design assumes that freshwater supply comes from the existing irrigation well (HNWR-1) on the Refuge in Arizona, and does not include any new monitoring wells in Arizona. If a new freshwater supply well or additional monitoring wells in Arizona are required they will be constructed in conformance with State construction standards (A.R.S. 45-594) by a State-licensed well driller (A.R.S. 45-595). A notice of intention to drill will be filed (A.R.S. 45-596), and a well driller's report will be filed within 30 days of completion of drilling (A.R.S. 45-600). Most of the groundwater that is withdrawn will be reinjected into the aquifer. Any groundwater that is withdrawn but not reinjected into the aquifer shall be put to reasonable and beneficial use.	While the 90% design includes freshwater supply from existing wells in Arizona, these supply wells are part of the alternative freshwater source evaluation (also known as the Fresh Water Implementation Plan [FWIP]). Compliance with ARARs, including the Arizona Well Standards, for the supply wells are included in the FWIP. If a new freshwater supply well or additional monitoring wells in Arizona are required they will be constructed in conformance with State construction standards (A.R.S. 45-594) by a State-licensed well driller (A.R.S. 45-595). A notice of intention to drill will be filed (A.R.S. 45-596), and a well driller's report will be filed within 30 days of completion of drilling (A.R.S. 45-600). Most of the groundwater that is withdrawn will be reinjected into the aquifer. Any groundwater that is withdrawn but not reinjected into the aquifer shall be put to reasonable and beneficial use.

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48	Arizona Action-Specific	Well construction standards -A.R.S. §45-594 and 595	ARAR	These provisions identify the well construction standards and requirements for new well construction in the State of Arizona. These requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		The preliminary (30%) design assumes that freshwater supply comes from the existing irrigation well (HNWR-1) on the Refuge in Arizona. If the Refuge irrigation well is not used in the final design, placement of new freshwater supply wells will be needed. In addition, new monitoring wells may also be constructed in Arizona, the locations of the monitoring wells will be presented in the intermediate (60%) design. If a new freshwater supply well or additional monitoring wells in Arizona are required they will be constructed in conformance with State construction standards (A.R.S 45-594) by a State-licensed well driller(A.R.S. 45-595).	The 60% design assumes that freshwater supply comes from the existing irrigation well (HNWR-1) on the Refuge in Arizona, and does not include any new monitoring wells in Arizona. If the Refuge irrigation well is not used in the final design, placement of new freshwater supply wells will be needed. If a new freshwater supply well or additional monitoring wells in Arizona are required they will be constructed in conformance with State construction standards (A.R.S. 45-594) by a State-licensed well driller(A.R.S. 45-595).	While the 90% design includes freshwater supply from existing wells in Arizona, these supply wells are part of the alternative freshwater source evaluation (also known as the Fresh Water Implementation Plan [FWIP]). Compliance with ARARs, including the Arizona Well Standards, for the supply wells are included in the FWIP. If a new freshwater supply well or additional monitoring wells in Arizona are required they will be constructed in conformance with State construction standards (A.R.S. 45-594) by a State-licensed well driller (A.R.S. 45-595).
49	Arizona Action-Specific	Notice of intention to drill - A.R.S. §45-596	ARAR	Substantive requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		The preliminary (30%) design assumes that freshwater supply comes from the existing irrigation well (HNWR-1) on the Refuge in Arizona. If the Refuge irrigation well is not used in the final design, placement of new freshwater supply wells will be needed. In addition, new monitoring wells may also be constructed in Arizona, the locations of the monitoring wells will be presented in the intermediate (60%) design. If a new freshwater supply well or additional monitoring wells in Arizona are required, a notice of intention to drill will be filed (A.R.S. 45-596).	The 60% design assumes that freshwater supply comes from the existing irrigation well (HNWR-1) on the Refuge in Arizona, and does not include any new monitoring wells in Arizona. If the Refuge irrigation well is not used in the final design, placement of new freshwater supply wells will be needed. If a new freshwater supply well or additional monitoring wells in Arizona are required, a notice of intention to drill will be filed (A.R.S. 45-596).	While the 90% design includes freshwater supply from existing wells in Arizona, these supply wells are part of the alternative freshwater source evaluation (also known as the Fresh Water Implementation Plan [FWIP]). Compliance with ARARs, including the Arizona Well Standards, for the supply wells are included in the FWIP. If a new freshwater supply well or additional monitoring wells in Arizona are required, a notice of intention to drill will be filed (A.R.S. 45-596).
50	Arizona Action-Specific	Report by driller - A.R.S. §45-600	ARAR	Substantive requirements will apply if the selected remedy involves the construction of wells in Arizona.	Construction of wells in Arizona	PG&E		The preliminary (30%) design assumes that freshwater supply comes from the existing irrigation well (HNWR-1) on the Refuge in Arizona. If the Refuge irrigation well is not used in the final design, placement of new freshwater supply wells will be needed. In addition, new monitoring wells may also be constructed in Arizona, the locations of the monitoring wells will be presented in the intermediate (60%) design. If a new freshwater supply well or additional monitoring wells in Arizona are required, a well driller's report will be filed within 30 days of completion of drilling (A.R.S. 45-600).	The 60% design assumes that freshwater supply comes from the existing irrigation well (HNWR-1) on the Refuge in Arizona, and does not include any new monitoring wells in Arizona. If the Refuge irrigation well is not used in the final design, placement of new freshwater supply wells will be needed. If a new freshwater supply well or additional monitoring wells in Arizona are required, a well driller's report will be filed within 30 days of completion of drilling (A.R.S. 45-600).	While the 90% design includes freshwater supply from existing wells in Arizona, these supply wells are part of the alternative freshwater source evaluation (also known as the Fresh Water Implementation Plan [FWIP]). Compliance with ARARs, including the Arizona Well Standards, for the supply wells are included in the FWIP. If a new freshwater supply well or additional monitoring wells in Arizona are required, a well driller's report will be filed within 30 days of completion of drilling (A.R.S. 45-600).

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51	Arizona Action-Specific	Arizona Remedial Action Requirements - A.R.S. §49-282.06(A)(2)	ARAR	Any treatment of groundwater must be conducted in a manner to provide for the maximum beneficial use of the waters of the state.	Treatment of groundwater in Arizona	PG&E		No further action is required. The preliminary (30%) design does not involve treatment of groundwater in Arizona.	No further action is required. The intermediate (60%) design does not involve treatment of groundwater in Arizona.	No further action is required. The pre-final (90%) design does not involve treatment of groundwater in Arizona.
74	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 1, §66262.11	ARAR Applicable	Owners or operators who generate waste shall determine whether waste is a hazardous waste. Applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Activity that generates waste that could potentially be hazardous	PG&E	O&M Plan, Construction/ Remedial Action Work Plan, Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	PG&E will prepare an O&M Plan, a Construction/Remedial Action Work Plan, and a Plan for Decommissioning of IM-3 Facility prior to construction activities. These plans will describe waste management procedures. Waste generated during construction and operation of the remedy will be evaluated when the wastes are generated to determine if they are hazardous wastes.	PG&E will prepare an O&M Plan, a Construction/Remedial Action Work Plan, and a Plan for Decommissioning of IM-3 Facility prior to construction activities. These plans will describe waste management procedures. Waste management is described in Section 6 of the O&M Plan (Volume 1), which is included in this BOD Report for the 60% design as Appendix L. The Construction/Remedial Action Work Plan will be submitted as part of the 90% design. The Plan for Decommissioning of the IM-3 Facility will also be submitted as part of the 90% design. Waste generated during construction and operation of the remedy will be evaluated when the wastes are generated to determine if they are hazardous wastes.	Waste management procedures are described in the following documents: 1) O&M Plan (Volume 1 of O&M Manual), Section 6, Waste Management Plan and Recoverable Materials, describes procedures for the collection, characterization, storage, transportation, and disposal of waste generated during operation and maintenance of the remedy. 2) Soil Management Plan (Volume 4 of O&M Manual), includes procedures and protocols for the management and disposal of potentially contaminated or contaminated soils displaced during drilling, construction, operation and maintenance of the remedy, and decommissioning and removal of IM-3 facilities. 3) The Waste Management Plan in an appendix of the Construction/Remedial Action Work Plan includes procedures for the management of wastes (other than soil) generated during construction and startup of the remedy. 4) IM-3 Decommissioning, Removal, and Restoration Work Plan, Section 5, Waste Management Plan and Recoverable Materials includes procedures for collection, characterization, storage, transportation, and disposal of wastes (other than soil) generated during the decommissioning and removal of IM-3 facilities.

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PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
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75	California Action-Specific	Hazardous Waste Control Act (HWCA) -Title 22, CCR, Div 4.5, Ch 12, Article 1, §66262.12	ARAR Applicable	A generator shall not treat, store, dispose of, transport or offer for transportation, hazardous waste without having received an identification number. Substantive requirements will be applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Activity that generates waste that could potentially be hazardous	PG&E	USEPA ID Number	Hazardous waste generated by the final remedy will be managed under the existing USEPA ID number for the Topock groundwater remediation area, CAR000151118.	Hazardous waste generated by the final remedy will be managed under the existing USEPA ID number for the Topock groundwater remediation area, CAR000151118.	Hazardous waste generated by the final remedy will be managed under the existing USEPA ID number for the Topock groundwater remediation area, CAR000151118.
76	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards for owners and operators of hazardous waste transfer and TSD facilities Title 22, CCR, Div 4.5, Ch 14, Article 2	ARAR Applicable	Establish requirements for a hazardous waste treatment facility to have a plan for waste analysis, develop a security system, conduct regular inspections, provide training to facility personnel, and use a quality assurance program during construction. The requirements may be applicable if CERCLA response action includes treatment, storage, or disposal as defined under RCRA, or may be relevant and appropriate if the requirements address problems or situations sufficiently similar to the specific circumstances at the site that their usage will be well suited.	Activity associated with construction and operation of a treatment facility or long term (longer than 90 days) storage of hazardous waste. If waste is simply removed, stored in appropriate containers after characterization, and removed off-site within 90 days, PG&E will be required to follow the substantive requirements of PG&E of a generator, including use of manifests, record keep, segregation of incompatibles, etc.	PG&E	O&M Plan, Construction/ Remedial Action Work Plan, Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	In-situ treatment of contaminated groundwater or conditioning of remedy-produced water does not comprise a hazardous waste treatment facility as defined in the hazardous waste regulations. However, a variety of these provisions will be addressed in documents such as the O&M Plan, Soil Management Plan prepared under EIR mitigation measure HAZ-2c, and the Security Plan prepared under EIR mitigation measure CUL-1a-3b. Waste analysis procedures will be addressed in standard operating procedures for the treatment/conditioning process that will be developed.	In-situ treatment of contaminated groundwater or conditioning of remedy-produced water does not comprise a hazardous waste treatment facility as defined in the hazardous waste regulations. However, a variety of these provisions will be addressed in documents such as the O&M Plan, Soil Management Plan prepared under EIR mitigation measure HAZ-2c, and the Security Plan prepared under EIR mitigation measure CUL-1a-3b. Waste management, including waste analysis, is described in Section 6 of the O&M Manual, which is included in this BOD Report for the 60% design as Appendix L. The Soil Management Plan is also included in the O&M Manual (Volume 4).	In-situ treatment of contaminated groundwater or conditioning of remedy-produced water does not comprise a hazardous waste treatment facility as defined in the hazardous waste regulations. However, a variety of these provisions are addressed in documents such as the O&M Plan, the Soil Management Plan prepared under EIR mitigation measure HAZ-2c, the Construction/Remedial Work Plan (including the Construction Quality Assurance Project Plan), and the Security Plan prepared under EIR mitigation measure CUL-1a-3b. Waste management, including waste analysis, is described in: a) Section 6 of the O&M Plan, which is included in the BOD Report for the 90% design as Volume 1 of the O&M Manual (Appendix L), b) The Soil Management Plan, which is included in Volume 4 of the O&M Manual (Appendix L), c) The Waste Management Plan, which is included as an appendix of the Construction/ Remedial Action Work Plan, and d) Section 5 of the IM-3 Decommissioning, Removal, and Restoration Work Plan (appendix to the CIMP and to the Construction/Remedial Action Work Plan).

TABLE 6.2-1
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77	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 2, §66262.20, §66262.22	ARAR Applicable	A generator of hazardous waste who transports or offers hazardous waste for transportation shall prepare a manifest. Substantive requirements will be applicable for any operation where waste is generated. The determination of whether wastes generated during remedial activities are hazardous shall be made when the wastes are generated.	Preparation of offsite shipment of hazardous waste	PG&E	O&M Plan, Construction/ Remedial Action Work Plan, Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	PG&E will prepare an O&M Plan, a Construction/Remedial Action Work Plan, and a Plan for Decommissioning of IM-3 Facility prior to construction activities. These plans will describe waste management procedures. Hazardous waste manifests will be prepared for each off-site shipment of hazardous waste.	Waste management is described in Section 6 of the O&M Plan (Volume 1), which is included in this BOD Report for the 60% design as Appendix L. Waste management will also be described in the Construction/Remedial Action Work Plan and the Plan for Decommissioning of the IM-3 Facility that will be submitted as part of the 90% design. Hazardous waste manifests will be prepared for each off-site shipment of hazardous waste.	Waste management procedures are described in the following documents: 1) O&M Plan (Volume 1 of O&M Manual), Section 6, Waste Management Plan and Recoverable Materials describes procedures for the collection, characterization, storage, transportation, and disposal of waste generated during operation and maintenance of the remedy. 2) Soil Management Plan (Volume 4 of O&M Manual) includes procedures and protocols for the management and disposal of potentially contaminated or contaminated soils displaced during drilling, construction, operation and maintenance of the remedy, and decommissioning and removal of IM-3 facilities. 3) The Waste Management Plan in an appendix of the Construction/Remedial Action Work Plan includes procedures for the management of wastes (other than soil) generated during construction and startup of the remedy. 4) IM-3 Decommissioning, Removal, and Restoration Work Plan, Section 5, Waste Management Plan and Recoverable Materials includes procedures for collection, characterization, storage, transportation, and disposal of wastes (other than soil) generated during the decommissioning and removal of IM-3 facilities. Hazardous waste manifests will be prepared for each off-site shipment of hazardous waste.

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78	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 3, §66262.30, §66262.31, §66262.32, §66262.33	ARAR Applicable	Before transporting hazardous waste or offering hazardous waste for transportation off-site, the generator must do the following in accordance with DOT regulations: package the waste, label and mark each package of hazardous waste, and ensure that the transport vehicle is correctly placarded.	Preparation of offsite shipment of hazardous waste	PG&E	O&M Plan, Construction/ Remedial Action Work Plan, Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	PG&E will prepare an O&M Plan, a Construction/Remedial Action Work Plan, and a Plan for Decommissioning of IM-3 Facility prior to construction activities. These plans will describe waste management procedures. Hazardous waste will be managed in accordance with Title 22 CCR Div 4.5, Ch 12, Article 3, §66262.30, §66262.31, §66262.32, and §66262.33..	Waste management is described in Section 6 of the O&M Plan (Volume 1), which is included in this BOD Report for the 60% design as Appendix L. Waste management will also be described in the Construction/Remedial Action Work Plan and the Plan for Decommissioning of the IM-3 Facility that will be submitted as part of the 90% design. Hazardous waste will be managed in accordance with Title 22 CCR Div 4.5, Ch 12, Article 3, §66262.30, §66262.31, §66262.32, and §66262.33.	Waste management procedures are described in the following documents: 1) O&M Plan (Volume 1 of O&M Manual), Section 6, Waste Management Plan and Recoverable Materials, describes procedures for the collection, characterization, storage, transportation, and disposal of waste generated during operation and maintenance of the remedy. 2) Soil Management Plan (Volume 4 of O&M Manual), includes procedures and protocols for the management and disposal of potentially contaminated or contaminated soils displaced during drilling, construction, operation and maintenance of the remedy, and decommissioning and removal of IM-3 facilities. 3) The Waste Management Plan in an appendix of the Construction/Remedial Action Work Plan includes procedures for the management of wastes (other than soil) generated during construction and startup of the remedy. 4) IM-3 Decommissioning, Removal, and Restoration Work Plan, Section 5, Waste Management Plan and Recoverable Materials includes procedures for collection, characterization, storage, transportation, and disposal of wastes (other than soil) generated during the decommissioning and removal of IM-3 facilities.

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79	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 3, §66262.34	ARAR Applicable	Requirements with respect to accumulation of waste on-site.	Accumulation of hazardous waste onsite	PG&E	O&M Plan, Construction/ Remedial Action Work Plan, Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration; Operations documents (e.g., manifests, inspection records)	PG&E will prepare an O&M Plan, a Construction/Remedial Action Work Plan, and a Plan for Decommissioning of IM-3 Facility prior to construction activities. These plans will describe waste management procedures. Hazardous waste generated onsite will meet the accumulation requirements of 22 CCR §66262.34.	Waste management is described in Section 6 of the O&M Plan (Volume 1), which is included in this BOD Report for the 60% design as Appendix L. Waste management will also be described in the Construction/Remedial Action Work Plan and the Plan for Decommissioning of the IM-3 Facility that will be submitted as part of the 90% design. Hazardous waste generated onsite will meet the accumulation requirements of 22 CCR §66262.34.	Waste management procedures (including accumulation requirements) are described in the following documents: 1) O&M Plan (Volume 1 of O&M Manual), Section 6, Waste Management Plan and Recoverable Materials, describes procedures for the collection, characterization, storage, transportation, and disposal of waste generated during operation and maintenance of the remedy. 2) Soil Management Plan (Volume 4 of O&M Manual), includes procedures and protocols for the management and disposal of potentially contaminated or contaminated soils displaced during drilling, construction, operation and maintenance of the remedy, and decommissioning and removal of IM-3 facilities. 3) The Waste Management Plan in an appendix of the Construction/Remedial Action Work Plan includes procedures for the management of wastes (other than soil) generated during construction and startup of the remedy. 4) IM-3 Decommissioning, Removal, and Restoration Work Plan, Section 5, Waste Management Plan and Recoverable Materials includes procedures for collection, characterization, storage, transportation, and disposal of wastes (other than soil) generated during the decommissioning and removal of IM-3 facilities.

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80	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards applicable to generators of hazardous waste Title 22, CCR, Div 4.5, Ch 12, Article 4, §66262.40, §66262.41	ARAR Applicable	Establishes requirements for record keeping of manifests, test results, waste analyses, and Biennial Reports. Any substantive requirements shall be attained.	Activity generating hazardous waste	PG&E	O&M Plan, Construction/ Remedial Action Work Plan, Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration, Operations documents (e.g., manifests, waste profiling records)	PG&E will prepare an O&M Plan, a Construction/Remedial Action Work Plan, and a Plan for Decommissioning of IM-3 Facility prior to construction activities. These plans will describe waste management procedures. Hazardous waste generated onsite will meet the recordkeeping requirements of 22 CCR §66262.40, §66262.41.	Waste management is described in Section 6 of the O&M Plan (Volume 1), which is included in this BOD Report for the 60% design as Appendix L. Waste management will also be described in the Construction/Remedial Action Work Plan and the Plan for Decommissioning of the IM-3 Facility that will be submitted as part of the 90% design. Hazardous waste generated onsite will meet the recordkeeping requirements of 22 CCR §66262.40, §66262.41.	Waste management procedures (including record keeping requirements) are described in the following documents: 1) O&M Plan (Volume 1 of O&M Manual), Section 6, Waste Management Plan and Recoverable Materials, describes procedures for the collection, characterization, storage, transportation, and disposal of waste generated during operation and maintenance of the remedy. 2) Soil Management Plan (Volume 4 of O&M Manual), includes procedures and protocols for the management and disposal of potentially contaminated or contaminated soils displaced during drilling, construction, operation and maintenance of the remedy, and decommissioning and removal of IM-3 facilities. 3) The Waste Management Plan in an appendix of the Construction/Remedial Action Work Plan includes procedures for the management of wastes (other than soil) generated during construction and startup of the remedy. 4) IM-3 Decommissioning, Removal, and Restoration Work Plan, Section 5, Waste Management Plan and Recoverable Materials includes procedures for collection, characterization, storage, transportation, and disposal of wastes (other than soil) generated during the decommissioning and removal of IM-3 facilities.
81	California Action-Specific	Corrective Action - Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.100 (a) through (d), (f), (g)(1), and (h)	ARAR Relevant and Appropriate	The owner or operator is required to take corrective action under Title 22, CCR, §66264.91 to remediate releases from the regulated unit and to ensure that the regulated unit achieves compliance with the water quality protection standard. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Remedy implementation	PG&E	O&M Plan (sampling and monitoring plan, contingency plan), Progress Reports, Construction/ Remedial Action Completion Report	PG&E will prepare an O&M Plan, a Construction/Remedial Action Work Plan, and a Plan for Decommissioning of IME Facility prior to construction activities. These plans will describe spill control and response procedures and will incorporate requirements of mitigation measure HAZ-1a, HAZ-1b, and HYDRO-1for spill prevention, control, and cleanup during O&M, construction, and decommissioning activities.. In addition the O&M Plan will include a sampling and monitoring plan for groundwater.	The O&M Manual, which is included in this BOD Report for the 60% design as Appendix L, includes a Sampling and Monitoring Plan in Volume 2 to ensure that the regulated unit achieves compliance with the water quality protection standard, and a Contingency Plan in Volume 3 to address circumstances that may adversely affect the operation of the remedy.	The O&M Manual, which is included in the BOD Report for the 90% design as Appendix L, includes a Sampling and Monitoring Plan in Volume 2 to ensure that the regulated unit achieves compliance with the water quality protection standard, and a Contingency Plan in Volume 3 to address circumstances that may adversely affect the operation of the remedy.

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82	California Action-Specific	Corrective Action for Waste Management Units -Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.101	ARAR Relevant and Appropriate	The owner or operator is required to take corrective action to remediate releases from any solid or hazardous waste management unit at the facility to protect public health and the environment. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Remedy implementation	PG&E	O&M Plan (sampling and monitoring plan, contingency plan), Progress Reports, Construction/ Remedial Action Completion Report	PG&E will prepare O&M Plan and a Construction/Remedial Action Work Plan. These plans will describe spill control and response procedures and will incorporate requirements of mitigation measure HAZ-1a, HAZ-1b, and HYDRO-1for spill prevention, control, and cleanup during O&M and construction activities. In addition, the O&M Plan will include a sampling and monitoring plan for groundwater.	The O&M Manual, which is included in this BOD Report for the 60% design as Appendix L, includes a Sampling and Monitoring Plan in Volume 2 to ensure that the regulated unit achieves compliance with the water quality protection standard, and a Contingency Plan in Volume 3 to address circumstances that may adversely affect the operation of the remedy.	The O&M Manual, which is included in the BOD Report for the 90% design as Appendix L, includes a Sampling and Monitoring Plan in Volume 2 to ensure that the regulated unit achieves compliance with the water quality protection standard, and a Contingency Plan in Volume 3 to address circumstances that may adversely affect the operation of the remedy.
83	California Action-Specific	Closure and post-closure care -Title 22, CCR, Div 4.5, Ch 14, Article 7, §66264.111, §66264.112, §66264.115 through 120	ARAR Applicable	Owners and operators shall close a facility and perform post-closure care when contaminated subsurface soil cannot be practically removed or decontaminated. Contaminated soil, residues, or groundwater from remedial action at a site will achieve clean closure; otherwise, post-closure care requirements will be relevant and appropriate.	Decommissioning	PG&E	Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration, Plan for Decommissioning of Remedy Facilities and Restoration	PG&E will prepare a Decommissioning Plan for Remedy Facility and Site Restoration. Achievement of RAOs will be considered clean closure and that will remove any post-closure care obligations.	PG&E will prepare a Decommissioning Plan for Remedy Facility and Site Restoration that will be submitted prior to decommissioning. Achievement of RAOs will be considered clean closure and that will remove any post-closure care obligations.	The IM-3 Decommissioning, Removal, and Restoration Work Plan was prepared and is included in Appendix B of the CIMP and also as an appendix of the Construction/Remedial Action Work Plan. Achievement of RAOs will be considered clean closure and that will remove any post-closure care obligations. In compliance with the CD (Appendix C Scope of Work, Article 9), PG&E will prepare a site-specific Plan for Decommissioning and Restoration of remedy facilities within 120 days of DOI's certification of remedial action completion and a determination by DOI that removal of such facilities is protective of human health and the environment.

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84	California Action-Specific	Use and management of containers -Title 22, CCR, Div 4.5, Ch 14, Article 9	ARAR Applicable	Containers used for the transfer or storage of hazardous waste must be in good condition, compatible with the waste, kept closed except to add or remove materials and be inspected weekly. The area used to store the containers must provide adequate secondary containment and be designed with runoff controls. Also, appropriate closure of the containers must take place.	Design and management of hazardous waste containers	PG&E	Design Submittals; O&M Plan; Construction/ Remedial Action Work Plan.	PG&E will prepare an O&M Plan, and a Corrective Measure/Remedial Action Construction Work Plan. These plans will describe waste management procedures. Containers used to transfer, store or treat hazardous waste will comply with requirements in 22 CCR §66262.171-§66262.179.	Waste management is described in Section 6 of the O&M Plan (Volume 1), which is included in this BOD Report for the 60% design as Appendix L. Waste management will also be described in the Construction/Remedial Action Work Plan and the Plan for Decommissioning of the IM-3 Facility that will be submitted as part of the 90% design. Containers used to transfer, store or treat hazardous waste will comply with requirements in 22 CCR §66262.171-§66262.179.	Waste management procedures (including containers requirements) are described in the following documents: 1) O&M Plan (Volume 1 of O&M Manual), Section 6, Waste Management Plan and Recoverable Materials, describes procedures for the collection, characterization, storage, transportation, and disposal of waste generated during operation and maintenance of the remedy. 2) Soil Management Plan (Volume 4 of O&M Manual), includes procedures and protocols for the management and disposal of potentially contaminated or contaminated soils displaced during drilling, construction, operation and maintenance of the remedy, and decommissioning and removal of IM-3 facilities. 3) The Waste Management Plan in an appendix of the Construction/Remedial Action Work Plan includes procedures for the management of wastes (other than soil) generated during construction and startup of the remedy. 4) IM-3 Decommissioning, Removal, and Restoration Work Plan, Section 5, Waste Management Plan and Recoverable Materials includes procedures for collection, characterization, storage, transportation, and disposal of wastes (other than soil) generated during the decommissioning and removal of IM-3 facilities.

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85	California Action-Specific	Tank systems - Title 22, CCR, Div 4.5, Ch 14, Article 10	ARAR Applicable	The remedial activities may involve storage and/or treatment in tanks. These tanks are required to have secondary containment, be monitored and inspected, be provided with overfill and spill protection controls, and operated with adequate freeboard. Also, appropriate closure must take place.	During project design, operation and maintenance activities where tank systems are used to transfer, store or treat hazardous waste	PG&E	Design Submittals; O&M Plan;	PG&E will prepare O&M Plan, and Corrective Measure/Remedial Action Construction Work Plan. Tank systems used to transfer, store or treat hazardous waste will comply with requirements in 22 CCR §66262.192-§66262.195.	At the 60% design stage, there is no transfer, storage and/or treatment of hazardous waste in tank systems.	At the 90% design stage, there are two design elements that could trigger compliance with this ARAR: **Sampling Purge Water Holding Tank in MW-20 Bench Carbon Amendment Building** If the purge water or decon pad water accumulated in this tank exhibits hazardous waste characteristics, the water tank and any ancillary equipment handling hazardous waste will comply with the requirements for hazardous waste tank systems. It will be labeled as a hazardous waste tank, be equipped with secondary containment and overfill prevention controls, daily inspections will be performed and documented, and an engineer's assessment of the tank system's integrity will be performed. **Portable Treatment Unit for Well Rehabilitation at Well Head** Treatment of well rehabilitation water with a pH below 2.0 at the well head may be performed in a portable treatment unit that is subject to the requirements for a fixed treatment unit (FTU) operating under the Conditional Authorization permit tier if it operates entirely onsite, or to the requirements for a transportable treatment unit (TTU) operating under the Permit By Rule permit tier if it operates at multiple sites. If the treatment unit includes tanks that accumulate or treat waste with hazardous characteristics, the tanks and any ancillary equipment that handles hazardous waste will comply with the requirements for hazardous waste tank systems, including labeling, having secondary containment and overfill prevention controls, being subject to documented daily inspections, and having an engineer's assessment of the tank system's integrity performed. If the treatment unit operates as a TTU, compliance will be the obligation of the TTU owner.

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86	California Action-Specific	Waste piles - Title 22, CCR, Div 4.5, Ch 14, Article 12	ARAR Applicable	The waste piles should be placed upon a lined foundation or base with a leachate system, protected from precipitation and wind dispersal, designed to prevent run on and run off. Also, closure and post-closure care requirements. Remedial action may involve soil excavation and the compiling of soil in a temporary waste pile. This requirement is applicable if the excavated waste meets RCRA hazardous waste criteria.	Under broad application, a triggering event could be any temporary stockpiling of haz soil	PG&E	Soil Management Plan (Volume 4 of O&M Manual)	PG&E will prepare a Soil Management Plan in conformance with EIR mitigation measures HAZ-2 and HAZ-2f to describe management procedures in the event that evidence of contaminated soil is identified during ground disturbing activities (e.g., noxious odors, discolored soil). It is not anticipated that regulated waste piles will be constructed.	A Soil Management Plan is included in Volume 4 of the O&M Manual as part of the 60% design. In conformance with EIR mitigation measures HAZ-2 and HAZ-2f, the Soil Management Plan describes management procedures in the event that evidence of contaminated soil is identified during ground disturbing activities (e.g., noxious odors, discolored soil). It is not anticipated that long-term storage of soil requiring construction of a waste pile meeting Chapter 14, Article 12 requirements for soil exhibiting RCRA hazardous waste characteristics will occur. If necessary to facilitate characterization or staging for offsite transportation, RCRA and non-RCRA hazardous waste soil will be temporarily accumulated in a staging pile that meets the design standards specified in California Health and Safety Code Section 25123.3 for up to 90 days prior to transportation to a permitted offsite disposal facility.	A Soil Management Plan is included in Volume 4 of the O&M Manual as part of the 60% design. In conformance with EIR mitigation measures HAZ-2 and HAZ-2f, the Soil Management Plan describes management procedures in the event that evidence of contaminated soil is identified during ground disturbing activities (e.g., noxious odors, discolored soil). It is not anticipated that long-term storage of soil requiring construction of a waste pile meeting Chapter 14, Article 12 requirements for soil exhibiting RCRA hazardous waste characteristics will occur. If necessary to facilitate characterization or staging for offsite transportation, RCRA and non-RCRA hazardous waste soil will be temporarily accumulated in a staging pile that meets the design standards specified in California Health and Safety Code Section 25123.3 for up to 90 days prior to transportation to a permitted offsite disposal facility.
87	California Action-Specific	Landfills - Title 22, CCR, Div 4.5, Ch 14, Article 14	ARAR Relevant and Appropriate	The requirements for landfills include the design and operation, action leakage rate, monitoring and inspection, response actions, surveying and recordkeeping and closure and post-closure care.	Design, construct, O&M, and closure of landfills (66260.10 defines "Landfill" as a disposal facility or part of a facility where hazardous waste is placed in or on land and which is not a pile, a land treatment facility, a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground mine, a cave, or a corrective action management unit.)	PG&E	N/A. No further action required unless design change triggers; reconfirm in design submittals.	No further action is required. The preliminary (30%) design does not include construction of a landfill.	No further action is required. The 60% design does not include construction of a landfill.	No further action is required. The 90% design does not include construction of a landfill.

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88	California Action-Specific	Miscellaneous Units - Title 22, CCR, Div 4.5, Ch 14, Article 16	ARAR Applicable	Applies to waste management unit not otherwise regulated under RCRA. It may include pumps, auxiliary equipment, air strippers, etc. The substantive requirements include design, construction, operation, maintenance and closure of the unit that will ensure protection of human health and the environment. The actions include general inspections for safety and operation efficiency, testing and maintenance of the equipment (including testing of warning systems). Applicable if pumps are used for extraction and treatment of leachate that meets RCRA hazardous waste criteria.	Design, construct, O&M, and closure of waste management units not otherwise regulated under RCRA	PG&E	Design Submittals; O&M Plan; Construction/ Remedial Action Work Plan	No further action is required. The preliminary (30%) design assumes that the only pumps used for extraction of groundwater meeting RCRA hazardous waste criteria are submersible well pumps in the IRZ wells along National Trails Highway.	No further action is required. The 60% design assumes that the only pumps used for extraction of groundwater meeting RCRA hazardous waste criteria are submersible well pumps in the IRZ wells along National Trails Highway.	No further action is required. The 90% design assumes that the only pumps used for extraction of groundwater meeting RCRA hazardous waste criteria are submersible well pumps in the IRZ wells along National Trails Highway.

TABLE 6.2-1
Summary of Compliance with Identified ARARs
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
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89	California Action-Specific	Land Disposal Restrictions (LDR) for RCRA wastes and non-RCRA wastes -Title 22, CCR, Div 4.5, Ch 18, Articles 1, 3, 4, 10, 11	ARAR Applicable	Movement of hazardous waste to new locations and placed in or on land will trigger LDR. General applicability, dilution prohibited, waste analysis and record keeping, and special rules apply for wastes that exhibit a characteristic waste. Best Demonstrated Available Technology (BDA) standards for each hazardous constituent in each listed waste, if residual is to be disposed. Utilize treatment standards table when necessary. Where applicable, hazardous waste generated from remedial activities must comply with LDR and meet the treatment standards or notify the disposal facility of the treatment standards before disposal at an appropriate offsite disposal facility.	Activity that generates hazardous waste	PG&E	O&M Plan, Construction/ Remedial Action Work Plan; Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration; Plan for Decommissioning of Remedy Facilities and Restoration	PG&E will prepare an O&M Plan, a Construction/Remedial Action Work Plan, and a Plan for Decommissioning of IM-3 Facility prior to construction activities. These plans will describe waste management procedures during construction, operation, and decommissioning. The remedy is not expected to involve onsite placement of hazardous waste that will trigger the LDR requirements. Hazardous waste generated will be characterized to determine if LDR treatment standards are exceeded. A notification will be submitted to the disposal facility indicating whether the waste is restricted from land disposal and whether it exceeds an applicable treatment standard.	Waste management is described in Section 6 of the O&M Plan (Volume 1), which is included in this BOD Report for the 60% design as Appendix L. Waste management will also be described in the Construction/Remedial Action Work Plan and the Plan for Decommissioning of the IM-3 Facility that will be submitted as part of the 90% design. The remedy is not expected to involve onsite placement of hazardous waste that will trigger the LDR requirements. Hazardous waste generated will be characterized to determine if LDR treatment standards are exceeded. A notification will be submitted to the disposal facility indicating whether the waste is restricted from land disposal and whether it exceeds an applicable treatment standard.	The remedy is not expected to involve onsite placement of hazardous waste that will trigger the LDR requirements. Hazardous waste generated will be characterized to determine if LDR treatment standards are exceeded. A notification will be submitted to the disposal facility indicating whether the waste is restricted from land disposal and whether it exceeds an applicable treatment standard.

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90	California Action-Specific	Hazardous Waste Control Act (HWCA) - Standards for owners and operators of hazardous waste transfer and TSD facilities, Title 22, CCR, Div 4.5, Ch 14, Articles 3 and 4	ARAR Applicable	Establish requirements for a facility to plan for emergency conditions. In addition, the design and operation of the facility must be done to prevent releases. Other requirements include testing and maintenance of equipment and incorporation of communication and alarm systems and contingency plan. The requirements may be applicable if CERCLA response action includes treatment, storage, or disposal as defined under RCRA, or may be relevant and appropriate if the requirements address problems or situations sufficiently similar to the specific circumstances at the site that their usage will be well suited.	Design, construction, operation and maintenance of the remedy	PG&E	Design submittals; Project-specific HMBP; O&M Plan; Construction/ Remedial Action Work Plan	PG&E will prepare a Project-specific HMBP; an O&M Plan; and a Construction/Remedial Action Work Plan that will address procedures for emergencies.	The Contingency Plan (Volume 3) of the O&M Manual includes contingency planning for potential failure modes (including large releases), assess and mitigate risks, and prioritize risk management in order to prevent problems before they arise. The O&M Plan (Volume 1) of the O&M Manual covers routine O&M activities which includes testing and maintenance of communication and alarm. Project-specific HMBP and a Construction/ Remedial Action Work Plan will address procedures for emergencies. The outline for the HMBP is presented in Appendix F of the O&M Plan, which is included in the 60% design. The complete HMBP and Construction/Remedial Action Work Plan will be included in the 90% design.	The Contingency Plan (Volume 3) of the O&M Manual includes contingency planning for potential failure modes (including large releases), assess and mitigate risks, and prioritize risk management in order to prevent problems before they arise. The O&M Plan (Volume 1) of the O&M Manual covers routine O&M activities which includes testing and maintenance of communication and alarm. Section 5 of the Construction/Remedial Action Work Plan includes contingency planning for failure modes during construction (including large releases), assess and mitigate risks, and prioritize risk management in order to prevent problems before they arise. The project-specific HMBP (Appendix F of the O&M Plan) also addresses procedures for emergencies. Communication protocols including contacts and notification in emergency conditions are presented in Exhibit L2.2-1 of the O&M Manual, Table 2.3-1 of the Construction/Remedial Action Work Plan, and the HMBP.

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91	California Action-Specific	Hazardous Waste Control Act (HWCA) - Groundwater monitoring and response, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.91 (a) and (c)	ARAR Relevant and Appropriate	Owners or operators of a RCRA surface impoundment, waste pile, land treatment unit, or landfill shall conduct a monitoring and response program for each regulated unit. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, construction, operation and maintenance of the remedy	PG&E	Design submittals, O&M Plan (sampling and monitoring plan, contingency plan); Construction/ Remedial Action Work Plan, Progress Reports	PG&E will prepare a project-specific HMBP; an O&M Plan (include sampling and monitoring plan); and a Construction/Remedial Action Work Plan. The preliminary (30%) design does not include regulated units.	PG&E will prepare a project-specific HMBP; an O&M Manual (including a sampling and monitoring plan); and a Construction/Remedial Action Work Plan. The O&M Manual, which includes a sampling and monitoring plan for groundwater and surface water, is included as Appendix L in this BOD Report for the 60% design. The outline for the HMBP is presented in Appendix F of the O&M Plan, which is included in the 60% design. The complete HMBP and Construction/Remedial Action Work Plan will be included in the 90% design. Although the 60% design does not include regulated units, these plans present a monitoring and response program that is functionally equivalent and will provide a level of protection to water quality equivalent to the cited requirement.	Although the 90% design does not include regulated units, the following plans present a monitoring and response program that is functionally equivalent and will provide a level of protection to water quality equivalent to the cited requirement: 1) Appendix E of the O&M Plan (Volume 1 of the O&M Manual) includes an industrial SWPPP that involves BMPs designed to reduce pollutants in discharges that may affect receiving water quality during operations and maintenance of the remedy. 2) Volume 2 of the O&M Manual includes a sampling and monitoring plan for groundwater and surface water. 3) The Construction/Remedial Action Work Plan includes a BMP Plan for construction activities that involves visual inspections and monitoring and sampling for purposes of ensuring the protection of receiving water quality. 4) The project-specific HMBP addresses procedures for emergencies.
92	California Action-Specific	Hazardous Waste Control Act (HWCA) - Monitoring, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.97 (b), (c), (d) and (e)(1) through (e)(5)	ARAR Relevant and Appropriate	Requirements for monitoring groundwater, surface water, and vadose zone. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E	Design submittals, O&M Plan (sampling and monitoring plan, contingency plan); Progress Reports	PG&E will prepare an O&M Plan and Progress Reports. The O&M Plan will include a sampling and monitoring plan for groundwater and surface water.	The O&M Manual, which includes a sampling and monitoring plan for groundwater and surface water, is included as Appendix L in this BOD Report for the 60% design. PG&E will prepare Progress Reports that presents the results and analysis of monitoring data.	The O&M Manual, which includes a sampling and monitoring plan for groundwater and surface water, is included as Appendix L in the BOD Report for the 90% design. PG&E will prepare quarterly Progress Reports that presents the results and analysis of monitoring data.
93	California Action-Specific	Hazardous Waste Control Act (HWCA) - Detection Monitoring Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.98	ARAR Relevant and Appropriate	Requires the owner or operator of a regulated unit to develop a detection monitoring program that will provide reliable indication of a release. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E	Design submittals, O&M Plan (sampling and monitoring plan, contingency plan); Progress Reports	PG&E will prepare an O&M Plan and Progress Reports. The O&M Plan will include a sampling and monitoring plan for groundwater and surface water that provides a level of protection equivalent to a detection monitoring program that will provide reliable indication of a release	PG&E will prepare an O&M Manual and Progress Reports. The O&M Manual, which includes a sampling and monitoring plan for groundwater and surface water, is included as Appendix L in this BOD Report for the 60% design. Although the 60% design does not include regulated units, the programs described in these documents provide a level of protection equivalent to a detection monitoring program that will provide reliable indication of a release.	Although the 90% design does not include regulated units, the programs described in the sampling and monitoring plan for groundwater and surface water (Volume 2 of the O&M Manual) and future quarterly progress reports provide a level of protection equivalent to a detection monitoring program that will provide reliable indication of a release.

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94	California Action-Specific	Hazardous Waste Control Act (HWCA) - Evaluation Monitoring, Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.99	ARAR Relevant and Appropriate	Requires the owner or operator of a regulated unit to develop an evaluation monitoring program that can be used to assess the nature and extent of a release from the unit. Substantive technical requirements are potentially relevant and appropriate for remedial action including groundwater monitoring.	Design, operation and maintenance of the remedy	PG&E	Design submittals, O&M Plan (sampling and monitoring plan, contingency plan); Progress Reports	PG&E will prepare an O&M Plan and Progress Reports. The O&M Plan will include a sampling and monitoring plan for groundwater and surface water that provides a level of protection equivalent to an evaluation monitoring program, based on site-specific conditions.	PG&E will prepare an O&M Plan and Progress Reports. Reports. The O&M Manual, which includes a sampling and monitoring plan for groundwater and surface water, is included as Appendix L in this BOD Report for the 60% design. Although the 60% design does not include regulated units, the programs described in these documents provide a level of protection equivalent to an evaluation monitoring program, based on site-specific conditions.	Although the 90% design does not include regulated units, the programs described in the sampling and monitoring plan for groundwater and surface water (Volume 2 of the O&M Manual) and future quarterly progress reports provide a level of protection equivalent to an evaluation monitoring program, based on site-specific conditions.
95	California Action-Specific	Discharges of Waste to Land - Title 23 CCR, Div 3, Ch 15	ARAR Relevant and Appropriate	The regulations in this chapter pertain to water quality aspects of hazardous waste discharge to land, establishing waste and site classifications and waste management requirements for waste treatment, storage, or disposal in landfills, surface impoundments, waste piles, and land treatment facilities. Requirements in this chapter are minimum standards for proper management of each waste category. Pursuant to Section 2511 (Exemptions), because this remediation constitutes actions taken by public agencies to cleanup unauthorized releases of waste, these regulations will only apply if the proposed remedial activities include (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	Activities involve (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	PG&E	N/A. No further action required unless design change triggers; reconfirm in design submittals.	No further action is required. The remedy design does not involve removal of waste from the immediate place of release and is not designed to keep some contamination in place.	No further action is required. The remedy design does not involve removal of waste from the immediate place of release and is not designed to keep some contamination in place.	No further action is required. The remedy design does not involve removal of waste from the immediate place of release and is not designed to keep some contamination in place.

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96	California Action-Specific	Consolidated Regulations for Storage, Treatment, Processing, or Disposal of Solid Waste - Title 27 CCR, Div 2, Subdivision 1	ARAR Relevant and Appropriate	The regulations in this subdivision (promulgated by the State Water Resources Control Board (SWRCB)) pertain to water quality aspects of discharges of solid waste to land for treatment, storage, or disposal. Pursuant to Section 20090 (Exemptions), because this remediation constitutes actions taken by public agencies to cleanup unauthorized releases of waste, these regulations will only apply if the proposed remedial activities include (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	Activities involve (1) removal of waste from the immediate place of release, or (2) keeping some contamination in place.	PG&E	N/A. No further action required unless design change triggers; reconfirm in design submittals.	No further action is required. The remedy design does not involve removal of waste from the immediate place of release and is not designed to keep some contamination in place.	No further action is required. The remedy design does not involve removal of waste from the immediate place of release and is not designed to keep some contamination in place.	No further action is required. The remedy design does not involve removal of waste from the immediate place of release and is not designed to keep some contamination in place.
97	California Action-Specific	Requirements for land-use covenants - Cal. Code Regs. Title 22, § 67391.1	ARAR Applicable	This regulation requires appropriate restrictions on use of property in the event that a proposed remedial alternative results in hazardous materials remaining at the property at levels which are not suitable for unrestricted use of the land. This is an ARAR with respect to PG&E-owned land at the Topock site.	A decision document finding that hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels which are not suitable for unrestricted use of the land.	DTSC	A land use covenant imposing appropriate limitations on land use shall be executed and recorded when hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels which are not suitable for unrestricted use of the land. The land use restrictions must be clearly stated in any response action decision document approved by DTSC. The following information must be	The final groundwater remedy includes restrictions on use of the groundwater for potable use, based on the conclusions of the groundwater risk assessment. The land use covenants (institutional controls) are described in Section 5.0.	The final groundwater remedy includes restrictions on use of the groundwater for potable use. The land use covenants (institutional controls) are described in Section 5.0 of the 60% BOD Report.	The final groundwater remedy includes restrictions on use of the groundwater for potable use. The land use covenants (institutional controls) are described in Section 5.0 of the 90% BOD Report.

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							specified: (1) the limitations or controls that will be incorporated into an appropriate land use covenant and (2) a description of the implementation and enforcement provisions, including but not limited to frequency of inspections and reporting requirements, necessary to ensure the integrity and long-term protectiveness of the land use covenant.			
98	California Action-Specific	California Water Code - Section 1380[c], California Well Standards, Bulletin 74-90 (Supplement to Bulletin 74-81)	ARAR Applicable	These standards for water, cathodic, and monitoring wells will be applicable if the remediation requires use of such wells.	Design, construction, decommission of groundwater wells	PG&E	Design submittals, Construction/ Remedial Action Work Plan, Plan for Decommissioning of IM-3 Facility and Site Restoration, Plan for Decommissioning of Remedy Facilities and Restoration.	PG&E will prepare Design submittals, a Construction/Remedial Action Work Plan, Plan for Decommissioning of IM-3 Facility and Site Restoration, and a Decommissioning Plan for Remedy Facility and Site Restoration. The remedy will include water and monitoring wells, and will adhere to the standards specified in this ARAR. Well construction and decommissioning standards will be described in the Construction /Remedial Action Work Plan.	The remedy includes water and monitoring wells, and will adhere to the standards specified in this ARAR. Note that the general approach for well decommissioning is currently being developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes. Protocols for well decommissioning will be based on this general approach and be presented in Appendix B of the O&M Plan (Volume 1 of the O&M Manual), at the 90% design stage. Well construction and decommissioning standards will also be described the Construction/ Remedial Action Work Plan.	The remedy includes water and monitoring wells, and will adhere to the standards specified in this ARAR. An approach for well decommissioning has been developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes. Protocols for well decommissioning developed based on this approach, are presented in the O&M Plan (Volume 1 of the O&M Manual). Well construction and decommissioning procedures are also described in the Construction/Remedial Action Work Plan.

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99	California Action-Specific	State Water Resources Control Board Resolution No. 88-63 Adoption of Policy Entitled "Sources of Drinking Water"	ARAR Applicable	With certain exceptions, all surface and ground waters of the State of California are to be considered suitable, or potentially suitable, for municipal or domestic water supply. The Regional Water Quality Control Board and State Water Resources Board have designated the beneficial use of the ground and surface waters in the Topock Site area as "municipal and domestic water supply." This designation is set forth in the Basin Plan.	Remedy implementation	PG&E	O&M Plan (sampling and monitoring plan, contingency plan), Progress Reports, Corrective Measure/Remedial Action Completion Report	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the federal and state MCLs of 100 µg/L and 50 mg/L respectively which represent the chemical concentrations in drinking water considered safe for human consumption. There are no MCLs or MCLGs for Cr(VI) and the RAO has been established based on the regional background concentration of 32 µg/L Cr(VI) at the conclusion of remedy implementation. The establishment of RAOs (see Section 1.2.1) is based on the conclusions of the groundwater risk assessment which assumed a hypothetical future use of groundwater within the plume as a drinking water supply. The final groundwater remedy includes an institutional control to restrict use of the groundwater for potable use until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the federal and state MCLs of 100 µg/L and 50 mg/L respectively, which represent the chemical concentrations in drinking water considered safe for human consumption. There are no MCLs or MCLGs for Cr(VI) and the RAO of 32 µg/L (based on the regional background concentration) has been established at the conclusion of remedy implementation. Concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate above baseline levels within the treatment area during remedy implementation. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona, will be pre-treated to below MCL prior to injection. Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation are localized, will attenuate under site conditions, and will return to pre-remedy baseline levels after the end of active remediation. Modeling also indicates that manganese generated from in-situ remediation does not exceed the upper tolerance level of background manganese concentration at the site. The final groundwater remedy includes an institutional control to restrict use of the groundwater for potable use until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.	Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the federal and state MCLs of 100 µg/L and 50 mg/L respectively, which represent the chemical concentrations in drinking water considered safe for human consumption. The state MCL for Cr(VI) is 10 µg/L. The RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation. Concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate above baseline levels within the treatment area during remedy implementation. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona. Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation and freshwater injection are localized, will attenuate under site conditions, and will return to pre-remedy baseline levels after the end of active remediation and the cessation of freshwater injection, respectively. Modeling also indicates that manganese generated from in-situ remediation does not exceed the upper tolerance level of background manganese concentration at the site. The final groundwater remedy includes an institutional control to restrict use of the groundwater for potable use until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control.

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100	California Action-Specific	Water Quality Control Plan; Colorado River Basin-Region 7, June 2006 (Basin Plan)	ARAR Applicable	This Basin Plan designates the Colorado River and the Colorado Hydrologic unit as having the beneficial use of "MUN" (or, municipal or domestic water supply). The Basin Plan also prescribes General Surface Water Objectives and Ground Water Objectives, in addition to Specific Surface Water Objectives for the Colorado River, which include a flow-weighted average annual numeric criterion for salinity for the portion of the Colorado River on the Topock Site of 723 mg/L. This TDS value must not be exceeded in any remedial alternative being considered	Remedy implementation	PG&E	O&M Plan (sampling and monitoring plan, contingency plan), Progress Reports, Corrective Measure/Remedial Action Completion Report	Surface water sampling in the Colorado River near the site show concentrations of Cr(T) less than the federal and state MCLs of 100 µg/L and 50 mg/L (drinking water supply standards). Surface water sampling in the Colorado River also show concentrations of Cr(VI) less than the California Toxics Rule criteria of 11 µg/L (protection of freshwater aquatic life). Reducing Cr(VI) concentrations in groundwater by implementation of the remedy will increase the level of certainty that surface water quality will continue to remain below these levels. PG&E will prepare an O&M Plan, Progress Reports, and a Corrective Measure/Remedial Action Completion Report. The remedy is intended to restore groundwater to the regional background Cr(VI) concentration of 32 µg/L, thereby addressing any contribution by PG&E affecting potential beneficial uses. The operation of the River Bank Extraction Wells will prevent migration of contaminants to the Colorado river that could impact beneficial uses or result in a failure to meet surface water quality objectives.	Surface water sampling in the Colorado River near the site show concentrations of Cr(T) less than the federal and state MCLs of 100 µg/L and 50 mg/L (drinking water supply standards). Surface water sampling in the Colorado River also show concentrations of Cr(VI) less than the California Toxics Rule criteria of 11 µg/L (protection of freshwater aquatic life). Reducing Cr(VI) concentrations in groundwater by implementation of the remedy will increase the level of certainty that surface water quality will continue to remain below these levels. The remedy is intended to restore groundwater to the regional background Cr(VI) concentration of 32 µg/L, thereby addressing any contribution by PG&E affecting potential beneficial uses. The operation of the River Bank Extraction Wells will prevent migration of contaminants to the Colorado River that could impact beneficial uses or result in a failure to meet surface water quality objectives. The remedy is also designed and will be implemented to control the generation and migration of in-situ by-products (arsenic, manganese). The MCL for arsenic is 10 µg/L and the secondary MCL for manganese is 50 µg/L. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L (which is typical of water quality in the vicinity of Topock, Arizona) will be pre-treated to below MCL prior to injection**.** Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation are localized, will attenuate under site conditions and will return to pre-remedy baseline levels after the end of active remediation. Modeling also indicates that manganese generated from in-situ remediation does not exceed the upper tolerance level of background manganese concentration at the site. The O&M Manual is Appendix L of this BOD Report for the 60% design. PG&E will prepare Progress Reports and a Corrective	Surface water sampling in the Colorado River near the site show concentrations of Cr(T) less than the federal and state MCLs of 100 µg/L and 50 mg/L (drinking water supply standards). Surface water sampling in the Colorado River also show concentrations of Cr(VI) less than the California Toxics Rule criteria of 11 µg/L (protection of freshwater aquatic life). Surface water data in the Colorado River show concentrations of TDS less than the Surface Water Objectives for the Colorado River of 723 mg/L. Calculations show that remedy operations have insignificant impact on TDS in the river. Reducing Cr(VI) concentrations in groundwater by implementation of the remedy will increase the level of certainty that surface water quality will continue to remain below these levels. The remedy is intended to restore groundwater to the regional background Cr(VI) concentration of 32 µg/L, thereby addressing any contribution by PG&E affecting potential beneficial uses. The operation of the River Bank Extraction Wells will prevent migration of contaminants to the Colorado River that could impact beneficial uses or result in a failure to meet surface water quality objectives. The remedy is also designed and will be implemented to control the generation and migration of in-situ by-products (arsenic, manganese). The MCL for arsenic is 10 µg/L and the secondary MCL for manganese is 50 µg/L. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona**.** Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation and freshwater injection are localized, will attenuate under site conditions and will return to pre-remedy baseline levels after the end of active remediation and the cessation of freshwater injection, respectively.

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PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
									Measure/Remedial Action Completion Report.	Modeling also indicates that manganese generated from in-situ remediation does not exceed the upper tolerance level of background manganese concentration at the site.
101	California Action-Specific	State Water Resources Control Board Resolution No. 68-16 ("Antidegradation Policy") - Statement of Policy with respect to Maintaining High Quality of Waters in California	ARAR Applicable	Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.	Remedy implementation	PG&E	O&M Plan (sampling and monitoring plan, contingency plan), Progress Reports, Corrective Measure/Remedial Action Completion Report	PG&E will prepare an O&M Plan, Progress Reports, and a Corrective Measure/Remedial Action Completion Report. Although constituent concentrations will fluctuate inside the footprint of the remedy during implementation, at the conclusion of the remedy the RAOs will achieve background levels for chromium. Therefore, the remedy will comply with the substantive provisions of the SWRCB Resolution 68-16 that requires maintenance of the highest water quality consistent with maximum benefit to the people of the State, and with the substantive provisions of SWRCB Resolution 92-49 that require restoration of background water quality.	The O&M Manual is Appendix L of the BOD Report for the 60% design. PG&E will prepare Progress Reports and a Corrective Measure/Remedial Action Completion Report. Although constituent concentrations will fluctuate inside the footprint of the remedy during implementation, at the conclusion of the remedy the RAOs will achieve background levels for chromium. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona, will be pre-treated to below MCL prior to injection. Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation will attenuate under site conditions, are localized, and will return to pre-remedy baseline levels after the end of active remediation. Modeling also indicates that manganese generated from in-situ remediation does not exceed the upper tolerance level of background manganese concentration at the site. Therefore, the remedy will comply with the substantive provisions of the SWRCB Resolution 68-16 that requires maintenance of the highest water quality consistent with maximum benefit to the people of the State, and with the substantive provisions of SWRCB Resolution 92-49 that require restoration of background water quality.	The O&M Manual is Appendix L of the BOD Report for the 90% design. PG&E will prepare Progress Reports and a Corrective Measure/ Remedial Action Completion Report. Although constituent concentrations will fluctuate inside the footprint of the remedy during implementation, at the conclusion of the remedy the RAOs will achieve background levels for chromium. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10 µg/L, which is typical of water quality in the vicinity of Topock, Arizona. Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation and freshwater injection will attenuate under site conditions, are localized, and will return to pre-remedy baseline levels after the end of active remediation and the cessation of freshwater injection, respectively. Modeling also indicates that manganese generated from in-situ remediation does not exceed the upper tolerance level of background manganese concentration at the site. Therefore, the remedy will comply with the substantive provisions of the SWRCB Resolution 68-16 that requires maintenance of the highest water quality consistent with maximum benefit to the people of the State, and with the substantive provisions of SWRCB Resolution 92-49 that require restoration of background water quality.

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102	California Action-Specific	State Water Resources Control Board Resolution No. 92-49 -- Policies and Procedures for investigation and Cleanup and Abatement of Discharges under Water Code Section 13304	ARAR Relevant and Appropriate	Section III.A of this Resolution states that the Regional Water Board shall "concur with any investigative and abatement proposal which the discharger demonstrates and the Regional Water Board finds to have a substantial likelihood to achieve compliance within a reasonable time frame…"	Remedy implementation	PG&E	Corrective Measure/ Remedial Action Completion Report	PG&E will prepare a Corrective Measure/Remedial Action Completion Report. Because RAOs will achieve background levels for chromium, the remedy will comply with the substantive provisions of the SWRCB Resolution 92-49 that require restoration of background water quality.	PG&E will prepare a Corrective Measure/ Remedial Action Completion Report. Because RAOs will achieve background levels for chromium, the remedy will comply with the substantive provisions of the SWRCB Resolution 92-49 that require restoration of background water quality.	PG&E will prepare a Corrective Measure/ Remedial Action Completion Report. Because RAOs will achieve background levels for chromium, the remedy will comply with the substantive provisions of the SWRCB Resolution 92-49 that require restoration of background water quality.
Location-Specific										
5	Federal Location-Specific	Federal Land Policy and Management Act - (FLPMA);43 USC § 1701, et seq.; 43 CFR 2800	ARAR Applicable	In managing public lands, BLM is directed to take any action necessary to prevent unnecessary or undue degradation of the lands. Actions[3] taken on the public land (i.e. BLM-managed land) portions of the Topock site should provide the "optimal balance between authorized resource use and the protection and long-term sustainability of sensitive resources."	Activities on public lands	BLM	Design submittals, Construction/ Remedial Action Work Plan, O&M Plan, Progress Reports, Plan for Decommissioning of Remedy Facilities and Restoration	The preliminary (30%) design was submitted by PG&E to DOI on November 18, 2011, and includes proposed facilities on BLM land. PG&E will prepare future design submittals, a Construction/ Remedial Action Work Plan, an O&M Plan, Progress Reports, and a Decommissioning Plan for review by DOI. PG&E understands that DOI will coordinate its review of these submittals with BLM.	The 60% design was submitted to DOI on April 5, 2013, and includes proposed facilities on BLM land. Engineering drawings are included as Appendix D to this 60% design report and an O&M Manual is included as Appendix L. PG&E will submit a Construction/Remedial Action Work Plan as part of the 90% design, a Decommissioning Plan prior to decommissioning, and progress reports for review by DOI. PG&E understands that DOI will coordinate its review of these submittals with BLM.	The 90% design was submitted to DOI on September 8, 2014, and includes proposed facilities on BLM land. Engineering drawings are included as Appendix D to the 90% design report and an O&M Manual is included as Appendix L. The Construction/Remedial Action Work Plan was also submitted concurrently with the 90% design as part of the 90% design. Progress reports will be submitted during the construction and operation and maintenance of the remedy. PG&E understands that DOI will coordinate its review of these submittals with BLM. In compliance with the CD (Appendix C Scope of Work, Article 9), PG&E will prepare a site-specific Plan for Decommissioning and Restoration of remedy facilities within 120 days of DOI's certification of remedial action completion and a determination by DOI that removal of such facilities is protective of human health and the environment.

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7	Federal Location-Specific	National Wildlife Refuge System Administration Act, as amended - 16 USC §§ 668dd-ee; 50 CFR Part 27	ARAR Applicable	This Act governs the use and management of National Wildlife Refuges. The Act requires that USFWS evaluate ongoing and proposed activities and uses to ensure that such activities are appropriate and compatible with both the mission of the overall National Wildlife Refuge System, as well as the specific purposes for which the Havasu National Wildlife Refuge (HNWR) was established. The Topock site includes portions of the HNWR. Prior to selection of a remedial action[3] by DOI/USFWS, that remedial action must be found by the Refuge Manager to be both an appropriate use of the HNWR and compatible with the mission of the HNWR and the Refuge System as a whole. [2]	Activities on the HNWR	USFWS/DOI	Design submittals, Construction/ Remedial Action Work Plan, O&M Plan, Progress Reports, Plan for Decommissioning of Remedy Facilities and Restoration	The preliminary (30%) design was submitted by PG&E to agencies on November 18. 2011 and includes proposed facilities on HNWR land. PG&E will prepare future design submittals, a Construction/ Remedial Action Work Plan, an O&M Plan, Progress Reports, and a Decommissioning Plan for review by DOI. PG&E understands that DOI will coordinate its review of these submittals with USFWS.	The 60% design was submitted to DOI on April 5, 2013, and includes proposed facilities on HNWR land. Engineering drawings are included as Appendix D to this 60% design report and an O&M Manual is included as Appendix L. PG&E will submit a Construction/Remedial Action Work Plan as part of the 90% design, a Decommissioning Plan prior to decommissioning, and progress reports for review by DOI. PG&E understands that DOI will coordinate its review of these submittals with USFWS.	See **Table 6.2-1A (Supplemental Information for ARAR #7_AUA_CD).**

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13	Federal Location-Specific	Fish and Wildlife Coordination Act - 16 USC §§ 661-667e	ARAR Applicable	This Act requires that any federally-funded or authorized modification of a stream or other water body must provide adequate provisions for conservation, maintenance, and management of wildlife resources and their habitat. Necessary measures should be taken to mitigate, prevent, and compensate for project-related losses of wildlife resources. Any remedial action selected for the Topock site that includes any modification of a water body will be subject to these requirements.	Any modification of a water body	PG&E	N/A. No further action required unless design change triggers; reconfirm in design submittals.	No further action is required. The preliminary (30%) design does not include modification of a water body.	Figure 2.4-5 in the 60% BOD Report document shows the overlaps between remedy infrastructure and the USACE and CDFW jurisdictional waters/wetlands. As shown in Figure 2.4-5, PG&E determined in the 60% Design that complete avoidance of washes is not feasible due to the need to install remediation and monitoring wells and associated pipes and components in washes (e.g., a wash in the Upland, Bat Cave Wash). For activities to be conducted in CDFW jurisdictional washes, PG&E will comply with the avoidance and minimization measures specified in the CDFW letter dated March 6, 2013 (CDFW 2013), and any additional measures PG&E's biologist determines to be necessary. PG&E will work with USACE and USFWS to determine and comply with the substantive requirements, per CERCLA 121(e), of Section 404 and the Fish and Wildlife Coordination Act, respectively.	Figure 2.4-5 in the 90% BOD Report document shows the overlaps between remedy infrastructure and the USACE and CDFW jurisdictional waters/wetlands. As shown in Figure 2.4-5, PG&E determined in the 90% Design that complete avoidance of washes is not feasible due to the need to install remediation and monitoring wells and associated pipes and components in washes (e.g., a wash in the Upland, Bat Cave Wash). For activities to be conducted in CDFW jurisdictional washes, PG&E will comply with the avoidance and minimization measures specified in the CDFW letter dated March 6, 2013 (CDFW 2013), and any additional measures PG&E's biologist determines to be necessary. PG&E will also comply with avoidance, minimization and mitigation measures specified in the Section 404 protocol (see Exhibit 6.1-1 at the end of Table 6.1-1) and the requirements of the Programmatic Biological Assessment. USFWS will be consulted on the 90% BOD Report.
14	Federal Location-Specific	National Historic Preservation Act - 16 USC § 470, et seq.;36 CFR 800.1, et seq.	ARAR Applicable	This statute and the implementing regulations direct federal agencies to consider the effects of their undertakings on historic properties included in or eligible for inclusion in the National Register of Historic Places and to consult with certain parties before moving forward with the undertaking. The agency must determine, based on consultation, if an undertaking's effects would be adverse and consider feasible and prudent alternatives that could avoid, mitigate, or minimize such adverse effects on a National Register or eligible property. The agency must then specify how adverse effects will be avoided or mitigated or acknowledge	Remedial action selected for the Topock site qualifies as an undertaking under NHPA	BLM, Advisory Council on Historic Preservation, California and Arizona State Historic Preservation Offices, USFWS and PG&E are parties to the PA	PA, CHPMP, Design Submittals, Construction/Remedial Action Work Plan, Plan for decommissioning, removal, and restoration of IM-3 facility, Plan for Decommissioning of Remedy Facilities and Restoration, Documents related to ongoing consultation, Brochure, Annual Report, Tribal Access Plan	Documents led by BLM include the PA, the CHPMP, the Brochure, the Annual Report, and the Tribal Access Plan. The PA has been completed. The Brochure to notify other state and federal agencies of the Signatories and Invited Signatories with the actions to be taken within the vicinity of the Topock Remediation Project, and the Topock Maze, is completed. The CHPMP, which is a requirement of the PA, is under preparation and the goal is to have a plan in place by January 20, 2012. BLM distributed a draft CHPMP on November 1, 2011. Comments on the draft CHPMP are due December 5, 2011. The Tribal Access Plan is also under preparation and the goal is to complete the Plan by November 26, 2011 (note that the PA-required Tribal Access Plan will be coordinated with the EIR-required Access Plan).Annual reports of cultural resources activities will be prepared and submitted to all Signatories, Tribes, and Invited Signatories as directed in the PA. Documents led by PG&E include design	Documents led by BLM include the PA, the CHPMP, the Brochure, the Annual Report, and the Tribal Access Plan. The PA has been completed. The Brochure to notify other state and federal agencies of the Signatories and Invited Signatories with the actions to be taken within the vicinity of the Topock Remediation Project, and the Topock Maze, is completed. The CHPMP, which is a requirement of the PA, was issued on January 20, 2012. The CHPMP can be modified and updated, as needed, to address new information and ongoing activities related to the project. Therefore, subsequent to the issuance of the CHPMP, BLM continues to hold periodic working meetings on the CHPMP. It should be noted that treatment measures are included in the CHPMP and a treatment plan will continue to be developed throughout the design to address mitigation measures. The Tribal Access Plan for lands under federal management was completed on November 26, 2011 (note that the PA-required Tribal Access Plan will be coordinated with the EIR-required Access Plan).	Documents led by BLM include the PA, the CHPMP, the Brochure, the Annual Report, and the Tribal Access Plan. The PA is completed. The Brochure to notify other state and federal agencies of the Signatories and Invited Signatories with the actions to be taken within the vicinity of the Topock Remediation Project, and the Topock Maze, is also completed. The CHPMP, which is a requirement of the PA, was issued on January 20, 2012. The CHPMP can be modified and updated, as needed, to address new information and ongoing activities related to the project. Therefore, subsequent to the issuance of the CHPMP, BLM continues to hold periodic working meetings on the CHPMP. It should be noted that treatment measures are included in the CHPMP and a treatment plan will be prepared and submitted to DTSC shortly after the submission of the 90% design. The Tribal Access Plan for lands under federal management was completed on November 26, 2011. On October 21, 2013, PG&E provided the Tribes a draft of the Access Plan for lands not under federal management for review and

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				that such effects cannot be avoided or mitigated. The Topock site includes historic properties in or eligible for inclusion in the National Register and remedial action selected for the Topock site qualifies as an undertaking pursuant to the NHPA. Measures to avoid or mitigate adverse effects of any selected remedial action that are adopted by the agency through consultation must be implemented by the remedial action to comply with the NHPA.				submittals, a Construction/Remedial Action Work Plan, a Plan for decommissioning, removal, and restoration of IM-3 facility, and a Decommissioning Plan for Remedy Facilities and Restoration. The preliminary (30%) design was submitted on November 18, 2011. The other documents will be prepared and submitted.	Annual reports of cultural resources activities will be prepared and submitted to all Signatories, Tribes, and Invited Signatories as directed in the PA. BLM published the first Annual Report on November 25, 2011, and the second Annual Report on January 29, 2013. The PA requires that such reports will be prepared and submitted by December 1 each year for the first five years after execution of the PA and every two years thereafter. Documents led by PG&E include design submittals; a Construction/Remedial Action Work Plan; a Plan for decommissioning, removal, and restoration of the IM-3 facility; and a Decommissioning Plan for Remedy Facilities and Restoration. The intermediate (60%) design submittal was submitted on April 5, 2013. The other documents will be prepared and submitted.	comment. Tribal comments were received on November 22, 2013. PG&E has updated the plan and included the plan in an appendix of the Construction/Remedial Action Work Plan. (note that the PA-required Tribal Access Plan will be coordinated with the EIR-required Access Plan). Annual reports of cultural resources activities will be prepared and submitted to all Signatories, Tribes, and Invited Signatories as directed in the PA. BLM published the first Annual Report on November 25, 2011, and the second Annual Report on January 29, 2013. The Third Annual Report was provided by BLM to the Signatories, Tribes, and Invited Signatories for comment on June 18, 2014. The PA requires that such reports will be prepared and submitted by December 1 each year for the first five years after execution of the PA and every two years thereafter. Documents led by PG&E include design submittals; a Construction/Remedial Action Work Plan; a Plan for decommissioning, removal, and restoration of the IM-3 facility; and a Decommissioning Plan for Remedy Facilities and Restoration. The 90% design, the Construction/ Remedial Action Work Plan, and the IM-3 decommissioning, removal, and restoration work plan were submitted on September 8, 2014. In compliance with the CD (Appendix C Scope of Work, Article 9), PG&E will prepare a site-specific Plan for Decommissioning and Restoration of remedy facilities within 120 days of DOI's certification of remedial action completion and a determination by DOI that removal of such facilities is protective of human health and the environment.

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17	Federal Location-Specific	National Archaeological and Historic Preservation Act – 16 USC § 469, et seq.; 36 CFR 65	ARAR Applicable	This statute requires the evaluation and preservation of historical and archaeological data which might otherwise be irreparably lost or destroyed through any alteration of terrain as a result of federal construction projects or a federally-licensed activity. The Topock site includes historical and archaeological data. Any remedial action selected for the Topock site must include measures for the evaluation and preservation of historical and archaeological data that might be lost or destroyed as a result of the remedial action.	Alteration of terrain that threatens significant scientific, historical or archaeological data.	Federal Agencies, PG&E	PA, CHPMP, Design Submittals, Construction/ Remedial Action Work Plan	Requirements in the PA and the forthcoming CHPMP will be adhered to. Documents led by PG&E include design submittals, a Construction/Remedial Action Work Plan, a Plan for decommissioning, removal, and restoration of IM-3 facility, and a Decommissioning Plan for Remedy Facilities and Restoration. The preliminary (30%) design was submitted on November 18, 2011. The other documents will be prepared and submitted.	Requirements in the PA and the CHPMP will be adhered to. Documents led by PG&E include design submittals; a Construction/Remedial Action Work Plan; a Plan for decommissioning, removal, and restoration of the IM-3 facility; and a Decommissioning Plan for Remedy Facilities and Restoration. The intermediate (60%) design submittal was submitted on April 5, 2013. The other documents will be prepared and submitted.	Requirements in the PA and the CHPMP will be adhered to. These requirements include implementation of mitigation measures identified in the PA and the CHPMP and through ongoing consultation activities with the Tribes that will avoid, mitigate, or otherwise minimize adverse effects from the undertaking. Tables 6.2-2 and 6.2-3 summarize actions by PG&E to implement the applicable provisions under the PA and the CHPMP. Documents led by PG&E include design submittals; a Construction/Remedial Action Work Plan; a Plan for decommissioning, removal, and restoration of the IM-3 facility; and a Decommissioning Plan for Remedy Facilities and Restoration. The 90% design, the Construction/ Remedial Action Work Plan, and the IM-3 decommissioning, removal, and restoration work plan were submitted on September 8, 2014. In compliance with the CD (Appendix C Scope of Work, Article 9), PG&E will prepare a Plan for Decommissioning and Restoration of the remedy facilities within 120 days of DOI's certification of remedial action completion and a determination by DOI that removal of such facilities is protective of human health and the environment.

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18	Federal Location-Specific	Archaeological Resources Protection Act - 16 USC § 470aa-ii, et seq.;43 CFR 7.1, et seq.	ARAR Applicable	This statute provides for the protection of archeological resources located on public and Tribal lands. The Act establishes criteria which must be met for the land manager's approval of any excavation or removal of archaeological resources if a proposed activity involves soil disturbances. The Topock site includes archaeological resources on public land. Any remedial action selected for the Topock site must satisfy the criteria applicable to excavation or removal of archaeological resources that might be affected as a result of the remedial action.	Disturbance of archaeological and historical sites	Federal Agencies, PG&E	PA, CHPMP, Design Submittals, Construction/ Remedial Action Work Plan	Requirements in the PA and the forthcoming CHPMP will be adhered to. PG&E will prepare and submit design submittals and the Construction/Remedial Action Work Plan. The preliminary (30%) design was submitted on November 18, 2011.	Requirements in the PA and the CHPMP will be adhered to. PG&E will submit a Construction/ Remedial Action Work Plan as part of the 90% design. The 60% design was submitted on April 5, 2013.	Requirements in the PA and the CHPMP will be adhered to. These requirements include implementation of mitigation measures identified in the PA and the CHPMP and through ongoing consultation activities with the Tribes that will avoid, mitigate, or otherwise minimize adverse effects from the undertaking. Tables 6.2-2 and 6.2-3 summarize actions by PG&E to implement the applicable provisions under the PA and the CHPMP. The 90% design and the Construction/Remedial Action Work Plan were submitted on September 8, 2014.
19	Federal Location-Specific	Historic Sites Act - 16 USC 461-467	ARAR Applicable	Pursuant to this Act, federal agencies are to consider the existence and location of historic sites, buildings, and objects of national significance using information provided by the National Park Service to avoid undesirable impacts upon such landmarks. There are no designated historic landmarks within the APE, although 16 USC 461, through Public Law 106-45, provides for a cooperative program "for the preservation of the Route 66 corridor" through grants and other measures. Undesirable impacts on this site that might result from any remedial action selected for the Topock site will be evaluated and mitigated to the maximum extent practicable.	Existence of a historic landmark	Federal Agencies	Reevaluate in design documents if designated historic landmark exist	There are no historic landmarks in the APE. No further action is required.	There are no historic landmarks in the APE. No further action is required.	There are no historic landmarks in the APE. No further action is required.

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21	Federal Location-Specific	Native American Graves Protection and Repatriation Act (NAGPRA) - 25 USC § 3001, et seq.; 43 CFR 10.1, et seq.	ARAR Applicable	NAGPRA establishes requirements regulating the removal and trafficking of human remains and cultural items, including funerary and sacred objects. The Topock site may contain human remains. If remediation activities result in the discovery of Indian human remains or related objects, NAGPRA requirements must be met.	Federal Lands only - Discovery of human remains	PG&E	PA, CHPMP	Requirements of the PA and the forthcoming CHPMP (led by BLM) will be adhered to during the implementation of the remedy.	Requirements of the PA and the CHPMP (led by BLM) will be adhered to during the implementation of the remedy.	Requirements in the PA and the CHPMP will be adhered to. These requirements include implementation of mitigation measures identified in the PA and the CHPMP and through ongoing consultation activities with the Tribes that will avoid, mitigate, or otherwise minimize adverse effects from the undertaking. Tables 6.2-2 and 6.2-3summarize actions by PG&E to implement the applicable provisions under the PA and the CHPMP.
22	Federal Location-Specific	American Indian Religious Freedom Act - 42 USC § 1996, et seq.	ARAR Relevant and Appropriate	The United States must "protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise [their] traditional religions..." Any remedial action selected for the Topock site must satisfy this requirement.	Remedy selection	Federal Agencies (BLM Lead), PG&E	Tribal Access Plan	BLM leads the preparation of the Tribal Access Plan. Goal is to complete the plan by November 26, 2011. Note that the EIR-required Access Plan will be coordinated with the PA-required Access Plan.	BLM led the preparation of the Tribal Access Plan for lands under federal management, and the Plan was completed on November 26, 2011. Note that the EIR-required Access Plan is under preparation.	BLM led the preparation of the Tribal Access Plan for lands under federal management, and the Plan was completed on November 26, 2011. The EIR-required Access Plan was prepared and is included in an appendix of the Construction/ Remedial Action Work Plan.

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27	Federal Location-Specific	Resource Conservation and Recovery Act - 42 USC § 6901, et.seq.; 40 CFR 264.18	ARAR Applicable	These regulations promulgated under RCRA establish Seismic and Floodplain considerations which must be followed for treatment, storage, or disposal facilities constructed, operated, or maintained within certain distances of fault lines and floodplains. Portions of the Topock site are located on or near a 100-year floodplain.	Infrastructure in 100-year floodplain/ regulatory floodway	PG&E	Design submittals	The groundwater remedial facilities are not a permitted RCRA treatment, storage or disposal facility. Seismic load design criteria and geotechnical design criteria are described in Appendix C. The 100-year floodplain is defined in the Flood Insurance Rate Map (FIRM), Panel 5705 of 9400 for San Bernardino County, California and Unincorporated Areas, Revised August 28, 2008. The base flood elevation shown on the current FIRM is 464 at River Mile (RM) 234 of the Colorado River. The effective Flood Insurance Study (FIS) for San Bernardino County lists a regulatory base flood elevation of 463.90. This design uses the more conservative elevation of 464 as the base flood elevation. Wells and pipelines are included in the preliminary (30%) design in areas of the Colorado River floodplain necessary for capture and treatment of the chromium plume. The infrastructure in this preliminary (30%) design (wells, pipes) is mostly outside the 100-year floodplain, see Sheet C-2, well FP-EX-5.	The groundwater remedial facilities are not a permitted RCRA treatment, storage or disposal facility. Seismic load design criteria and geotechnical design criteria are described in Appendix C of this BOD Report for the 60% design. The 100-year floodplain is defined in the Flood Insurance Rate Map (FIRM), Panel 5705 of 9400 for San Bernardino County, California and Unincorporated Areas, Revised August 28, 2008, and Panel 5675 of 6700 for Mohave County, Arizona and Unincorporated Areas, Revised November 18, 2009 (Map Number 04015C5675G). The base flood elevation shown on the current FIRM is 464 at River Mile (RM) 234 of the Colorado River. A review of the Mohave County Flood Insurance Study (FIS) shows that this elevation is specific to the California side of the River only, and is different from information found in the newer FIS for Mohave County, AZ. The effective FIS for San Bernardino County lists a regulatory base flood elevation of 463.90 feet. This design uses the more conservative elevation of 464 feet as the base flood elevation for the project on the California side of the Colorado River. The vertical datum for all flood elevations shown on the San Bernardino County FIRM is NAVD88. The effective FIS for Mohave County lists a regulatory base flood elevation of 465.3 feet NAVD. This is used as the base flood elevation for the project on the Arizona side of the Colorado River. The vertical datum for all flood elevations shown on the Mohave County FIRM is NAVD88. In this 60% design, certain infrastructure (piping) cannot be located outside of 100-year floodplain as defined by the above baseline flood elevation. PG&E will work with San Bernardino County and Mohave County Flood Administrator to ensure compliance with the county requirements for construction in the floodplain.	The groundwater remedial facilities are not a permitted RCRA treatment, storage or disposal facility. Seismic load design criteria and geotechnical design criteria are described in Appendix C of this BOD Report for the 90% design. The 100-year floodplain is defined in the Flood Insurance Rate Map (FIRM), Panel 5705 of 9400 for San Bernardino County, California and Unincorporated Areas, Revised August 28, 2008, and Panel 5675 of 6700 for Mohave County, Arizona and Unincorporated Areas, Revised November 18, 2009 (Map Number 04015C5675G). The base flood elevation shown on the current FIRM is 464 at River Mile (RM) 234 of the Colorado River. A review of the Mohave County Flood Insurance Study (FIS) shows that this elevation is specific to the California side of the River only, and is different from information found in the newer FIS for Mohave County, AZ. The effective FIS for San Bernardino County lists a regulatory base flood elevation of 463.90 feet. This design uses the more conservative elevation of 464 feet as the base flood elevation for the project on the California side of the Colorado River. The vertical datum for all flood elevations shown on the San Bernardino County FIRM is NAVD88. The effective FIS for Mohave County lists a regulatory base flood elevation of 465.3 feet NAVD. This is used as the base flood elevation for the project on the Arizona side of the Colorado River. The vertical datum for all flood elevations shown on the Mohave County FIRM is NAVD88. In the 90% design, certain infrastructure (piping) cannot be located outside of 100-year floodplain as defined by the above baseline flood elevation. PG&E has worked with Mohave County Flood Administrator to ensure compliance with the county requirements for construction in the floodplain.

TABLE 6.2-1
Summary of Compliance with Identified ARARs
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
43	Arizona Location-Specific	Archeological Discoveries - A.R.S. § 41-841 through 847	ARAR	This Act prohibits any person from knowingly excavating on Arizona State or State agency owned land which is a historic or prehistoric ruin, burial ground, archaeological or paleontological site. These requirements will apply if the selected remedy involves excavation in Arizona.	Only if remedy in Arizona - Discovery of any archaeological, paleontological or historical site or object (including human remains) that is at least fifty years old	PG&E	PA, CHPMP, Construction/ Remedial Action Work Plan	Requirements from the PA and the forthcoming CHPMP (led by BLM) will be adhered to during implementation of the remedy. PG&E will prepare and submit the Construction/Remedial Action Work Plan.	Requirements from the PA and the CHPMP (led by BLM) will be adhered to during implementation of the remedy. PG&E will prepare and submit the Construction/Remedial Action Work Plan as part of the 90% design.	Requirements in the PA and the CHPMP will be adhered to. These requirements include implementation of mitigation measures identified in the PA and the CHPMP and through ongoing consultation activities with the Tribes that will avoid, mitigate, or otherwise minimize adverse effects from the undertaking. Tables 6.2-2 and 6.2-3 summarize actions by PG&E to implement the applicable provisions under the PA and the CHPMP. The Construction/Remedial Action Work Plan was prepared and submitted concurrently with the 90% design on September 8, 2014.
44	Arizona Location-Specific	Historic Preservation - A.R.S. § 41-865	ARAR	This Act restricts any person from disturbing human remains or funerary objects on lands other than lands[2]owned or controlled by the State. These requirements will apply if the selected remedy involves excavation in Arizona.	Only if remedy in Arizona on private lands - Discovery of human remains/funerary objects	PG&E	PA	Requirements from the PA and the forthcoming CHPMP will be adhered to during implementation of the remedy.	Requirements from the PA and the CHPMP will be adhered to during implementation of the remedy.	Requirements in the PA and the CHPMP will be adhered to. These requirements include implementation of mitigation measures identified in the PA and the CHPMP and through ongoing consultation activities with the Tribes that will avoid, mitigate, or otherwise minimize adverse effects from the undertaking. Tables 6.2-2 and 6.2-3 summarize actions by PG&E to implement the applicable provisions under the PA and the CHPMP.

TABLE 6.2-1
Summary of Compliance with Identified ARARs
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.[1]	Category[1]	Citation[1,2]	Determination[1,2]	Description in DOI's ARARs Table[1,2]	Triggering Event	Compliance Responsibility	Which existing/ future document(s) will document continued compliance with this ARAR?[4]	Action (Compliance Status)		
								Preliminary (30%) Design	Intermediate (60%) Design	Pre-Final (90%) Design
63	California Location-Specific	Seismic and Floodplain standards -Title 22, CCR, Div 4.5, Ch 14, Article 2, §66264.18	ARAR Relevant and Appropriate	These standards are relevant and appropriate for TSD facilities constructed, operated, or maintained within certain distances of fault lines, floodplains, or the maximum high tide.	Infrastructure in 100-year floodplain/ regulatory floodway	PG&E	Design submittals, Construction/ Remedial Action Work Plan	The groundwater remedial facilities are not a permitted RCRA treatment, storage or disposal facility. Seismic load design criteria and geotechnical design criteria are described in Appendix C. The 100-year floodplain is defined in the Flood Insurance Rate Map (FIRM), Panel 5705 of 9400 for San Bernardino County, California and Unincorporated Areas, Revised August 28, 2008. The base flood elevation shown on the current FIRM is 464 at River Mile (RM) 234 of the Colorado River. The effective Flood Insurance Study (FIS) for San Bernardino County lists a regulatory base flood elevation of 463.90. This design uses the more conservative elevation of 464 as the base flood elevation. Wells and pipelines are included in the preliminary (30%) design in areas of the Colorado River floodplain necessary for capture and treatment of the chromium plume. The infrastructure in this preliminary (30%) design (wells, pipes) is mostly outside the 100-year floodplain, see Sheet C-2, well FP-EX-5.	The groundwater remedial facilities are not a permitted RCRA treatment, storage or disposal facility. Seismic load design criteria and geotechnical design criteria are described in Appendix C of the BOD report for the 60% design. The 100-year floodplain is defined in the FIRM, Panel 5705 of 9400 for San Bernardino County, California and Unincorporated Areas, Revised August 28, 2008. The base flood elevation shown on the current FIRM is 464 at RM 234 of the Colorado River. The effective FIS for San Bernardino County lists a regulatory base flood elevation of 463.90 feet. The vertical datum for all flood elevations shown on the San Bernardino County FIRM is NAVD88.This design uses the more conservative elevation of 464 feet as the base flood elevation. In this 60% design, certain infrastructure (piping) cannot be located outside of 100-year floodplain as defined by the above baseline flood elevation. PG&E will work with San Bernardino County and Mohave County Flood Administrator to ensure compliance with the county requirements for construction in the floodplain.	The groundwater remedial facilities are not a permitted RCRA treatment, storage or disposal facility. Seismic load design criteria and geotechnical design criteria are described in Appendix C of the BOD report for the 90% design. The 100-year floodplain is defined in the FIRM, Panel 5705 of 9400 for San Bernardino County, California and Unincorporated Areas, Revised August 28, 2008. The base flood elevation shown on the current FIRM is 464 at RM 234 of the Colorado River. The effective FIS for San Bernardino County lists a regulatory base flood elevation of 463.90 feet. The vertical datum for all flood elevations shown on the San Bernardino County FIRM is NAVD88.This design uses the more conservative elevation of 464 feet as the base flood elevation. In the 90% design, certain infrastructure (piping) cannot be located outside of 100-year floodplain as defined by the above baseline flood elevation. PG&E has worked with Mohave County Flood Administrator to ensure compliance with the county requirements for construction in the floodplain.

Notes:
[1] Source: Table 2 of the Groundwater Record of Decision, Pacific Gas and Electric Company Topock Compressor Station, Needles, San Bernardino County, California, December 2010 (DOI 2010).
[2] As corrected by the Department of the Interior.
[3] The "action" notation in Location-specific ARARs #5 and 7 refers to the DOI Record of Decision (DOI 2010), surnamed by the Bureaus (BLM, BOR, USFWS) and Bureau of Indian Affairs.
[4] The intent of this column is to identify what current or future document(s) are intended to satisfy this measure and be transparent on future forthcoming documentation. This column is not intended to document compliance with the ARARs.

TABLE 6.2-1A

Information for the Havasu National Wildlife Refuge's Appropriate Use Analysis and Compatibility Determination (AUA/CD)

Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Items listed in DOI's October 23, 2008 letter *"PG&E Topock Compressor Station Remediation Site – Evaluation of Attainment of Fish and Wildlife Service Location-Specific ARARs for the Proposed Remedial Alternatives"*	**Action (90% Design Compliance Status)**
What the proposed actions/facilities are – including specifics (such as how many wells, the spacing of wells, detailed sizes/lengths of facilities, etc.)	The 90% design was submitted to DOI on September 8, 2014. Section ES. 3 and Table ES-1 (Summary of Engineering Design Parameters and Key features) of the 90% BOD report provide an executive summary and high level description of the remedy features (wells, pipelines, supporting systems and utilities, structures/buildings, access roads, etc.) including references to specific report figures that show the locations of these features. Detailed descriptions of the remedy features are provided throughout the BOD report, specifically: • Section 3.2 describes the in-situ remediation system and its configuration including the IRZ wells, the River Bank Extraction Wells, the Inner Recirculation Loop wells, the TCS Recirculation Loop wells, the Freshwater Injection Wells, and the associated pipeline alignment. • Section 3.3 describes the source of freshwater, the contingent arsenic treatment system, and freshwater piping conveyance including storage. • Section 3.4 describes the remedy-produced water management system. • Section 3.5 describes the utilities and other supporting facilities including power supply, SCADA, and structures/buildings to support the remedy. • Section 3.6 describes the monitoring network/wells. • Section 5 describes the ICs which are also required components of the remedy.
Where the use would be conducted – including specific areas of use, habitat types and acres, key wildlife species that occur there, proportion of refuge or habitat type involved, and other areas affected incidental to use – provide in site maps	Section 2.4 (Other Site Conditions Affecting Design) of the 90% BOD report describes the baseline site conditions that affect remedy design. Among the documented conditions related to ecological resources at the site are surface water quality, USACE/CDFW jurisdictional waters and wetlands, vegetation communities, special status plants, and special status wildlife, avian, and aquatic species. Select maps were provided in Section 2.4 that overlays the remedy features on surveyed ecological resources.
When the use would be conducted—including time of day and year; duration of use; and a timeline of implementing, performing/maintaining, and closing out the actions/facilities	An estimated project schedule is included in Exhibit 7.5-1 in Section 7.5. Exhibit 7.5-1 provides an estimated timeline for implementing the remedial action through remedy start-up and start of full remedy operations (anticipated June 2019). Consistent with the CMS/FS and Agencies Decision Documents (ROD, Statement of Basis), it is anticipated that this remedy could require 30 years of operations on refuge lands. Per the November 20, 2013 State Water Resources Control Board letter, monitoring on refuge land will be required in order to demonstrate that the water quality objective for arsenic in the receiving groundwater is met "within the earlier of (i) 20 years after achieving the remedial action objective for chromium or (ii) 20 years after ceasing injection of the water containing naturally occurring arsenic at concentrations above the water quality objective." After the remedial action is complete, the remedy facilities will be decommissioned. An updated project schedule will be included in the 90% design and the future Remedial Action Work Plan.
How the use would be conducted—including techniques and equipment used, the number of people involved, routine operation and maintenance procedures	O&M procedures are described in Volume 1 of the Draft O&M Manual (Appendix L of the 90% BOD Report). Details related to construction of the remedy are included in the Construction/Remedial Action Work Plan, submitted concurrently with the 90% design.
What would be the anticipated impacts—identifying and describing the impacts; citing available sources of information (plans, environmental assessments, narratives, research, state plans, field experience, consultation with others); distinguishing between long-term and short-term impacts; documenting direct, indirect, and cumulative impacts on refuge resources	Section 2.4 (Other Site Conditions Affecting Design) of the 90% BOD report describes the baseline site conditions that affect remedy design. Among the documented conditions related to ecological resources at the site are surface water and wetlands, vegetation communities, special status plants, and special status wildlife, avian, and aquatic species. PG&E, USFWS, and DOI coordinated on the Programmatic Biological Assessment (PBA) for the final groundwater remedy. The Final Groundwater Remedy PBA (CH2M HILL 2014k) was prepared to support informal consultations for actions to be conducted under the remedial action, including activities located on BLM and U.S. Fish and Wildlife Service administered lands. This ESA Section 7 consultation was concluded with receipt of USFWS concurrency letter on July 7, 2014 which preceded the approval of the Construction/Remedial Action Work Plan. Measures outlined in the PBA and associated USFWS determination will be implemented before and during construction activities. Biological completion reports will be submitted to USFWS documenting areas of impacts and monitoring of construction activities. Impact analyses for proposed construction and operation activities are described in the Final Groundwater Remedy PBA (CH2M HILL 2014k) for the action area, and also in the Habitat Restoration Plans for the HNWR lands (CH2M HILL 2014n) and for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014o) (these plans are included as appendices to the Construction/Remedial Action Work Plan). Impacts analysis are also described in the EIR Section 4.3.3.3 and include: BIO-1 – Potential Fill of Wetlands and Other Waters of the U.S. or removal of Riparian Habitat; BIO-2 – Direct Disturbance of and Loss of Habitat for Special-Status Birds and Desert Tortoise; and BIO-3 Fish Mortality, Interference with Spawning Habitat, and Other Adverse Effects. Of these, only BIO-1 and BIO-2 are related to the proposed activities. The certified EIR summarizes results from site-specific surveys that were conducted for Southwestern willow flycatcher, Mojave desert tortoise, Yuma clapper rail, and other avian species which were also identified during these surveys. Implementation of the EIR mitigation measures would reduce all of these impacts to a less-than-significant level. Subsequent studies have been conducted to document the type and extent of jurisdictional wetlands and waters of the U.S. (Wetland Delineation Report, Aug 2013); as well as the type and location of rare and protected plants (Floristic Survey Report, Aug 2013) and culturally significant plants (Ethnobotany Survey Report, Aug 2013). Additional survey for lycium and arrowweed was conducted in response to comment #311 DOI-140. Potential impacts to sensitive resources during remedy implementation will be documented as required by the EIR. Additionally, applicable cultural resource mitigation measures included in the Programmatic Agreement (PA) (BLM 2010), Cultural and Historic Properties Management Plan (CHPMP), Cultural Impact Mitigation Program (CIMP), and the EIR Section 4.4 are being and will continue to be implemented to avoid, minimize, or mitigate adverse effects to cultural and historic properties on refuge land.
What mitigation is planned for loss of functional value of refuge while use is in operation	The Construction/Remedial Action Work Plan includes a Habitat Restoration Plan in compliance with the CD, Appendix C (Scope of Work), Article 3. This plan has been prepared to provide information requested by the HNWR for its Appropriate Use Analysis and Compatibility Determination (AUA/CD) regarding planned mitigation for potential loss of functional value of refuge while use is in operation.

TABLE 6.2-1A

Information for the Havasu National Wildlife Refuge's Appropriate Use Analysis and Compatibility Determination (AUA/CD)

Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Items listed in DOI's October 23, 2008 letter *"PG&E Topock Compressor Station Remediation Site – Evaluation of Attainment of Fish and Wildlife Service Location-Specific ARARs for the Proposed Remedial Alternatives"*	**Action (90% Design Compliance Status)**
How and when the actions/facilities would be closed out—including restoration plans	In addition to the Habitat Restoration Plan described above, a Plan for Decommissioning of Remedy Facilities and Restoration will include procedures for the removal and decommissioning of the groundwater remedy. The Plan will also incorporate planning/approaches for post-remedy restoration (including, but not limited, to a series of photo points). This future Plan will be submitted to DOI within 120 days of DOI's certification of completion of the remedial action and a determination by DOI that removal of such facilities is protective of human health and the environment. In addition to the plans mentioned above, three other restoration plans also pertain to HNWR lands including the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (CH2M HILL 2014o), the Aesthetics and Visual Resources Protection and Revegetation Plan (CH2M HILL 2014l), and the Mitigation and Monitoring Plan for Culturally Significant Plants (CH2M HILL 2014p).
What contingency plans will be in place—identifying actions that will be taken should an accident, unintended discharge, etc. occur.	Contingency Plans are described in Volume 3 of the O&M Manual of the 90% BOD report. Additional details on Contingency Plans for the Remedy Construction are included in the Construction/Remedial Action Work Plan.

Summary of Compliance with Applicable PA Stipulations, CHPMP

(On CD-ROM only)

TABLE 6.2-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in PA Document	Relevant Excerpt from Document	Triggering Event	Action (Compliance Status)	
				Intermediate (60%) Design	Pre-Final (90%) Design
1	Stipulation I(A)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to select and implement, or cause to be implemented, an alternative or combination of alternatives to remediate the groundwater and soil contamination in a manner that fulfills the requirements of CERCLA and the CERCLA Records of Decision (RODs) and protects the Colorado River, human populations, and the natural environment to the maximum extent practicable.	Implementation of Selected Groundwater Remedy	PG&E is implementing the groundwater remedy selected by DOI and DTSC.	PG&E is implementing the groundwater remedy selected by DOI and DTSC.
2	Stipulation I(B)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to Subject to I(A) above, carry out, and require others under their jurisdiction to carry out, all investigative, testing and remediation activities, including all supporting operations and maintenance activities, in ways that avoid, minimize, or mitigate adverse effects to cultural and historic properties within the APE, to the maximum extent practicable.	Implementation of Selected Groundwater Remedy	PG&E remediation resources specialist (Glenn Caruso) participated in field reviews of planned remedial facilities with the design team on April 23-24 and June 20, 2012. The purpose of these field reviews along with the ongoing in office reviews is to ensure that the footprints of planned facilities are designed in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible.	PG&E Cultural Resources Expert (Glenn Caruso) participated in field reviews of planned remedial facilities with the design team on April 7-10, 2014. The purpose of these field reviews along with the ongoing in office reviews is to ensure that the footprints of planned facilities are designed in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible.
3	Stipulation I(C)	The BLM, USFWS, USBR and PG&E shall consult with the Tribes that attach cultural significance to the TCP within the APE to develop a plan to ensure Tribal access to areas within the APE for religious, cultural, or spiritual purposes. Access shall be consistent with applicable laws, regulations and agreements governing property within the APE and may not impede the Topock Remediation Project, may not create health and safety concerns, and shall exclude the Topock Compressor Station and related facilities.	Development of Access Plan (Tribal Access)	The Tribal Access Plan for lands under federal management was completed on November 26, 2011. PG&E has initiated work on an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan, for submittal with the final design (target 2013).	The Tribal Access Plan for lands under federal management was completed on November 26, 2011. PG&E has prepared an Access Plan in coordination with Tribes, for the lands not under federal management, taking into consideration the information in the BLM Access Plan. The Access Plan is included in an appendix of the Construction/Remedial Action Work Plan and submitted on September 8, 2014.
4	Stipulation I(D)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to ensure that PG&E shall to the extent practicable restore the areas affected by the Topock Remediation Project within the APE, including, but not limited to, the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation and remediation related appurtenances and facilities.	Planning for Restoration	The plan for the decommissioning and removal of the IM-3 Facility and Site Restoration will be included as an appendix to the CIMP, which will be submitted with the 90% Design.	The plan for the decommissioning and removal of the IM-3 Facility and Site Restoration was prepared and submitted as Appendix B of the CIMP and also as an appendix of the Construction/Remedial Action Work Plan. Section 8 of the Plan includes restoration guidelines (steps to be followed during restoration), elements of the restoration of habitat and revegetation and demobilization, and a draft annotated outline of a future more detailed, site specific IM-3 Restoration Plan. In coordination with the FMIT and other Tribes, PG&E has developed a schedule for developing the more detailed Restoration Plan. PG&E anticipates that some details of the restoration plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration.
4	Stipulation I(E)	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to consult with other Signatories, Tribes and Invited Signatories, following the guidelines in Appendix B of this PA, regarding actions proposed in this Undertaking, including establishment of any rights of way, time critical or emergency actions.	Groundwater Remedy Design and Implementation	BLM has consulted and is continuing to consult with the Tribes regarding the design under the PA's Consultation Protocol.	BLM has consulted and is continuing to consult with the Tribes regarding the design under the PA's Consultation Protocol.

TABLE 6.2-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in PA Document	Relevant Excerpt from Document	Triggering Event	Action (Compliance Status)	
				Intermediate (60%) Design	Pre-Final (90%) Design
5	Stipulation II(B)	At each phase (work plan or design document) of implementation of the Undertaking, an evaluation will occur to determine if the APE should be amended. This evaluation will coincide with the development of the work plan or design document for the specific phase of the Undertaking. Where alternatives under consideration consist of corridors or large land areas, or where access to properties is restricted, the agency official may use a phased process to conduct identification and evaluation efforts (36 CFR §800.4(b)(2)). Prior to implementation of each phase (work plan or design document) of the Undertaking, BLM will determine, in consultation with the AZ SHPO, CA SHPO, Tribes, and PG&E, what, if any, changes are required in the APE. If BLM determines that the APE must be revised, BLM will redefine the APE taking the input from those parties into account. Should such revision to the APE be needed, BLM will amend the CHPMP to include any changes to the APE.	Groundwater Remedy Design and Implementation	BLM has consulted and is continuing to consult with the Tribes regarding the design under the PA's Consultation Protocol, including on the APE.	BLM has consulted and is continuing to consult with the Tribes regarding the design under the PA's Consultation Protocol, including on the APE.
6	Stipulation III(B)(1), III(B)(2)(a) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, existing monitoring wells and related facilities shall be used to the maximum extent practicable.	Implementation of Selected Groundwater Remedy	In the intermediate (60%) design, all existing monitoring wells have been incorporated into the monitoring well network for the remedy, thereby reducing the need for drilling new monitoring wells.	In the pre-final (90%) design, existing monitoring wells have been incorporated into the monitoring well network for the remedy, thereby reducing the need for drilling new monitoring wells.
7	Stipulation III(B)(2)(b) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, the need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the guidelines in Appendix B.	Implementation of Selected Groundwater Remedy	The 60% design presented planned facilities and activities for the implementation of the groundwater remedy. BLM has consulted and is continuing to consult with the Tribes regarding the design under the PA's Consultation Protocol.	The 90% design presents planned facilities and activities for the implementation of the groundwater remedy. The Construction/Remedial Action Work Plan includes procedures and protocols to be implemented and contingencies during remedy construction and start-up. The O&M Manual includes procedures for implementation and contingencies during operation and maintenance of the remedy. BLM has consulted and is continuing to consult with the Tribes regarding the design under the PA's Consultation Protocol, and will consult the Tribes on the Construction/Remedial Action Work Plan and O&M Manual.
8	Stipulation III(B)(2)(c) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, that new facilities or activities be placed in areas already disturbed by previous grading or other mechanized activities to the maximum extent practicable, consistent with protecting human health and the environment and achieving cleanup in a timely manner.	Implementation of Selected Groundwater Remedy	The design has been and is carried out in a manner that gives: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, such as but not limited to wells and pipelines, but not including IM-3 facilities. A disturbed area map was prepared in compliance with an EIR mitigation measure (CUL-1a-9), to facilitate placement of infrastructure; a current version of the map is included in Appendix A2 of the 60% Basis of Design (BOD) Report. In addition, in compliance with the directive to give priority to re-use of existing physical improvements and to previously disturbed areas for new physical improvements, the intermediate (60%) design proposes the following: • All existing monitoring wells have been incorporated into the monitoring well network for the remedy, thereby reducing the need for drilling new monitoring wells. • The freshwater supply for the remedy will be the existing HNWR-1 well.	The design has been and is carried out in a manner that gives: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, such as but not limited to wells and pipelines, but not including IM-3 facilities. A disturbed area map was prepared in compliance with an EIR mitigation measure (CUL-1a-9), to facilitate placement of infrastructure; an updated version of the map is included in Appendix A2 of the 90% Basis of Design (BOD) Report. In addition, in compliance with the directive to give priority to re-use of existing physical improvements and to previously disturbed areas for new physical improvements, the pre-final (90%) design proposes the following: • All existing monitoring wells have been incorporated into the monitoring well network for the remedy, thereby reducing the need for drilling new monitoring wells. • The piping corridor is located almost entirely in existing roadways, right of ways and previously disturbed areas.

TABLE 6.2-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in PA Document	Relevant Excerpt from Document	Triggering Event	Action (Compliance Status)	
				Intermediate (60%) Design	Pre-Final (90%) Design
				• The freshwater supply storage will be the existing water storage tanks at the Compressor Station. • The remedy-produced water treatment plant and freshwater pre-injection treatment system will be located entirely within the footprint of Compressor Station. • The central maintenance facility for the remedy will be located entirely on PG&E property, at the Transwestern Bench. By centralizing maintenance functions into one location, this reduces the footprint of remedy structure outside of PG&E property.	• Most of the existing access roads have been incorporated into the 90% design. • The remedy-produced water conditioning plant and the contingent systems (arsenic treatment and dissolved metals removal) are located entirely within the footprint of the Compressor Station. • The operation building and carbon storage/amendment facilities are located on the existing Transwestern Bench and MW-20 Bench. • All of the proposed soil storage and construction staging areas are located on previously disturbed areas. • The main construction headquarters and staging area is located on previously disturbed areas at Moabi Regional Park.
9	Stipulation III(B)(2)(e) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, the performance of all field activities in support of the remedy shall be executed in such a way as to avoid and/or minimize adverse effects to cultural and historic properties to the maximum extent practicable.	Implementation of Field Activities in Support of the Groundwater Remedy	The planning of field activities is executed under the guidance of PG&E remediation resources specialist (Glenn Caruso). The implementation of field activities is performed in accordance with approved work plans and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities.	The planning of field activities is executed under the guidance of PG&E Cultural Resources Expert (Glenn Caruso). The implementation of field activities is performed in accordance with approved work plans and under the monitoring of Archaeological Monitor(s). Tribal Monitors are invited to observe ground-disturbing field activities.
10	Stipulation III(B)(2)(f) - Remediation of GW contamination	Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, subject to Stipulation I(A), direct, indirect and cumulative adverse effects shall be considered and mitigated.	Implementation of Selected Groundwater Remedy	Adverse effects are being considered and mitigated through the implementation of the measures included in the PA, the CHPMP and the EIR.	Adverse effects are being considered and mitigated through the implementation of the measures included in the PA, the CHPMP and the EIR.
11	Stipulation III(B)(3)(a) - Remediation of GW contamination – Final Design	Consultation between the Signatories, Tribes and Invited Signatories shall be initiated prior to final design and implementation of that alternative.	Design and Implementation of Selected Groundwater Remedy	BLM has consulted and is continuing to consult with the Tribes regarding the design under the PA's Consultation Protocol.	BLM has consulted and is continuing to consult with the Tribes regarding the design under the PA's Consultation Protocol.
12	Stipulation III(B)(3)(b) - Remediation of GW contamination – Final Design	Every effort should be made to avoid and minimize adverse effects in accordance with the general principles set forth in Stipulation I.	Implementation of Selected Groundwater Remedy	PG&E remediation resources specialist (Glenn Caruso) participated in field reviews of planned remedial facilities with the design team on April 23-24 and June 20, 2012. The purpose of these field reviews along with the ongoing in office reviews is to ensure that the footprints of planned facilities are designed in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible.	PG&E Cultural Resources Expert (Glenn Caruso) participated in field reviews of planned remedial facilities with the design team on April 7-10, 2014. The purpose of these field reviews along with the ongoing in office reviews is to ensure that the footprints of planned facilities are designed in ways to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible.
13	Stipulation III(B)(3)(c) - Remediation of GW contamination	Whatever the selected alternative, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the design, implementation, and monitoring activities to determine how best to restore the areas affected by the Topock Remediation Project. These areas will include, but not be limited to, the site of the existing treatment plant and related facilities but will exclude the Topock Compressor Station and related facilities. The Federal Agencies will ensure that environmental restoration to the conditions existing prior to the construction of the Project, is planned and conducted to the extent practicable.	Implementation of Selected Groundwater Remedy	The plan for the decommissioning and removal of the IM-3 Facility and Site Restoration will be included as an appendix to the CIMP, which will be submitted with the 90% Design. Additionally, a Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning, and BLM will consult the Tribes on this Plan.	The plan for the decommissioning and removal of the IM-3 Facility and Site Restoration was prepared and submitted in Appendix B of the CIMP and also as an appendix of the Construction/Remedial Action Work Plan. A site-specific Plan for Decommissioning and Restoration of remedy facilities will be submitted in the future (within 120 days of DOI's certification of remedial action completion and a determination by DOI that removal of such facilities is protective of human health and the environment), prior to decommissioning, and BLM will consult the Tribes on this Plan.

TABLE 6.2-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in PA Document	Relevant Excerpt from Document	Triggering Event	Action (Compliance Status)	
				Intermediate (60%) Design	Pre-Final (90%) Design
14	Stipulation V(A)	All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. All such removal will be planned in consultation with the Signatories, Tribes, and Invited Signatories, following the guidelines in Appendix B [Consultation Protocol).	Planning for decommissioning	This stipulation will be adhered to in planning for the decommissioning of remedy facilities. Additionally, a Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning, and BLM will consult the Tribes on this Plan.	This stipulation will be adhered to in planning for the decommissioning of remedy facilities. A site-specific Plan for Decommissioning and Restoration of remedy facilities will be submitted in the future (within 120 days of DOI's certification of remedial action completion and a determination by DOI that removal of such facilities is protective of human health and the environment), prior to decommissioning, and BLM will consult the Tribes on this Plan.
15	Stipulation V(B)	The removal of such facilities shall be monitored following the monitoring guidelines in Appendix C.	Planning for decommissioning	This stipulation will be adhered to in planning for the decommissioning of remedy facilities.	This stipulation will be adhered to in planning for the decommissioning of remedy facilities.
16	Stipulation V(C)	The removal of such facilities shall take place along existing graded roads to the maximum extent practicable.	Planning for decommissioning	This stipulation will be adhered to in planning for the decommissioning of remedy facilities.	This stipulation will be adhered to in planning for the decommissioning of remedy facilities.
17	Stipulation V(D)	Prior to decommissioning of any remediation facility, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the development of the closure plan to determine how to best restore the areas affected by the Topock Remediation Project, including but not limited to, the site of the existing treatment plant and related facilities, but excluding the Topock Compressor Station and related facilities, to ensure that environmental restoration of conditions existing prior to the construction of the Project, is achieved to the extent practicable.	Planning for decommissioning	This stipulation will be adhered to in planning for the decommissioning of remedy facilities. The Closure Plan for Decommissioning of Remedy Facilities and Restoration will be submitted in the future, prior to decommissioning, and BLM will consult the Tribes on this Plan.	This stipulation will be adhered to in planning for the decommissioning of remedy facilities. A site-specific Plan for Decommissioning and Restoration of remedy facilities will be submitted in the future (within 120 days of DOI's certification of remedial action completion and a determination by DOI that removal of such facilities is protective of human health and the environment), prior to decommissioning, and BLM will consult the Tribes on this Plan.
18	Stipulation V(E)	PG&E will draft a plan for decommissioning, removal and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes and Invited Signatories.	Groundwater Remedy Design	This stipulation will be adhered to during design. The plan for the decommissioning and removal of the IM-3 Facility and Site Restoration will be included as an appendix to the CIMP, which will be submitted with the 90% Design. The Plan will be drafted in consultation with all Signatories, Tribes and Invited Signatories.	PG&E has developed the plan for the decommissioning and removal of the IM-3 Facility and Site Restoration, in consultation with the Tribes. The Plan is submitted in Appendix B of the CIMP and also as an appendix of the Construction/Remedial Action Work Plan.

TABLE 6.2-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in PA Document	Relevant Excerpt from Document	Triggering Event	Action (Compliance Status)	
				Intermediate (60%) Design	Pre-Final (90%) Design
19	Stipulation IX(A)-(D)	A. If the Undertaking affects a previously unidentified cultural and/or historic resource, including human remains and/or associated funerary objects or graves, or affect such resources in a way not previously anticipated, or have greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the BLM, in consultation with Tribal and Archaeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger areas if warranted by specific circumstances) in which no further work is to take place until treatment of the discovery is resolved. At such point BLM will notify all Signatories, Tribes, and Invited Signatories of the nature and general location of the discovery. The BLM will implement appropriate measures, including stabilization or covering, to protect any discovery (human remains, funerary objects, sacred objects, or objects of cultural patrimony) from further disturbance in accordance with the principles set forth in Stipulation I. Ongoing work not within 50 meters (or a smaller area if determined appropriate by parties in the field) of the discovery may continue. If human remains and/or associated funerary objects compose all or part of the discovery, then BLM shall ensure the stipulations of the POA included in the CHPMP, as described in Stipulation VII (H) hereof, will be completed. Also, if human remains and/or funerary objects are encountered, all activities shall follow the procedures and direction provided in NAGPRA and California Public Resources Code sections 5097.98 and 5097.991. For Arizona, such activities shall follow the procedures and direction provided in NAGPRA and applicable state laws, including the Arizona Antiquities Act of 1927 (ARS § 41-841 to 41-846), Burial Protection Law of 1990 (ARS §41-865), and ARS §41-844 of 1990.	Field Implementation of Selected Groundwater Remedy	This stipulation will be adhered to during the field implementation of the Construction/Remedial Action Plan. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.	This stipulation will be adhered to during the field implementation of the Construction/Remedial Action Plan and during the operation and maintenance of the remedy. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.

TABLE 6.2-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
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Item No.	Reference Location in PA Document	Relevant Excerpt from Document	Triggering Event	Action (Compliance Status)	
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20	Stipulation IX(A)-(D) (continued)	B. If the Tribes, PG&E, and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E, and BLM will use their best efforts to resolve treatment as quickly as possible. C. If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. D. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will utilize the dispute resolution process in Stipulation XV of this PA to resolve any objection.	Field Implementation of Selected Groundwater Remedy	This stipulation will be adhered to during the field implementation of the selected groundwater remedy.	This stipulation will be adhered to during the field implementation of the selected groundwater remedy.
21	Appendix C Monitoring Protocol	Cultural sensitivity training will be required of all staff, workers and contractors engaged in activities in the Topock Remediation Project APE to familiarize them with the sacred nature of the areas so that they will perform their job in a respectful manner. This training will also be given to new personnel before they are allowed to do fieldwork within the APE. This training will be conducted by PG&E with participation by Tribes and Tribal Monitors, Archaeological Monitors, Federal Agency staff, and PG&E supervising staff, as appropriate. Consistent with PG&E's stated policy, PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers or contractors who do not comply with this section.	Implementation of Selected Groundwater Remedy	Site orientation and the training on cultural/historical resources sensitivity will be provided at the project initiation meeting, to be held at the Topock Compressor Station. Site orientation will stress that all site activities will be conducted in a respectful manner. Sensitivity training will be provided by PG&E Site Operations Manager, PG&E Remediation Resources Specialist, and PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate. In addition, PG&E and Tribes are collaborating on a similar measure under the CIMP, and to produce a training/education manual to educate workers. This CIMP measure was discussed with interested Tribes at the monthly meeting on April 26, 2012, August 23, 2012 and September 19, 2012.	Site orientation and the training on cultural/historical resources sensitivity will be provided at the project initiation meeting, to be held at the Topock Compressor Station. Site orientation will stress that all site activities will be conducted in a respectful manner. Sensitivity training will be provided by PG&E's Site Operations Manager, and PG&E Cultural Resources Expert. PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate.
22	Appendix C Monitoring Protocol	Prior to execution of the PA for the Undertaking, PG&E sometimes invited the Tribes to be present on site during construction to monitor and observe non-maintenance grading, trenching, or other excavation for any facilities, new roads, or other project components related to the Undertaking which may have had the potential to adversely impact cultural and historic resources. The Tribal and Archaeological Monitors shall both be invited to monitor such field work.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project.	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. In addition, a similar measure under the CIMP (CUL-1a-8l) will also be adhered to during field implementation. The CIMP is included in an appendix of the Construction/Remedial Action Work Plan.

TABLE 6.2-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in PA Document	Relevant Excerpt from Document	Triggering Event	Action (Compliance Status)	
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23	Appendix C Monitoring Protocol	This Protocol specifies ways in which the Tribes, BLM, and PG&E may ensure that: 1. Tribes, BLM, and PG&E, each are kept well informed of Undertaking activities and outcomes; 2. Tribal and Archaeological Monitors have the opportunity to alert PG&E's site supervisor (or designee) to potentially sensitive areas or issues that Monitors may be aware of or may become aware of while fieldwork is in progress; 3. PG&E's site supervisor (or designee) notifies BLM of potentially complicated situations. These situations may include discovery of a new cultural or historical resource, damage to a previously recorded cultural or historical resource, or unanticipated effects identified; 4. Tribal concerns regarding work activities are addressed while fieldwork is in progress.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered. In addition, a similar measure under the CIMP (CUL-1a-8l) will also be adhered to during field implementation. The CIMP is included in an appendix of the Construction/Remedial Action Work Plan.
24	Appendix C Monitoring Protocol (Work Schedule)	Tribal and Archaeological Monitors will be provided with anticipated schedules for Topock Remediation Project work that requires monitoring as early as possible but at least three (3) business days in advance of the initiation of the identified project work, whenever possible. Recognizing that changes to the work schedule may be inevitable, any change in the work schedule will be provided to the Tribal and Archaeological Monitors as soon as possible after the change becomes part of the work schedule. If there is a question regarding need for a monitor, the questioning party shall consult the BLM Project or Field Manager who will make the final determination of need.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. The PG&E Site Operations Manager or his designee will provide the work schedule and inform the monitors of schedule changes as soon as practicable.	This stipulation will be adhered to during field implementation. The PG&E Site Operations Manager or his designee will provide the work schedule and inform the monitors of schedule changes as soon as practicable. In addition, a similar measure under the CIMP (CUL-1a-8j) will also be adhered to during field implementation. The CIMP is included in an appendix of the Construction/Remedial Action Work Plan.
25	Appendix C Monitoring Protocol (Discoveries)	If the Undertaking will affect previously unidentified resources, or affect a previously recorded cultural or historical resource in a way not previously anticipated, or have greater or different effects than previously anticipated, all work having potential for adverse affect shall cease within a fifty (50)-meter radius (or a smaller or larger area if determined appropriate by the BLM, the Monitors, and PG&E in the field) of the point of discovery. The Archaeological and Tribal Monitors will work with BLM and PG&E to ensure that the PA requirements of Stipulation VII (CHPMP) and Stipulation IX (Discoveries) are met.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.
26	Appendix C Monitoring Protocol (Human Remains)	If the Undertaking affects previously unidentified human remains and/or associated funerary objects or graves, or affects such resources in a way not previously anticipated, or has greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the BLM, in consultation with Tribal and Archeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger area if warranted) in which no further work is to take place until treatment of the discovery is resolved.	Implementation of Field Activities	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor ground-disturbing field activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.

TABLE 6.2-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in PA Document	Relevant Excerpt from Document	Triggering Event	Action (Compliance Status)	
				Intermediate (60%) Design	Pre-Final (90%) Design
27	Appendix C Monitoring Protocol (Safety)	Tribal and Archeological Monitors will be required to meet with PG&E's site supervisor prior to initiating monitoring activity and will be required to obtain any applicable training required under 29 CFR 1910.120 and 40 CFR 300.150. The PG&E site supervisor will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors are invited to attend the safety meetings at the start of each workday or new work task. If the Monitors do not attend this meeting, they will be instructed about the safety concerns of the day by a PG&E representative. Tribal and Archaeological Monitors will be expected to wear all personal protective equipment specified by PG&E's site supervisor and required of other similarly situated field workers. Tribal and Archaeological Monitors will be expected to actively participate to enhance the safety of themselves and the other workers onsite by communicating with PG&E's site supervisor if any safety concerns are identified. Due to safety considerations at the Project site, Tribal and Archaeological Monitors will also be prohibited from conducting any monitoring within designated construction exclusion zones, unless otherwise authorized by PG&E. Such zones are to be clearly delineated to the Tribal and Archaeological Monitors by PG&E's site supervisor. In these situations, other efforts to provide alternative methods for accommodating Monitors including, but not limited to, high-powered binoculars, spotting scopes, or other vision enhancement tools or alternative viewing platforms will occur.	Implementation of Field Activities	During the project initiation meeting or at similar venues (as appropriate), the PG&E Site Operations Manager or his designee will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors will be invited to attend the safety meetings at the start of each work day or new work task. If they do not attend, they will be instructed of the safety concerns of the day by PG&E.	During the project initiation meeting or at similar venues (as appropriate), the PG&E Site Operations Manager or his designee will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors will be invited to attend the safety meetings at the start of each work day or new work task. If they do not attend, they will be instructed of the safety concerns of the day by PG&E.

TABLE 6.2-3
Summary of Compliance with Applicable Cultural and Historic Property Management Plan (CHPMP) Provisions
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in CHPMP Document	Relevant Excerpt from Document	Action (Compliance Status)	
			Intermediate (60%) Design	Pre-Final (90%) Design
1	Section 6.2	Measures and principles to avoid, minimize, or resolve adverse effects include the following: • Existing monitoring wells and related facilities shall be used to the maximum extent practicable. • The need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the Guidelines in Appendix B. • New facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with human health and the environment and achieving cleanup in a timely manner. • The performance of all field activities in support of the remedy shall be executed in such a way as to avoid and/or minimize adverse effects to cultural and historic properties to the maximum extent practicable. • Subject to Stipulation I(A) above, direct, indirect and cumulative impacts shall be considered and mitigated.	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c), (e) and (f) in Table 6.2-2.	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c), (e) and (f) in Table 6.2-2
2	Section 6.2.3	Refers to the requirement in the PA Stipulation V(E) and PG&E's 2006 Settlement Agreement with the Fort Mojave Indian Tribe that a plan will be prepared for the decommissioning, removal and restoration of the IM-3 facility prior to implementation of the groundwater remedy, in consultation with all Signatories, Tribes and Invited Signatories. Additionally, PG&E will remove all other remediation facilities and appurtenances related to the Topock Remediation Project as soon as practicable following the attainment of cleanup standards and a determination by DOI that the removal of these facilities is protective of human health and the environment.	See responses to PA Stipulations V(A)-(E) in Table 6.2-2.	See responses to PA Stipulations V(A)-(E) in Table 6.2-2.
3	Section 6.3	"Environmental Restoration" refers to the restoration obligations in the Programmatic Agreement and the Consent Decree, including that PG&E draft a plan for decommissioning, removal, and restoration of the IM-3 facility and a Remedy Decommissioning Plan that will address post-remedy restoration of the site.	See responses to PA Stipulations I(D), III(B)(3)(c), and V(D)-(E) in Table 6.2-2.	See responses to PA Stipulations I(D), III(B)(3)(c), and V(D)-(E) in Table 6.2-2.
4	Section 6.6.3	"Avoidance Measures/Management Thresholds" provides that: "The primary means for achieving avoidance will be through careful planning and placement of project facilities and installation of temporary barrier fences around significant cultural and historic properties. Metal fence posts and orange mesh all-weather fabric will be used, unless other appropriate materials are identified as preferable, for temporary fencing and will be regularly inspected and maintained. Permanent post-and double cable fencing may be required in high traffic areas. An archaeologist and/or Tribal representative(s) will clearly delineate the sensitive areas to be avoided by construction and supervise fence installation. Project personnel will be notified that fenced locations are to be completely avoided."	See responses EIR MMRP CUL-1a in Table 6.1-1. PG&E remediation resources specialist (Glenn Caruso) participated in field reviews of planned remedial facilities with the design team on April 23-24 and June 20, 2012. The purpose of these field reviews along with in office reviews is to ensure that the footprints of planned facilities are designed, in ways that avoid, minimize, and mitigate significant adverse effects to historically significant cultural and historic resources.	See responses to EIR MMRP CUL-1a in Table 6.1-1. PG&E's steps to prevent and reduce inadvertent damage are outlined in the CIMP Protocol for CUL-1a-8n: Protocols for protective measures for archaeological/historical sites during construction (Section 2.14 of the CIMP). In this protocol, PG&E outlines pre-construction measures to be taken to identify sites requiring protection, pre-construction identification of protective measures, and procedures for installation and removal of the protective measures, and restoration of the area to pre-construction conditions. Further, under the CHPMP requirements at Section 6.6.5 Periodic Site Monitoring, PG&E has proposed a monitoring and condition assessment program in the 2013 monitoring report (AE 2014) and submitted for DTSC review.
5	Section 6.6.4	Construction Monitoring Monitoring of all earth-disturbing Project activities will be in accordance with Appendix C of the PA (Tribal and Archaeological Monitoring Protocol). Qualified archaeological and Tribal monitors will be notified in advance and invited to be on site during earth-disturbing construction activities (grading, trenching, boring, drilling, or other excavation) for new injection, extraction or monitoring wells, new pipelines, new treatment facilities, new access roads, new staging areas, other new transportation facilities, or other new Project components. Due to safety considerations at the Project site, Tribal and archaeological monitors will comply with all safety requirements.	See responses to PA Appendix C, Monitoring Protocol in Table 6.2-2. See also EIR MMRP CUL-1a-8(l).	See responses to PA Appendix C, Monitoring Protocol in Table 6.2-2. See also EIR MMRP CUL-1a-8(l).

TABLE 6.2-3
Summary of Compliance with Applicable Cultural and Historic Property Management Plan (CHPMP) Provisions
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in CHPMP Document	Relevant Excerpt from Document	Action (Compliance Status)	
			Intermediate (60%) Design	Pre-Final (90%) Design
6	Section 6.6.5	Periodic Site Monitoring Sound management of the archaeological and historical properties requires that any progressive degradation of sites be identified. Additionally, it is recognized that a mechanism is needed to identify any accidental damage that may occur. To accomplish these goals, PG&E will develop a proposal describing a program of periodic site monitoring and condition assessment. BLM, following consultation with the Tribes and other appropriate parties, will approve any monitoring program before implementation by PG&E. The program will include all historic properties within the APE. Any previously unknown properties that may be encountered during the Project also will be included in the monitoring program unless such properties are evaluated as ineligible. During its initial phase, periodic monitoring and condition assessment will consist of annual field visits to monitor site conditions and disturbances	As part of the 2004 Cultural Resources Management Plan, Applied Earthworks conducted quarterly monitoring the first year and since then (2005 – 2012) annual monitoring and condition assessment.	PG&E has proposed a monitoring and condition assessment program in the 2013 monitoring report (AE 2014) and submitted for DTSC review.
7	Section 6.8	"Protocols for Tribal and Archaeological Monitoring" states that monitoring for the Project will be performed in accordance with the PA's Appendix C (Tribal and Archaeological Monitoring Protocol).	See responses to PA Appendix C, Monitoring Protocol in Table 6.2-2. See also EIR MMRP CUL-1a-8(l).	See responses to PA Appendix C, Monitoring Protocol in Table 6.2-2. See also EIR MMRP CUL-1a-8(l).
8	Section 6.9	If the Undertaking extends beyond the APE, BLM will determine, in consultation with the PA Signatories, Tribes, and Invited Signatories, what (if any) changes are required in the APE. If BLM determines that the APE must be revised, BLM will redefine the APE, taking into account the advice of the other Consulting Parties. Should such revision to the APE be needed, BLM will amend the CHPMP to include any changes to the APE (BLM et al. 2010:8).	See response to PA Stipulation II(B) in Table 6.2-2.	See response to PA Stipulation II(B) in Table 6.2-2.
9	Section 7.1	1. Physical avoidance of the Topock Maze and associated prehistoric sites. 2. To the maximum extent practicable, PG&E will avoid all archaeological sites within the APE and protect all historic properties regardless of their NRHP status. The primary means for accomplishing avoidance will be through careful planning and placement of proposed access routes and drilling sites and by the installation of barrier fences around significant historic properties. A pre-project archaeological survey field verification will be conducted prior to any ground-disturbing activities. Consistent with other phases of work conducted at the Topock Remediation Project site, agency representatives and other stakeholders (including representatives of Native American Indian Tribes involved with the Project) will be invited to the site for a project initiation meeting to discuss various cultural sensitivities associated with the Project. 3. Ensure that PG&E shall, to the extent practicable, restore the areas affected by the Topock Remediation Project within the APE, including but not limited to the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation and remediation related appurtenances and facilities per PA Stipulation I.D. 4. Remediation activities that propose the removal or introduction of vegetation on public lands shall be undertaken after coordination with Tribes to assess if culturally significant native plant species are being impacted and if there could be potential visual impacts to the Topock TCP. 5. Existing monitoring wells and related facilities shall be used to the extent practicable per PA Stipulation III.B.2(a). 6. The need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the Guidelines in Appendix B and per PA Stipulation III.B.2(b). 7. New facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with human health and the environment and achieving cleanup in a timely manner per PA Stipulation III.B.2(c). 8. Clay deposits are an important resource identified by the Hualapai in their creation, and may be important as well to other Tribes. Accordingly, BLM, PG&E, and those Tribes that ascribe importance to clay deposits shall meet to identify the clay deposits that are considered a resource and develop a protocol to be followed if such clay deposits are encountered.	See responses to PA Stipulations I(B), I(D), III(B)(1), III(B)(2)(a)-(c) and (e), III(B)(3)(c), and V(D) in Table 6.2-2. See also EIR MMRPs CUL-1a-8(i), AES-1, and AES-2. Regarding Item 4, PG&E does not plan to remove or introduce vegetation on public lands in connection with the remedy; instead, only some trimming of vegetation may be required which will be focused on non-native species (e.g., tamarisk). The trimming of native species (e.g., palo verde and mesquite) will be avoided or minimized to the extent practicable. Regarding Item 8, BLM met with the Hualapai Tribe and PG&E in late 2012 and discussed the Clay Monitoring Protocol. The Hualapai representative indicated that the Hualapai would make the initial draft of this protocol and then send it out for BLM and PG&E to review.	See responses to PA Stipulations I(B), I(D), III(B)(1), III(B)(2)(a)-(c) and (e), III(B)(3)(c), and V(D) in Table 6.2-2. See also EIR MMRPs CUL-1a-8(i), AES-1, and AES-2. Regarding Item 4, PG&E will introduce only native plants grown from local seed sources. These plants will be of the same species as those removed. At this 90% design stage, removal of tamarisk and arrow weed will occur during pipeline construction on the historical floodplain. The remedy design has avoided native trees in this area where they have been observed; however, it is possible that individual palo verde or mesquite trees could occur within the tamarisk thickets that will be affected. Where possible during construction, native trees will be avoided even if this requires additional impacts (i.e., removal or trimming) on tamarisk and arrow weed. There will be locations where impacts to native trees cannot be avoided and those losses will be mitigated according to the nature of the impact and the approaches in the appropriate restoration plan for the HNWR refuge, riparian areas, mature plants, or culturally-significant plants. Mitigation for impacts could include transplantation of likely candidate (younger) trees or replacement planting in a designated restoration area. The northern aerial bridge crossing of Bat Cave Wash is one location where it is currently known that 3 palo verde trees will require removal in order to install the aerial pipe bridge. Regarding Item 8, BLM met with the Hualapai Tribe and PG&E in late 2012 and discussed the Clay Monitoring Protocol. The Hualapai representative indicated that the Hualapai would make the initial draft of this protocol and then send it out for BLM and PG&E to review.

TABLE 6.2-3
Summary of Compliance with Applicable Cultural and Historic Property Management Plan (CHPMP) Provisions
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in CHPMP Document	Relevant Excerpt from Document	Action (Compliance Status)	
			Intermediate (60%) Design	Pre-Final (90%) Design
10	Section 7.2	Accommodation of Tribal Activities and Ceremonies Involving the Topock Maze/TCP The BLM will continue to work with the Tribes to identify Tribal activities and ceremonies that are associated with the Topock TCP. When such activities and ceremonies are identified, BLM will consult with the Tribes and PG&E to develop treatment measures to accommodate them. Treatment measures may address scheduling of Undertaking work to accommodate ceremonial activities and to mitigate audible and visual impacts.	See response to EIR MMRP CUL-1a-8k in Table 6.1-1.	See response to EIR MMRP CUL-1a-8k in Table 6.1-1.
11	Section 7.3	Treatment of other cultural, historical, and archaeological properties within the APE "The only properties identified within the APE that are not contributing properties to the Topock TCP are the properties from the historic period (i.e., Route 66, the AT&SF Railroad Grade, and National Old Trails Road). None of these properties has been impacted, to date, by this Undertaking. These properties shall be avoided, to the extent practicable, in the implementation of the Undertaking. These properties are periodically monitored for condition assessment to assure that they are being protected."	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c) and (e) in Table 6.2-2.	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c) and (e) in Table 6.2-2.
12	Section 8.1	Discoveries - Steps to be taken if previously unrecorded properties are found	PG&E will follow the procedures specified in Appendix C of the CHPMP (Discovery Plan). See also response to PA Stipulation IX(A)-(D) in Table 6.2-2, and to EIR MMRP CUL-1a-8(b) and -8(o) in Table 6.1-1.	PG&E will follow the procedures specified in Appendix C of the CHPMP (Discovery Plan). See also responses to PA Stipulation IX(A)-(D) in Table 6.2-2, and to EIR MMRP CUL-1a-8(b) and -8(o) in Table 6.1-1.
13	Section 8.2	Discoveries - Treatment of any human remains, funerary objections, ceremonial objects and items of cultural patrimony	PG&E will follow the procedures specified in Appendix D of the CHPMP (Plan of Action). See also response to PA Stipulation IX(A)-(D) in Table 6.2-2, and to EIR MMRP CUL-1a-8(b) and -8(o) in Table 6.1-1.	PG&E will follow the procedures specified in Appendix D of the CHPMP (Plan of Action). See also responses to PA Stipulation IX(A)-(D) in Table 6.2-22.7-3, and to EIR MMRP CUL-1a-8(b) and -8(o) in Table 6.1-12.7-1.
14	Section 8.3	Consultation Procedures Related to Unanticipated Discoveries • The BLM will notify all Signatories of the PA, Tribes and Invited Signatories of the nature and general location of any discovery. If the Tribes, PG&E and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E and BLM will use their best efforts to resolve treatment as quickly as possible. • If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. • If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will utilize the dispute resolution process in Stipulation XV of the PA to resolve any objection.	See response to PA Stipulation IX(A)-(D) in Table 6.2-2. See also EIR MMRP CUL-1a-8(b) and -8(o) in Table 6.1-1.	See responses to PA Stipulation IX(A)-(D) in Table 6.2-2 and to EIR MMRP CUL-1a-8(b) and -8(o) in Table 6.1-1.

Appendix L
Soil Management Plan
(On CD-ROM only)

Operation and Maintenance Manual

Volume 4

Soil Management Plan

Pre-Final (90%) Design Submittal for the Final Groundwater Remedy PG&E Topock Compressor Station Needles, California

Prepared for

Pacific Gas & Electric Company

September 2014

CH2MHILL®

155 Grand Avenue
Suite 800
Oakland, CA 94612

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Acronyms and Abbreviations

AOC	Area of Concern
APE	Area of Potential Effects
ARAR	applicable or relevant and appropriate requirement
BLM	U.S. Bureau of Land Management
BMP	Best Management Practice
BOR	U.S. Bureau of Reclamation
CCR	California Code of Regulations
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHHSL	California Human Health Screening Level
DQO	Data Quality Objective
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DTSC	California Department of Toxic Substances Control
EIR	environmental impact report
FMIT	Fort Mojave Indian Tribe
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSP	Health and Safety Plan
IM-3	Interim Measure No. 3
LDR	Land Disposal Restriction
mg/kg	milligrams per kilogram
O&M	operation and maintenance
OEHHA	California Office of Environmental Health Hazard Assessment
OSHA	Occupational Health and Safety Administration
PAH	polycyclic aromatic hydrocarbon
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SMP	Soil Management Plan

STLC	soluble threshold limit concentration
SWMU	Solid Waste Management Unit
TC	toxicity characteristic
TCLP	toxicity characteristic leaching procedure
TTLC	total threshold limit concentration
UA	Undesignated Area
USEPA	United States Environmental Protection Agency
WET	Waste Extraction Test

SECTION 1

Introduction

Pacific Gas and Electric Company (PG&E) is implementing the selected groundwater remedy to address chromium contamination in groundwater at the Topock Compressor Station (Compressor Station) in San Bernardino County, Needles, California. In addition, after receipt of approval from the California Department of Toxic Substances Control (DTSC), with the U.S. Department of the Interior's (DOI's) concurrence, PG&E will decommission and remove the Interim Measure No. 3 (IM-3) Groundwater Extraction and Treatment System (referred to herein as the "IM-3 system"). The IM-3 Treatment Plant and MW-20 Bench Facility (a portion of which is part of the IM-3 system) areas have been identified as investigation areas (Areas of Concern [AOCs] 29 and AOC 30, respectively) in the concurrent Soil RCRA Facility Investigation/Remedial Investigation (RFI/RI) program.

The mitigation measure HAZ-2c set forth in the certified environmental impact report (EIR) (DTSC 2011) adopted by the DTSC for the groundwater remediation project requires that contaminated soil identified during ground disturbance activities be managed and disposed of in accordance with a project-specific Soil Management Plan (SMP) and Health and Safety Plan (HSP). If activities involve stockpiling of excavated hazardous soil, this would trigger the need for compliance with the California action-specific applicable or relevant and appropriate requirement (ARAR) #86: Waste piles for RCRA hazardous waste (22 CCR, Div 4.5, Ch. 14, Article 12) (DOI 2010), which is addressed in this SMP.

At the 90% design stage of the groundwater remediation project, proposed remedy infrastructure (excluding future provisional wells) is within 20 feet of or overlaps with eighteen Soil Investigation Areas that are undergoing investigations as part of the Soil RFI/RI (see Figure 1.0-1 located at the end of this section). As shown in Figure 1.0-1, the overlap between the groundwater remediation project and ongoing soil investigations (or areas within 20 feet of these investigation areas) occurs in the following areas:

- Soil Investigation Areas inside the Compressor Station:

  AOC 7 – Hazardous Materials Storage Area
  AOC 8 – Paint Locker
  AOC 13 – Unpaved Areas within the Compressor Station
  AOC 17 – Onsite Septic System
  AOC 18 – Combined Hazardous Waste Transference Pipelines
  AOC 22 – Unidentified Three-sided Structure
  AOC 33 – Potential Former Burn Area near AOC 17

- Soil Investigation Areas outside Compressor Station:

  AOC 1 – Area Around Former Percolation Bed
  AOC 4 - Debris Ravine
  AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
  AOC 10 – East Ravine
  AOC 11 – Topographic Low Areas
  AOC 12 – Fill Areas
  AOC 27 – MW-24 Bench
  AOC 28 – Pipeline Drip Legs
  AOC 30 – MW 20 Bench
  Perimeter Area outside of but adjacent to the Compressor Station fence line
  Storm Drain System

In compliance with the aforementioned EIR mitigation measure and action-specific ARAR, this SMP includes procedures and protocols for the management and disposal of potentially contaminated and contaminated soil displaced during drilling, construction, operation and maintenance (O&M) of the groundwater remedy, and the decommissioning and removal of the IM-3 system. Potentially contaminated and contaminated soil is expected to be limited to within and near the boundaries of the Soil RFI/RI Investigation Areas. This SMP is Volume 4 of the O&M Manual, which is Appendix L of the Basis of Design Report for the 90% design. The HSP for O&M activities is Volume 5 of the O&M Manual. The HSP for groundwater remedy construction activities was submitted as part of the Construction/Remedial Action Work Plan (CH2M HILL 2014b). Details of the decommissioning and removal of the IM-3 system are submitted as part of the IM-3 Decommissioning, Removal, and Restoration Work Plan.

Soil and material originating in or near Soil RFI/RI Investigation Areas (areas of known or suspected soil contamination) that is displaced as part of the groundwater remediation project shall be handled and managed in accordance with this SMP and the HSPs for construction and O&M activities. Displaced soil and material originating outside areas of known or suspected contamination will be pre-characterized prior to remedy construction to identify areas potentially impacted by nearby current and former roadways (polycyclic aromatic hydrocarbons [PAHs] and lead). Displaced soil from areas outside of known or suspected contamination areas that is impacted with PAHs and lead will be handled and managed in accordance with this SMP and the HSPs for construction and O&M activities. Uncontaminated soil will be reused as backfill into the same trench or excavation area, if practicable. Uncontaminated soil that cannot be immediately used as backfill may be reused in other areas within the Area of Potential Effects (APE), or stockpiled for future reuse within the APE. The stockpiled uncontaminated soil will be managed following the Construction and Operations Best Management Practices (BMPs) Plan for Soil Storage that is summarized in Section 3.1.2 of this SMP, the Construction/Remedial Action Work Plan (CH2M HILL 2014b), and the Groundwater Remedy O&M Storm Water Pollution Prevention Plan (also called the Industrial SWPPP) (Appendix E of Volume 1 of the O&M Manual).

In addition, handling and management of displaced soil and material from Soil RFI/RI Investigation Areas, and soil displaced as part of the decommissioning and removal of the IM-3 system shall be performed in accordance with this SMP and the IM-3 Decommissioning, Removal, and Restoration Work Plan. Soil generated from Soil RFI/RI work activities will follow the protocols for handling of soil specified in the Revised Final Soil RFI/RI Work Plan (CH2M HILL 2013).

1.1 Soil Management Plan Purpose and Objectives

The purpose and objectives of this SMP are as follows:

1. Ensure that soil is handled in a manner that complies with ARARs and the EIR mitigation measures.
2. Ensure that displaced soil from in and near Soil RFI/RI Investigation Areas that are generated during drilling, construction, decommissioning, removal, and O&M activities is handled in a manner that is protective of human health (including construction workers) and the environment within the framework of appropriate federal, state, and local requirements, and consistent with United States Environmental Protection Agency (USEPA) guidance.
3. Maximize onsite reuse of soil that was displaced during drilling, construction, decommissioning, removal, and O&M activities, following guidelines and protocols of the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E 2012).
4. Minimize offsite transportation and disposal of soil that was displaced during drilling, construction, decommissioning, removal, and O&M.
5. Collect data to help guide future decision-making regarding the disposition of displaced soil and material.

1.2 Site Description, Soil Investigation History, and Findings

The Compressor Station is located adjacent to the Colorado River in eastern San Bernardino County, California, approximately 12 miles southeast of Needles, California, south of Interstate 40 (I-40), in the north end of the Chemehuevi Mountains. The APE for the Topock site is contained within what the Fort Mojave Indian Tribe (FMIT)

and other Native American Tribes have identified as a larger area of traditional and cultural importance. The Tribes believe that the environmental, cultural, and spiritual resources may not be physically perceptible. DTSC has concluded within the January 2011 certified EIR that the 779.2-acre project site "appears to qualify as a historic resource under CEQA [California Environmental Quality Act] as an area that is significant in the social and cultural annals of California," and the U.S. Bureau of Land Management (BLM) also has determined that a traditional cultural property or property of traditional religious and cultural significance that is eligible for listing on the National Register of Historic Places exists in the area of the Topock project within the current APE, consisting of 1,600 acres of surface area and a section of the Colorado River (DTSC 2011).
In recognition of this, all remedial activities at the Compressor Station are planned in such a way as to minimize impact to this area. Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the EIR. In addition, mitigation measures will be implemented in accordance with the Programmatic Agreement (PA), the Cultural and Historic Properties Management Plan (CHPMP), and the Cultural Impact Mitigation Program (CIMP), and in consultation with the Tribes throughout the design process. The work will be conducted in a manner that recognizes and respects these resources and the spiritual values of the area.

Since 1996, there have been multiple phases of investigation at the Topock site to collect data to evaluate the nature and extent of contamination at the Solid Waste Management Units (SWMUs), AOCs, and Undesignated Areas (UAs). Results from the RFI/RI at the site are being documented in three volumes:

- **RFI/RI Volume 1**. The *Revised Final RCRA Facility Investigation and Remedial Investigation Report, Volume 1 – Site Background and History* (CH2M HILL 2007a) was completed in August 2007 and was approved by DTSC and DOI. Volume 1 of the RFI/RI identifies the 20 SWMUs, AOCs, and other UAs at the Topock Compressor Station to be carried forward in the Final RFI/RI. An Addendum to the RFI/RI Volume 1 (CH2M HILL 2014a) was submitted and approved in May 2014. This Addendum summarizes the history and available data for 15 new units identified since the completion of the RFI/RI Volume 1.
- **RFI/RI Volume 2.** The Revised *Final RCRA Facility Investigation/Remedial Investigation, Volume 2—Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigation Report* (CH2M HILL 2009a) was completed in February 2009 and approved by DTSC and DOI. Volume 2 of the RFI/RI contains the hydrogeologic characterization and results of groundwater and surface water investigations to address historical releases to groundwater from wastewater discharged at Bat Cave Wash and injection well PGE-8 at the Topock Compressor Station. The purpose of the Volume 2 RFI/RI is to complete the RFI/RI requirements for groundwater impacts associated with the past discharge of wastewater from Bat Cave Wash (SMWU 1/ AOC 1) and injection well PGE-8 (SWMU 2). An Addendum to the RFI/RI Volume 2 (CH2M HILL 2009b) was submitted in June 2009. This Addendum included select data and information collected between October 2007 and September 2008, after the data cutoff period for RFI/RI Volume 2.
- **RFI/RI Volume 3.** RFI/RI Volume 3 will include final characterization data to complete the RFI/RI requirements for remaining Topock Compressor Station operations, including results of soils investigations and the current East Ravine (AOC 10) and Compressor Station groundwater investigation. Also included in Volume 3 will be new or additional SWMUs and AOCs that have been identified in the Addendum to the RFI/RI Volume 1.,

PG&E will continue to document and notify the Agencies of any new units discovered in the future. The SWMUs, AOCs, UAs, and other investigation areas still being characterized in support of the RFI/RI Volume 3 are presented in Exhibit 1.2-1 and shown on Figure 1.0-1.

Two draft work plans were initially prepared to describe collection of additional soil data to complete site characterization activities at the SWMUs, AOCs, and UAs identified in the Revised Final RFI/RI Volume 1 in support of RFI/RI Volume 3 preparation. Investigation areas outside the compressor station fence line were addressed in the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A, PG&E Topock Compressor Station, Needles, California* (Draft Soil Part A Work Plan) (CH2M HILL 2006). Investigation areas within the compressor station fence line were addressed in the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part B, PG&E Topock Compressor Station, Needles, California* (Draft Part B Work Plan) (CH2M HILL 2007b).

EXHIBIT 1.2-1
Soil RCRA Facility Investigation/Remedial Investigation Solid Waste Management Units, Areas of Concern, and Undesignated Areas
Groundwater Remedy Operation and Maintenance Manual
Volume 4: Soil Management Plan
PG&E Topock Compressor Station, Needles, California

Soil Investigation Areas		Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure? (Y/N) — List type of infrastructure
Located Outside the Topock Compressor Station Fence Line		
SWMU 1	Former Percolation Bed	No
AOC 1	Area Around Former Percolation Bed	Yes – wells, pipes
AOC 4	Debris Ravine	Yes – pipes
AOC 9	Southeast Fence Line (Outside Visitor Parking Area)	Yes – pipes
AOC 10	East Ravine	Yes – pipes, wells
AOC 11	Topographic Low Areas	Yes – pipes, wells, building
AOC 12	Fill Area	Yes – pipe, wells
AOC 14	Railroad Debris Site	No
AOC 27	MW 24 Bench	Yes – well
AOC 28	Pipeline Drip legs	Yes – pipes, wells
AOC 29	IM-3 Treatment Plant	No
AOC 30	MW 20 Bench	Yes – pipes, wells, building, tanks
AOC 31	Former Teapot Dome Oil Pit	No
UA 1	Potential Pipe Disposal Area	No
UA 2	Former 300B Pipeline Liquids Tank	No
Located Inside the Topock Compressor Station Fence Line		
SWMU 5	Sludge-Drying Beds	No
SWMU 6	Chromate Reduction Tank	No
SWMU 8	Process Pump Tank	No
SWMU 9	Transfer Sump	No
SWMU 11	Former Sulfuric Acid Tanks	No
AOC 5	Cooling Tower A	No
AOC 6	Cooling Tower B	No
AOC 7	Hazardous Materials Storage Area	Yes – pipes, tanks
AOC 8	Paint Locker	Yes – pipes, tanks
AOC 13	Unpaved Areas within the Compressor Station	Yes – pipes, wells, buildings
AOC 15	Auxiliary Jacket Water Cooling Pumps	No
AOC 16	Sandblast Shelter	No
AOC 17	Onsite Septic System	Yes – pipes, building
AOC 18	Combined Hazardous Waste Transference Pipelines	Yes – pipes
AOC 19	Former Cooling Liquid Mixing Area and Former Hotwell	No
AOC 20	Industrial Floor Drains	No
AOC 21	Round Depression near Sludge Drying Bed	No
AOC 22	Unidentified Three-sided Structure	Yes – pipes
AOC 23	Former Water Conditioning Building	No
AOC 24	Stained Area and Former American Petroleum Institute Oil/Water Separator	No
AOC 25	Compressor and Generator Engine Basements	No

EXHIBIT 1.2-1
Soil RCRA Facility Investigation/Remedial Investigation Solid Waste Management Units, Areas of Concern, and Undesignated Areas
Groundwater Remedy Operation and Maintenance Manual
Volume 4: Soil Management Plan
PG&E Topock Compressor Station, Needles, California

Soil Investigation Areas		Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure? (Y/N) — List type of infrastructure
AOC 26	Former Scrubber Oil Sump	No
AOC 32	Oil Storage Tanks and Waste Oil Sump	No
AOC 33	Potential Former Burn Area near AOC 17	Yes – pipes
Unit 4.3	Oil/Water Holding Tank	No
Unit 4.4	Oil Water Separator	No
Unit 4.5	Portable Waste Oil Storage Tank	No
Perimeter Area		Yes – pipes, wells
Storm Drain System		Yes – pipes

Subsequent to submitting the two draft work plans, the Part A and Part B work plans were combined into a single work plan: *Draft Soil RFI/RI Work Plan, PG&E Topock Compressor Station, Needles, California* (Soil RFI/RI Work Plan) (CH2M HILL 2011a). The Draft Soil RFI/RI Work Plan contains the Part A and B Data Quality Objectives (DQOs) process, data gaps analysis for each SWMU/AOC, and the proposed sampling plan for the next phase of investigation.

A Revised Final Soil RFI/RI Work Plan was prepared to incorporate comments received from Agencies and stakeholders on the Draft Work Plan, and was submitted to Agencies on January 14, 2013 (CH2M HILL 2013) for final review and approval.

1.2.1 Soil Investigation History and Findings Outside the Compressor Station Fence Line

Ten investigation areas located outside of the Compressor Station fence line, one new investigation area (AOC 28 – Pipeline Drip Legs), Perimeter Area, and Storm Drains System located outside of the Compressor Station fence line require further investigation in order to satisfy the Part A DQOs. These investigation areas are:

- SWMU 1 – Former Percolation Bed
- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10 – East Ravine
- AOC 11 – Topographic Low Areas, including the two new areas
- AOC 14 – Railroad Debris Area
- AOC 28 – Pipeline Drip Legs
- AOC 27 – MW-24 Bench Area
- UA-1 – Potential Pipeline Disposal Area
- AOC 31 – Former Teapot Dome Oil Pit
- Perimeter Area
- Storm Drains System

The proposed sampling plan for these units is described in the Revised Final Soil RFI/RI Work Plan (CH2M HILL 2013). Table 1.2-1 (tables are presented at the end of each section) provides a summary of historical activities at the Part A investigation areas, a list of constituents that exceeded interim screening levels, and the proposed analytical suites.

1.2.2 Soil Investigation History and Findings Inside the Compressor Station Fence Line

Twenty-four investigation areas located inside the compressor station fence line require further investigation in order to satisfy the Part B DQOs. These investigation areas are:

- SWMU 5 – Sludge-drying Beds
- SWMU 6 – Chromate Reduction Tank
- SWMU 8 – Process Pump Tank
- SWMU 9 – Transfer Sump
- SWMU 11 – Former Sulfuric Acid Tanks
- AOC 5 – Cooling Tower A
- AOC 6 – Cooling Tower B
- AOC 7– Hazardous Materials Storage Area
- AOC 8 – Paint Locker
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 15 – Auxiliary Jacket Cooling Water Pumps
- AOC 16 – Sandblast Shelter
- AOC 17 – Onsite Septic System
- AOC 18 – Combined Wastewater Transference Pipelines
- AOC 19 – Former Cooling Liquid Mixing Area and Former Hotwell
- AOC 20 – Industrial Floor Drains
- AOC 21 – Round Depression near Sludge Drying Bed
- AOC 22 – Three-sided Structure
- AOC 23 – Former Water Conditioning Building
- AOC 24 – Stained Area and Former American Petroleum Institute Oil/Water Separator
- AOC 26 – Former Scrubber Sump
- AOC 33 – Potential Former Burn Area Near AOC 17
- Unit 4.3 – Oily Water Holding Tank
- Unit 4.4 – Oil/Water Separator
- Unit 4.5 – Portable Waste Oil Holding Tank

The proposed sampling plan for these units was described in the Revised Final Soil RFI/RI Work Plan (CH2M HILL 2013). Table 1.2-2 provides a summary of historical activities at the Part B investigation areas, a list of constituents that exceeded interim screening levels, and the proposed analytical suites.

1.3 Report Organization

This SMP is organized into the following sections:

- Section 1.0 contains background information, objectives, a summary of the previous investigations conducted at the site, and a list of Soil RFI/RI Investigation Areas within 20 feet of or overlapping groundwater remedy infrastructure.
- Section 2.0 presents details related to soil management activities including identifying areas of potential/ known contamination in the vicinity of the groundwater remedy system and IM-3 system, and the process for soil characterization, soil screening and classification, handling, and storage of soil at the site.
- Section 3.0 describes storage methods, labeling requirements and inspection of soil storage areas.
- Section 4.0 summarizes the employee training required for waste soil management, hazardous waste profiling, transportation, and disposal of the various waste streams.
- Section 5.0 summarizes the records and documents that should be maintained at the site.
- Section 6.0 presents the process for updating the SMP.
- Section 7.0 presents a list of references used in the preparation of this SMP.

TABLE 1.2-1
Historical Activities Summary, Constituents Exceeding Interim Screening Levels for Soil RFI/RI Units Outside the Fence Line, Perimeter Area, and Storm Drains, and Associated Analytical Suites
Groundwater Remedy Operation and Maintenance Manual
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PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
SWMU 1	SWMU 1 is located outside the facility fence line in the bed of Bat Cave Wash. During the 1950s, the facility discharged wastewater containing chromium (cooling tower blowdown) wastewater into Bat Cave Wash without any impoundment. From about 1964 to approximately 1971, the facility discharged wastewater containing chromium to a percolation bed and allowed water to percolate into the ground and/or evaporate. The chromium-containing wastewater was combined with a small quantity (approximately 5 percent) of treated water from the oily waste treatment system discharged from the station.	As, Ba, Ca, Total Cr, Cr^{+6}, Co, Cu, Pb, Mn, Mo, Ni, K, Se, V, Zn, Ca, Mg, Mn, K	Title 22 metals, hexavalent chromium, VOCs. SVOCs, PAHs, TPH, pH, pesticides, PCBs[2]	No
AOC 1	AOC 1 is located in the area surrounding SWMU 1, outside the fence line within Bat Cave Wash. This area comprises property owned by PG&E, Havasu National Wildlife Refuge, and the Bureau of Reclamation. As discussed for SWMU 1, the facility discharged wastewater containing chromium into the Bat Cave Wash until approximately 1964.	As, Ba, Total Cr, Cr^{+6}, Cu, Pb, Mo, Ni, Zn, Mn, Benzo (a) anthracene; Benzo (a) pyrene; Benzo (b) fluoranthene; PAH High Molecular weight; B(a)P Equivalent; Aroclor 1254; Total PCBs	Title 22 metals, hexavalent chromium, VOCs. SVOCs, PAHs, TPH, pH, pesticides, PCBs[2]	Yes
AOC 4	AOC 4 is located south of the fence line, and is a narrow, steep ravine that drains into the Bat Cave Wash. This area comprises property owned by PG&E and the Havasu National Wildlife Refuge. Operation of the area is not well known, but trash burning has been identified on site. In 2009, a Removal Action and erosion control were conducted.	An, Ba, Cd, Total Cr, Cr^{+6}, Co, Cu, Pb, Hg, Ni, V, Zn, Benzo (a) anthracene; Benzo (a) pyrene; Benzo (b) fluoranthene; Benzo (k) fluoranthene; Indeno (1,2,3-cd) pyrene; PAH High Molecular weight; B(a)P Equivalent; Aroclor 1254; Aroclor 1260, Total PCBs	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, pesticides, PCBs	Yes
AOC 9	AOC 9 is located outside the fence line on the east side, south of the visitor parking lot on a steep slope. In 2000, a broken stormwater drainage pipe and stained soil were found in the area. The staining most likely originated from leaks near the Auxiliary Building. The stained soil was excavated, a new stormwater drainage pipe was installed, and the area was backfilled with 1 – 2 feet of clean soil. The exact location of the former storm drain line is uncertain, and the footprint of AOC 9 is sufficiently large to address both potential locations.	Total Cr, Cr^{+6}, Cu, Pb, Hg, Mo, Ni, Tl, Zn, Benzo (a) pyrene; B(a)P Equivalent; 4,4-DDE	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, asbestos, pesticides, PCBs	Yes

TABLE 1.2-1
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Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
AOC 10	AOC 10 is the east ravine located on the southeast side, outside of the fence line. This AOC comprises property owned by PG&E and the Havasu National Wildlife Refuge. The ravine is bisected by three constructed berms built between 1916 and the 1950s. AOC 10 receives run-off from the eastern portion of the upper yard of the compressor station, and the station access road.	As, Ba, Total Cr, Cr^{+6}, Co, Cu, Pb, Mo, Ni, Se, V, Zn, Benzo (a) anthracene; Benzo (a) pyrene; Benzo (b) fluoranthene; Benzo (k) fluoranthene; Indeno (1,2,3-cd) pyrene; PAH High Molecular weight; B(a)P Equivalent	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, general chemistry parameters, pesticides, PCBs, dioxins and furans (if burn material present)	Yes
AOC 11	AOC 11 consists of the topographic low areas on the northeast side of the Topock Compressor Station. AOC 11 is located on PG&E and Havasu National Wildlife Refuge property. Multiple storm drains may be discharging to this area, or have discharged to this area in the past. AOC 11 also includes the topographic low area north of the plant access road near the Old Route 66 sign. This area receives run-off from the station access road.	As, Ba, Total Cr, Cr^{+6}, Cu, Pb, Mo, Se, Zn, Al, Mn, K, Benzo (a) anthracene; Benzo (a) pyrene; Benzo (b) fluoranthene; Benzo (k) fluoranthene; PAH High Molecular weight; B(a)P Equivalent; Aroclor 1260; Total PCBs; 4,4-DDE; Dieldrin	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, PCBs, pesticides	Yes
AOC 12	AOC 12, known as the Fill Area, included three areas located near the Transwestern gas pipeline meter station, east of the compressor station. Portions of AOC 12 are located on PG&E and Havasu National Wildlife Refuge property. These areas were identified as locations that may contain buried construction-related debris, but no debris was found in the identified areas during the Soil Part A Phase investigation.	Co, Cu, Se, Zn, Di-N-butyl phthalate; Benzo (a) pyrene; B(a)P Equivalent	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, asbestos, pesticides, PCBs	Yes
AOC 14	AOC 14, the Railroad Debris Site, is located immediately north of I-40. It is bounded by Santa Fe railroad tracks to the north. The area sits approximately 100 feet above the bottom of the Bat Cave Wash. Aerial photos dated from 1947 to 1955 depicted materials and debris scattered in this area, and water softening (lime) sludge is also believed to have been disposed of in this area. An asbestos removal action was completed in 1999, and sampling detected no remaining asbestos. Field observations identified scattered debris and a potential burn layer (visible in the I-40 road cut) in this area.	Total Cr, Cr^{+6}, Cu, Pb, Hg, Mo, Se, Zn, Benzo (a) pyrene; PAH High Molecular weight; B(a)P Equivalent; 4,4-DDE; 4,4-DDT	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, asbestos, pesticides, PCBs, dioxins and furans (if burn material present)	No

TABLE 1.2-1
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Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
AOC 27	AOC 27, known as the MW-24 Bench, is located north of the upper yard of the compressor station and south of I-40. During employee interviews conducted by PG&E, a former PG&E Topock Compressor Station employee indicated this area was also used as a potential waste disposal area. In January 2008, during trenching activities in the MW-24 bench area associated with installation of a control panel related to the upland *in-situ* pilot test, debris consisting mostly of treated wood, concrete, and scrap steel/tin (including a possible fragment of a storage tank) were encountered.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, pesticides, PAHs, VOCs, SVOCs, PCBs, TPH, pH, dioxins and furans (if burn material present)	Yes
AOC 28	AOC 28, the Pipeline Drip Legs, consists of three drip legs associated with the 300A and 300B pipelines are located to the east of the compressor station and a drip leg for the 300B pipeline downstream of the compressor station in Bat Cave Wash. A drip leg collects pipeline liquids by gravity. It is connected to a valve used to drain the pipeline liquids to a fixed or portable tank.	No data have been collected in this area.	TPH, PAHs, and PCBs	Yes
AOC 29	AOC 29, the Interim Measure-3 Treatment Plant, is located north of Interstate-40. The Interim Measure-3 provides hydraulic control of the plume boundaries near the Colorado River to maintain a landward gradient. This facility was established and is operated under modern waste management laws, and will be closed pursuant to a decommissioning plan. Investigation of this AOC has been postponed until the plant is closed.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, sodium, chloride	No
AOC 30	AOC 30, the MW 20 Bench, is located between the National Trails Highway and the Colorado River. This area is part of the floodplain reductive zone in-situ pilot test. This facility was established and is operated under modern waste management laws and will be closed in accordance with agency requirements; therefore, investigation of this AOC is postponed until this unit is closed.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, sodium, chloride	Yes

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Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
AOC 31	AOC 31, the Teapot Dome oil pit, is located on the northeast side of the facility, just outside the compressor station fence line. It is located within and overlaps with the Perimeter Area investigation. Former employees indicated that they had been told that the Teapot Dome restaurant provided oil changes, and that oil from vehicles was dumped into a pit. Potential wastes in this area pre-date the construction of the compressor station.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs	No
UA 1	UA 1 is located north of the gas pipeline road near the former evaporation ponds. During site investigations, a former employee identified this area as a possible burial for asbestos-covered metal pipes. In 2008, a geophysical survey did not reveal any presence of the buried pipes, only small metallic anomalies found underground. This area will be investigated further, but no historical data have been documented. UA-1 is located within an especially culturally sensitive area, and the Tribes have expressed their desire to avoid or greatly limit any further activity in this area.	No data have been collected in this area.	Asbestos	No
UA 2	UA 2, the former 300B Pipeline Drip Tank, is located southeast of the plant on a shelf in the hill next to old Route 66. In 1994, investigation found oil-stained soil in a small area underneath and adjacent to this tank. In 1996 the tank was removed, and a cleanup was implemented. Soil was excavated to a depth of 5.5 ft. No further characterization is recommended in this area.	As, Ba, Pb, Zn	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, pesticides, PCBs	No
Perimeter Area[3]	The Perimeter Area is the area extending from the facility fence line to the toe of the slope. The majority of the Perimeter Area is lower than the station, and these topographically lower areas could have received runoff and incidental spills from the station. The Perimeter Area excludes those portions of the slope that are already part of a designated unit (i.e., portions of SWMU 1, AOC 9, AOC 10, and AOC 11). There has been no previous investigations or sampling in this area.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs	Yes

TABLE 1.2-1
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Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
Storm Drains[3]	Fifteen storm drain outfalls have been visually identified outside the fence line, but little information is known regarding the exact locations of historic lines and drainage to these lines. Contaminants discharged to catch basins within the compressor station would most likely have entered the storm drains and been transported to the outfalls.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs	Yes

Notes:

[1] Analytical suites as presented in the Revised Final Soil RFI/RI Work Plan (CH2M HILL 2013).

[2] PCB analysis only on soil collected between 0 and 2 feet below ground surface.

[3] The Perimeter Area and Storm Drains are being investigated separately from the areas outside (Part A) and within (Part B) the fence line; once the data from the Perimeter Area and Storm Drains investigations have been collected, they will be combined with the appropriate existing Part A or B unit(s) or identified as a hotspot if there is no apparent connection to an existing unit.

Metals: Antimony (An); Arsenic (As); Barium (Ba); Beryllium (Be), Cadmium (Cd); Hexavalent Chromium (Cr^{+6}); Total Chromium (Total Cr); Cobalt (Co); Copper (Cu); Lead (Pb); Mercury (Hg); Molybdenum (Mo); Nickel (Ni); Selenium (Se); Silver (Hg); Thallium (Tl); Vanadium (V); Zinc (Zn)

Inorganics: Aluminum (Al); Calcium (Ca); Iron (Fe); Magnesium (Mg); Manganese (Mn); Potassium (K); Sodium (Na); Cyanide (CN)

Semivolatile Organic Compounds (SVOCs): 4-Methylphenol; Bis (2-ethylhexyl) phthalate; Di-N-butyl phthalate

Volatile Organic Compounds (VOCs): Methyl acetate

Polycyclic Aromatic Hydrocarbons (PAHs): 1-Methyl naphthalene; 2-Methyl naphthalene; Acenaphthene, Anthracene; Benzo (a) anthracene; Benzo (a) pyrene; Benzo (b) fluoranthene; Benzo (ghi) perylene; Benzo (k) fluoranthene; Chrysene; Dibenzo (a,h) anthracene; Fluoranthene; Fluorene; Indeno (1,2,3-cd) pyrene, Naphthalene; Phenanthrene; Pyrene, PAH Low molecular weight; PAH High Molecular weight; B(a)P Equivalent

Polychlorinated biphenyls (PCBs): Aroclor-1016; Aroclor-1254; Aroclor-1260; Total PCBs

Pesticides: 1,1-dichloro-2.2-bis[p-chlorophenyl] ethylene (4,4-DDE); 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane (4,4-DDT)

Total Petroleum Hydrocarbons (TPH): TPH as diesel; TPH as motor oil

TABLE 1.2-2
Historical Area Summary and Constituents Exceeding Background Threshold Value for Soil RFI/RI Units Inside the Fence Line and Associated Analytical Suites
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Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
SWMU 5	SWMU 5 is located inside the fence line and comprises the two former sludge-drying beds. Both of these beds were approximately 20 feet wide by 50 feet long. Bed 1, constructed in the early 1950s,was used to dehydrate lime sludge generated by the water softening process. From 1964 through 1969, it was used to treat chromium-bearing wastewater in the single-step chromate reduction process. A second bed was constructed in the late 1960s, and from 1969 through 1985, the two drying beds were used to dehydrate chromic hydroxide sludge. Use of these beds ceased in 1985. Closure of the drying beds was accomplished during Phase I of the Hazardous Waste Treatment System Closure, between 1988 and 1989.	Total Cr, Pb, Zn	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs	No
SWMU 6	SWMU 6 was the chromate reduction tank located in the southern end of the lower yard. The tank was part of the two-step waste water treatment system installed in 1969 and was in operation through 1985. The tank was approximately 10 feet high and 5 feet in diameter, with a capacity of 1,500 gallons. Closure of this system was completed during Phase I Hazardous Waste Treatment System Closure.	Total Cr, Cr^{+6}, Zn	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs	No
SWMU 8	SWMU 8 was located on the southern end of the lower yard in an area that is now covered by the new Fire Pump Building. SWMU 8 was the process pump tank that was part of the two-step waste water treatment system. The tank was approximately 8 feet high and 5.5 feet in diameter. The pump tank was used as a temporary holding tank for treated wastewater discharged from the precipitation tank, before it was pumped to the former percolation bed. In 1985, this unit was removed from service and closure was accomplished during Phase I.	Co, Cu, Ni	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs	No
SWMU 9	SWMU 9, located in the southwestern portion of the lower yard, was the transfer sump that was part of a two-step wastewater treatment system. The sump was a pre-fabricated concrete septic tank that had the capacity of 1,500 gallons. The sump was 3 feet in diameter and 20 feet deep. From 1969 through 1985 effluent from the chromate reduction tank was routed through SWMU 9. In 1989, the transfer sump was removed during Phase 2 of the Hazardous Waste Treatment System Closure.	Be	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs	No
SWMU 11	SWMU 11 consists of two 400-gallon sulfuric acid tanks, located in the cooling tower A (AOC 5) and cooling Tower B (AOC 6). These tanks were used to control pH to minimize scale, corrosion, and biological growth. The 1950s through 1984, sulfuric acid was delivered to the facility in drums and pumped directly into the basins. To date, no data have been collected to evaluate any potential concerns related to sulfuric acid tanks.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, and pH	No

TABLE 1.2-2
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Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
AOC 5	AOC 5 is the area surrounding original Cooling Tower A, and encompasses the cooling tower, former chemical shed, and SWMU 11. Most of the area is covered with gravel, but pavement bounds the surrounding area. From 1951 to 1985 chromium-based corrosion inhibitors were used to treat the cooling water, and stored within the chemical shed. Stained soils were observed within the shed during demolition of the shed in 2000. The stained soils were excavated.	Cr^{+6}, total Cr, Cu, Zn	Title 22 metals, hexavalent chromium, and pH	No
AOC 6	AOC 6 is the entire area surrounding Cooling Tower B, and encompasses the cooling tower, former chemical shed, and SWMU 11. Most of the area is covered with gravel, but pavement bounds the surrounding area. From 1951 to 1985 chromium-based corrosion inhibitors were used to treat the cooling water, and stored within the chemical shed. Stained soils were observed within the shed during demolition of the shed in 2000. The stained soils were excavated.	Cr^{+6}, total Cr, Cu, Ni, Zn	Title 22 metals, hexavalent chromium, and pH	No
AOC 7	AOC 7 consists of the hazardous materials storage area and loading dock, and the adjacent Carpenter Shop (former Chemical Storage Building). The current hazardous material storage area has been used since the mid-1980s to store chemical products used at the station. The former Chemical Storage Building was constructed in 1951 as part of the original station configuration.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, PCBs, TPH, and pH	Yes
AOC 8	AOC 8 consists of a small storage locker used for paint storage. The locker is 5 feet wide by 5 feet long and is set back into southern retaining wall at the Compressor Station. The paint locker is constructed of steel with tight fitting doors, and located on pavement. No evidence of release is present.	No data have been collected in this area.	Title 22 metals, VOCs and TPH	Yes
AOC 13	AOC 13 consists of the current and former unpaved areas within the fence line. Many of the former unpaved areas are now paved and covered by buildings. Spills that have occurred at the facility and may have affected unpaved areas.	Be, Cd, Cr+6, Total Cr, Co, Cu, Pb, Mo, Ni, Se, Zn	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and asbestos	Yes
AOC 15	AOC 15 consist of the auxiliary jacket cooling water pumps located north of the Auxiliary Building. AOC 15 is part of the closed-loop cooling system for the generator engines. From 1951 through 1985, chromium-based cooling water additives were used in the closed loop cooling systems. Leaks from valve seals and pumps may have affected the soil at AOC 15.	Cr^{+6}, total Cr, Cu, Pb, Mo, Ni, Zn	Title 22 metals, hexavalent chromium, and pH	No

TABLE 1.2-2
Historical Area Summary and Constituents Exceeding Background Threshold Value for Soil RFI/RI Units Inside the Fence Line and Associated Analytical Suites
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Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
AOC 16	AOC 16 is the sand blast shelter located in the lower yard. The sandblast shelter was installed in the early 1990s, and used primarily for smaller items (fixed infrastructure and large items are typically sandblasted in place).	No data have been collected in this area.	Title 22 metals	No
AOC 17	AOC 17 is the onsite septic system that serves the Auxiliary Building and nearby buildings. It consists of the septic located northeast of the air dryer building, and the associated leachfield. Wastewater from the facility laboratory of the Auxiliary Building is routed to the septic system. According to informal station drawings, the leachfield consists of 3 100-foot-long lines spaced 6 feet apart. The onsite septic system is believed to have been installed as part of the original compressor station facilities.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs	Yes
AOC 18	AOC 18 consists of the hazardous waste transference pipelines associated with the hazardous waste treatment system, as well as the pipelines conveying the cooling tower blowdown to the lower yard. In the 1980s, the pipelines were uncovered, pressure tested, and removed in accordance with the hazardous waste treatment system closure plan. Visually contaminated soil was removed, confirmation sampling was conducted, and supplemental soil excavation was conducted where needed. Not all sections of the piping could be removed, and active sections were not pressure tested.	Be, Cr^{+6}, Total Cr, Pb, Mo, Ni, Zn	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs	Yes
AOC 19	AOC 19 is the Former Cooling Liquid Mixing and Jacket Cooling Water Hot Well Area located east of the Compressor Building. Employee interviews indicated that the hot well periodically overflowed. The hotwell was replaced with surge tanks circa 1967. Remnants of the hotwell were discovered and removed during a construction project in the 1990s. The former cooling liquid mixing area consists of a small concrete pad. Green droplets were noticed on the concrete pad during a routine test of a nearby eyewash fountain/safety shower in 2006. Elevated level of chromium were found in the green water.	Cd, Cr^{+6}, total Cr, Cu, Pb, Mo, Se, Zn	Title 22 metals, hexavalent chromium, and pH	No
AOC 20	AOC 20 consists of the industrial floor drains within the compressor station building and other buildings within the upper yard, as well as the associated pipelines, and the pipelines conveying the drainage to the oily water holding tank in the lower yard. Historically, the pipes associate with AOC 20 were made from vitrified clay.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, PCBs, and PAHs	No

TABLE 1.2-2
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Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
AOC 21	AOC 21 is a former round structure found adjacent to Sludge Drying Bed No. 1. This round structure was filled with white material that was most likely water softener (lime) sludge. The material appears to be similar to the material found in Sludge Drying Bed No. 1. No information is available on the construction of this area, although it appears to be of earthen materials.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, calcium, sodium, and pH	No
AOC 22	AOC 22 consists of a three-sided structure located in the upper yard, along the present compressor station fence line. A 1955 aerial photo appears to depict a drum that was near the structure. No further information about this structure is available.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, PCBs, and PAHs	Yes
AOC 23	AOC 23 is the former water conditioning (water softening) building located in the southern part of the upper yard. Currently AOC 23 is used for storage of dry non-hazardous materials. Chemical feed tanks for the water softening process were located inside the building, and the precipitator for the water softening system was located outside the building.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and pH	No
AOC 24	AOC 24 consists of the stained area near the API oil/water separator formerly located northeast of the northern scrubbers, as well as the footprint of the separator. The staining is apparent in 1955 aerial photographs and some plant photographs. The separator was later moved and reused as part of the old oily water treatment system adjacent to Sludge Drying Bed No. 1.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and pH	No
AOC 25	AOC 25 consists of the compressor and generator engine basements. There are 10 compressor engines, 9 of which are still active, and four generators engines. Each of the engines is mounted on a concrete pedestal on a concrete foundation. The pedestal is surrounded by a concrete trench. The trench around the pedestal is known as the basement. Drips and leaks from the engines would discharge into the drains in the basements, and enter AOC 20. Surface and shallow subsurface site investigation and soil removal have been conducted in areas immediately adjacent to the auxiliary and compressor buildings.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and asbestos	No

TABLE 1.2-2
Historical Area Summary and Constituents Exceeding Background Threshold Value for Soil RFI/RI Units Inside the Fence Line and Associated Analytical Suites
Groundwater Remedy Operation and Maintenance Manual
Volume 4: Soil Management Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
AOC 26	AOC 26 is the location of the former scrubber oil sump located in the lower yard south of the South Scrubbers. The sump received pipeline liquids of the natural gas scrubbers, as well as oil from the oil bath filters until the filters were taken out of service in the 1960s. The scrubber sump was removed in 1996 as part of an upgrade to the waste oil system. The area was investigated and contaminated soil was removed to the degree feasible (excavation was limited by the presence of infrastructure). Residual contamination is present below the maximum excavation depth (approximately 10 feet).	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and pH	No
AOC 32	AOC 32 is the oil storage area in the upper yard immediately west of the visitor parking lot. AOC 32 contains five 7,150-gallon capacity oil storage tanks, the steel-lined waste oil sump, and two 150-gallon capacity lubricating oil surge tanks. The tanks and oil sump are part of the original compressor station installation. The tanks and sump are located within a concrete containment structure. The sidewalls of the containment structure are apparent in a ca. 1956 station photograph; however, it is uncertain if the floor of the oil storage area has always been paved. Associated piping is also located within the containment. The containment structure appears to be in good repair; an inspection conducted in 1994 indicated that it was in good condition at the time. The dirty oil sump receives waste oil from the oil/water separator, and pipeline liquids collected from the scrubbers. It formerly received used oil from the scrubber sump.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, and PCBs	No
AOC 33	AOC 33 is the potential burn area located near AOC 17. This area was identified when PG&E conducted additional interviews with current and former employees to collect new anecdotal information pertaining to historical compressor station practices. Several employees reported that PG&E may have conducted a yearly fire training exercise during which materials were set on fire and employees practiced extinguishing the fire. The employees indicated that these fire extinguishing drills took place in the early 1980s (and may have taken place prior to then) and continued into the 1990s.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, asbestos, and dioxin and furans	Yes
Unit 4.3	Unit 4.3 is the oil/water holding tank that was installed in 1970. It was a cylindrical steel tank 15 feet long by 5 feet in diameter that was used to collect oily water from the compressor floor drainage, engine and steam-cleaning operations, and other activities discharging to AOC 20.	None, sampled only for TPH.	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs	No

TABLE 1.2-2
Historical Area Summary and Constituents Exceeding Background Threshold Value for Soil RFI/RI Units Inside the Fence Line and Associated Analytical Suites
Groundwater Remedy Operation and Maintenance Manual
Volume 4: Soil Management Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[1]	Overlaps or Is within 20 feet of Groundwater Remedy Infrastructure?
Unit 4.4	Unit 4.4 was the oil water separator located adjacent to Unit 4.3 (the API oil/water separator relocated from the area northeast of the north scrubbers. Unit 4.4 was equipped with an underflow weir to control discharge, and the floating oil was transferred by hose to a portable waste oil storage tank.	None, sampled only for TPH.	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs	No
Unit 4.5	Unit 4.5 was the portable waste oil storage tank adjacent to the Unit 4.3 and 4.4. Skimmed oil from Unit 4.4 was discharged into Unit 4.5. The portable tank was stationed on a concrete pad; when it was full it was transported to the east side of the facility, and pumped into the waste oil tank. Starting in 1975, the oil was either sold for reuse or transported to a recycling center.	None, sampled only for TPH.	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs	No

Notes:

[1] Analytical suites as presented in the Revised Final Soil RFI/RI Work Plan (CH2M HILL 2013).

Metals: Antimony (An); Arsenic (As); Barium (Ba); Beryllium (Be), Cadmium (Cd); Hexavalent Chromium (Cr^{+6}); Total Chromium (Total Cr); Cobalt (Co); Copper (Cu); Lead (Pb); Mercury (Hg); Molybdenum (Mo); Nickel (Ni); Selenium (Se); Silver (Hg); Thallium (Tl); Vanadium (V); Zinc (Zn)

Inorganics: Aluminum (Al); Calcium (Ca); Iron (Fe); Magnesium (Mg); Manganese (Mn); Potassium (K); Sodium (Na); Cyanide (CN)

Semivolatile Organic Compounds (SVOCs): 4-Methylphenol; Bis (2-ethylhexyl) phthalate; Di-N-butyl phthalate

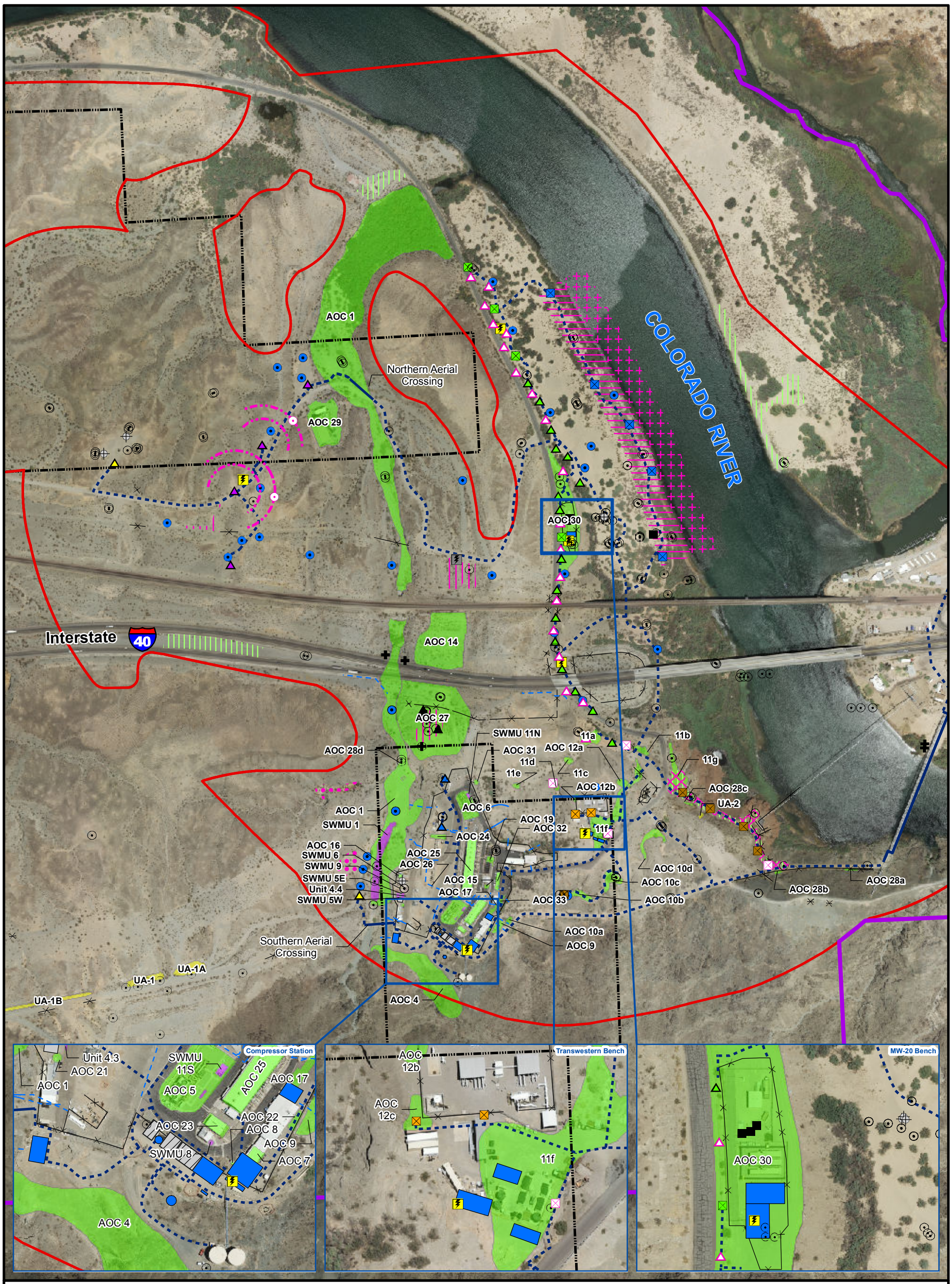
Volatile Organic Compounds (VOCs): Methyl acetate

Polycyclic Aromatic Hydrocarbons (PAHs): 1-Methyl naphthalene; 2-Methyl naphthalene; Acenaphthene, Anthracene; Benzo (a) anthracene; Benzo (a) pyrene; Benzo (b) fluoranthene; Benzo (ghi) perylene; Benzo (k) fluoranthene; Chrysene; Dibenzo (a,h) anthracene; Fluoranthene; Fluorene; Indeno (1,2,3-cd) pyrene, Naphthalene; Phenanthrene; Pyrene, PAH Low molecular weight; PAH High Molecular weight; B(a)P Equivalent

Polychlorinated biphenyls (PCBs): Aroclor-1016; Aroclor-1254; Aroclor-1260; Total PCBs

Pesticides: 1,1-dichloro-2.2-bis[p-chlorophenyl] ethylene (4,4-DDE); 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane (4,4-DDT)

Total Petroleum Hydrocarbons (TPH): TPH as diesel; TPH as motor oil



LEGEND

Existing Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:
- Extraction Well
- Injection Well
- Monitoring Well (MW-CC and EE are pending/future provisional monitoring wells)
- ARC for IRL-2 and IRL-3
- Arsenic Monitoring Wells
- Area for East Ravine (ER) Wells
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells
- Area for Monitoring Well

Planned Wells:
- Extraction, East Ravine
- Extraction, National Trails Highway (NTH) In-situ Reactive Zone (IRZ)
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well

Transformers
- Planned Transformer
- Future Provisional Transformer

- Site Fence Boundary
- Stormwater Piping Below Ground
- Stormwater Piping Above Ground

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Property Boundaries
- Area of Potential Effects (APE)
- EIR Project Area

Work Areas
- Solid Waste Management Unit (SWMU)
- Area of Concern (AOC)
- Other

Remedy Facilities
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System

Notes:
1. All wells and remedy structure locations are approximate.
2. AOC 13 consists of the current and former unpaved areas within the fence line.AOC 18 consists of the hazardous waste transference pipelines and cooling tower blowdown pipelines.

N

0 550
Feet

FIGURE 1.0-1
GROUNDWATER REMEDY FEATURES, SOLID WASTE MANAGEMENT UNITS, AND AREAS OF CONCERN
GROUNDWATER REMEDY IMPLEMENTATION - SOIL MANAGEMENT PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\GROMM\FIG101_RemedyLayout_AOCs_Samples.mxd Date Saved: 8/22/2014 11:52:22 AM

SECTION 2

Soil Management

Soil that may be displaced in the vicinity of the groundwater remedy system during drilling, construction, and O&M activities that are part of the groundwater remediation project or decommissioning and removal of the IM-3 system will be managed according to the processes described in this SMP. This section identifies Soil RFI/RI Investigation Areas in the vicinity of the groundwater remedy system and IM-3 system, and describes the processes for soil characterization, soil screening and classification, handling, short-term storage, and longer storage of displaced soil.

The process presented herein for determining whether displaced soil (including drill cuttings) is hazardous waste, is in compliance with California action-specific ARAR #74 (22 CCR Section 66262.11), Requirements for Waste Determination (DOI 2010). Once determined to be a hazardous waste, the waste shall be managed in compliance with California action-specific ARARs #75 through #80, and #84 through #86 (DOI 2010):

- ARAR #75 (22 CCR 66262.12): USEPA identification number
- ARAR #76 (22 CCR, Div 4.5, Ch 14, Article 2): General requirements for hazardous waste facilities
- ARAR #77 (22 CCR 66262.20 and 66262.22): Use of hazardous waste manifest
- ARAR #78 (22 CCR 66262.30, 66262.31, 66262.32 and 66262.33): Packaging, marking, labeling, and placarding hazardous waste shipments
- ARAR #79 (22 CCR 66262.34): Accumulation requirements for hazardous waste
- ARAR #80 (22 CCR 66262.40 and 66262.41): Recordkeeping
- ARAR #84 (22 CCR, Div 4.5, Ch 14, Article 9): Use and management of containers
- ARAR #85 (22 CCR, Div 4.5, Ch 14, Article 10): Tank systems
- ARAR #86 (22 CCR, Div 4.5, Ch 14, Article 12): Waste piles for RCRA hazardous waste

In addition, to maximize onsite reuse of displaced soil and minimize offsite transportation and disposal of site soil, characterization, screening, handling, and storage processes were developed following guidelines in the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E 2012).

2.1 Soil RFI/RI Investigation Areas Intersected by the Groundwater Remedy Project

As of the 90% design stage, proposed remedy pipeline/conduit alignments (includes direct burial pipelines/ conduits, pipeline trenches, and remediation wells [i.e., injection and extraction wells] that are connected to those pipelines), remedy structures, and new monitoring well will intersect eighteen Soil RFI/RI Investigation Areas. These areas are listed below and shown on Figure 1.0-1:

- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Locker
- AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10 – East Ravine
- AOC 11 – Topographic Low Areas
- AOC 12 – Fill Areas
- AOC 13 – Unpaved Areas within the Compressor Station

- AOC 17 – Onsite Septic System
- AOC 18 – Combined Hazardous Waste Transference Pipelines
- AOC 22 – Unidentified Three-sided Structure
- AOC 27 – MW-24 Bench
- AOC 28 – Pipeline Drip Legs
- AOC 30 – MW 20 Bench
- AOC 33 – Potential Former Burn Area near AOC 17
- Perimeter Area outside of but adjacent to the Compressor Station fence line
- Storm Drain System

The decommissioning and removal of the IM-3 system will affect two AOCs – AOC 29 (IM-3 Treatment Plant) and AOC 30 (MW 20 Bench).

These Soil RFI/RI Investigation Areas are currently being investigated under the Soil RFI/RI program. Tables 1.2-1 and 1.2-2 provide a summary of historical activities at each of these investigation areas, a list of constituents that exceeded interim screening levels, and the proposed analytical suites as presented in the revised Soil FRI/RI Work Plan. Existing soil data collected from within AOCs will be used to assess required protection of workers for health and safety purposes. Personnel engaged in field activities within known AOC areas will have completed the Occupational Safety Health Administration 40-hour health and safety training that meet the requirements of Title 29 CFR Section 1910.120 and Title 8 CCR Section 5192. All personnel will read applicable project-specific health and safety plans.

2.2 Soil and Waste Characterization Process

Soil in the vicinity of the groundwater remedy system expected to be displaced will be pre-characterized following the Groundwater Remedy Implementation—Baseline Soil Sampling and Analysis Plan (Baseline SAP), included as Appendix A of this document. The baseline soil sampling results will be screened following the process described below in Section 2.3 to classify the displaced soil for handling, storage, and/or disposal purposes. Soil generated during 1) post-construction O&M in or near Soil RFI/RI Investigation Areas that has not been pre-characterized and 2) the decommissioning and removal of the IM-3 system infrastructure used for the groundwater remedy, will be stockpiled or placed in lined roll-off bins at the work site, if practicable, or onsite in a temporary storage area designated by PG&E until they have been characterized.

Field segregation of soil will be a key step in the process of management of displaced soil for any ground disturbance activities that occur during remedy construction. As soil is displaced, any soil with odors or visual evidence of contamination will be segregated, characterized, and handled following procedures outlined in this SMP.

Representative sample profile results, existing soil sample results, and knowledge of the area history will be used to assess waste classification for displaced soil that has not been pre-characterized. Additional characterization of displaced soil from or near Soil RFI/RI Investigation Areas will be performed as needed. In general, characterization will entail collection of composite samples from roll-off bins and stockpiles. One four-point composite sample will be taken from each roll-off bin. For stockpiles, the number of representative samples to be collected will be as follows unless otherwise directed by the disposal facility:

Stockpile Volume	Frequency
0 to 500 cy	Four-point composite per 250 cy
500 to 1,500 cy	Four-point composite per 500 cy
1,500+ cy	Four-point composite per 1,500 cy

Source: Alisto et al. 2009
cy = cubic yard

The waste characterization soil samples collected within or near Soil RFI/RI Investigation Areas will be analyzed for the applicable Soil RFI/RI Investigation Area analytical suite presented in Tables 1.2-1 and 1.2-2. The samples collected outside areas of known or suspected contamination will be analyzed for PAHs and lead. Analytical results will be screened according to the procedure listed in Section 2.3 to classify the soil for handling, storage, and disposal purposes. It is imperative to coordinate with the waste hauler and disposal facility to ensure proper completion of the profile.

Drill cuttings from new monitoring, extraction, and injection well locations will not be fully characterized as part of the Baseline SAP; therefore, drill cuttings from installation of monitoring wells will be containerized in 55-gallon U.S. Department of Transportation (DOT) drums or lined roll-off bins. Drill cuttings from individual RFI/RI Investigation Areas will be segregated to prevent comingling of waste. The drill cuttings drums/bins will be stored onsite in a temporary storage area designated by PG&E until they have been characterized. Drum and roll-off bin storage are described in Section 3.1.

Characterization of drilling cuttings will be performed by collection of samples as follows:

- For one drum, one discrete sample will be collected from the drum. The sample will be collected from the center of the drum from at least 12-inches below the surface of the soil.
- For 2 to 10 drums, one discrete sample will be collected from each drum and composited into a single composite sample.
- For more than 10 drums, one composite sample will be collected for every 10 drums.
- For each roll-off bin, one four-point composite sample will be taken from the roll-off bin.

The samples will be analyzed for applicable Soil RFI/RI Investigation Area analytical suite presented in Tables 1.2-1 and 1.2-2. Analytical results will be screened according to the procedure listed in Section 2.3 to classify the soil for handling, storage, and disposal purposes.

2.3 Screening and Classification of Soil

The following process for screening and classification of displaced soil in compliance with California action-specific ARAR #74 (22 CCR 66262.11) is based on the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E 2012) (see Appendix B).

Analytical results from the Baseline SAP or other characterization of soil samples (i.e., drum or roll-off bins, or areas not pre-characterized) will be used to assess whether displaced soil is suitable for retention onsite for eventual return, reuse, or replacement, or if the soil must be removed from the site for disposal in accordance with applicable state and federal laws and regulations. Analytes detected in the Baseline SAP or other characterization of soil samples above laboratory detection limits will be screened against the screening values included on Tables 2.4-1 and 2.4-2. These screening values include the following:

- **Interim Screening Levels (Table 2.4-1)** – The screening levels for metals are predominantly Topock-specific soil background values. However, if a background value is not available then the lesser of the DTSC residential California Human Health Screening Level (CHHSL) (California Office of Environmental Health Hazard Assessment [OEHHA] 2005) or the ecological comparison value is used. If a CHHSL is not available, then the lesser of the USEPA residential regional screening level or the ecological comparison value is used. These levels are the most conservative, and it is assumed that the project-specific soil cleanup goal will be equal to or greater than these levels.
- **Hazardous Waste Toxicity Characteristic Levels (Table 2.4-2)** – These values will be used to assess if the soil should be classified as a non-hazardous waste, a state (non-RCRA California) hazardous waste, or a federal (RCRA) hazardous waste. Specifically, total constituent concentrations expressed in milligrams per kilogram (mg/kg) will be compared to the hazardous waste characteristic levels in Table 2.4-2, and will be evaluated as follows:

- Step 1 – If the total constituent concentration exceeds the total threshold limit concentration (TTLC), the soil represented by the sample will be classified as a non-RCRA hazardous waste. Additional evaluation of the soluble threshold limit concentration (STLC), as described in Step 3 below, will not be performed.
- Step 2 – If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic (TC) level by about 20 times or more, the toxicity characteristic leaching procedure (TCLP) will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in Step 3 below, will not be performed.
- Step 3 – If the sample has not been classified as hazardous waste in Steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by 10 times or more, the California Waste Extraction Test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA hazardous waste.
- Step 4 – If the sample has not been classified as a hazardous waste in Steps 1, 2, or 3, the soil represented by the sample will be not be classified or managed as hazardous waste.

Subsequent to screening, soil that may be displaced in the vicinity of the groundwater remedy system will be classified into 3 categories and will be managed as follows:

- RCRA hazardous waste—The waste will be removed from the site within 90 days of generation and disposed of offsite in accordance with applicable laws and regulations (California action-specific ARARs #78 and #79) and the Remedial Design/Remedial Action Consent Decree (CD) (DOI 2013). It is imperative to coordinate with the waste hauler and disposal facility to ensure proper completion of the waste profile and to avoid unnecessary delays in acceptance of a waste to a specific facility (as discussed in Section 4.0).
- Non-RCRA hazardous waste – Same as management of the RCRA hazardous waste.
- Non-hazardous waste:
  - Clean soil—Soil that is not classified as a hazardous waste, and is equal to or below the interim screening level, is suitable for immediate return, reuse, or replacement onsite (as discussed in Section 2.4).
  - Soil for storage—Soil that is not classified as a hazardous waste, and is greater than the interim screening level, will be stored onsite until the project-specific cleanup goals are established. Until these goals are established, soil that falls into this intermediate category will be retained onsite for storage (as discussed in Section 2.5).

2.4 Handling and Short-term Storage of Non-Hazardous Clean Soil

Non-hazardous clean displaced soil will be stockpiled at the work site, if practicable, and recorded in an inventory as described in Section 5.0. Clean soil that was removed from trenches or excavations will be reused as backfill into the same trench or excavation area, if practicable. Clean soil that cannot be immediately used as backfill may be reused in other areas within the APE, or stockpiled for future reuse within the APE. Displaced soil that is stockpiled for future use will be managed following the BMPs described in Section 3.1.2 below, the BMPs Plan presented in Appendix C, the Construction/Remedial Action Work Plan, and the Groundwater Remedy Industrial SWPPP (Appendix E of Volume 1 of this O&M Manual).

Consistent with the special handling procedures requested by the Hualapai Department of Cultural Resources for displaced material generated from clay beds (this does not include clay-containing sediment mixtures, only clay beds), if clay bed(s) are encountered during construction, the clay material will be set aside on 100% cotton muslin (dye free) for future disposition following discussions with the Tribes. PG&E will notify the Agencies and Tribes in the event clay material is encountered and separated for storage. Further, salvage of topsoil during installation of trenches will be done where the proposed excavation will occur in areas where undisturbed topsoil

may be present. In such areas, the upper 4 inches of soil will be carefully removed and placed near the excavation. The remaining subsurface-soil will then be excavated and stored separately from the topsoil. Following the installation of piping/conduits and backfilling of the trench, the topsoil will be replaced over the trench. Therefore, there will be no need for long-term storage of undisturbed topsoil. The rest of the excavated soil that is not undisturbed topsoil consists of desert soils that are generally low in nutrients and organic matter. Desert soil that has been subject to disturbance typically loses a large percentage of the available nutrient supply and important soil biota. Therefore, salvage of soil from disturbed areas will not occur and there will be no specific actions related to protecting biological integrity while these soils are being stored.

Additional segregation or sorting of material by size may occur, e.g., separating oversize rocks and gravel that are excavated during trenching but are not considered suitable for backfill. Oversize rocks may be used as erosion control (riprap) or processed (crushed) to provide aggregates in concrete, pavements or road surfacing. An onsite segregation unit for screening/crushing may be used to process material for onsite use.

The estimated volume of clean soil (generated from construction of the groundwater remedy) needing storage is approximately 8,000 cubic yards. This volume is based on the total net volume of soil excavated from trenches and building foundations located outside of Soil RFI/RI Investigation Areas that cannot be immediately used as backfill. During the 60% design comment resolution process (September 2013 through March 2014), potential locations for soil storage were evaluated by PG&E and Tribes and discussed with Agencies and landowners/ managers (BLM/BOR). As a result of these discussions, PG&E proposes to use two areas in Moabi Regional Park for long-term soil storage (see Figure 2.4-1 at the end of this section). It is anticipated that clean soil will be stored in stockpiles and managed per the BMPs presented in the BMPs Plan (Appendix C) and summarized in Section 3.1.2 below, the Construction/Remedial Action Work Plan, and the Groundwater Remedy Industrial SWPPP (Appendix E of Volume 1 of this O&M Manual).

The volume and classification of clean displaced soil from the decommissioning and removal of the IM-3 system requiring storage will not be known until after the system has been decommissioned and removed, which will not occur until after the start of implementation of the groundwater remedy. Since the amount of displaced soil from the decommissioning and removal of the IM-3 system is expected to be minimal and characterization of this displaced soil will not occur until after the SMP has been revised to include the Baseline SAP results, this displaced soil will be stored and managed following the same process as the soil displaced during the groundwater remedy installation and O&M provided in the revised SMP.

2.5 Storage of Non-Hazardous Soil

Displaced soil that is non-hazardous but is unsuitable for final disposition onsite because contaminants are present above the interim screening level cannot be reused until project-specific soil cleanup goals are finalized and must be stored onsite. Once final project specific cleanup goals are established, the contamination will be re-assessed based on existing data, or additional data as determined necessary, to determine final disposition (i.e., transportation to offsite disposal facility or reuse within the APE).

The estimated volume of non-hazardous soil (from construction of the groundwater remedy) needing storage is approximately 900 cubic yards. This volume is based on the total net volume of soil excavated from trenches and building foundations located within Soil RFI/RI investigation areas. It is anticipated that this soil will be stored in roll-off bins and managed per the BMPs described in Section 3.1.3. The roll-off bins will be stored at the storage area shown on Figure 2.4-1.

The volume and classification of displaced soil from the decommissioning and removal of the IM-3 system requiring storage in the vicinity of the groundwater remedy system will not be known until after the system has been decommissioned and removed, which will be after the start of implementation of the groundwater remedy. The amount of displaced soil from the decommissioning and removal of the IM-3 system is expected to be minimal. The displaced soil will be stored and managed following the same process for non-hazardous soil storage/management as described herein.

TABLE 2.4-1
Reference List of Potentially Applicable Analytes and Associated Screening Levels
Groundwater Remedy Operation and Maintenance Manual (Volume 4: Soil Management Plan)
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level		Interim Screening Level Source	Hazardous Waste Disposal Criteria
Dioxins and Furans (ng/kg)					
	1,2,3,4,6,7,8-HpCDD	NE		Not Established	NE
	1,2,3,4,6,7,8-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8,9-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8-HxCDD	NE		Not Established	NE
	1,2,3,4,7,8-HxCDF	NE		Not Established	NE
	1,2,3,6,7,8-HxCDD	NE		Not Established	NE
	1,2,3,6,7,8-HxCDF	NE		Not Established	NE
	1,2,3,7,8,9-HxCDD	NE		Not Established	NE
	1,2,3,7,8,9-HxCDF	NE		Not Established	NE
	1,2,3,7,8-PeCDD	4.6		DTSC Residential CHHSL	NE
	1,2,3,7,8-PeCDF	NE		Not Established	NE
	2,3,4,6,7,8-HxCDF	NE		Not Established	NE
	2,3,4,7,8-PeCDF	NE		Not Established	NE
	2,3,7,8-TCDD	4.6		DTSC Residential CHHSL	See Table A-3
	2,3,7,8-TCDF	NE		Not Established	NE
	OCDD	NE		Not Established	NE
	OCDF	NE		Not Established	NE
	TEQ Avian	16		Soil Ecological Comparison Value (ECV)	NE
	TEQ Human	50		Soil Ecological Comparison Value (ECV)	NE
	TEQ Mammals	1.6		Soil Ecological Comparison Value (ECV)	NE
Metals (mg/kg)					
	Aluminum	16,400		Background Level	NE
	Antimony	0.285		Soil Ecological Comparison Value (ECV)	See Table A-3
	Arsenic	11	*	Background Level	See Table A-3
	Barium	410	*	Background Level	See Table A-3
	Beryllium	0.672		Background Level	See Table A-3
	Cadmium	1.1	*	Background Level	See Table A-3
	Calcium	66,500		Background Level	NE
	Chromium, Hexavalent	0.83	*	Background Level	See Table A-3
	Chromium, total	39.8	*	Background Level	See Table A-3
	Cobalt	12.7	*	Background Level	See Table A-3
	Copper	16.8		Background Level	See Table A-3
	Cyanide	0.9		Soil Ecological Comparison Value (ECV)	NE
	Iron	55,000		EPA Residential RSL	NE
	Lead	8.39	*	Background Level	See Table A-3
	Magnesium	12,100		Background Level	NE
	Manganese	402	*	Background Level	NE
	Mercury	0.0125		Soil Ecological Comparison Value (ECV)	See Table A-3
	Molybdenum	1.37	*	Background Level	See Table A-3
	Nickel	27.3	*	Background Level	See Table A-3
	Potassium	4,400		Background Level	NE
	Selenium	1.47	*	Background Level	See Table A-3
	Silver	5.15		Soil Ecological Comparison Value (ECV)	See Table A-3
	Sodium	2,070		Background Level	NE
	Thallium	2.32		Soil Ecological Comparison Value (ECV)	See Table A-3
	Vanadium	52.2	*	Background Level	See Table A-3
	Zinc	58	*	Background Level	See Table A-3

TABLE 2.4-1
Reference List of Potentially Applicable Analytes and Associated Screening Levels
Groundwater Remedy Operation and Maintenance Manual (Volume 4: Soil Management Plan)
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Pesticides (µg/kg)				
	4,4-DDD	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	4,4-DDE	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	4,4-DDT	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	Aldrin	33	DTSC Residential CHHSL	See Table A-3
	alpha-BHC	77	EPA Residential RSL	NE
	alpha-Chlordane	430	DTSC Residential CHHSL	See Table A-3
	beta-BHC	270	EPA Residential RSL	NE
	delta-BHC	77	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table A-3
	Endo sulfan I	370,000	EPA Residential RSL	NE
	Endo sulfan II	370,000	EPA Residential RSL	NE
	Endosulfan sulfate	370,000	EPA Residential RSL	NE
	Endrin	21,000	DTSC Residential CHHSL	See Table A-3
	Endrin aldehyde	21,000	DTSC Residential CHHSL	NE
	Endrin ketone	21,000	DTSC Residential CHHSL	NE
	gamma-BHC (Lindane)	500	DTSC Residential CHHSL	See Table A-3
	gamma-Chlordane	430	DTSC Residential CHHSL	See Table A-3
	Heptachlor	130	DTSC Residential CHHSL	See Table A-3
	Heptachlor Epoxide	53	EPA Residential RSL	See Table A-3
	Methoxychlor	340,000	DTSC Residential CHHSL	See Table A-3
	Toxaphene	460	DTSC Residential CHHSL	See Table A-3
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	22,000	EPA Residential RSL	NE
	2-Methyl naphthalene	310,000	EPA Residential RSL	NE
	Acenaphthene	3,400,000	EPA Residential RSL	NE
	Acenaphthylene	1,700,000	EPA Residential RSL	NE
	Anthracene	17,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	38	DTSC Residential CHHSL	NE
	Benzo (a) anthracene	380	EPA Residential RSL	NE
	Benzo (a) pyrene	38	DTSC Residential CHHSL	NE
	Benzo (b) fluoranthene	380	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,700,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	380	EPA Residential RSL	NE
	Chrysene	3,800	EPA Residential RSL	NE
	Dibenzo (a,h) anthracene	110	EPA Residential RSL	NE
	Fluoranthene	2,300,000	EPA Residential RSL	NE
	Fluorene	2,300,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	380	EPA Residential RSL	NE
	Naphthalene	3,600	EPA Residential RSL	NE
	PAH High molecular weight	1,160	Soil Ecological Comparison Value (ECV)	NE
	PAH Low molecular weight	10,000	Soil Ecological Comparison Value (ECV)	NE
	Phenanthrene	1,700,000	EPA Residential RSL	NE
	Pyrene	1,700,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	3,900	EPA Residential RSL	See Table A-3
	Aroclor 1221	140	EPA Residential RSL	See Table A-3

TABLE 2.4-1
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PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1232	140	EPA Residential RSL	See Table A-3
	Aroclor 1242	220	EPA Residential RSL	See Table A-3
	Aroclor 1248	220	EPA Residential RSL	See Table A-3
	Aroclor 1254	220	EPA Residential RSL	See Table A-3
	Aroclor 1260	220	EPA Residential RSL	See Table A-3
	Aroclor 1262	220	EPA Residential RSL	See Table A-3
	Aroclor 1268	220	EPA Residential RSL	See Table A-3
	Total PCBs	204	Soil Ecological Comparison Value (ECV)	See Table A-3
Semivolatile Organic Compounds (µg/kg)				
	1,1´-Biphenyl	3,900,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	18,000	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,800,000	EPA Residential RSL	NE
	2,4-Dichlorophenol	180,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,200,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	120,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,600	EPA Residential RSL	See Table A-3
	2,6-Dinitrotoluene	61,000	EPA Residential RSL	NE
	2-Chloro naphthalene	6,300,000	EPA Residential RSL	NE
	2-Chlorophenol	63,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,100,000	EPA Residential RSL	See Table A-3
	2-Nitroaniline	183,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,100	EPA Residential RSL	NE
	3-Nitroaniline	18,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	6,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,100,000	EPA Residential RSL	NE
	4-Chloroaniline	2,400	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table A-3
	4-Nitroaniline	24,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,100	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	240,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,100,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	180,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	260,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	24,000	EPA Residential RSL	NE
	Dibenzofuran	150,000	EPA Residential RSL	NE
	Diethyl phthalate	49,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	100,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	2,400,000	EPA Residential RSL	NE
	Hexachlorobenzene	300	EPA Residential RSL	See Table A-3
	Hexachloroethane	35,000	EPA Residential RSL	See Table A-3
	N-Nitroso-di-n-propylamine	69	EPA Residential RSL	NE
	N-nitrosodiphenylamine	99,000	EPA Residential RSL	NE

TABLE 2.4-1
Reference List of Potentially Applicable Analytes and Associated Screening Levels
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PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Semivolatile Organic Compounds (µg/kg)				
	Pentachlorophenol	2,490	Soil Ecological Comparison Value (ECV)	See Table A-3
	Phenol	18,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	540	Regional Water Quality Control Board (RWQCB)	NE
	TPH as gasoline	540	Regional Water Quality Control Board (RWQCB)	NE
	TPH as motor oil	1,800	Regional Water Quality Control Board (RWQCB)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	1,900	EPA Residential RSL	NE
	1,1,1-Trichloroethane	8,700,000	EPA Residential RSL	NE
	1,1,2,2-Tetrachloroethane	560	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	43,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	3,300	EPA Residential RSL	NE
	1,1-Dichloroethene	240,000	EPA Residential RSL	See Table A-3
	1,1-Dichloropropene	1,700	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	49,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	22,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	62,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.4	EPA Residential RSL	NE
	1,2-Dibromoethane	34	EPA Residential RSL	NE
	1,2-Dichlorobenzene	1,900,000	EPA Residential RSL	NE
	1,2-Dichloroethane	430	EPA Residential RSL	See Table A-3
	1,2-Dichloropropane	890	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	780,000	EPA Residential RSL	NE
	1,3-Dichlorobenzene	530,000	EPA Residential RSL	NE
	1,3-Dichloropropane	1,600,000	EPA Residential RSL	NE
	1,4-Dichlorobenzene	2,400	EPA Residential RSL	See Table A-3
	1,4-Dioxane	18,000	DTSC Residential CHHSL	NE
	2,2-Dichloropropane	890	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,100,000	EPA Residential RSL	See Table A-3
	2,4,6-Trichlorophenol	6,900	EPA Residential RSL	See Table A-3
	2-Chlorotoluene	160,000	EPA Residential RSL	NE
	2-Hexanone	210,000	EPA Residential RSL	NE
	4-Isopropyltoluene	2,100,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	150	EPA Residential RSL	NE
	Acrylonitrile	55	EPA Residential RSL	NE
	Benzene	1,100	EPA Residential RSL	See Table A-3
	Bis (2-chloroethyl) ether	210	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,600	EPA Residential RSL	NE
	Bromobenzene	300,000	EPA Residential RSL	NE
	Bromochloromethane	270	EPA Residential RSL	NE
	Bromodichloromethane	270	EPA Residential RSL	NE
	Bromoform	61,000	EPA Residential RSL	NE
	Bromomethane	7,300	EPA Residential RSL	NE

TABLE 2.4-1
Reference List of Potentially Applicable Analytes and Associated Screening Levels
Groundwater Remedy Operation and Maintenance Manual (Volume 4: Soil Management Plan)
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Volatile Organic Compounds (µg/kg)				
	Carbon disulfide	820,000	EPA Residential RSL	NE
	Carbon tetrachloride	250	EPA Residential RSL	See Table A-3
	Chlorobenzene	290,000	EPA Residential RSL	See Table A-3
	Chloroethane	15,000,000	EPA Residential RSL	NE
	Chloroform	290	EPA Residential RSL	See Table A-3
	Chloromethane	120,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	780,000	EPA Residential RSL	NE
	cis-1,3-Dichloropropene	1,700	EPA Residential RSL	NE
	Cyclohexane	7,000,000	EPA Residential RSL	NE
	Dibromochloromethane	680	EPA Residential RSL	NE
	Dibromomethane	25,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	180,000	EPA Residential RSL	NE
	Ethylbenzene	5,400	EPA Residential RSL	NE
	Hexachlorobutadiene	6,200	EPA Residential RSL	See Table A-3
	Hexachlorocyclopentadiene	370,000	EPA Residential RSL	NE
	Isophorone	510,000	EPA Residential RSL	NE
	Isopropylbenzene	2,100,000	EPA Residential RSL	NE
	m,p-Xylenes	3,400,000	EPA Residential RSL	NE
	Methyl acetate	22,000,000	EPA Residential RSL	NE
	Methyl ethyl ketone	28,000,000	EPA Residential RSL	See Table A-3
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	43,000	EPA Residential RSL	NE
	Methylcyclohexane	2,600,000	EPA Residential RSL	NE
	Methylene chloride	11,000	EPA Residential RSL	NE
	N-Butylbenzene	240,000	EPA Residential RSL	NE
	Nitrobenzene	4,800	EPA Residential RSL	See Table A-3
	N-Propylbenzene	240,000	EPA Residential RSL	NE
	o-Xylene	3,800,000	EPA Residential RSL	NE
	p-Chlorotoluene	5,500,000	EPA Residential RSL	NE
	sec-Butylbenzene	220,000	EPA Residential RSL	NE
	Styrene	6,300,000	EPA Residential RSL	NE
	tert-Butylbenzene	390,000	EPA Residential RSL	NE
	Tetrachloroethene	550	EPA Residential RSL	See Table A-3
	Toluene	5,000,000	EPA Residential RSL	NE
	trans-1,2-Dichloroethene	150,000	EPA Residential RSL	NE
	trans-1,3-Dichloropropene	1,700	EPA Residential RSL	NE
	Trichloroethene	2,800	EPA Residential RSL	See Table A-3
	Trichlorofluoromethane (Freon 11)	790,000	EPA Residential RSL	NE
	Vinyl chloride	60	EPA Residential RSL	See Table A-3
	Xylenes, total	630,000	EPA Residential RSL	NE

Notes:

This table presents a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes and screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations.

Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

Background	"Final Soil Background Investigation at Pacific Gas and Electric Company Topock Compressor Station, Needles, California" (CH2M HIll 2009c)
DTSC CHHSL	California Department of Toxic Substances Control; California human health screening levels (OEHHA 2005)
EPA RSL	United States Environmental Protection Agency Regional Screening Level, various dates. See Tables 3-1 to 3-8 of the Soil Investigation Part A Phase 1 Data Gaps Evaluation Report (CH2M HILL 2011c) for respective dates for each RSL.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis 2008)
RWQCB	"San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels, Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater" (Table K-1). May 27, 2008
*	One or more screening levels (EPA RSL, DTSC CHHSL, ECV, or Soil SL) have values lower than the background level.
NE	not established
mg/kg	milligrams per kilogram
ng/kg	nanograms per kilogram
µg/kg	micrograms per kilogram

TABLE 2.4-2

Hazardous Waste Toxicity Characteristic Levels

Groundwater Remedy Operation and Maintenance Manual (Volume 4: Soil Management Plan)

PG&E Topock Compressor Station, Needles, California

Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Asbetos							
	Asbestos	1%	NE	NE	NE	NE	NE
Dioxins and Furans							
	2,3,7,8-TCDD	0.01	0.01	NE	0.001	NE	NE
Metals							
	Antimony	500	150	NE	15	NE	NE
	Arsenic	500	50	100	5	5	D004
	[j] Barium	10,000	1,000	2,000	100	100	D005
	Beryllium	75	7.5	NE	0.75	NE	NE
	Cadmium	100	10	20	1	1	D006
	Chromium, Hexavalent	500	50	NE	5	NE	NE
	[k] Chromium, total	2,500	50	100	5	5	D007
	Cobalt	8,000	800	NE	80	NE	NE
	Copper	2,500	250	NE	25	NE	NE
	Lead	1,000	50	100	5	5	D008
	Mercury	20	2	4	0.2	0.2	D009
	[l] Molybdenum	3,500	3,500	NE	350	NE	NE
	Nickel	2,000	200	NE	20	NE	NE
	Selenium	100	10	20	1	1	D010
	Silver	500	50	100	5	5	D011
	Thallium	700	70	NE	7	NE	NE
	Vanadium	2,400	240	NE	24	NE	NE
	Zinc	5,000	2,500	NE	250	NE	NE
Pesticides							
	4,4-DDD	1	1	NE	0.1	NE	NE
	4,4-DDE	1	1	NE	0.1	NE	NE
	4,4-DDT	1	1	NE	0.1	NE	NE
	Aldrin	1.4	1.4	NE	0.14	NE	NE
	alpha-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Dieldrin	8	8	NE	0.8	NE	NE
	Endrin	0.2	0.2	0.4	0.02	0.02	D012
	gamma-BHC (Lindane)	4	4	8	0.4	0.4	D013
	gamma-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Heptachlor	4.7	4.7	0.16	0.47	0.008	D031
	Heptachlor Epoxide	4.7	4.7	0.16	0.47	0.008	D031
	Methoxychlor	100	100	200	10	10	D014
	Toxaphene	5	5	10	0.5	0.5	D015
Polychlorinated Biphenyls							
	Aroclor 1016	50	50	NE	5	NE	NE
	Aroclor 1221	50	50	NE	5	NE	NE
	Aroclor 1232	50	50	NE	5	NE	NE
	Aroclor 1242	50	50	NE	5	NE	NE
	Aroclor 1248	50	50	NE	5	NE	NE
	Aroclor 1254	50	50	NE	5	NE	NE
	Aroclor 1260	50	50	NE	5	NE	NE
	Aroclor 1262	50	50	NE	5	NE	NE
	Aroclor 1268	50	50	NE	5	NE	NE
	Total PCBs	50	50	NE	5	NE	NE

TABLE 2.4-2

Hazardous Waste Toxicity Characteristic Levels

Groundwater Remedy Operation and Maintenance Manual (Volume 4: Soil Management Plan)

PG&E Topock Compressor Station, Needles, California

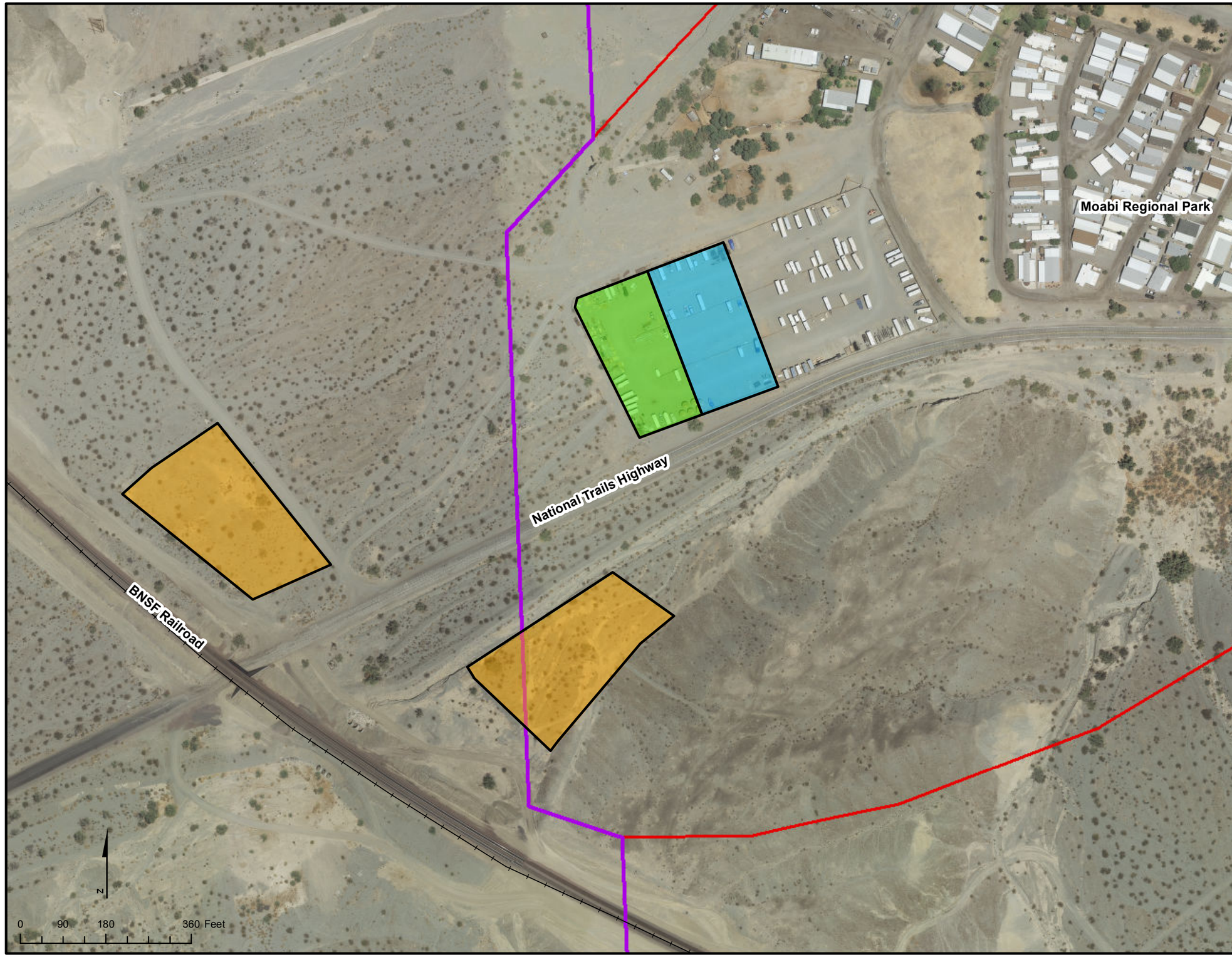
Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Polychlorinated Biphenyls							
Semivolatile Organic Compounds							
	2,4-Dinitrotoluene	NE	NE	2.6	NE	0.13	D030
g	2-Methylphenol (o-Cresol)	NE	NE	4,000	NE	200	D023
g	3-Methylphenol (m-Cresol)	NE	NE	4,000	NE	200	D024
g	4-Methylphenol (p-Cresol)	NE	NE	4,000	NE	200	D025
	Hexachlorobenzene	NE	NE	2.6	NE	0.13	D032
	Hexachloroethane	NE	NE	60	NE	3	D034
	Pentachlorophenol	17	17	2,000	1.7	100	D037
Volatile Organic Compounds							
	1,1-Dichloroethene	NE	NE	14	NE	0.7	D029
	1,2-Dichloroethane	NE	NE	10	NE	0.5	D028
	1,4-Dichlorobenzene	NE	NE	150	NE	7.5	D027
	2,4,5-Trichlorophenol	NE	NE	8,000	NE	400	D041
	2,4,6-Trichlorophenol	NE	NE	40	NE	2	D042
	Benzene	NE	NE	10	NE	0.5	D018
	Carbon tetrachloride	NE	NE	10	NE	0.5	D019
	Chlorobenzene	NE	NE	2,000	NE	100	D021
	Chloroform	NE	NE	120	NE	6	D022
	Hexachlorobutadiene	NE	NE	10	NE	0.5	D033
	Methyl ethyl ketone	NE	NE	4,000	NE	200	D035
	Nitrobenzene	NE	NE	40	NE	2	D036
	Tetrachloroethene	NE	NE	14	NE	0.7	D039
	Trichloroethene	2,040	2,040	10	204	0.5	D040
	Vinyl chloride	NE	NE	4	NE	0.2	D043

Notes:

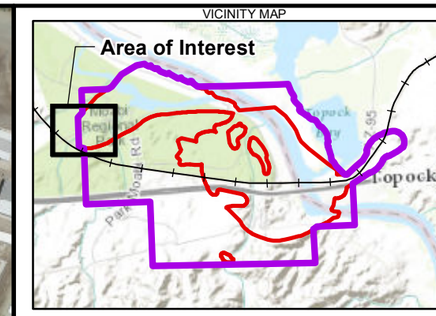
NE	not established
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
EPA HW	Environmental Protection Agency Hazardous Waste Code
TC	Toxicity Characteristic
TTLC	Total Threshold Limit Concentration
STLC	Soluble Threshold Limit Concentration
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure
WET	California Waste Extraction Test

Hazardous waste critiera exist for kepone, 2,4-D, mirex, pyridine, and 2,45-TP (Silvex); however, since they are not contaminants of potential concern at the Topock site, they are excluded from this table.

a	Total Threshold Limit Concentration (TTLC) from 22 CCR 66261.24(a)(2). Calculated based on the concentration of the elements, not the compounds.
b	Screening level is 10x Soluble Threshold Limit Concentraction (STLC). If screening level is exceeded in total analysis, California Waste Extraction Test (WET) should be run to evaluate whether STLC is exceeded.
c	Screening level is 20x RCRA Toxicity Characteristic (TC). If screening level is exceeded in total analysis, Toxicity Characteristic Leaching Procedure (TCLP) should be run to evaluate whether RCRA TC is exceeded.
d	Soluble threshold limit concentration from 22 CCR 66261.24(a)(2), measured using the WET. Calculated based on the concentration of the elements, not the compounds.
e	RCRA TC level from 22 CCR 66261.24(a)(1), measured using the TCLP.
f	A waste is assigned a RCRA waste code for each constituent where the results of the TCLP equal or exceed the RCRA TC level.
g	If o-, m- and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/L.
i	In the case of asbestos and elemental metals, the specified concentration limits apply only if the substances are in a friable, powdered or finely divided state. Asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.
j	TTLC and STLC exclude barite. TTLC excludes barium sulfate.
k	For STLC, if the waste does not exceed the RCRA TC or exhibit another RCRA hazardous characteristic, the STLC is 560 mg/L, not 5 mg/L.
l	For TTLC, excludes molybdenum disulfide.
h	Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.



VICINITY MAP



LEGEND

- Long Term Remedy Support Area (1.2 acres approx.)
- Soil Storage Area (Each 1.5 acres approx.)
- Temporary Construction Laydown Area (1.3 acres approx.)
- Area of Potential Effects (APE)
- EIR Project Area

Notes:
1. This is a conceptual layout. Locations are approximate
2. Descriptions of activities/functions anticipated for the construction support areas are included in the Construction/Remedial Action Work Plan.
3. Descriptions of activities/functions anticipated for the long-term remedy support areas are included in Section 3.5 of this BOD, and the O&M Manual.

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

FIGURE 2.4-1
SOIL STORAGE AREAS
GROUNDWATER REMEDY IMPLEMENTATION - SOIL MANAGEMENT PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\GROMM\FIG241_StagingRemedy_11x17_FC1.mxd

SECTION 3

Soil Storage

This section describes the storage procedures for soil displaced in the vicinity of the groundwater remedy system during drilling, construction, decommissioning, removal, and O&M activities at the site. Displaced soil will be segregated into the following waste streams:

- RCRA Hazardous Waste
- Non-RCRA Hazardous Waste
- Non-hazardous Waste
  - Clean soil
  - Soil for storage until project cleanup goals are defined

Soil that is classified as non-hazardous waste clean soil that is suitable for final deposition onsite will be managed following the BMPs described in Section 3.1.2 below and Appendix C, the Construction/Remedial Action Work Plan, and the Groundwater Remedy Industrial SWPPP (Appendix E of Volume 1 of this O&M Manual).

The procedures for accumulation of hazardous waste onsite shall be in compliance with California action-specific ARAR #79 (22 CCR 66262.34). In addition, containerization of hazardous waste shall be in compliance with ARAR #84 (22 CCR, Div 4.5, Ch 14, Article 9), ARAR #85 (22 CCR, Div 4.5, Ch 14, Article 10) and for RCRA hazardous waste, ARAR #86 (22 CCR Div 4.5, Ch 14, Article 12).

3.1 Methods to Store Soil

Soil will be stored in 55-gallon drums/small containers, roll-off bins, and/or stockpiles. Soil that is classified as hazardous waste and placed in containers must comply with Title 22 CCR Div. 4.5, Chapter 15, Article 9 (container management), Article 27, Article 28 and Article 28.5 (air emission standards) as required by ARAR #79, and with 22 CCR Div. 4.5, Chapter 14, Article 9 (container management) as required by ARAR #84. A BMPs Plan for soil storage is included in Appendix C of this SMP, and is summarized in the subsections below. PG&E does not anticipate utilizing any remote locations for storage of hazardous waste. If hazardous waste is encountered, it will likely be stored at the Compressor Station and/or the Transwestern Bench. In addition to these primary hazardous waste storage locations, PG&E may also store hazardous waste at the facilities at Moabi Regional Park.

3.1.1 Drums/Small Containers

Drums containing soils which are hazardous waste will be stored in a hazardous waste storage area at the Compressor Station and/or Transwestern Bench and disposed of within 90 days of generation. Drums/small containers that contain soil that may be displaced in the vicinity of the groundwater remedy system that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level, will be stored following these BMPs:

- Only DOT-specification containers will be used for soil accumulation.
- Empty drums will be inspected and inventoried upon arrival onsite for signs of contamination and/or deterioration.
- Drums and small containers will be transported to the temporary accumulation areas on wood pallets and will be secured together with non-metallic banding.
- Drums will be placed within a bermed and lined area or otherwise will be provided with secondary containment.
- Adequate aisle space (e.g., 36 inches) will be provided for containers such as 55-gallon drums to allow the unobstructed movement of personnel and equipment for inspection purposes. Drums will be placed with no more than two drums per row. The column length must fit within the lined, bermed area.

- Each drum will be provided with its own label, and labels will be visible for inspection purposes.
- Drums will remain closed except when removing or adding soil to the drum. Closed means that the lid and securing ring must be on and securely tightened.
- Drums containing hazardous waste will not be reused.

3.1.2 Stockpiles

Stockpile management procedures and practices will be implemented to reduce or eliminate pollution to the air and stormwater from materials that are stockpiled. Stockpile protection is required year-round. Any stockpiles will be stored in the staging area and outside of the roadway right-of-way. Stockpiles will be located a minimum of 50 feet away from any concentrated flow of stormwater, drainage courses, and inlets. During the rainy season, stockpiles will be covered and anchored down with gravel bags and/or sand bags.

RCRA and non-RCRA Hazardous Soil. Stockpiling of RCRA and non-RCRA hazardous waste/soil is not planned. It is anticipated that all soil that is above soil screening levels will be placed in roll-off bins or similar containers.

If it is necessary to temporarily stockpile soil classified as RCRA or non-RCRA hazardous waste for up to 90 days to facilitate characterization or staging for offsite transportation, the liner shall consist of a single sheet of material, or multiple sheets with seams that are sealed together. Hazardous waste stockpiles shall use a minimum 20-mil liner if constructed on a foundation (e.g., pavement or compacted soil) or a 60-mil liner if constructed in a location without a foundation (e.g., unpaved, uncompacted soil). Stockpiles will be inspected by a California-registered professional engineer to verify conformance with these requirements. Temporary staging for up to 90 days prior to offsite transportation will not trigger compliance with ARAR #86 (requirements for waste piles that are applicable to RCRA hazardous waste). The contents of the stockpile, including the words “Hazardous Waste” and the accumulation start date, will be posted on a sign next to the stockpile, and the contents and accumulation start date will be entered in the field logbook. Stockpiles will be inspected on a weekly basis to verify that controls to prevent run-on, runoff, and windblown dispersal of soil are in place and effective. Security and emergency response equipment will be provided as described in Section 3.5.

Non-Hazardous Soil Above Interim Screening Levels. It is anticipated that all soil that is above soil screening levels will be placed in roll-off bins or similar containers. If it is necessary to stockpile displaced soil that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level, the following BMPs will be implemented:

- Stockpiles will be constructed with liner and perimeter berm to prevent release or infiltration of liquids. Minimum 20-mil polyethylene sheeting or equivalent will be used for liners.
- Wind erosion will be prevented by use of a cover, applying Soiltac® or a similar soil stabilization product, or other suitable means. If a cover is employed it will be minimum 6-mil polyethylene sheeting or equivalent.
- The perimeter berm will be constructed of clean materials (such as hay bales or straw wattle under the liner).
- If a cover is employed, it shall extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the stockpile.
- Covers and perimeter berms will be secured in place when not in use and at the end of each workday and as necessary to prevent wind dispersion or run-off from precipitation events.
- Liquids that accumulate inside the berm will be pumped from the stockpile to a container or tank for characterization and disposal.
- If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until the stockpiles are removed from the site.
- Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind-generated particulate matter as shown on Figure 2.4-1.

- After the stockpile has been removed, all residual material shall be removed from the underlying and surrounding areas.

Non-Hazardous Clean Soil. Stockpiles of displaced soil outside of Soil RFI/RI Investigation Areas that is non-hazardous, clean, and suitable for immediate reuse will be stored following these BMPs:

- Stockpiles will be constructed with liner and perimeter berm to prevent release or infiltration of liquids. Minimum 20-mil polyethylene sheeting or equivalent will be used for liners.
- Wind erosion will be prevented by use of a cover, applying Soiltac® or a similar soil stabilization product, or other suitable means. If a cover is employed it will be minimum 6-mil polyethylene sheeting or equivalent.
- The perimeter berm will be constructed of clean materials (such as hay bales or straw wattle under the liner).
- If a cover is employed, it shall extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the stockpile.
- Covers and perimeter berms will be secured in place when not in use and at the end of each workday and as necessary to prevent wind dispersion or run-off from precipitation events.
- If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until it is removed from the site.
- Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind-generated particulate matter as shown on Figure 2.4-1.
- After the stockpile has been removed, all residual material shall be removed from the underlying and surrounding areas.

3.1.3 Roll-off Bins

- All empty roll-off bins will be inspected upon arrival onsite. Any roll-off containers arriving with contents, residual contamination, or deterioration will be rejected. Existing damage (dings, significant paint scratches, broken wheels, etc.), if not significant enough to result in rejection, will be documented upon arrival of the bin using photos and written documentation.
- Roll-off bins will be provided with covers and disposable liners.
- Covers will be properly secured, except when adding or removing soil.
- Old labels will be removed, and each bin will be provided with its own label. Labels will be visible.
- Roll-off bins containing soils that are hazardous waste will be stored in a hazardous waste storage area and disposed of within 90 days of generation.
- Roll-off bins containing clean soil can be stored anywhere on PG&E property or at other properties that have granted permission to PG&E.
- Roll-off bins that contain displaced soil that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level will be stored at designated locations. The bins will be covered and inspected at a specified frequency (see Section 3.4 for inspection frequencies).

3.2 Hazardous Waste Soil Storage Time Limit

In compliance with 22 CCR 66262.34 (California action-specific ARAR #79), non-RCRA and RCRA hazardous wastes will be removed from the site within 90 days from date of generation. The date of generation is the day that a waste is first placed in a container (drum or roll-off bin) or stockpile. Accumulation start date for containers is documented on the hazardous waste label. A log or other record shall be used to document the accumulation start date for stockpiles.

3.3 Labeling

This section describes the labeling of waste containers.

3.3.1 Hazardous Waste Soil

Labeling for hazardous waste soil and soil pending characterization that could potentially be classified as hazardous will be in accordance with 22 CCR, Division 4.5, Chapter 12 (California action-specific ARAR #78) and 49 Code of Federal Regulations (CFR) 172, 173, and 178. Labels will include the type of waste, location from which the waste was generated, and accumulation start date. “Remediation Waste” will be written on the container with a paint pen, or on a blank label on the side of the container. Containers and roll-off bins used to store/accumulate hazardous waste will be labeled with a pre-printed “Hazardous Waste” label specific to California, with the following information:

- Accumulation start date
- Generator name, address, and phone number
- USEPA ID number
- Waste codes
- Description of waste, including hazardous properties and physical state
- DOT shipping description

Prior to transport, the manifest number will be added to each label. Soil pending characterization that could potentially be classified as hazardous will be labeled with the hazardous waste label described above, except that the waste codes and DOT shipping description will not be entered until the analytical results are received. An “Analysis Pending” or “Waste Material” label, which is a temporary or handwritten label, will be placed next to the hazardous waste label until analytical results are received and reviewed. This label will include generator information, type and location of waste, and the accumulation start date. The waste codes and DOT shipping description must be entered on the Hazardous Waste label, and the Analysis Pending label must be removed, within 10 days of receipt of the analytical results.

The appropriate DOT hazard class label will also be placed on the container prior to loading onto the transport vehicle.

3.3.2 Non-Hazardous Soil

Containers and roll-off bins used to store/accumulate non-hazardous soil will be labeled as follows:

- Place a “Non-hazardous Clean Soil” label on containers/roll-off bins containing soil determined to be suitable for onsite reuse. This is a handwritten label with the following information:
  - Material origin – Specific location of the site
  - Material description (e.g., soil, rock, etc.)
  - Date(s) of displacement or accumulation
  - Generating activity (e.g., drilling, excavation, etc.)
- Place a “Non-hazardous Soil for Storage” label on containers/roll-off bins containing soil identified for storage pending development of project-specific cleanup goals. This is a handwritten label with the following information:
  - Material origin – Specific location of the site
  - Material description (e.g., soil, rock, etc.)
  - Date(s) of displacement or accumulation
  - Generating activity (e.g., drilling, excavation, etc.)
- Different color labels will be used to distinguish between “Non-Hazardous Clean Soil” and “Non-Hazardous Soil for Long-Term Storage.”

3.4 Inspections

In compliance with 22 CCR 66264.15 (California action-specific ARAR #76), soil accumulation or storage areas for hazardous waste will be inspected at a frequency specified in the BMPs Plan (Appendix C) for malfunctions, deterioration, discharges, and leaks that could result in a release.

- Containers and roll-off containers will be inspected for proper closure, leaks, signs of corrosion, or signs of general deterioration, proper labeling, and accumulation time.
- Stockpiles will be inspected for liner, cover, and berm integrity and to check that controls for windborne dispersion and run-on and run-off control are functioning properly.
- Secondary containment structures will be inspected for integrity and accumulation of liquids.
- All areas will be inspected to ensure that good housekeeping practices are maintained.

Any deficiencies observed during inspection will be corrected upon discovery, and corrective measures will be documented. The employee inspecting the storage areas will be responsible for documenting the deficiency and implementing its remedy.

Appropriate measures may include transfer of waste from leaking container to new container, replacement of liner or cover, or repair of containment berm. Copies of inspection reports and corrective measures will be maintained onsite and will be available for review.

As part of BMPs, soil storage areas for displaced soil that has been classified as non-hazardous soil above interim screening levels and non-hazardous clean soil will be inspected on a monthly basis as specified in the BMPs Plan (Appendix C).

3.5 Security/Emergency Response

In compliance with 22 CCR 66264.14 (California action-specific ARAR #76), a barrier, such as temporary fencing, will be provided for hazardous waste accumulation areas. PG&E does not anticipate utilizing any remote locations for storage of hazardous waste. If hazardous waste is encountered, it will likely be stored at the Compressor Station and/or the Transwestern Bench. In addition to these primary hazardous waste storage locations, PG&E may also store hazardous waste at the facilities at Moabi Regional Park.

Hazardous waste soil accumulation areas will also have signs that provide 24-hour emergency contacts and telephone numbers. Hazardous waste accumulation areas will contain emergency response equipment appropriate to applicable waste hazards. The project-specific HSPs will identify the project emergency response procedures and equipment, including emergency response contacts and phone numbers.

In addition to the project-specific HSP procedures, hazardous waste accumulation areas will be provided with fire extinguishers, decontamination equipment including an eye wash station, and an alarm system (if radio equipment is not available to all staff working in accumulation area).

SECTION 4

Hazardous Waste Training, Profiling, Transportation, and Disposal

This section describes guidelines for waste management training, waste profiling, transportation for offsite disposal, and disposal of displaced soil that is classified as a hazardous waste. The previously established practice at the site is that transportation within the plume boundary is considered to be onsite transportation. Consistent with this practice, transportation of soil within the project's APE is considered to be onsite transportation for purposes of complying with hazardous waste requirements.

4.1 Employee Training for Waste Soil Management

In compliance with 22 CCR 66264.16 (California action-specific ARAR #76), field personnel that will manage hazardous or potentially hazardous waste will obtain:

- Hazardous waste management training that meets the requirements of 22 CCR 66265.16, and that will address how to implement applicable provisions of the hazardous waste contingency plan and how to perform job duties related to hazardous waste management in a manner that complies with hazardous waste regulatory requirements. Each employer working at the site is responsible for providing this training to their employees. The specific content of this training will vary by employer and by job function.
- On-the-job training (as applicable to the job description), including:
  - Project-specific HSP review that requires each site worker and guests to review and sign the plan
  - Activity hazard analysis and daily "tailgate" meetings
  - Project-specific Work Plan review (e.g., this SMP)
  - DOT hazardous material training (49 CFR 172.704)

Training documentation will be maintained and will include the job title for each position involving hazardous waste soil management and the name of the person filling the job, written job description including skills and required qualifications, description of type and amount of continuing training given, and records that document training or job experience.

4.2 Hazardous Waste Profiling

As discussed in Section 2, displaced soil from in and near Soil RFI/RI Investigation Areas will be screened to assess whether it is hazardous using prior knowledge of the soil and sample analytical results. However, in some cases, offsite disposal facilities may require additional analyses to evaluate the soil waste stream prior to acceptance. The purpose of pre-disposal profiling of the hazardous waste soil identified for offsite disposal is to characterize the appropriate disposal method and location.

Ultimately, the profile of the waste must meet the acceptance criteria of the disposal facility and be in compliance with all pertinent federal, state, and local regulations. Characterization will be documented on a waste profile form provided by the offsite treatment or disposal facility as part of the waste acceptance process. An approved copy of the waste profile will be received prior to offsite transportation of the material.

4.3 Manifests/Shipping Documentation

In compliance with 22 CCR 66262.20 and 66262.22 (California action-specific ARAR #77), each load of soil classified as hazardous waste will be manifested prior to leaving the site. The hazardous waste manifest (USEPA Form 8700-22) is the shipping document for tracking shipments of hazardous waste from the site to the final disposal facility.

Additionally, each shipment of waste soil will also have a haul ticket. If the signed hazardous waste manifest from the designated offsite facility is not received within 35 days, PG&E will contact the transporter or the designated

facility to determine the status of the waste. All communications will be documented. If the signed hazardous waste manifest has not been received within 45 days, PG&E will prepare an Exception Report and submit it to the State of California, as required under 22 CCR 66262.42.

4.4 Department of Transportation (DOT) Requirements

Requirements under 49 CFR 171-178 (DOT) and 22 CCR 66262.30 through 66262.33 (California action-specific ARAR #78) and the CD (DOI 2013) will apply to all offsite shipments of soil that is classified as hazardous waste. The information contained in this section is provided as a general guide. Requirements specific to each hazardous waste will be determined in the field. It is the responsibility of a DOT-trained individual to ensure that the requirements of 49 CFR 171-178 are met.

4.4.1 Shipping Name

Each shipment will be properly classified using the Hazardous Materials Table in 49 CFR 172.101. All determinations will be made by DOT-trained personnel.

4.4.2 Packaging, Marking, and Labeling

The shipping name, hazard class, identification number, technical names (if applicable), USEPA markings and waste code numbers, and consignee/consignor designations will be marked on packages for shipment (49 CFR 172.301). Once a waste is characterized, reference will be made to the Hazardous Materials Table in 49 CFR 172.101 to determine the appropriate label.

4.4.3 Placards

Appropriate placards will be determined by DOT-trained personnel. Specific placard descriptions are found starting at 49 CFR 172.521. If a placard is required, it will be affixed on each side and each end of the vehicle. It is the shipper's responsibility to provide the proper placards for their shipment if the transporter does not have them.

4.5 California Transportation Requirements

California hazardous waste regulations (22 CCR Division 4.5, Chapter 13) require that anyone engaged in the transportation of hazardous waste within California must possess a valid hazardous waste hauler registration issued by DTSC.

4.6 Transporter Requirements

Each transportation vehicle and load of hazardous waste will be inspected before leaving the site and will be documented. A PG&E representative will verify that the driver has the appropriate class of driver's license with appropriate endorsements for the class of vehicle being driven before loading hazardous waste onto the vehicle. The quantities of hazardous waste leaving the site will be recorded on a transportation and disposal log. The transporter must be registered with DTSC as a hazardous waste hauler, have a USEPA Identification number, and must comply with transportation requirements outlined in 49 CFR 171-179 (DOT) and 22 CCR 66262.33 (California action-specific ARAR #78).

The transporter will be responsible for ensuring that loaded trucks comply with all applicable weight limits. For each load of material, weight measurements will be obtained for each full and empty container and dump truck. Disposal quantities will be based on the difference of weight measurements between the full and empty container or dump truck. Weights will be recorded on the waste manifest and weight ticket by the disposal facility.

The transporter will observe the following practices when hauling and transporting hazardous waste offsite:

- Minimize impacts to general public traffic.
- Trucks/trailers and roll-off bins used for hauling hazardous or regulated waste will be lined and covered with a tarp or ridged closure before transport to comply with EIR mitigation measure HAZ-2f and to prevent spills or releases.

- Decontaminate exterior of vehicle using dry methods as necessary prior to leaving the site.
- Wastes or materials from other projects may not be combined with wastes generated during this project.
- All personnel involved in offsite disposal activities will follow safety and spill response procedures outlined in project-specific HSPs.

4.7 Spill Reporting

In the event of a spill or release of hazardous waste, the transporter must immediately notify a PG&E representative**.** The following information about the spill will be reported and recorded:

- Type of material (for example, soil) and contaminant
- Location
- Estimated volume
- Media affected (for example, spilled on concrete pad or soil)
- Time of spill/release
- Final disposition of spilled material

The transporter will also report any spill or release of hazardous waste, as required by 49 CFR 171.15, to the National Response Center at 800/424-8802 or 202/426-2675. The transporter will also report, in writing, as required by 49 CFR 171.16, to the Director, Office of Hazardous Materials Regulations, Materials Transportation Bureau, Department of Transportation, Washington D.C. 20590.

4.8 Spill Response

The transporter will clean up any spill or release of hazardous waste (including soil) that occurs during transportation or will take such action as may be required or approved by federal, state, or local officials. Spilled waste will be immediately cleaned up, including soils on the outside of the trucks, the truck and/or container, or road surface. Where appropriate, the spilled material will be returned to the original waste container. Regardless, the spilled material will be properly contained and disposed.

4.9 Waste Disposal

Soil classified as RCRA or non-RCRA hazardous waste will be disposed of at an appropriately permitted facility. In accordance with the requirements of the CD (DOI 2013), prior to the first shipment of waste material offsite, and annually thereafter, PG&E will demonstrate to DOI's satisfaction that USEPA has determined that the proposed receiving facility is operating in compliance with 42 U.S.C. § 9621(d)(3) and 40 CFR § 300.440. If PG&E knows or has reason to know the facility no longer meets the criteria of 40 CFR § 300.440(b), PG&E will inform DOI, propose an alternate receiving facility prior to any subsequent shipments, and demonstrate to DOI's satisfaction that USEPA has determined that the alternate receiving facility is operating in compliance with 42 U.S.C. § 9621(d)(3) and 40 CFR § 300.440. The waste material will be stored onsite in accordance with this waste management plan until approval is received and the waste material is transported offsite. If the waste management facility is out-of-state, prior to the first shipment of waste material, PG&E will provide written notice for disposal of waste material at the listed facilities to the appropriate State environmental official in each receiving facility's State and the DOI Project Manager.

SECTION 5

Recordkeeping

California action-specific ARAR #80 (22 CCR 66262.40) requires that hazardous waste manifests, biennial reports, exception reports, and waste analysis and waste determination records be retained for three years. Further, 22 CCR 66262.41 requires large quantity generators of RCRA hazardous waste to submit a biennial report to USEPA by March 1 of each even-numbered year that describes hazardous waste generated in the previous odd-numbered year. In addition, the CD (DOI 2013) requires that project-related records be retained until 10 years after receipt of the Certificate of Completion. The following records and documents will be maintained for the hazardous waste:

- Transportation and offsite disposal records, including:
  - Profiles and associated characterization data
  - Manifests, Land Disposal Restriction (LDR) notifications/certifications, bills of lading, and weight tickets
  - Offsite facility waste receipts, certificates of disposal/destruction/recycle
  - Trucking logs
- Training records
- Inspection records

In addition, in accordance with the Management Protocol for Handling and Disposition of Displaced Site Material, PG&E will maintain a Displaced Material Inventory for all displaced soil, which will include:

- Material origin – Specific location of the site.
- Material description (e.g., soil, rock, etc.).
- Date(s) of displacement or accumulation.
- Generating activity (e.g., drilling, excavation, etc.).
- Approximate volume of material stored.
- Short-term storage mode and location – Type of storage (including container identification number, as applicable) and location of short-term storage pending soil characterization. In some cases, this information may need to be updated as containers are moved between areas of the site.
- Characterization status – Characterization sample information (e.g., date of submittal and laboratory used), date of receipt of results, and the contamination assessment based on comparison to screening criteria (as discussed in Section 2.3).
- Storage mode and location – Type of storage (including container identification number, as applicable) and location of storage pending decision regarding final disposition. This information may need to be updated as containers are moved between areas of the site.
- Final disposition information – Indication of the onsite or offsite final disposition action identified through discussion with the Tribe(s), Agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment.

SECTION 6

Soil Management Plan Updates

PG&E developed this SMP using current 90% design specifications for the groundwater remedy, current understanding of historical site activities, and available soil data. The SMP will be a “living document” that will continue to be updated as new information is obtained through the Soil RFI/RI investigations and as the groundwater remedy moves from the 90% design phase to the final design. An addendum to the SMP will also be prepared after the implementation of the Baseline SAP to document sampling results and refine soil classification volumes.

Areas of soil disturbance associated with groundwater remedy activities may be modified between the 90% and final design. As the soil program advances through the RCRA/CERCLA processes, PG&E will also obtain a better understanding of existing soil conditions across the site by collecting additional analytical data, performing a risk assessment, and (if necessary) developing a Corrective Measures Study/Feasibility Study that will develop project-specific goals and determine appropriate soil remedy(ies). In addition, screening levels included in Tables 2.4-1 and 2.4-2 will be updated as applicable regulations and project-specific decisions are made. PG&E will review all such new relevant information as it becomes available, incorporate it into the SMP as appropriate, and submit the revisions and addenda to the SMP to the regulatory agencies for review and approval.

After the 90% design stage, the following changes are anticipated for the SMP:

- Revise the SMP as needed at the final design stage, and submit for approval with the final design. Goal is to incorporate new information obtained from soil investigations, as appropriate, into the SMP submitted for approval. It is anticipated that soil investigations will commence in early 2015 prior to the start of groundwater remedy construction later in 2015.
- Prepare an addendum to the SMP to incorporate results from implementation of the Baseline SAP (as part of the groundwater remedy construction).

SECTION 7

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Appendix A
Groundwater Remedy Implementation—Baseline Soil Sampling and Analysis Plan

Groundwater Remedy Implementation—Baseline Soil Sampling and Analysis Plan, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is implementing the selected groundwater remedy of chromium at the Topock Compressor Station (Compressor Station) in San Bernardino County, Needles, California. The selected remedy consists of the following five primary components:

- In-Situ Reactive Zone (IRZ)
- Inner Recirculation Loop
- Freshwater Injection System
- Institutional Controls (ICs)
- Monitored Natural Attenuation (MNA)

Three components for the groundwater remedy system—IRZ, Inner Recirculation Loop, and Freshwater Injection System—involve construction and installation of infrastructure such as pipelines, pipe trenches, buildings, tanks, electrical equipment, and remediation/monitoring wells, and are the focus of this Sampling and Analysis Plan (SAP).

To document baseline soil conditions prior to groundwater remedy implementation, this SAP has been developed to provide the approach and methods to collect and analyze soil samples in the areas used by the groundwater remedy, as designed at the 90% stage. In addition, the SAP also includes the collection of data to assist with the management of materials displaced during construction activities, in accordance with the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E 2012) (Appendix B of the Soil Management Plan) that was developed by a subgroup consisting of representatives from PG&E, Agencies, Interested Tribes, and other stakeholders. The process for assessing the baseline data for management of displaced materials is described in the main text of the Soil Management Plan (SMP).

In areas where groundwater remedy infrastructure is within 20 feet of or overlaps with Soil Investigation Areas, the approach presented in this SAP has been fully coordinated with the current RCRA Facility Investigation/Remedial Investigation (RFI/RI) (CH2M HILL 2013) planning activities to minimize the total number of soil samples to be collected and associated ground disturbances, as well as to ensure consistency between the groundwater and soil programs at Topock. Figures A-1, A-1A, A-2, and A-3 show these overlapping areas (or areas within 20 feet) (tables and figures are presented at the end of this appendix). As shown, remedy infrastructure proposed at this 90% design stage (i.e., excluding future provisional wells) is within 20 feet of or overlaps with the following eighteen Soil Investigation Areas:

- AOC 1 – Area Around Former Percolation Bed
- AOC 4 - Debris Ravine
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Locker
- AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10 – East Ravine
- AOC 11 – Topographic Low Areas
- AOC 12 – Fill Areas
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 17 – Onsite Septic System
- AOC 18 – Combined Hazardous Waste Transference Pipelines

- AOC 22 – Unidentified Three-sided Structure
- AOC 27 – MW-24 Bench
- AOC 28 – Pipeline Drip Legs
- AOC 30 – MW 20 Bench
- AOC 33 – Potential Former Burn Area near AOC 17
- Perimeter Area outside of but adjacent to the Compressor Station fence line
- Storm Drain System

The following sections discuss the sampling and analytical approach (Section 2); sampling methods, sample management, and shipping (Section 3); procedures for waste management and decontamination (Section 4); data management and reporting (Section 5); references (Section 6); and certification (Section 7). The final SAP will receive a professional stamp by Keith Sheets, CH2M HILL's supervising California-registered Professional Geologist.

2.0 Sampling and Analytical Approach

Baseline soil samples will be collected along the remedy pipelines/conduits alignments, which include direct burial pipelines/conduits, pipeline trenches, and the remediation wells (i.e., injection and extraction wells) that are connected to those pipelines, as well as at the new remedy monitoring well locations. The exception is that baseline soil sampling will not occur along the alignment of the freshwater pipeline in Arizona, and on the California side, leading to the Compressor Station. The freshwater pipeline will contain groundwater pumped from water supply well(s) installed on the Havasu National Wildlife Refuge (HNWR) in Arizona, near the Topock Marsh. Because inorganic compounds are present in the fresh water at such low concentrations, soil underlying the pipeline would not be adversely impacted by inorganic compounds from incidental releases, spills or leaks from the pipeline. All other remedy pipeline alignments will be part of the baseline sampling plan and will follow the sampling guidelines provided below and presented in Figure A-4 .

Baseline soil samples will also be collected at locations of remedy structures/buildings following the sampling guidelines below and presented in Figure A-5.

Where practicable, proposed sample locations are located near existing roads or in other disturbed areas to minimize the potential for impacts to sensitive resources (cultural, historical, and/or biological). Access routes used to collect baseline soil samples are expected to be the same routes used to construct and install the remedy infrastructure. Qualified biologists and cultural resource consultants will be consulted during the selection of final sampling locations.

2.1 Pipeline Alignment (including Connecting Remediation Wells)

The remedy pipeline/conduit alignments will be installed both above and below ground. To assess baseline conditions along the pipeline/conduit alignments, soil samples will be collected approximately every 500 linear feet along the proposed pipeline/conduit runs. If pipelines/conduits are aboveground, baseline soil samples will be collected at 0.5 foot below ground surface (bgs). If pipelines/conduits alignments are underground, then soil samples will be collected at the bottom of the trench if the pipelines/conduit alignments are outside Soil RFI/RI Investigation areas. Except as noted below, if the pipelines/conduit alignments are in or within 20 feet of Soil RFI/RI Investigation Areas, a soil sample will be collected at 1 foot bgs and at the bottom of the trench to assess conditions for management of disturbed soil.

Proposed remedy pipelines/conduits alignments intersect seventeen Soil RFI/RI Investigation Areas as shown on Figures A-1 and A-1A. These seventeen investigation areas are currently undergoing investigations under the Soil RFI/RI program:

- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Locker

- AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10 – East Ravine
- AOC 11 – Topographic Low Areas, including the two new areas
- AOC 12 – Fill Areas
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 17 – Onsite Septic System
- AOC 18 – Combined Hazardous Waste Transference Pipelines
- AOC 22 – Unidentified Three-sided Structure (in upper yard)
- AOC 28 –Pipeline Drip Legs
- AOC 30 – MW 20 Bench
- AOC 33 – Burn Area near AOC 17
- Perimeter Area
- Storm Drain System

As part of the Soil RFI/RI, soil samples will be collected from several samples locations within these seventeen areas. To minimize disturbance and potential impacts to sensitive resources, baseline soil samples will not be collected along a pipeline segment if soil RFI/RI Investigation proposed sample locations and/or existing soil data locations are located within 20 feet of the pipeline/conduit run and meet the criteria of the baseline sample program. Proposed Soil RFI/RI sample locations and existing soil data locations pertinent to this baseline sampling plan are shown in Figures A-1 and A-1A. Figure A-4 shows the decision process that will be used to collect baseline soil samples along the pipelines/conduits.

Baseline soil samples will be analyzed for PAHs, sodium, and Title 22 metals in order to assess potential affects to soil associated with the operation of the groundwater remedy and to provide pre-characterization information prior to remedy construction. Title 22 metals is standard testing methodology for assessment of metals, and includes certain metals that are generally of concern at the Topock Compressor Station. If a baseline soil sample location is within 20 feet of a Soil RFI/RI Investigation Area, the sample will also be analyzed for the Soil RFI/RI Investigation Area analytical suite as presented in Table A-1.

2.2 Remedy Structures

A number of remedy structures are proposed to be constructed to support the groundwater remedy system. A majority of the proposed structures will be within the Compressor Station fence line, the Transwestern Bench, and the MW-20 Bench as shown in Figures A-1 and A-1A. There are a few miscellaneous structures that will also require baseline sampling, including well vaults and soil storage areas as well as the satellite maintenance and storage yard at Moabi Regional Park. The following is a list of key remedy structures; these structures are also shown in Figures A-1, A-1A, and A-2:

- **Structures Located Inside the Compressor Station**
  - Remedy-Produced Water Conditioning Plant
  - Conditioned Water Storage Tanks and Secondary Containment
  - Influent Water Storage Tanks and Secondary Containment
  - Freshwater Storage Tank
  - Air Compressor Building
  - Decontamination Pad (occupies the same footprint as the Contingent Freshwater Pre-injection Treatment Building)
  - Contingent Storage Tanks associated with the Contingent Freshwater Pre-injection Treatment System
  - Relocated Hazardous Waste Storage Area
- **Structures Located at the Transwestern Bench**
  - Operation Building
  - Carbon Amendment Building
  - Carbon Storage Tank
  - Leach Field

- **Structures Located at the MW-20 Bench**
  - Carbon Amendment Building
  - Carbon Storage Tank
- **Other Remedy Structures**
  - Well Vaults
  - Soil Storage/Management at Moabi Regional Park
  - Long term remedy support area at Moabi Regional Park (this area will also be used as the main construction yard during remedy construction)

To assess baseline conditions in areas where remedy structures will be constructed, soil samples will be collected on a 50-foot grid, or a minimum of one sample location within each remedy structure footprint. Soil samples will be collected at 0.5 foot below the proposed remedy structure. If the remedy structure is being constructed over an existing structure footprint, baseline soil samples will be collected only if the former structure's foundation is being removed and exposing underlying soil. Surface soil samples (0.5 foot below the ground surface) will be collected on a 100-foot grid in the soil storage areas and the satellite maintenance and storage yard at Moabi Regional Park.

The currently proposed remedy structures are located within 20 feet of or overlap six Soil RFI/RI Investigation Areas. These Soil RFI/RI Investigation Areas and their associated analytical suites are included in Table A-1 and are currently undergoing investigations under the Soil RFI/RI program:

- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Locker
- AOC 11 – Topographic Low Areas, including the two new areas
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 17 – Onsite Septic System
- AOC 30 – MW 20 Bench

As part of the Soil RFI/RI, soil samples will be collected from several sample locations within these six Soil RFI/RI areas. To minimize disturbance and impacts to sensitive resources, baseline soil samples will not be collected within the remedy structure footprint if soil RFI/RI Investigation proposed sample locations and/or existing soil data points are located within the proposed structure footprint or within 20 feet of the footprint and meet the criteria of the baseline sample program. Figure A-5 shows the decision process that will be used to collect baseline soil samples within remedy structure footprints.

Baseline soil samples will be analyzed for Title 22 metals, PAHs, and sodium. Except as noted below, if the baseline soil sample location is within 20 feet of or overlaps a Soil RFI/RI Investigation Area, the sample will also be analyzed for the same analytical suite for that Soil RFI/RI Investigation Area as presented in Table A-1.

In addition, select baseline sample locations will be used to collect geotechnical data to support the groundwater remedy design. The areas where geotechnical samples will be collected have been identified and are included in the 90% Basis of Design Report, Appendix C.

2.3 New Monitoring Well Locations

A number of new monitoring wells are proposed to be installed to support the groundwater remedy system. To assess baseline conditions in areas where the monitoring wells will be installed, one soil sample will be collected at each new monitoring well location at 1.0 feet bgs. Baseline soil samples will be analyzed for Title 22 metals and sodium. If the baseline soil sample location is within 20 feet of or overlaps a Soil RFI/RI Investigation Area, the sample will also be analyzed for the same analytical suite for that Soil RFI/RI Investigation Area as presented in Table A-1.

The new monitoring well locations intersect nine Soil RFI/RI Investigation Areas:

- AOC 1 – Area Around Former Percolation Bed
- AOC 10 – East Ravine

- AOC 11 – Topographic Low Areas, including the two new areas
- AOC 12 – Fill Areas
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 27 – MW-24 Bench
- AOC 28 – Pipeline Drip Legs
- AOC 30 – MW 20 Bench
- Perimeter Area

3.0 Sampling Methods, Sample Management, and Shipping

For consistency between the groundwater remedy and the Soil RFI/RI program, soil sample collection and handling activities will follow the standard operating procedures (SOPs) included in the Revised Final Soil RFI/RI Work Plan. Those SOPs are also included in Attachment 1 of this SAP. Sample containers, preservation, and hold times are summarized in Table A-1A.

3.1 Sample Management and Storage

Samples will be placed immediately into field coolers with ice; VOC and TPH-gasoline containers will be arranged in the sample cooler standing upright. The field coolers will be taken to the sample management area, where the samples will be transferred into a refrigerator and/or freezer. If transport of a sample to the laboratory is scheduled for a pickup more than 24 hours after sampling, samples will be stored in the freezer.

3.2 Shipping

Samples collected for chemical analysis will be transported to the laboratory via courier, generally daily. Chains-of-custody will accompany all samples to the laboratory.

4.0 Waste Management and Decontamination

The approach for investigation-derived waste (IDW) management and equipment decontamination is presented in the following subsections.

4.1 Equipment Decontamination

If used for sample collected, the downhole drilling tools, tracks on track rigs, and the back ends of the drilling rigs will be decontaminated prior to arrival at the site and will be cleaned between investigation areas as determined necessary by the field team leader. In addition, a visual inspection will be conducted between boring locations to determine if decontamination is necessary. Decontamination will be accomplished by steam-cleaning or pressure washing the core barrel, drill stem, drive casing, and back of the drilling rig. Equipment may also be cleaned using dry methods prior to leaving an excavation area to prevent the tracking of material out of the area. The backs of drill rigs and down-hole drilling tools will be decontaminated before arrival at the site.

Steam-cleaning or pressure washing will be conducted on the decontamination pad located at the Transwestern Bench. Rinseate from the decontamination operation will be collected on the containment pad and will be transferred to the cuttings bin/drum or portable storage tank. Rinseate will be processed at the IM-3 treatment plant, the new remedy-produced water conditioning plant, or transported to a PG&E-contracted offsite disposal facility.

4.2 Investigation-derived Waste Management

Several types of waste materials will be generated during the drilling and sampling of soil borings, excavation of potholes, and hand excavation for utility clearance. IDW materials that will be generated include drill cuttings, incidental trash, equipment decontamination water, and possibly small quantities of soil from pothole or hand excavation areas. The IDW will be handled in accordance with the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E 2012).

Drill cuttings include fragments of rock and soil that are removed to create the borehole. The cuttings will be contained in drums or lined roll-off bins at staging areas during drilling and sampling activities. After sampling and characterization, drums and bins will be removed from the staging areas. If cuttings or soil are free from

contaminants (below interim screening levels presented in Table A-2), material will be designated appropriate for reuse on site. Cuttings and any soil from excavation areas that exceed the hazardous waste characteristic levels presented in Table A-3 will be considered contaminated and transported to a permitted offsite disposal facility. Cuttings and any soil from excavation areas that are below hazardous waste characteristic levels, but above interim screening levels, will be managed following protocols prescribed in this Soil Management Plan.

Water generated during equipment decontamination will be collected in bins or portable storage tanks temporarily located in staging areas near the drilling sites or at the Compressor Station as needed. Secondary containment will be set up at the drilling area for the portable storage tanks or bins. Rinseate will be processed at the IM No. 3 treatment plant, the new remedy-produced water conditioning plant, or transported to a PG&E-contracted offsite disposal facility.

Incidental trash will be collected at the end of each drilling shift and will be disposed of properly.

5.0 Data Management and Reporting

The electronic data will be used to generate validation reports, data summary tables, and figures. Management of data generated from baseline soil sampling will be conducted in a manner that is consistent with the Soil RFI/RI program.

5.1 Data Validation

Data validation will be carried out when the data packages are received from the laboratory. It will be performed on an analytical batch basis using the summary results of calibration and laboratory quality control, as well as those of the associated field samples. Data packages will be reviewed for all analytes. Raw data will be reviewed when deemed necessary. Data validation procedures will include:

- Review of the data package for completeness.
- Review of chain-of-custody records for discrepancies that might degrade data quality.
- Review for compliance with holding time and quality control frequency requirements.
- Evaluation of all calibration and quality control summary results against the project requirements.
- Verification of analyte identification and calculations for at least 10 percent of the data.
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations.
- Initiation of corrective actions, as necessary, based on the data review findings.

Data validation procedures follow the United States Environmental Protection Agency (USEPA) *Contract Laboratory National Functional Guidelines for Inorganic Data Review* (USEPA 2002) and *Contract Laboratory National Functional Guidelines for Organic Data Review* (USEPA 1999), substituting the qualifiers, the calibration and quality control requirements specified in the *PG&E Program Quality Assurance Project Plan, Revision 2* (CH2M HILL 2012), the Addendum to the QAPP (CH2M HILL 2008), and the *PG&E Program Quality Assurance Project Plan for Dioxins and Furans* (CH2M HILL 2010).

5.2 Reporting

PG&E will present the results of the baseline soil sampling in an addendum to the SMP, summarizing the sampling event and analysis results. The addendum will consist of a discussion of the sampling, laboratory analytical results, a discussion of uncertainties in the data, and a discussion of the implications on management of displaced soil, especially storage of soil. Field documentation, summary tables of laboratory results, and laboratory analytical data sheets will be included as attachments or appendices to the addendum.

6.0 References

California Office of Environmental Health Hazard Assessment (OEHHA). 2005. *California Human Health Screening Levels (CHHSLs)*.

CH2M HILL. 2005. *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program*. March 31.

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Pacific Gas and Electric Company (PG&E). 2012. *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California*. Presented as Appendix B of the Soil Management Plan. October 3.

United States Environmental Protection Agency (USEPA). 1999. *Contract Laboratory National Functional Guidelines for Organic Data Review*.

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7.0 Certification

This report was prepared by CH2M HILL under the supervision of the professional whose seal and signature appears herein, in accordance with currently accepted professional practices; no warranty, expressed or implied, is made.

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Keith Sheets
California Professional Geologist, PG No. 6888

Tables

TABLE A-1
List of RFI/RI Investigation Areas within 20 feet of or that Overlap with Groundwater Remedy Infrastructure and Proposed Analyte Suite
Groundwater Remedy Implementation - Baseline Soil Sampling and Analysis Plan
Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

Soil RFI/RI Investigation Area	Analytical Suite[1]
AOC 1 - Area Around Former Percolation Bed	Title 22 metals, hexavalent chromium, PAHs, pH, PCBs[2]
AOC 4 – Debris Ravine	Title 22 metals, PAHs, PCBs, dioxins/furans
AOC 7 - Hazardous Materials Storage Area	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, PCBs, TPH, and pH
AOC 8 – Paint Locker	Title 22 metals, VOCs, and TPH
AOC 10 – East Ravine	Title 22 metals, hexavalent chromium, PAHs, Asbestos
AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)	Hexavalent chromium, Title 22, PAHs, PCBs, pesticides
AOC 11 - Topographic Low Areas	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, PCBs
AOC 12 - Fill Areas	Title 22 metals, hexavalent chromium, VOCs, TPH, PAHs, pH, asbestos, pesticides, PCBs
AOC 13 - Unpaved Areas within the Compressor Station	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and asbestos
AOC 17 - Onsite Septic System	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs
AOC 18 – Combined Hazardous Waste Transference Pipelines	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, PCBs, and PAHs
AOC 22 - Unidentified Three-sided Structure	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, PCBs, and PAHs
AOC 27 – MW-24 Bench	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, PCBs, pesticides, and PAHs
AOC 28 - Pipeline Drip Leg	TPH, PAHs, and PCBs
AOC 30 - MW 20 Bench	Title 22 metals, hexavalent chromium, sodium, chloride
AOC 33 – Former Potential Burn Area Near AOC 17	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, asbestos, and dioxin and furans
Perimeter Area	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
Storm Drain System	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs

Notes:
[1] Analytical suites as presented in the Revised Final Soil RFI/RI Work Plan.(CH2M HILL 2013)
[2] PCB analysis only on soil collected between 0 and 2 feet below ground surface
AOC - Area of Concern
PAHs - polynuclear aromatic hydrocarbons
PCBs - polychlorinated biphenyls
SVOCs - semivolatile organic compounds
TPH - total petroleum hydrocarbons
VOCs - volatile organic compounds

TABLE A-1A
Sample Containers, Preservation, and Holding Times
Groundwater Remedy Implementation – Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

		Container and Minimum Quantity			
Analyte	**Method**	**Water**	**Soil/Sediment**	**Preservation**	**Holding Time**
Metals (except hexavalent chromium)	SW6010B or C, SW6020A, EPA200.7, EPA200.8, SM3120B, EPA245.1, SW7000 series methods	1-liter P or G	8-oz/P, G, or T	Water: Add HNO_3 to pH<2; soil/sediment: None	28 days for mercury; 180 days for all others
Hexavalent Chromium	SW7199	Not applicable	4-oz/P, G, or T	Soil/sediment: Chill to 4°C (±2°C)	Soil: 30 days to extraction, 7 days to analysis
Hexavalent Chromium	EPA218.6	250-mL P	Not applicable	Chill to ≤6°C Laboratory or field filtration within 24 hours. After filtration adjust the pH to 9–9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Hexavalent Chromium	SM3500-Cr B	250-mL P	Not applicable	Chill to ≤6°C Laboratory or field filtration within 24 hours. After filtration adjust the pH to 9–9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Purgeable TPH	SW8015B, C or D Preparation methods: SW5035B (soil) SW5030B (water)	Three 40-mL G-TLC	Three 40-mL G-TLC	Water: Add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: Chill to 4°C (±2°C) and or • Frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved within 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol
Extractable TPH	SW8015B, C or D	Two 1-liter Amber G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis

TABLE A-1A
Sample Containers, Preservation, and Holding Times
Groundwater Remedy Implementation – Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

		Container and Minimum Quantity			
Analyte	**Method**	**Water**	**Soil/Sediment**	**Preservation**	**Holding Time**
Pesticides	SW8081A or B	Two 1-liter Amber G	8-oz/ G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
PCBs	SW8082 or SW8082A	Two 1-liter Amber G	8-oz/ G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
VOCs	SW8260B or C Preparation methods: SW5035B (Soil) SW5030B (Water)	Three 40-mL G-TLC	Three 40-mL G-TLC	Water: Add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: Chill to 4°C (±2°C) and or • Frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved with 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol
SVOCs	SW8270C or D	Two 1-liter Amber G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Herbicides	SW8151A	Two 1-liter Amber G	8-oz G or T	Chill to 4°C (± 2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
PAHs	SW8270SIM	Two 1-liter Amber G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
pH	SM4500H+B or SW9040	500-mL P or G	4-oz P, G, or T	Chill to ≤6°C	15 minutes
Dioxins and furans	SW8290	Two 1-liter Amber G	8-oz G	Chill to 4°C (±2°C)	Water and Thursday: 30 days to extraction; 45 days after extraction to analysis

TABLE A-1A
Sample Containers, Preservation, and Holding Times
Groundwater Remedy Implementation – Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
Asbestos	Water – EPA 100.1/100.2-TEM Soil- PLM/BULK (present/absent); CARB435/PLM; TEM	1-liter sonicated P	4-oz G	Chill to 4°C (±2°C)	Water: 48 hour holding time Soil: 1 year
Multiple (California WET)	STLC Extraction Analysis by methods listed above	See specific method above for container	8-oz G	Chill to 4°C (±2°C)	See specific matrix and method above for holding time
Multiple (RCRA TCLP)	TCLP Extraction Analysis by methods listed above	See specific method above for container	8-oz G	Chill to 4°C (±2°C)	See specific matrix and method above for holding time

Notes:

<	=	less than
≤	=	less than or equal to
°C	=	degrees centigrade
G	=	glass
HCl	=	hydrochloric acid
HNO_3	=	nitric acid
mL	=	milliliters
NH_4OH	=	ammonium hydroxide
$(NH_4)_2SO_4$	=	ammonium sulfate
oz	=	ounce
P	=	polyethylene
PCBs	=	polychlorinated biphenyls
PAHs	=	polynuclear aromatic hydrocarbons
RCRA	=	Resource Conservation and Recovery Act
SIM	=	selected ion monitoring
SVOCs	=	semivolatile organic compounds
T	=	brass sleeves in the sample barrel (sometimes called California brass)
TCLP	=	Toxicity Characteristic Leaching Procedure
TLC	=	Teflon lined closure
TPH	=	total petroleum hydrocarbons
VOCs	=	volatile organic compounds
WET	=	Waste Extraction Test

TABLE A-2
Reference List of Potentially Applicable Analytes and Associated Screening Levels
Groundwater Remedy Implementation - Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level		Interim Screening Level Source	Hazardous Waste Disposal Criteria
Dioxins and Furans (ng/kg)					
	1,2,3,4,6,7,8-HpCDD	NE		Not Established	NE
	1,2,3,4,6,7,8-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8,9-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8-HxCDD	NE		Not Established	NE
	1,2,3,4,7,8-HxCDF	NE		Not Established	NE
	1,2,3,6,7,8-HxCDD	NE		Not Established	NE
	1,2,3,6,7,8-HxCDF	NE		Not Established	NE
	1,2,3,7,8,9-HxCDD	NE		Not Established	NE
	1,2,3,7,8,9-HxCDF	NE		Not Established	NE
	1,2,3,7,8-PeCDD	4.6		DTSC Residential CHHSL	NE
	1,2,3,7,8-PeCDF	NE		Not Established	NE
	2,3,4,6,7,8-HxCDF	NE		Not Established	NE
	2,3,4,7,8-PeCDF	NE		Not Established	NE
	2,3,7,8-TCDD	4.6		DTSC Residential CHHSL	See Table A-3
	2,3,7,8-TCDF	NE		Not Established	NE
	OCDD	NE		Not Established	NE
	OCDF	NE		Not Established	NE
	TEQ Avian	16		Soil Ecological Comparison Value (ECV)	NE
	TEQ Human	50		Soil Ecological Comparison Value (ECV)	NE
	TEQ Mammals	1.6		Soil Ecological Comparison Value (ECV)	NE
Metals (mg/kg)					
	Aluminum	16,400		Background Level	NE
	Antimony	0.285		Soil Ecological Comparison Value (ECV)	See Table A-3
	Arsenic	11	*	Background Level	See Table A-3
	Barium	410	*	Background Level	See Table A-3
	Beryllium	0.672		Background Level	See Table A-3
	Cadmium	1.1	*	Background Level	See Table A-3
	Calcium	66,500		Background Level	NE
	Chromium, Hexavalent	0.83	*	Background Level	See Table A-3
	Chromium, total	39.8	*	Background Level	See Table A-3
	Cobalt	12.7	*	Background Level	See Table A-3
	Copper	16.8		Background Level	See Table A-3
	Cyanide	0.9		Soil Ecological Comparison Value (ECV)	NE
	Iron	55,000		EPA Residential RSL	NE
	Lead	8.39	*	Background Level	See Table A-3
	Magnesium	12,100		Background Level	NE
	Manganese	402	*	Background Level	NE
	Mercury	0.0125		Soil Ecological Comparison Value (ECV)	See Table A-3
	Molybdenum	1.37	*	Background Level	See Table A-3
	Nickel	27.3	*	Background Level	See Table A-3
	Potassium	4,400		Background Level	NE
	Selenium	1.47	*	Background Level	See Table A-3
	Silver	5.15		Soil Ecological Comparison Value (ECV)	See Table A-3
	Sodium	2,070		Background Level	NE
	Thallium	2.32		Soil Ecological Comparison Value (ECV)	See Table A-3
	Vanadium	52.2	*	Background Level	See Table A-3
	Zinc	58	*	Background Level	See Table A-3

TABLE A-2
Reference List of Potentially Applicable Analytes and Associated Screening Levels
Groundwater Remedy Implementation - Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Pesticides (µg/kg)				
	4,4-DDD	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	4,4-DDE	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	4,4-DDT	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	Aldrin	33	DTSC Residential CHHSL	See Table A-3
	alpha-BHC	77	EPA Residential RSL	NE
	alpha-Chlordane	430	DTSC Residential CHHSL	See Table A-3
	beta-BHC	270	EPA Residential RSL	NE
	delta-BHC	77	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table A-3
	Endo sulfan I	370,000	EPA Residential RSL	NE
	Endo sulfan II	370,000	EPA Residential RSL	NE
	Endosulfan sulfate	370,000	EPA Residential RSL	NE
	Endrin	21,000	DTSC Residential CHHSL	See Table A-3
	Endrin aldehyde	21,000	DTSC Residential CHHSL	NE
	Endrin ketone	21,000	DTSC Residential CHHSL	NE
	gamma-BHC (Lindane)	500	DTSC Residential CHHSL	See Table A-3
	gamma-Chlordane	430	DTSC Residential CHHSL	See Table A-3
	Heptachlor	130	DTSC Residential CHHSL	See Table A-3
	Heptachlor Epoxide	53	EPA Residential RSL	See Table A-3
	Methoxychlor	340,000	DTSC Residential CHHSL	See Table A-3
	Toxaphene	460	DTSC Residential CHHSL	See Table A-3
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	22,000	EPA Residential RSL	NE
	2-Methyl naphthalene	310,000	EPA Residential RSL	NE
	Acenaphthene	3,400,000	EPA Residential RSL	NE
	Acenaphthylene	1,700,000	EPA Residential RSL	NE
	Anthracene	17,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	38	DTSC Residential CHHSL	NE
	Benzo (a) anthracene	380	EPA Residential RSL	NE
	Benzo (a) pyrene	38	DTSC Residential CHHSL	NE
	Benzo (b) fluoranthene	380	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,700,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	380	EPA Residential RSL	NE
	Chrysene	3,800	EPA Residential RSL	NE
	Dibenzo (a,h) anthracene	110	EPA Residential RSL	NE
	Fluoranthene	2,300,000	EPA Residential RSL	NE
	Fluorene	2,300,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	380	EPA Residential RSL	NE
	Naphthalene	3,600	EPA Residential RSL	NE
	PAH High molecular weight	1,160	Soil Ecological Comparison Value (ECV)	NE
	PAH Low molecular weight	10,000	Soil Ecological Comparison Value (ECV)	NE
	Phenanthrene	1,700,000	EPA Residential RSL	NE
	Pyrene	1,700,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	3,900	EPA Residential RSL	See Table A-3
	Aroclor 1221	140	EPA Residential RSL	See Table A-3

TABLE A-2
Reference List of Potentially Applicable Analytes and Associated Screening Levels
Groundwater Remedy Implementation - Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1232	140	EPA Residential RSL	See Table A-3
	Aroclor 1242	220	EPA Residential RSL	See Table A-3
	Aroclor 1248	220	EPA Residential RSL	See Table A-3
	Aroclor 1254	220	EPA Residential RSL	See Table A-3
	Aroclor 1260	220	EPA Residential RSL	See Table A-3
	Aroclor 1262	220	EPA Residential RSL	See Table A-3
	Aroclor 1268	220	EPA Residential RSL	See Table A-3
	Total PCBs	204	Soil Ecological Comparison Value (ECV)	See Table A-3
Semivolatile Organic Compounds (µg/kg)				
	1,1´-Biphenyl	3,900,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	18,000	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,800,000	EPA Residential RSL	NE
	2,4-Dichlorophenol	180,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,200,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	120,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,600	EPA Residential RSL	See Table A-3
	2,6-Dinitrotoluene	61,000	EPA Residential RSL	NE
	2-Chloro naphthalene	6,300,000	EPA Residential RSL	NE
	2-Chlorophenol	63,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,100,000	EPA Residential RSL	See Table A-3
	2-Nitroaniline	183,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,100	EPA Residential RSL	NE
	3-Nitroaniline	18,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	6,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,100,000	EPA Residential RSL	NE
	4-Chloroaniline	2,400	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table A-3
	4-Nitroaniline	24,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,100	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	240,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,100,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	180,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	260,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	24,000	EPA Residential RSL	NE
	Dibenzofuran	150,000	EPA Residential RSL	NE
	Diethyl phthalate	49,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	100,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	2,400,000	EPA Residential RSL	NE
	Hexachlorobenzene	300	EPA Residential RSL	See Table A-3
	Hexachloroethane	35,000	EPA Residential RSL	See Table A-3
	N-Nitroso-di-n-propylamine	69	EPA Residential RSL	NE
	N-nitrosodiphenylamine	99,000	EPA Residential RSL	NE

TABLE A-2
Reference List of Potentially Applicable Analytes and Associated Screening Levels
Groundwater Remedy Implementation - Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Semivolatile Organic Compounds (µg/kg)				
	Pentachlorophenol	2,490	Soil Ecological Comparison Value (ECV)	See Table A-3
	Phenol	18,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	540	Regional Water Quality Control Board (RWQCB)	NE
	TPH as gasoline	540	Regional Water Quality Control Board (RWQCB)	NE
	TPH as motor oil	1,800	Regional Water Quality Control Board (RWQCB)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	1,900	EPA Residential RSL	NE
	1,1,1-Trichloroethane	8,700,000	EPA Residential RSL	NE
	1,1,2,2-Tetrachloroethane	560	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	43,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	3,300	EPA Residential RSL	NE
	1,1-Dichloroethene	240,000	EPA Residential RSL	See Table A-3
	1,1-Dichloropropene	1,700	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	49,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	22,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	62,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.4	EPA Residential RSL	NE
	1,2-Dibromoethane	34	EPA Residential RSL	NE
	1,2-Dichlorobenzene	1,900,000	EPA Residential RSL	NE
	1,2-Dichloroethane	430	EPA Residential RSL	See Table A-3
	1,2-Dichloropropane	890	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	780,000	EPA Residential RSL	NE
	1,3-Dichlorobenzene	530,000	EPA Residential RSL	NE
	1,3-Dichloropropane	1,600,000	EPA Residential RSL	NE
	1,4-Dichlorobenzene	2,400	EPA Residential RSL	See Table A-3
	1,4-Dioxane	18,000	DTSC Residential CHHSL	NE
	2,2-Dichloropropane	890	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,100,000	EPA Residential RSL	See Table A-3
	2,4,6-Trichlorophenol	6,900	EPA Residential RSL	See Table A-3
	2-Chlorotoluene	160,000	EPA Residential RSL	NE
	2-Hexanone	210,000	EPA Residential RSL	NE
	4-Isopropyltoluene	2,100,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	150	EPA Residential RSL	NE
	Acrylonitrile	55	EPA Residential RSL	NE
	Benzene	1,100	EPA Residential RSL	See Table A-3
	Bis (2-chloroethyl) ether	210	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,600	EPA Residential RSL	NE
	Bromobenzene	300,000	EPA Residential RSL	NE
	Bromochloromethane	270	EPA Residential RSL	NE
	Bromodichloromethane	270	EPA Residential RSL	NE
	Bromoform	61,000	EPA Residential RSL	NE
	Bromomethane	7,300	EPA Residential RSL	NE

TABLE A-2
Reference List of Potentially Applicable Analytes and Associated Screening Levels
Groundwater Remedy Implementation - Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Volatile Organic Compounds (µg/kg)				
	Carbon disulfide	820,000	EPA Residential RSL	NE
	Carbon tetrachloride	250	EPA Residential RSL	See Table A-3
	Chlorobenzene	290,000	EPA Residential RSL	See Table A-3
	Chloroethane	15,000,000	EPA Residential RSL	NE
	Chloroform	290	EPA Residential RSL	See Table A-3
	Chloromethane	120,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	780,000	EPA Residential RSL	NE
	cis-1,3-Dichloropropene	1,700	EPA Residential RSL	NE
	Cyclohexane	7,000,000	EPA Residential RSL	NE
	Dibromochloromethane	680	EPA Residential RSL	NE
	Dibromomethane	25,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	180,000	EPA Residential RSL	NE
	Ethylbenzene	5,400	EPA Residential RSL	NE
	Hexachlorobutadiene	6,200	EPA Residential RSL	See Table A-3
	Hexachlorocyclopentadiene	370,000	EPA Residential RSL	NE
	Isophorone	510,000	EPA Residential RSL	NE
	Isopropylbenzene	2,100,000	EPA Residential RSL	NE
	m,p-Xylenes	3,400,000	EPA Residential RSL	NE
	Methyl acetate	22,000,000	EPA Residential RSL	NE
	Methyl ethyl ketone	28,000,000	EPA Residential RSL	See Table A-3
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	43,000	EPA Residential RSL	NE
	Methylcyclohexane	2,600,000	EPA Residential RSL	NE
	Methylene chloride	11,000	EPA Residential RSL	NE
	N-Butylbenzene	240,000	EPA Residential RSL	NE
	Nitrobenzene	4,800	EPA Residential RSL	See Table A-3
	N-Propylbenzene	240,000	EPA Residential RSL	NE
	o-Xylene	3,800,000	EPA Residential RSL	NE
	p-Chlorotoluene	5,500,000	EPA Residential RSL	NE
	sec-Butylbenzene	220,000	EPA Residential RSL	NE
	Styrene	6,300,000	EPA Residential RSL	NE
	tert-Butylbenzene	390,000	EPA Residential RSL	NE
	Tetrachloroethene	550	EPA Residential RSL	See Table A-3
	Toluene	5,000,000	EPA Residential RSL	NE
	trans-1,2-Dichloroethene	150,000	EPA Residential RSL	NE
	trans-1,3-Dichloropropene	1,700	EPA Residential RSL	NE
	Trichloroethene	2,800	EPA Residential RSL	See Table A-3
	Trichlorofluoromethane (Freon 11)	790,000	EPA Residential RSL	NE
	Vinyl chloride	60	EPA Residential RSL	See Table A-3
	Xylenes, total	630,000	EPA Residential RSL	NE

Notes:

This table presents a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes and screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations.

Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

Background	"Final Soil Background Investigation at Pacific Gas and Electric Company Topock Compressor Station, Needles, California" (CH2M HIll 2009c)
DTSC CHHSL	California Department of Toxic Substances Control; California human health screening levels (OEHHA 2005)
EPA RSL	United States Environmental Protection Agency Regional Screening Level, various dates. See Tables 3-1 to 3-8 of the Soil Investigation Part A Phase 1 Data Gaps Evaluation Report (CH2M HILL 2011b) for respective dates for each RSL.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis 2008)
RWQCB	"San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels, Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater" (Table K-1). May 27, 2008
*	One or more screening levels (EPA RSL, DTSC CHHSL, ECV, or Soil SL) have values lower than the background level.
NE	not established
mg/kg	milligrams per kilogram
ng/kg	nanograms per kilogram
µg/kg	micrograms per kilogram

TABLE A-3
Hazardous Waste Toxicity Characteristic Levels
Groundwater Remedy Implementation - Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Asbetos							
	Asbestos	1%	NE	NE	NE	NE	NE
Dioxins and Furans							
	2,3,7,8-TCDD	0.01	0.01	NE	0.001	NE	NE
Metals							
	Antimony	500	150	NE	15	NE	NE
	Arsenic	500	50	100	5	5	D004
j	Barium	10,000	1,000	2,000	100	100	D005
	Beryllium	75	7.5	NE	0.75	NE	NE
	Cadmium	100	10	20	1	1	D006
	Chromium, Hexavalent	500	50	NE	5	NE	NE
k	Chromium, total	2,500	50	100	5	5	D007
	Cobalt	8,000	800	NE	80	NE	NE
	Copper	2,500	250	NE	25	NE	NE
	Lead	1,000	50	100	5	5	D008
	Mercury	20	2	4	0.2	0.2	D009
l	Molybdenum	3,500	3,500	NE	350	NE	NE
	Nickel	2,000	200	NE	20	NE	NE
	Selenium	100	10	20	1	1	D010
	Silver	500	50	100	5	5	D011
	Thallium	700	70	NE	7	NE	NE
	Vanadium	2,400	240	NE	24	NE	NE
	Zinc	5,000	2,500	NE	250	NE	NE
Pesticides							
	4,4-DDD	1	1	NE	0.1	NE	NE
	4,4-DDE	1	1	NE	0.1	NE	NE
	4,4-DDT	1	1	NE	0.1	NE	NE
	Aldrin	1.4	1.4	NE	0.14	NE	NE
	alpha-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Dieldrin	8	8	NE	0.8	NE	NE
	Endrin	0.2	0.2	0.4	0.02	0.02	D012
	gamma-BHC (Lindane)	4	4	8	0.4	0.4	D013
	gamma-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Heptachlor	4.7	4.7	0.16	0.47	0.008	D031
	Heptachlor Epoxide	4.7	4.7	0.16	0.47	0.008	D031
	Methoxychlor	100	100	200	10	10	D014
	Toxaphene	5	5	10	0.5	0.5	D015
Polychlorinated Biphenyls							
	Aroclor 1016	50	50	NE	5	NE	NE
	Aroclor 1221	50	50	NE	5	NE	NE
	Aroclor 1232	50	50	NE	5	NE	NE
	Aroclor 1242	50	50	NE	5	NE	NE
	Aroclor 1248	50	50	NE	5	NE	NE
	Aroclor 1254	50	50	NE	5	NE	NE
	Aroclor 1260	50	50	NE	5	NE	NE
	Aroclor 1262	50	50	NE	5	NE	NE
	Aroclor 1268	50	50	NE	5	NE	NE
	Total PCBs	50	50	NE	5	NE	NE

TABLE A-3
Hazardous Waste Toxicity Characteristic Levels
Groundwater Remedy Implementation - Baseline Soil Sampling and Analysis Plan
PG&E Topock Compressor Station, Needles, California

Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Polychlorinated Biphenyls							
Semivolatile Organic Compounds							
	2,4-Dinitrotoluene	NE	NE	2.6	NE	0.13	D030
g	2-Methylphenol (o-Cresol)	NE	NE	4,000	NE	200	D023
g	3-Methylphenol (m-Cresol)	NE	NE	4,000	NE	200	D024
g	4-Methylphenol (p-Cresol)	NE	NE	4,000	NE	200	D025
	Hexachlorobenzene	NE	NE	2.6	NE	0.13	D032
	Hexachloroethane	NE	NE	60	NE	3	D034
	Pentachlorophenol	17	17	2,000	1.7	100	D037
Volatile Organic Compounds							
	1,1-Dichloroethene	NE	NE	14	NE	0.7	D029
	1,2-Dichloroethane	NE	NE	10	NE	0.5	D028
	1,4-Dichlorobenzene	NE	NE	150	NE	7.5	D027
	2,4,5-Trichlorophenol	NE	NE	8,000	NE	400	D041
	2,4,6-Trichlorophenol	NE	NE	40	NE	2	D042
	Benzene	NE	NE	10	NE	0.5	D018
	Carbon tetrachloride	NE	NE	10	NE	0.5	D019
	Chlorobenzene	NE	NE	2,000	NE	100	D021
	Chloroform	NE	NE	120	NE	6	D022
	Hexachlorobutadiene	NE	NE	10	NE	0.5	D033
	Methyl ethyl ketone	NE	NE	4,000	NE	200	D035
	Nitrobenzene	NE	NE	40	NE	2	D036
	Tetrachloroethene	NE	NE	14	NE	0.7	D039
	Trichloroethene	2,040	2,040	10	204	0.5	D040
	Vinyl chloride	NE	NE	4	NE	0.2	D043

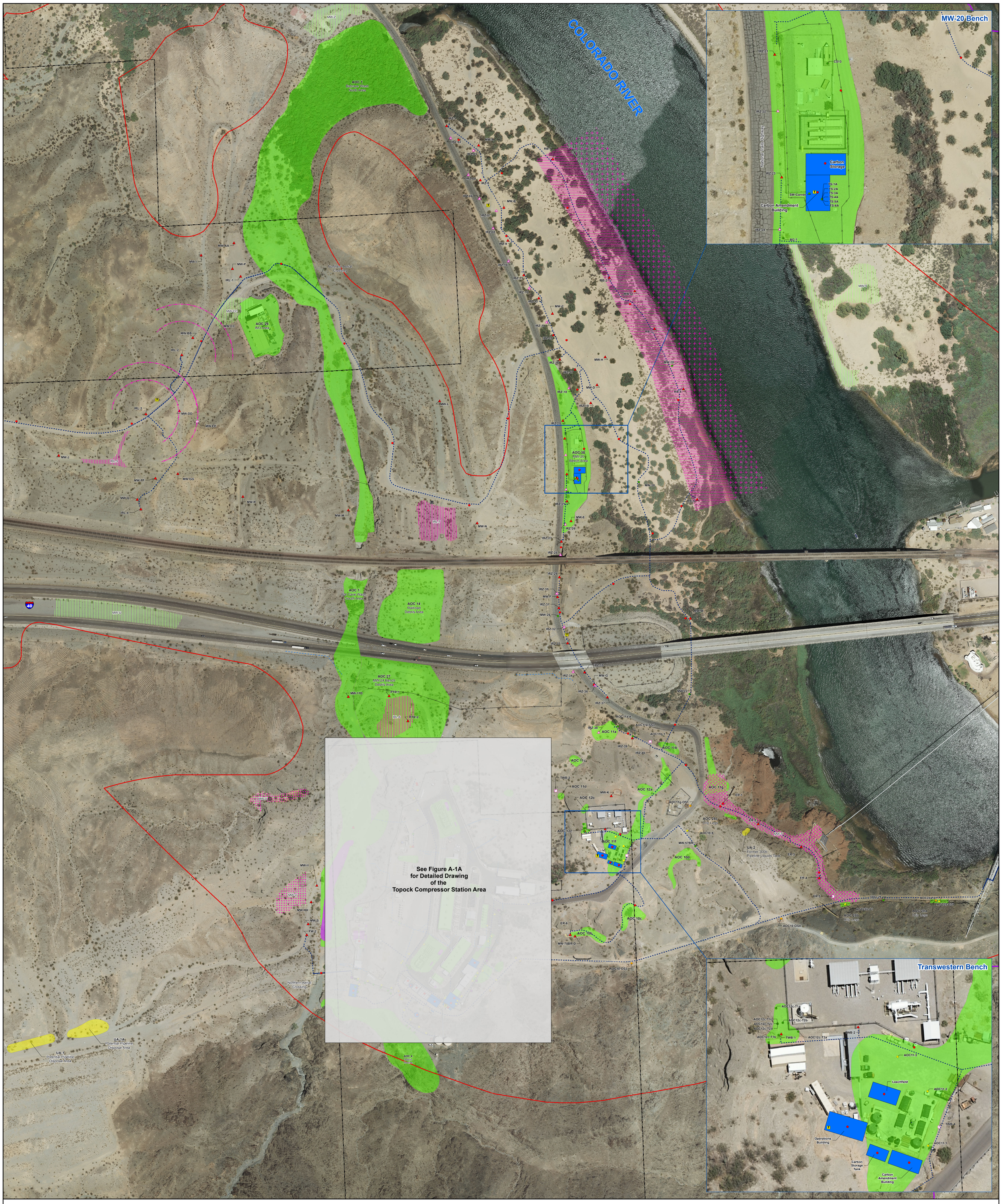
Notes:

NE	not established
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
EPA HW	Environmental Protection Agency Hazardous Waste Code
TC	Toxicity Characteristic
TTLC	Total Threshold Limit Concentration
STLC	Soluble Threshold Limit Concentration
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure
WET	California Waste Extraction Test

Hazardous waste critiera exist for kepone, 2,4-D, mirex, pyridine, and 2,45-TP (Silvex); however, since they are not contaminants of potential concern at the Topock site, they are excluded from this table.

a	Total Threshold Limit Concentration (TTLC) from 22 CCR 66261.24(a)(2). Calculated based on the concentration of the elements, not the compounds.
b	Screening level is 10x Soluble Threshold Limit Concentraction (STLC). If screening level is exceeded in total analysis, California Waste Extraction Test (WET) should be run to evaluate whether STLC is exceeded.
c	Screening level is 20x RCRA Toxicity Characteristic (TC). If screening level is exceeded in total analysis, Toxicity Characteristic Leaching Procedure (TCLP) should be run to evaluate whether RCRA TC is exceeded.
d	Soluble threshold limit concentration from 22 CCR 66261.24(a)(2), measured using the WET. Calculated based on the concentration of the elements, not the compounds.
e	RCRA TC level from 22 CCR 66261.24(a)(1), measured using the TCLP.
f	A waste is assigned a RCRA waste code for each constituent where the results of the TCLP equal or exceed the RCRA TC level.
g	If o-, m- and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/L.
i	In the case of asbestos and elemental metals, the specified concentration limits apply only if the substances are in a friable, powdered or finely divided state. Asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.
j	TTLC and STLC exclude barite. TTLC excludes barium sulfate.
k	For STLC, if the waste does not exceed the RCRA TC or exhibit another RCRA hazardous characteristic, the STLC is 560 mg/L, not 5 mg/L.
l	For TTLC, excludes molybdenum disulfide.
h	Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.

Figures



LEGEND

- Proposed Remedy System Soil Sample Location
- Proposed Remedy System Well and Vault Soil Sample Location
- Proposed RFI/RI Soil Sample Location
- Proposed XRF Screening Location
- Existing Soil Sample Location
- Existing Opportunistic Soil Sample Location

Provisional Wells:

- Extraction Well
- Injection Well
- Monitoring Well (MW-EE is a pending/future provisional monitoring well)

- Planned Transformer
- Future Provisional Transformer
- Site Fence Boundary
- Stormwater Piping Below Ground
- Stormwater Piping Above Ground

Pipeline Corridor for Remedy

- Aboveground Pipe
- Underground Pipe/Conduit
- Property Boundaries
- Area of Potential Effects (APE)
- EIR Project Area

Work Areas

- Solid Waste Management Unit (SWMU)
- Area of Concern (AOC)
- Other

Remedy Facilities

- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System

Notes:
1. Soil sampling locations are approximate.
2. No baseline soil sampling is proposed for freshwater pipeline, wells, and associated infrastructure.
3. Baseline soil samples will be collected at 0.5 feet below ground surface (bgs) for aboveground pipelines/conduit runs and from the bottom of the trench for underground pipelines/conduit runs approximately every 500 linear feet along proposed pipeline/conduit runs (see Figure A-4 for more details).
4. Baseline soil samples will be collected at 0.5 feet bgs below the remedy structure on a 50-foot grid, or a minimum of one sample location within each remedy structure footprint (see Figure A-5 for more details).
5. Baseline soil samples will be collected at 1 foot bgs at each new monitoring, extraction, injection, and recirculation well and at 0.5 feet bgs from the bottom of the associated well vault.
6. If provisional groundwater remedy infrastructure and areas are needed, they will be sampled according to the baseline sampling program at the time of installation/use.
7. To minimize disturbance and potential impacts to sensitive resources, baseline soil samples have not been proposed at remedy infrastructure if soil RFI/RI Investigation proposed sample locations and/or existing soil data locations are located within 20 feet the infrastructure and meet the criteria of the baseline sample program.
8. All well and structure locations are approximate.

N

0 145 290 580 Feet

FIGURE A-1
GROUNDWATER REMEDY FEATURES, SOLID WASTE MANAGEMENT UNITS, AREAS OF CONCERN, BASELINE SOIL SAMPLE LOCATIONS, EXISTING AND PROPOSED RFI/RI SOIL SAMPLE LOCATIONS OUTSIDE THE COMPRESSOR STATION

GROUNDWATER REMEDY IMPLEMENTATION - SOIL MANAGEMENT PLAN
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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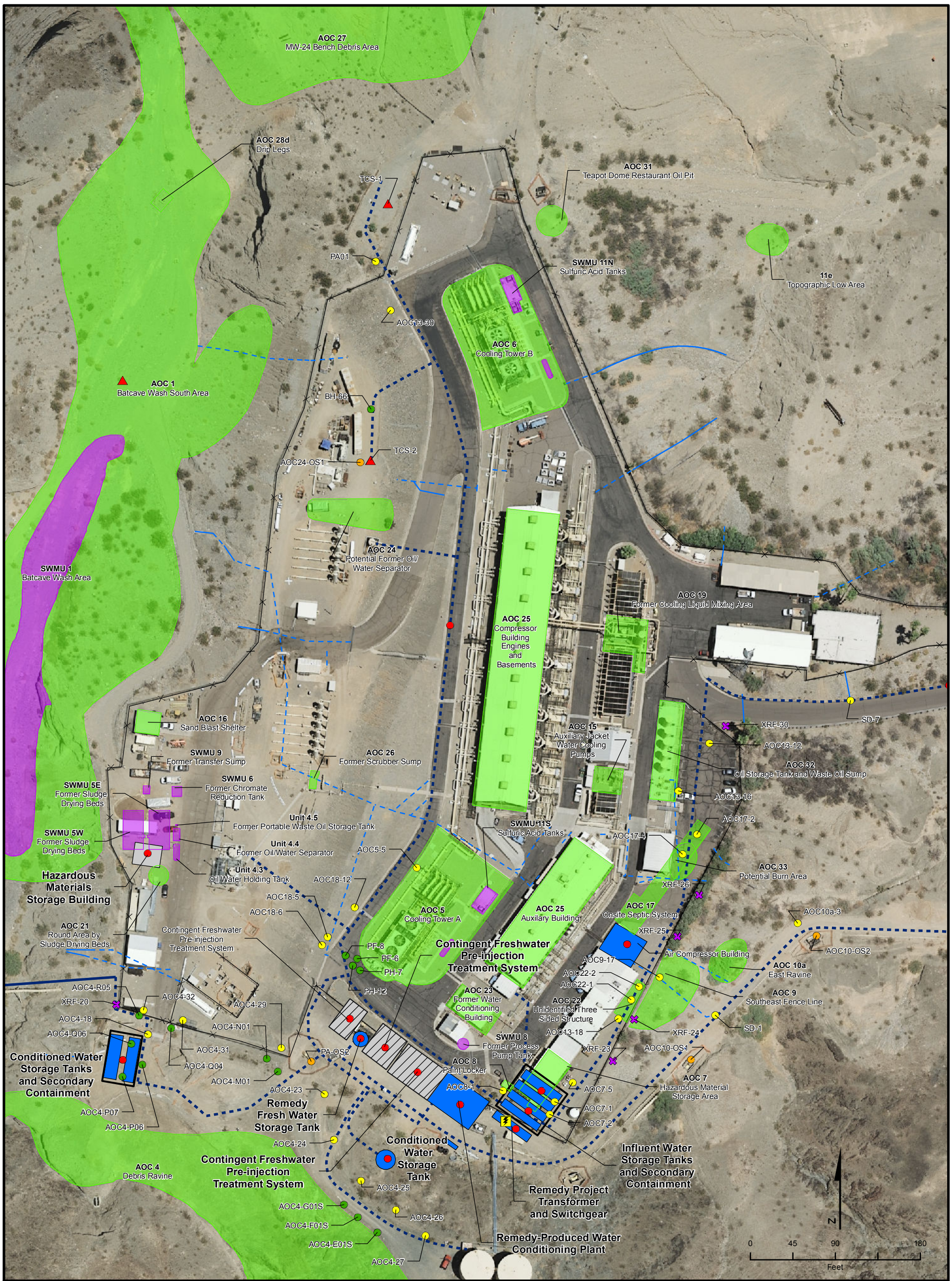

LEGEND

- Proposed Remedy System Soil Sample Location
- Planned Transformer
- Site Fence Boundary
- Stormwater Piping Below Ground
- Stormwater Piping Above Ground

Pipeline Corridor for Remedy

- Aboveground Pipe
- Underground Pipe/Conduit

Work Areas

- Solid Waste Management Unit (SWMU)
- Area of Concern (AOC)

Remedy Facilities

- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System

Notes:

1. Soil sampling locations are approximate.
2. No baseline soil sampling is proposed for freshwater pipeline, wells, and associated infrastructure.
3. Baseline soil samples will be collected approximately every 500 linear feet along proposed pipeline/conduit runs (see Figure A-4 for more details).
4. Baseline soil samples will be collected on a 50-foot grid, or a minimum of one sample location within each remedy structure footprint (see Figure A-5 for more details).
5. Baseline soil samples will be collected at each new monitoring, extraction, injection, and recirculation well and associated well vault.
6. If provisional groundwater remedy infrastructure and areas are needed, they will be sampled according to the baseline sampling program at the time of installation/use.
7. To minimize disturbance and potential impacts to sensitive resources, baseline soil samples have not been proposed at remedy infrastructure if soil RFI/RI Investigation proposed sample locations and/or existing soil data locations are located within 20 feet the infrastructure and meet the criteria of the baseline sample program.
8. All well and structure locations are approximate.

FIGURE A-1A
GROUNDWATER REMEDY FEATURES, SOLID WASTE MANAGEMENT UNITS, AREAS OF CONCERN, BASELINE SOIL SAMPLE LOCATIONS, EXISTING AND PROPOSED RFI/RI SOIL SAMPLE LOCATIONS WITHIN AND NEARBY THE COMPRESSOR STATION

GROUNDWATER REMEDY IMPLEMENTATION - SOIL MANAGEMENT PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

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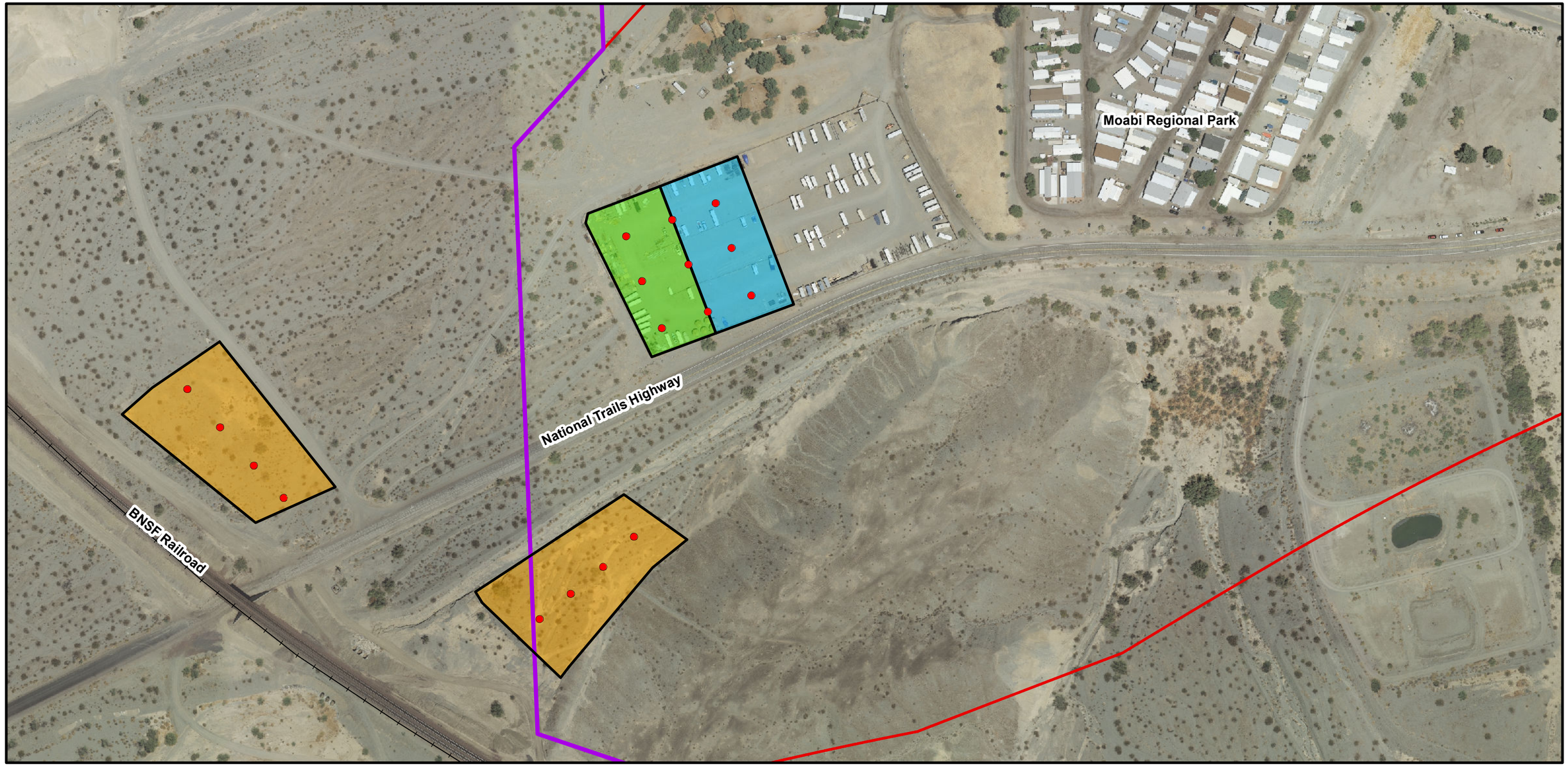

LEGEND

- Proposed Remedy System Soil Sample Location
- Long Term Remedy Support Area (1.2 acres approx.)
- Soil Storage Area (Each 1.5 acres approx.)
- Temporary Construction Laydown Area (1.3 acres approx.)
- Area of Potential Effects (APE)
- EIR Project Area

N

0 90 180 360 Feet

Note:
1. Soil sampling locations are approximate.
2. Surface soil samples (0.5 foot below ground surface) on a 100-foot grid within the soil storage area and construction yard.

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

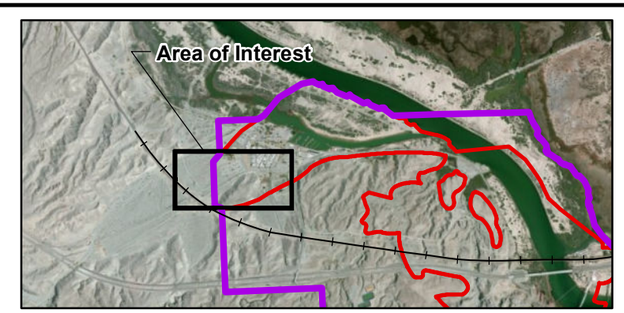

FIGURE A-2
MAIN CONSTRUCTION YARD, SOIL STORAGE AREAS, AND SATELLITE STORAGE/MAINTENANCE YARD AND BASELINE SOIL SAMPLE LOCATIONS

GROUNDWATER REMEDY IMPLEMENTATION - SOIL MANAGEMENT PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

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LEGEND

- Proposed Remedy System Soil Sample Location
- Underground Gas Supply Pipe
- Proposed Remedy Structure

N

0 37.5 75 150 Feet

Note:
All remedy structure locations are approximate.

FIGURE A-3
TCS EVAPORATION PONDS BASELINE SOIL SAMPLE LOCATIONS
GROUNDWATER REMEDY IMPLEMENTATION - SOIL MANAGEMENT PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

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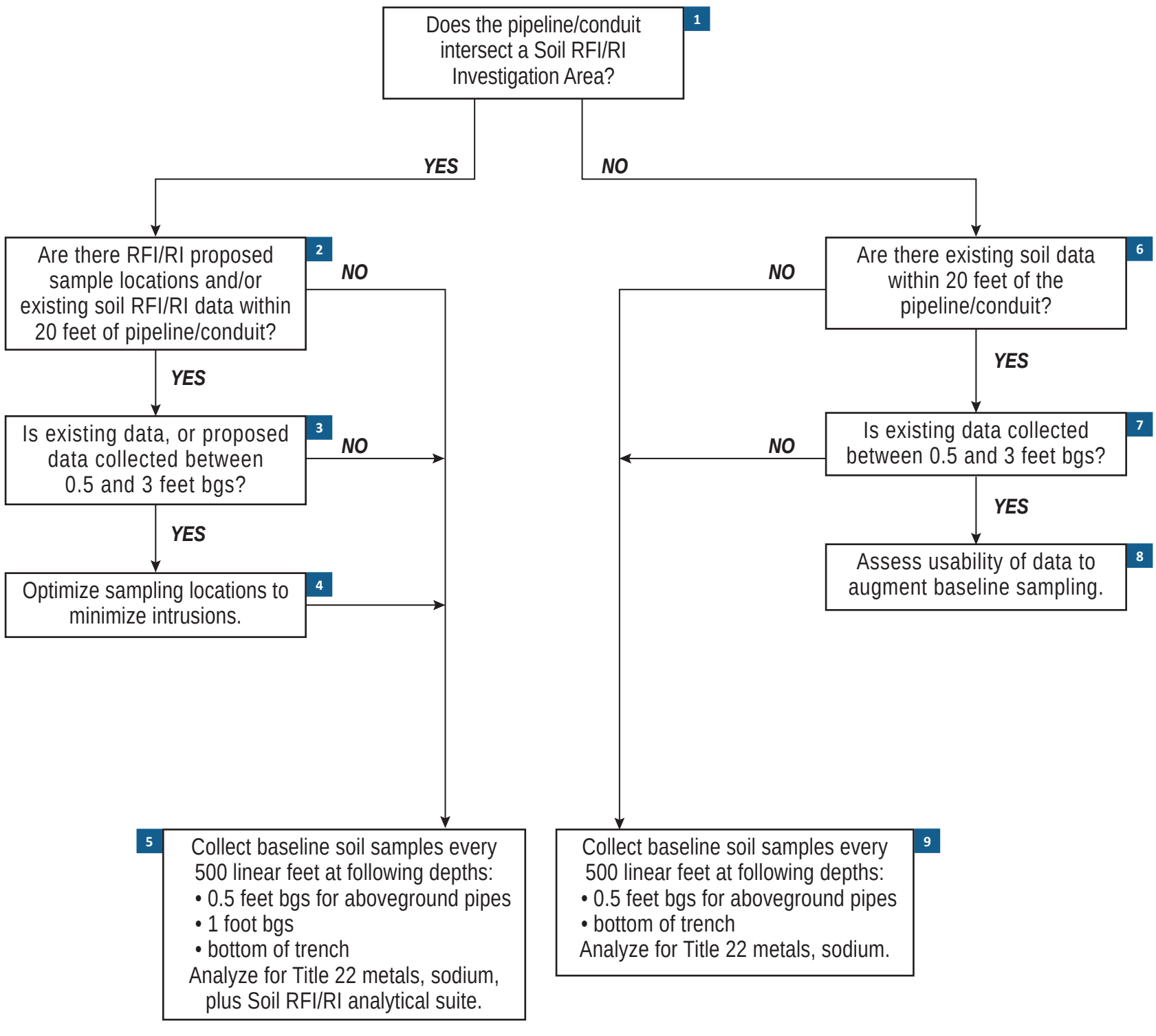


LEGEND

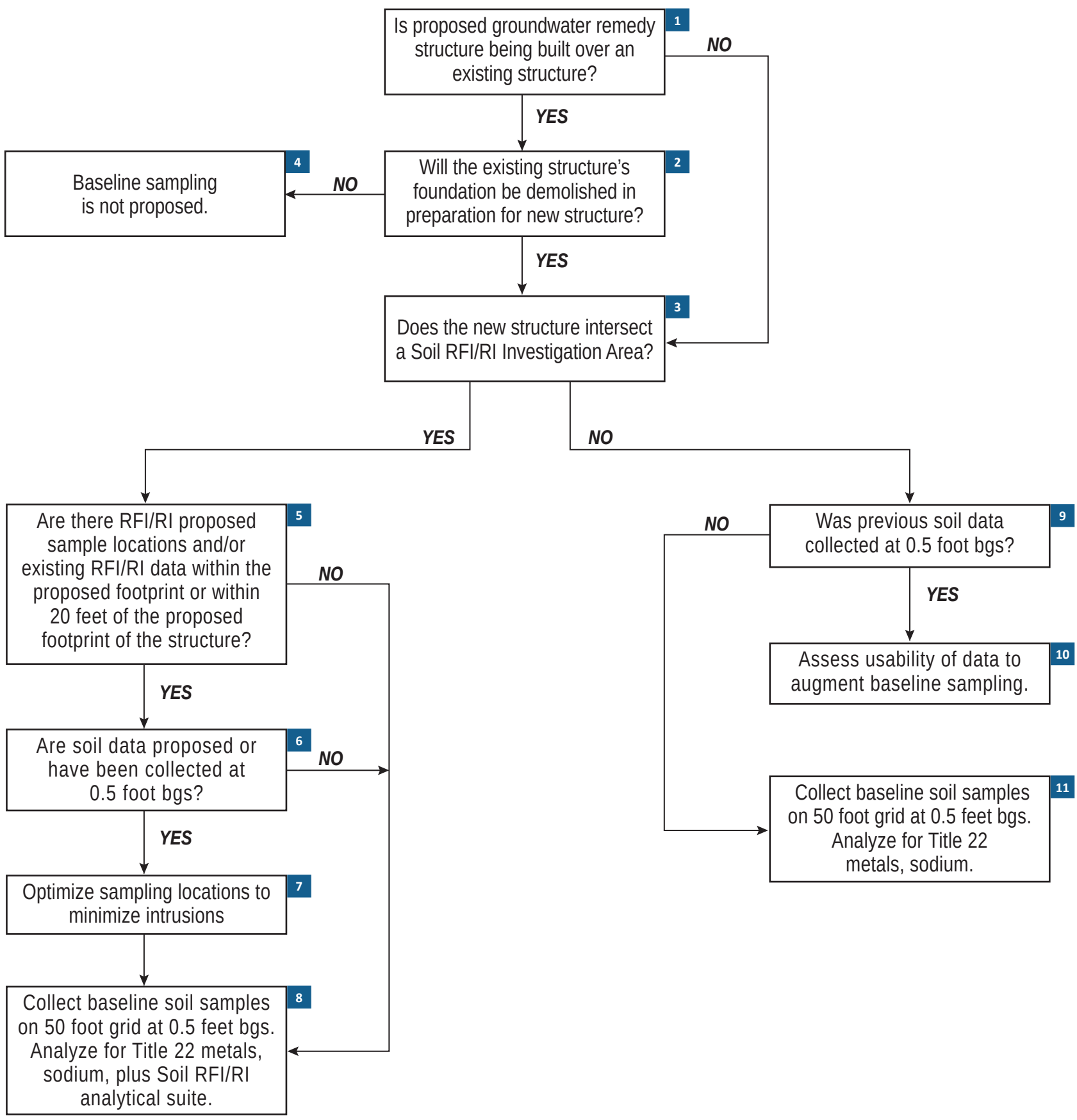
bgs below ground surface

RFI/RI Resource Recovery and Conservation Act Facility Investigation/Remedial Investigation

Figure A-4
Pipelines/Conduits Baseline Sampling Decision Tree
Groundwater Remedy Implementation – Baseline Soil Sampling and Analysis Plan
Pacific Gas and Electric Company
Topock Compressor Station
Needles, California

CH2MHILL®

ES031313182851BAO_PGE_Topock_PipeRun_Baseline-flowchart.ai_032013_lho



LEGEND

bgs below ground surface

RFI/RI Resource Recovery and Conservation Act Facility Investigation/Remedial Investigation

Figure A-5

Remedy Structure Baseline Sampling Decision Tree

Groundwater Remedy Implementation – Baseline Soil Sampling and Analysis Plan

Pacific Gas and Electric Company

Topock Compressor Station

Needles, California

CH2MHILL®

ES031313182851BAO_PGE_Topock_RemedyStructureBaseline-flowchart.ai_031413_lho

Attachment 1
Standard Operating Procedures (SOPs)

(Provided on CD-ROM Only)

SOP-B2

Soil Classification and Logging Procedures
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance to obtain accurate and consistent descriptions of soil characteristics during soil-sampling operations. The characterization is based on visual examination and manual tests not on laboratory determinations.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan, work plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.

2) Applicable project work plan or monitoring plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project* Plan (Procedures Manual), as required.

3) Topock Program Health and Safety Plan (HSP).

4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available.

5) Blank field notebook.

6) Blank CH2M HILL soil boring log Form D1586.

PREPARATION AND SETUP

1) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.

2) Initiate field logbook for sampling activity.

3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.

EQUIPMENT LIST

- Indelible pens
- Tape measure or ruler
- Field logbook
- Spatula
- HCl, 10-percent solution
- Squirt bottle/Spray bottle with water

- Rock- or soil-color chart (e.g., Munsell)
- Grain-size chart
- Hand lens
- Unified Soil Classification System index charts and tables to help with soil classification

PROCEDURES

This section covers several aspects of the soil characterization: instructions for completing the CH2M HILL soil boring log (see Form D1586, Attachment A) and the field logging of soil using the "Unified Soil Classification System and Logging Criteria" (Attachment B).

Instructions for Completing Soil Boring Logs

- Soil boring logs will be completed on field boring log forms. Information collected will be consistent with that required for Form D1586 (attached), a standard CH2M HILL form, or an equivalent form that supplies the same information.
- The information collected in the field to perform the soil characterization is described below.
- Field personnel should review completed logs for accuracy, clarity, and thoroughness of detail. Samples also should be checked to see that information is correctly recorded on both jar lids and labels and on the log sheets.

Heading Information

1) **Boring/Well Number.** Enter the boring/well number. A numbering system should be chosen that does not conflict with information recorded for previous exploratory work done at the site. Number the sheets consecutively for each boring.
2) **Location.** If stationing, coordinates, mileposts, or similar project layout information is available, indicate the position of the boring to that system using modifiers such as "approximate" or "estimated," as appropriate.
3) **Elevation.** Elevation will be determined at the conclusion of field activities.
4) **Drilling Contractor.** Enter the name of the drilling company and the city and state where the company is based.
5) **Drilling Method and Equipment.** Identify the bit size and type, drilling fluid (if used), and method of drilling (e.g., rotary, hollow-stem auger, sonic). Information on the drilling equipment (e.g., CME 55, Mobile B61) should be noted.
6) **Water Level and Date.** Enter the depth below ground surface to the apparent water level in the borehole. The information should be recorded as a comment. If free water is not encountered during drilling or cannot be detected because of the drilling method, this information should be noted. Record date and time of day (for tides, river stage) of each water level measurement.

7) **Date of Start and Finish.** Enter the dates the boring was started and completed. Time of day should be added if several borings are performed on the same day.

8) **Logger.** Enter the first initial and full last name of the logger.

Technical Data

1) **Depth Below Surface.** Use a depth scale that is appropriate for the sample spacing and for the complexity of subsurface conditions.

2) **Sample Interval.** Note the depth at the top and bottom of the sample interval.

3) **Sample Type and Number.** Enter the sample type and number. SS-1 = split spoon, first sample. Number samples consecutively regardless of type. Enter a sample number even if no material was recovered in the sampler.

4) **Sample Recovery.** Enter the length to the nearest 0.1 foot of soil sample recovered from the sampler. Often, there will be some wash or caved material above the sample; do not include the wash material in the measurement. Record recovery in feet.

5) **Soil Description.** The soil classification should follow the format described in the "Field Classification of Soil" subsection below.

6) **Comments.** Include all pertinent observations (changes in drilling fluid color, rod drops, drilling chatter, rod bounce as in driving on a cobble, damaged Shelby tubes, and equipment malfunctions). In addition, note if casing was used, the sizes and depths installed, and if drilling fluid was added or changed. You should instruct the driller to alert you to any significant changes in drilling (changes in material, occurrence of boulders, and loss of drilling fluid). Such information should be attributed to the driller and recorded in this column. Specific information might include:

   - The date and the time drilling began and ended each day.
   - The depth and size of casing and the method of installation.
   - The date, time, and depth of water level measurements.
   - Depth of rod chatter.
   - Depth and percentage of drilling fluid loss.
   - Depth of hole caving or heaving.
   - Depth of change in material.
   - Health and safety monitoring data.
   - Drilling interval through a boulder.

Field Classification of Soil

This section presents the format for the field classification of soil. In general, the approach and format for classifying soils should conform to the "United Soils Classification System and Logging Criteria" (see charts and criteria, Attachment B).

- The Unified Soil Classification System (USCS) is based on numerical values of certain soil properties that are measured by laboratory tests (ASTM D 2487). It is possible, however, to estimate these values in the field with reasonable accuracy using visual-manual procedures (ASTM D 2488). In addition, some elements of a complete soil description, such as the presence of cobbles or boulders, changes in strata, and the relative proportions of soil types in a bedded deposit can be obtained only in the field.
- Soil descriptions should be precise and comprehensive without being verbose. The correct overall impression of the soil should not be distorted by excessive emphasis on insignificant details. In general, similarities rather than differences between consecutive samples should be stressed.

Soil Descriptions

Soil descriptions must be recorded for every soil sample collected. The format and order for soil descriptions should be:

1) Soil name (synonymous with ASTM D 2488 Group Name) with appropriate modifiers. Soil name should be in all capitals in the log, for example "POORLY-GRADED SAND."
2) Group symbol, in parentheses, for example, "(SP)."
3) Color, using Munsell color designation.
4) Particle size distribution (i.e., sand, silt, clay).
5) Moisture content.
6) Relative density or consistency.
7) Soil structure, mineralogy, or other descriptors.

This order follows, in general, the format described in ASTM D 2488.

(1) Soil Name

The basic name of a soil should be the ASTM D 2488 Group Name on the basis of visual estimates of gradation and plasticity. The soil name should be capitalized.

Examples of acceptable soil names are illustrated by the following descriptions:

- A soil sample is visually estimated to contain 15-percent gravel, 55-percent sand, and 30-percent fines (passing No. 200 sieve). The fines are estimated as either low- or highly-plastic silt. This visual classification is SILTY SAND WITH GRAVEL with a Group Symbol of (SM).
- Another soil sample has the following visual estimate: 10-percent gravel, 30-percent sand, and 60-percent fines (passing the No. 200 sieve). The fines are estimated as low-plastic silt. This visual classification is SANDY SILT. The gravel portion is not included in the soil name because the gravel portion was estimated as less than 15 percent. The Group Symbol is (ML).

The gradation of coarse-grained soil (more than 50 percent retained on No. 200 sieve) is included in the specific soil name in accordance with ASTM D 2488.

- There is no need to further document the gradation.
- However, the maximum size and angularity or roundness of gravel and sand-sized particles should be recorded.
- For fine-grained soil (50 percent or more passing the No. 200 sieve), the name is modified by the appropriate plasticity/elasticity term in accordance with ASTM D 2488.

Interlayered soil should each be described starting with the predominant type.

- An introductory name, such as "Interlayered Sand and Silt," should be used.
- In addition, the relative proportion of each soil type should be indicated (see Table 1 for example).

Where helpful, the evaluation of plasticity/elasticity can be justified by describing results from any of the visual-manual procedures for identifying fine-grained soils, such as reaction to shaking, toughness of a soil thread, or dry strength as described in ASTM D 2488.

(2) Group Symbol

The appropriate group symbol from ASTM D 2488 must be given after each soil name.

1) The group symbol should be placed in parentheses to indicate that the classification has been estimated.
2) In accordance with ASTM D 2488, dual symbols (e.g., GP-GM or SW-SC) can be used to indicate that a soil is estimated to have about 10-percent fines.
3) Borderline symbols (e.g., GM/SM or SW/SP) can be used to indicate that a soil sample has been identified as having properties that do not distinctly place the soil into a specific group. Generally, the group name assigned to a soil with a borderline symbol should be the group name for the first symbol. The use of a borderline symbol should not be used indiscriminately. Every effort should be made to first place the soil into a single group.

(3) Color

Soil color is described by comparing the sample with the Munsell Soil Color Charts. The Munsell colors should be used unless directed otherwise by project sampling plans. Instructions for their proper use are in the color charts. The color name shall precede the Munsell color notation (e.g., "yellowish brown, 10 YR 5/4"), with color hue and chroma number parenthetically entered in the borelog description. If no color chip is available, the color should be simply described as primary color (i.e., green, brown, gray, yellow, tan, etc.).

(4) Particle Size Distribution

Within the gravel sizes and the sand sizes, there are further divisions based on particle sizes. Gravel is divided into fine and coarse gravel. Fine-gravel particles (pebbles) are those that would pass through 3/4-inch opening but not a 1/4-inch opening. The fine gravel ranges from pea- to marble-sized. Coarse-gravel particles are those that would pass through a 3-inch opening but not a 3/4-in opening. Common objects of this size are grapes and tennis balls. Cobbles range from 3 inches to 12 inches in size; boulders are larger than 12 inches.

Sand is divided into three sizes: fine, medium, and coarse. Sand passes a No. 4 sieve (approximately 1/4 inch) and is retained in a No. 200 sieve (0.003 inch). Fine-sand particles pass a No. 40 sieve (approximately 1/64 inch) and are retained in the No. 200 (0.003 inch) sieve. These particles are sugar- or table salt-sized. Medium sand passes the No. 10 sieve (approximately 1/2 inch) and retained on the No. 40 sieve. These particles are about the same size as the openings in window screening. Coarse-sand particles would pass a No. 4 sieve (approximately 1/4 inch) and be retained on a No. 10 sieve. Rock salt granules fall in this size range. Sand and gravel particle sizes are illustrated in ASTM D2488 along with percentage estimating charts. The percentages of different grain size fractions are important in the soil type determination.

(5) Moisture Content

Soil moisture content shall be estimated using only the terminology described below:

- Dry - Absence of moisture, dusty, dry to the touch
- Moist - Damp but no visible water
- Wet - Visibly free water, usually sampled from below the water table

(6) Relative Density or Consistency

An estimate of the consistency shall accompany descriptions of all fine-grained soil (silt and clay where more than 50 percent of the material would pass the No. 200 sieve). A pocket penetrometer is the most accurate method for estimating the consistency of fine-grained soils. The table below lists characteristics for soil consistency identification.

Consistency	Unconfined Compressive Strength (tons/ft)[a]	Blows/foot (SPT) [b]	Manual Procedure
Very soft	<0.25	0 – 4	Thumb will penetrate soil more than 1 inch (25 mm).
Soft	0.25 - 0.50	4 – 8	Thumb will penetrate soil about 1 inch (25 mm).
Firm (formerly stiff)	-1.50	8 – 15	Thumb will indent soil about 1/4 inch (6 mm).
Hard	-2.00	15 – 30	Thumb will not indent soil but readily indented with thumbnail.
Very hard	>4.0	> 30	Thumbnail will not indent soil.

Notes:

[a] Pocket penetrometer

[b] Blows/foot is defined as the total number of blows required to drive the second and third 6 inches of penetration (blow counts for the first 6 inches are also noted) while driving an 18-inch SPT sampler with a 140-pound hammer falling a free height of 30 inches. Conversion factors may be applied when the field log information is transferred to the final log when using a sampler other than an SPT (Standard penetrometer) (e.g., S&H or Modified California), or when using different hammer weights and drop. The conversion factor is approximately 0.5 for an S&H sampler with a hammer weight of 140 pounds falling 30 inches.

Descriptions of all coarse-grained soil (sand and gravel where less than 50 percent of the material would pass the No. 200 sieve and 100 percent would pass the 3-inch sieve) shall be

accompanied by an estimate of the density based upon standard penetrometer (SPT) blow counts. The following terminology should be used:

Density	Blows/foot (SPT)
Very loose	< 4
Loose	4-10
Medium dense	10-30
Dense	30-50
Very dense	> 50

(7) Soil Structure, Mineralogy, and Other Descriptors

Discontinuities and inclusions are important and should be described. Such features include joints or fissures, slickensides, bedding or laminations, veins, root holes, and wood debris.

Significant mineralogical information such as cementation, abundant mica, or unusual mineralogy should be described.

Other descriptors may include particle angularity or shape, maximum particle size, hardness of large particles, plasticity of fines, dry strength, dilatancy, toughness, reaction to HCl, and staining, as well as other information such as organic debris, odor, or presence of free product. Criteria for the use of these other descriptions include:

- Structure:
  - Stratified - Alternating layers of varying material or color with layers at least 1/4-inch thick; note thickness.
  - Laminated - Alternating layers of varying material or color with the layers less than 1/4-inch thick; note thickness.
  - Fissured - Breaks along definite planes of fracture with little resistance.
  - Slickensides - Fracture planes appear polished or glossy, often striated.
  - Blocky - Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
  - Lensed - Inclusion of small pockets of different soils, such as lenses of sand within clay; note thickness.
  - Homogeneous - Same color and appearance throughout.
  - Grading - Whether the particles increase or decrease in size toward the top of logged interval.
- Particle Shape:
  - Flat - Particles with width/thickness ratio > 3.
  - Elongated - Particles with length/width ratio > 3.

  - Elongated and flat - Particles meet criteria for both flat and elongated.

- Particle Angularity:
  - Angular - Particles have sharp edges and relatively planar sides with unpolished surfaces.
  - Subangular - Particles are similar to angular description but have rounded edges.
  - Subrounded - Particles have nearly planar sides but have well-rounded corners and edges.
  - Rounded - Particles have smoothly-curved sides and no edges.

- Cementation:
  - Weak - rumbles or breaks with handling or little finger pressure.
  - Moderate - Crumbles or breaks with considerable finger pressure.
  - Strong - Will not crumble or break with finger pressure.

- Reaction with HCl:
  - None - No visible reaction.
  - Weak - Some reaction, bubbles forming slowly.
  - Strong - Vigorous reaction, bubbles forming immediately.

Comments

This section should be reserved for information not pertaining to lithologic description. Sample information including sample identifier, analysis, matrix, and depth interval should be included in the boring log comments. Information related to drilling, such as drilling rate, chatter, and equipment malfunctions should also be well documented in the comments section of the boring log. Additionally interpretations of the lithologic data may also be presented in the comments section. Examples of this include "transition between Older Alluvium and Fanglomerate," "paleosol horizon B," or "conductive zone."

Recovery

Recovery data are entered along the left side of the boring log. Enter the length of retrieved core to the nearest 0.1 foot of sample recovered and record the value in feet. Do not count slough or caved material as part of the total recovered length of core. Record total length and percent of sample recovered. If using a 5-foot sample barrel, multiply the total length by 2 and 100 to get a percentage number. Similarly, if using a 2.5-foot sampler, multiply by 4 and 100 to get the percent recovery.

Backfilling

When a boring is completed and the water level measured, the boring shall be backfilled to ground surface according to applicable regulations. The destruction of the hole shall be noted on the log. Borehole destruction should follow SOP 28 *Soil Boring Abandonment*

Attachments

- Soil Boring Log, CH2M HILL Form D1586, and a completed example
- Unified Soil Classification System and Logging Criteria

Key Checks and Preventive Maintenance

Check entries to the soil boring log and field logbook in the field; because the samples will be disposed of, confirmation and corrections cannot be made later. Check that sample numbers and intervals are properly specified. Check that drilling and sampling equipment is decontaminated using the procedures defined in SOP *Decontamination of Drilling Rigs and Equipment*.

ATTACHMENT A

Examples of Soil Bore Logs

CH2MHILL

PROJECT NUMBER	BORING NUMBER SHEET OF

SOIL BORING LOG

PROJECT _____ LOCATION _____

ELEVATION _____ DRILLING CONTRACTOR _____

DRILLING METHOD AND EQUIPMENT _____

WATER LEVELS _____ START _____ FINISH _____ LOGGER _____

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION

REV 9/96 FORM D1586

PROJECT NUMBER: 326128.01.16.EN

BORING NUMBER: *MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006 / **DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
5			6	SP	**POORLY GRADED SAND (SP)** - very lt brn (10YR7/3), =2% fines, 98% f to m lithic quartz sand, subang to subrnd, dry - fine roots, iron staining, some iron oxide coating on grains	Hand augured to 5' bgs
10			10	SP	- slightly moist - dry	Rapid drill rate, no chatter
15				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - lt yellowish brn (10YR6/4), 45% gravel up to 7cm, 50% f to m sand, 5% fines, loose, met subang gravel, dry(moist@ 17')	
20			16	SW	- cobble present in slough - one subrnd chert gravel - Possible Fluvially Reworked Alluvium - lt grey (10YR7/2), subang to rnd met gravel up to 9cm, 2% to 5% fines - dk yellowish brn (10YR4/4), mostly c sand subang to ang, met, some Miocene conglomerate gravel	
25				SW	- 65% sand, 30% gravel up to 4cm, 5% fines	
30				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dk yellowish brn (10YR3/6), 35% gravel up to 4cm, 55% m to c sand, 10% silty fines, met clasts are grain supported some mm siltstone - some oxide staining	
35				SW	**WELL GRADED SAND w/ GRAVEL AND CLAY (SW)** - dk yellowish brn (10YR3/6), 30% subang met gravel up to 7 cm, 55% subrnd to subang m to c sand, 15% clayey fines, m density, moist	Drill rate slowed to clean out 8" pipe

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
			2.5	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dr yellowish brn (10YR3/6), 30% gravel, 60% sand, 10% silty fines	Drilling smooth but preceeds less rapidly
40			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - 40% subang met gravel up to 6cm, 55% subrnd to ang sand, 5% fines - more gravel below 38' - gravel is mostly fine	
45						
50			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - Pale brn (10YR6/3), 30% subang met gravel up to 5cm, 60% subrnd to subang m to c met sand, 10% silty fines, wet	Soil sample collected
				SP	**POORLY GRADED SAND w/ GRAVEL (SP)** - pale brn (10TR6/3), 30% f subang gravel up to 2 cm, 65% mostly c sand, =2% fines	
55				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 40% subang met gravel up to 9cm, 55% f to c met sand, 5% silty fines, clast supported, m density, wet	
60			9.5	GW	**WELL GRADED GRAVEL w/ SILT AND SAND (GW)** - brn (7.5YR5/4), 55% subang to ang met gravel up to 4cm, 25% f to c sand, 20% silty fines, dense, moist to dry - soil dries out	Collected Isoflow sample
65					- lt grey (10YR7/2) and powder dry - moist sandy zone, 55% gravel, 35% sand, 10% fines - dry silty lt grey GW below 65'	Drill rate slows to 2' / min
70				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 35% subang met gravel up to 4cm, 60% subrnd sand, 5% silty fines, loose, moist to wet	Moderate Drill Rate

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PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
	X		6	SP	**POORLY GRADED SAND w/ SILT (SP)** - brn (7.5YR4/4), 5% subrnd to subang met gravel up to 4cm, 85% f to c sand, 10% fines, poorly graded, wet, no odor	
145	X		3	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 20% subang to subrnd gravel up to 6cm, 60% f to c sand, 20% silty fines, well graded, m consolidated, met, wet, no odor	
150	X		5	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 25% subang to subrnd up to 4cm met gravel, 60% well graded f to c sand, 15% fines, wet, no odor	
155	X		4	SW	**WELL GRADED SAND w/ SILT AND SAND (SW)** - dr yellowish brn (10YR4/4), 10% subang to subrnd up to 3cm met gravel, 75%well graded f to c sand, 15% fines, moist to wet	
	X		2	SW	**SILTY SAND (SM)** - brn (7.5YR4/4), 5% ang to subrnd met gravel up to 1.5cm increasing with depth, 85% poorly graded m to c sand, 10% fines, loose, wet	
	X		2	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 15% subang to subrnd up to 2.5cm met gravel, 75% well graded f to c sand, 10% fines, mostly met, trace chert, loose, wet, no odor	Collected Isoflow sample
160	X		4	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 25% subang to subrnd gravel up to 6.5cm, 60% m to c sand, 15% silty fines, well graded, m consolidated, met, wet, no odor	Drill rate = 0.75' to 1.5' / min
165	X		4	SW	**SILTY SAND (SW)** - mottled dk reddish brn (5YR3/4), 10% subang to subrnd gravel up to 2.5cm, 50% well graded f to m sand, 40% silt, metamorphic, dry to damp, no odor, interbedded sandy silt laminations	
170	X		5.5	SW	**SAND w/ GRAVEL (SW)** - dk reddish brn (5YR3/4), 20% subang to subrnd gravel up to 5cm, 75% f to c sand, 5% fines, well graded, loose, met, wet	
175	X		2.5	SM	**SILTY SAND w/ GRAVEL (SM)** - brn (7.5YR4/4), 15% subang to subrnd gravel, 70% f to m sand, 15% fines, poorly graded, met,increasingly consolidated, slightly to moderately calcareous, moist to wet	

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PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
285			0	BR	**MIOCENE CONGLOMERATE BEDROCK (BR)** - 60% well graded subang to rnd gravel up to 10cm, 30% well graded sand, 10% fines, very calcareous, well consolidated to mostly hard, mod to very altered locally, mostly met, dry to moist	

Boring Terminated at 288 ft

ABBREVIATIONS

cc = continuous core run
brn = brown
lt = light
dk = dark
vf = very fine-grained
f = fine-grained
m = medium-grained
c = coarse-grained
vc = very coarse-grained
ang = angular
subang = subangular
subrnd = subrounded
rnd = rounded
br = bedrock formation
ss = sandstone
conglom = conglomerate
comptd = compacted
qtz = quartz

CH2MHILL

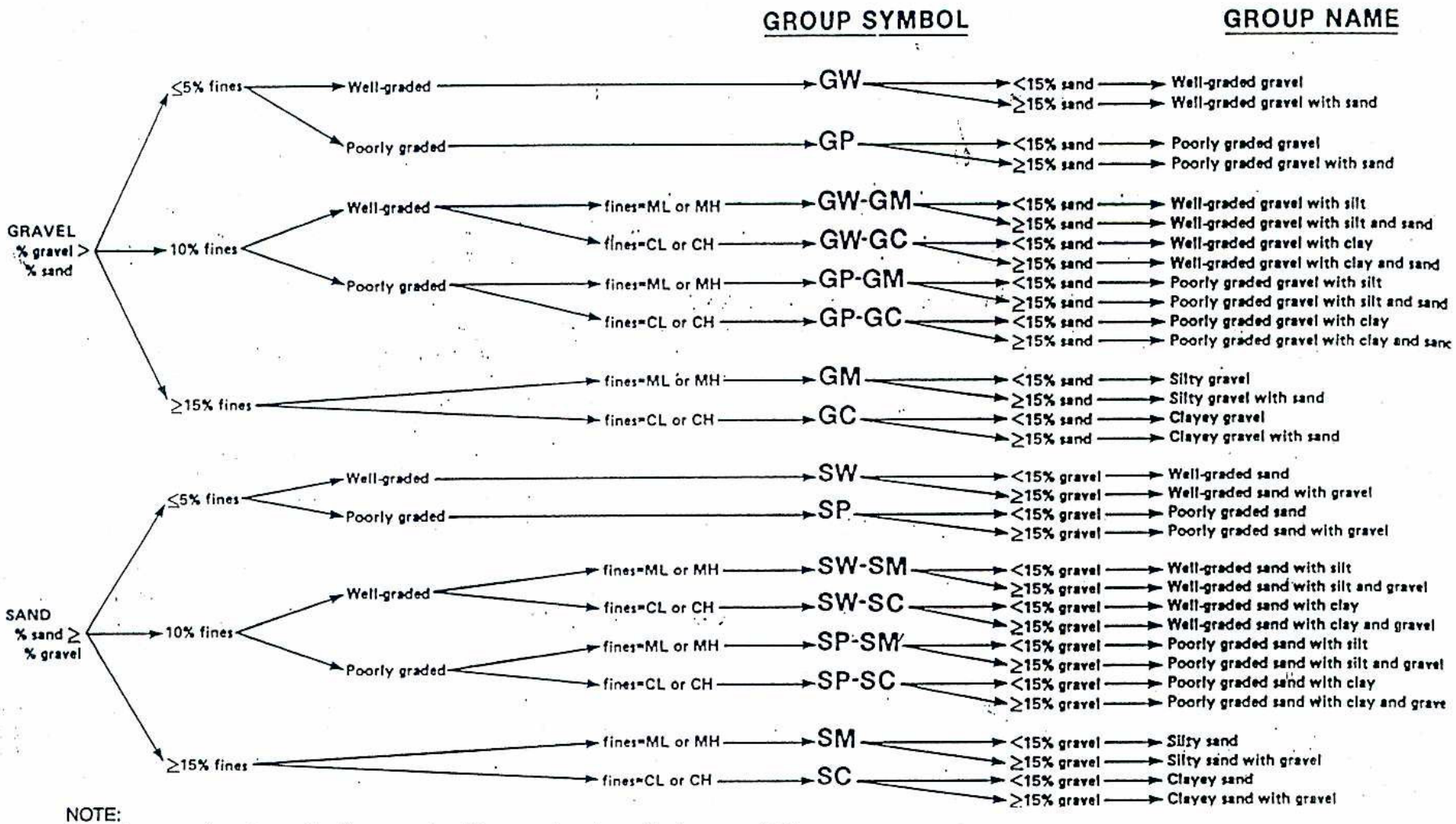
ATTACHMENT B

Unified Soil Classification System and Logging Criteria

GENERAL SOIL CATEGORIES			SYMBOLS	TYPICAL SOIL TYPES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVEL More than half coarse fraction is larger than No. 4 sieve size	Clean Gravel with little or no fines	GW	Well Graded Gravel, Gravel-Sand Mixtures
			GP	Poorly Graded Gravel, Gravel-Sand Mixtures
		Gravel with more than 12% fines	GM	Silty Gravel, Poorly Graded Gravel-Sand-Silt Mixtures
			GC	Clayey Gravel, Poorly Graded Gravel-Sand-Clay Mixtures
	SAND More than half coarse fraction is smaller than No. 4 sieve size	Clean sand with little or no fines	SW	Well Graded Sand, Gravelly Sand
			SP	Poorly Graded Sand, Gravelly Sand
		Sand with more than 12% fines	SM	Silty Sand, Poorly Graded Sand-Silt Mixtures
			SC	Clayey Sand, Poorly Graded Sand-Clay Mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILT AND CLAY Liquid Limit Less than 50%		ML	Inorganic Silt and Very Fine Sand, Rock Flour, Silty or Clayey Fine Sand, or Clayey Silt with Slight Plasticity
			CL	Inorganic Clay of Low to Medium Plasticity, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay
			OL	Organic Clay and Organic Silty Clay of Low Plasticity
	SILT AND CLAY Liquid Limit Greater than 50%		MH	Inorganic Silt, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silt
			CH	Inorganic Clay of High Plasticity, Fat Clay
			OH	Organic Clay of Medium to High Plasticity, Organic Silt
HIGHLY ORGANIC SOILS			PT	Peat and Other Highly Organic Soils

UNIFIED SOIL CLASSIFICATION SYSTEM

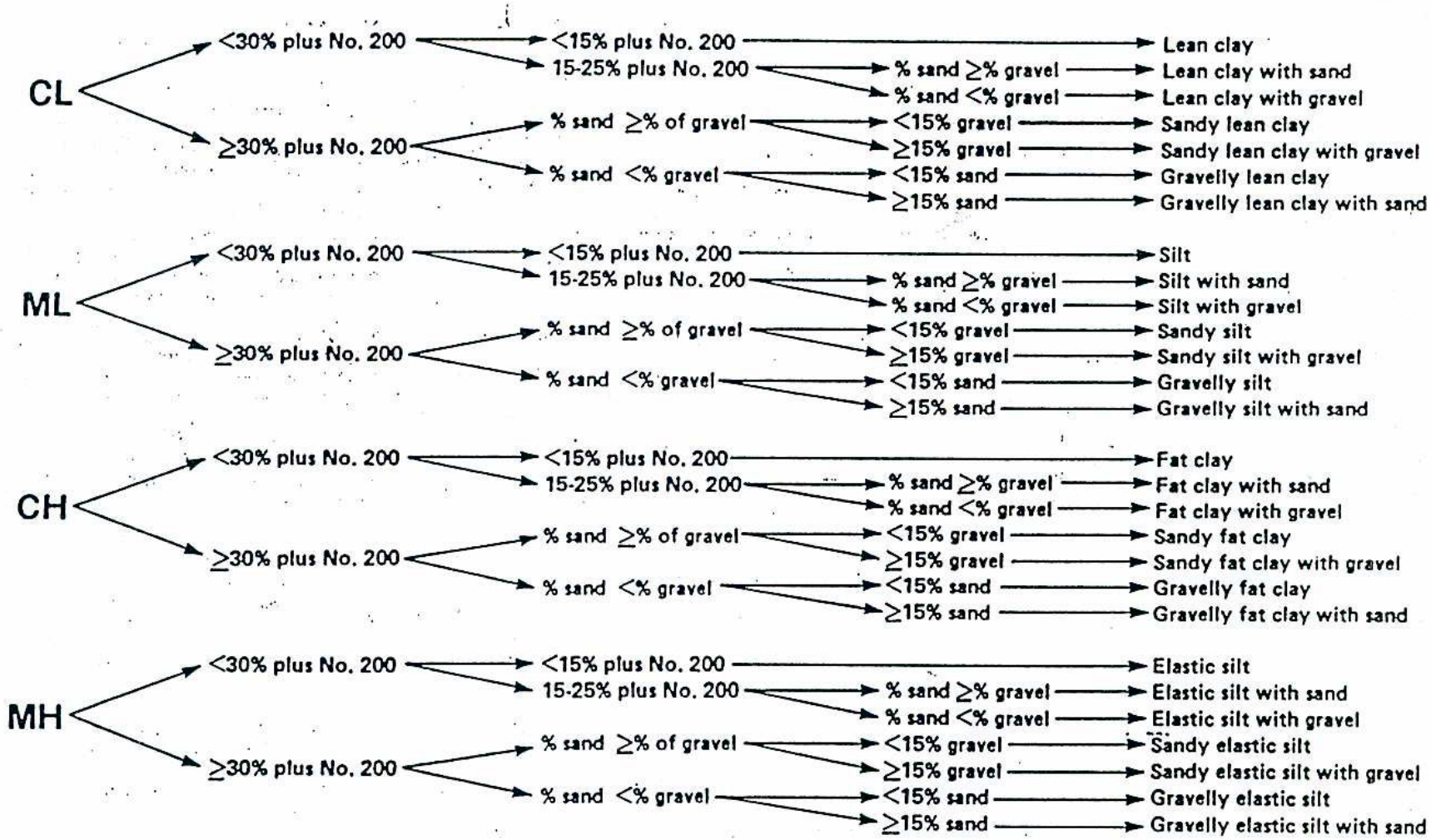
JOB NUMBER	DATE	APPROVED	PLATE



NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Coarse-grained Soil
(50% or more retained on No. 200 sieve)

Field Guide for Soil Classification and Logging Procedures



NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Fine-grained Soil
(50% or more passing No. 200 sieve)

Field Guide for Soil Classification and Logging Procedures

similar, the material is classified as poorly graded or well sorted. If fines represent less than 5 percent of the total mass, the symbol SP is used for a poorly-graded sand and SW for a well graded sand. If silts and/or clays exceed 12 percent, the symbols GC, SC, GM, and SM are used, respectively.

If the silts and clays are between 5 to 12 percent of the total sample weight, a dual classification with two group symbols is used. The first symbol is GW, GP, SW, or, SP, and the second is GC, GM, SC, or SM. The group name corresponds to the first group symbol plus the modifying words "with clay" or "with silt" to indicate the plasticity characteristics. If the fines plot on the CL-ML range on the plasticity chart (Figure 2-2), possible dual classification group names are:

GW-GM	well graded gravel with silt
GW-GC	well graded gravel with clay
GP-GM	poorly graded gravel with silt
GP-GC	poorly graded gravel with clay
SW-SM	well graded sand with silt
SW-SC	well graded sand with clay
SP-SM	poorly graded sand with silt
SP-SC	poorly graded sand with clay

If silts and clays exceed 12 percent of the total weight of sample, the modifiers "M" and "C" are used, respectively. If a sand or gravel has more than 15 percent of the other coarse-grained constituent, the words "with gravel" or "with sand" are added to the group name. A flow chart for classifying coarse-grained soils is presented in Figure 2-3.

2.2 Fine-grained Soils

Particles passing the No. 200 sieve are silts (M) and clays (C). These soils must undergo testing in order to differentiate between them. Typical tests used are: dry strength, dilatancy, toughness, and plasticity. These terms are further discussed in Tables 2-2 through Table 2-6. Silts have little or no dry strength when dry, while clays have considerable dry strength. Dry strength, dilatancy, and toughness are also used to identify the fine-grained fraction of coarse-grained soils.

TABLE 2-2
Criteria for Describing Dry Strength

Description	Criteria
None	The dry specimen crumbles into powder with the mere pressure of handling.
Low	The dry specimen crumbles into powder with some finger pressure.
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure.
High	The dry specimen cannot be broken with finger pressure. The specimen will break into pieces between the thumb and a hard surface.
Very high	The dry specimen cannot be broken between the thumb and a hard surface.

TABLE 2-3
Criteria for Describing Dilatancy

Description	Criteria
None	There is no visible change in the specimen.
Slow	Water appears slowly on the surface of the specimen during shaking, and does not disappear, or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking, and disappears quickly upon squeezing.

TABLE 2-4
Criteria for Describing Toughness

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness.
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness.

TABLE 2-5
Identification of Inorganic Fine-grained Soils from Manual Tests

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot form
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	None	High

TABLE 2-6
Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A 1/8-inch (3-mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to read the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier that the plastic limit.

Fine-grained soils are accurately determined in the laboratory using the Atterberg Limits test. This test include liquid limit, plastic limit, and plasticity index measurements. The liquid limit is the water content of a soil at the point of transition from a plastic to a liquid state. The plastic limit is the water content of a soil at the point of transition from a semisolid to a plastic state. The plasticity index is the difference between the liquid limit and the plastic limit.

As shown in the Figure 2-2, five fields have been identified. These include:

- Silty Clays (CL), Organic Silts (OL) or Organic Silty Clays (OL) of low plasticity
- Fat Clays (CH) and Organic Clays (OH)
- Inorganic Silts (ML) and Organic Silty Clays (OL) of low plasticity
- Silts (MH) and Organic Clays (OH) of a high plasticity
- Silty Clays to Clayey Silt (CL-ML) of low plasticity

Fine-grained soils with a liquid limit > 50 are modified by the symbol H (MH or CH), and those with a liquid limit < 50 are modified by the symbol L (ML or CL). Fine-grained soils containing 30 percent or more coarse-grained fraction should be modified by descriptive terms, such as "gravelly" or "sandy." If the coarse fraction is between 15 and 30 percent, the words" with sand and/or gravel" should be added to the group name. A flow chart for classifying fine-grained soils is presented in Figure 2-4.

2.3 Organic Soils

To classify organic soils, the percentage organic material present in the soil as well as the non-organic fines must be estimated. When the organic content ranges from 18 to 36 percent, the material is an organic clay or an organic silt, depending on the nature of the fine-grained constituents. When the organic content is between 36 and 90 percent, the material is designated a muck or peaty muck (OL or OH). A flow chart for classifying organic soil is presented in Figure 2-4. The term "peaty" is added if the organic remains are

SOP-B3

Borehole Sampling and Logging of Soil Borings
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance for sample collection from soil borings during the drilling process, and proper documentation necessary. Detailed guidance for sample collection, preservation and handling is provided in Section 4.0 of the site Quality Assurance Project Plan (QAPP) and in the Topock Program *Sampling, Analysis, and Field Procedures Manual* (Procedures Manual). SOP-B2 provides detailed guidance for soil characterization and logging.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP), work plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.

2) Applicable project work plan or monitoring plan. Refer to the Procedures Manual and QAPP, as required.

3) Topock Program Health and Safety Plan (HSP).

4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available.

5) Blank sampling log and field notebook.

PREPARATION AND SETUP

1) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.

2) Initiate field logbook for sampling activity.

3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.

Equipment List

- Field logbook
- Borehole log
- Blue or black waterproof or permanent ink pens
- Trash bags
- Plastic sandwich bags
- Paper towels

- Stainless steel sampling equipment (provided by driller)
- Decontamination equipment (Alconox® solution in spray bottle, brushes, buckets, rinse water spray bottle)
- Soil sample containers appropriate for sample analysis and preservation as called for in SAP and QAPP (glass jars, brass sleeves, Encore® containers, sandwich bags, etc.)
- Soil sampling equipment not provided by driller (spatula or putty knife, stainless steel compositing bowl, hand auger, etc.)
- Groundwater sample containers appropriate for sample analysis and preservation as called for in SAP and QAPP (glass jars, VOA vials, plastic jars, etc.)
- Groundwater sample equipment not provided by driller (pump, filters, tubing, power supply, etc.)
- Water quality meters
- Water level indicator
- Distilled water
- Coolers with ice
- Protective waterproof gloves (nitrile or latex)

GUIDELINES

Soil Boring Logs Documentation

Soil boring logs will be completed on the soil boring log forms during the drilling activities at the time of the logging and soil descriptions. Information collected will be consistent with the standard CH2M HILL form (See SOP-B2 attachment A). Sample data may also be documented in the comments section of the boring log.

Items documented on the borehole log include:

1) **Sample Interval:** The top and bottom depth of each sample run should be recorded on the borelog. Sampling includes samples collected for analysis as well as core retrieved for logging purposes.

2) **Sample Type and Number:** Enter the sample type and number consistent with the sampling and analysis plan at the correct depth intervals. An "x" should be placed across the vertical interval where the environmental soil, grab groundwater, or geotechnical sample was collected.

3) **Sample Recovery:** Enter the length of retrieved core to the nearest 0.1 foot of sample recovered, and record the value in feet. Do not count slough or caved material as part of the total recovered length of core. Record total length and percent of sample recovered. If using a 5-foot sample barrel, multiply the total length by 2 and 100 to get a percentage number. Similarly, if using a 2.5-foot sampler, multiply by 4 and 100 to get the percent recovery.

4) **Sampling:** Sampling difficulties shall be noted. Disturbed samples shall be noted on the log as well as the sample recovery. The top of the sample shall be marked on the container.

5) **Water Levels:** Water-level measurements, where groundwater is encountered, are required for each boring. Changes in soil moisture shall be noted and, if there is no water encountered, a note to that effect shall be included on the borehole log. The date and time of water-level measurements shall be documented.

At a minimum, sample identifiers (IDs) should be noted on boring logs at the depth collected. When time and space allows, a summary of analytical sample information can be included. When inclusion of these data prevents documentation of drilling information, sample data should be omitted in order to document drilling.

Borehole Sampling by Drilling—General Procedure

Split-spoon sampling procedures shall be executed in accordance with American Society for Testing and Materials (ASTM) D1586, "Standard Method for Penetration Test and Split-barrel Sampling of Soils" (ASTM 1984). California (2-inch) or Modified California (2.5-inch) split-barrel samplers may also be used.

1) The split-spoon or split-barrel sampler shall be advanced to the top of the sampling interval using a wire-line or sample rods such as A or AW. The larger-diameter samplers may be fitted with three 6-inch-long stainless-steel sleeves. The sampler shall be driven 18 inches or to refusal, with a 140-pound hammer dropping repeatedly 30 inches. Refusal shall be defined as requiring 50 blows with the hammer to advance the sampler less than 6 inches.

2) The number of blows required to drive the sampler each 6 inches shall be recorded on the borelog.

3) As the sample tubes are disassembled, an organic vapor monitor probe shall be inserted into the gap between two sample liners, and the liner exhibiting the highest reading shall be selected for analysis.

4) In general, the middle liner is collected for laboratory analysis, and 10 percent of the bottom liners are collected for quality assurance testing. A sample of the soil in the top liner typically is placed in a re-sealable plastic bag or 8-ounce clear glass jar and left in the sun for approximately 15 minutes to allow any volatile organic compounds (VOC) to volatilize.

5) After the 15 minute volatilization period, the soil vapor in the plastic bag is then measured for VOCs by taking a reading of the headspace. Background VOCs for the bag are determined by monitoring the air in an empty bag.

6) Results of the organic vapor monitoring are recorded on the boring log.

7) Small portions of soil at the ends of the sleeve are scraped off for classification.

Borehole Sampling by Drilling—Split Spoon Sampling

1) Samples collected for laboratory analysis using split spoon sampling device will be separated and transferred from the split-spoon halves into sample jars by clean stainless-steel utensils.

2) Samples for VOCs will be separated and collected first, followed by semivolatile organic compounds samples.

3) For VOC samples, avoid mixing the soil before sampling and sample directly from the split spoon. See SOPs for guidance on homogenizing soil samples and for VOC sampling using EnCore samplers, respectively.

Borehole Sampling by Drilling—Direct-push Sampling

1) Samples collected for laboratory analysis using a direct-push sampling drill rig will be handled by either opening the tube and placing the soil in sample jars or cutting the acetate tube and submitting it the laboratory directly.

2) For samples that will be removed from the acetate tube, the tube will be cut open longitudinally using a double-bladed razor knife.

   - Soil will be inspected and logged prior to removal of soil samples.
   - A short section of soil will be removed from the acetate sleeve using a stainless-steel utensil, homogenized in a clean stainless-steel bowl, and placed in sample jars.
   - Soil collected for VOC analysis will be sampled directly from the split acetate sleeve using EnCore samplers.

3) Alternatively, a short (6-inch) length of liner will be cut from the acetate sleeve and collected directly for laboratory analysis.

   - The section of acetate liner will be removed, capped with Teflon sheeting and plastic end caps at both ends, and taped with clear label or packing tape.
   - Labels shall be affixed to the liners with job designation, time, boring number, sample depth interval, sample number, date sampled, and the initials of the sampler clearly marked.
   - The samples shall then be enclosed in a plastic bag and stored in a cooler maintained at 4°C.
   - Sample information shall be placed on the chain-of-custody, the borelog, and the field logbook. All samples shall be handled in accordance with *Chain of Custody Procedures*.

Borehole Sampling by Drilling—Split-barrel Sampling

Soil samples can also be collected using a 3-foot-long or 5-foot-long split-barrel sampler. The split-barrel sampler is similar to the split-spoon sampler that is used to hold steel or brass sampling sleeves, but the split-barrel sampler typically is not used to hold sample sleeves.

1) The sampler is lowered to the base of the drill bit and is advanced slightly ahead of the drill bit and augers (or conductor casing). The weight of the drill string and sample barrel along with the drilling and cutting action of the drill bit advances the face of the split-barrel sampler into the formation.
2) Once the desired depth interval is reached, the split-barrel sampler is retrieved using a cable or tool steel sections.
3) The retrieved sampler is unscrewed, and one or both halves are laid on the sample table. The soil typically will form a continuous column of soil in one of the split-barrel halves.
4) The soil column is split longitudinally for soil descriptions using a putty knife or spatula.
5) Samples for VOC analysis are collected immediately directly from the soil column.
6) Other soil samples are collected after the core section has been described and logged. The soil is described following the procedures in the following sections.

Groundwater Sampling

1) Groundwater samples can be collected by hydropunch by bailer or by pumping from an isolated zone. Collection of groundwater by bailing is not an accurate method of collection depth discrete groundwater samples, as the zone sampled is poorly isolated.
2) Hydropunch samples are collected below the bit of the drill stem, in relatively undisturbed soil zone. This method of sample collection may be difficult in fine-textured soils and in very rocky soils. To collect these samples, a point is driven below the depth of the drill bit, then a screen zone is opened within this point and water allowed to flow in. The hydropunch tool must be decontaminated between samples.

Groundwater can also be collected from the open or cased borehole with a bailer. A disposable or decontaminated stainless-steel bailer is lowered into the boring, and water is collected. This method is preferable for collection of groundwater from the water table. Attempts can be made to collect discrete groundwater samples beneath the water table; however, the boring must be cased with watertight, stainless-steel pipe, and the boring must be evacuated prior to collection of samples.

Alternatively, discrete groundwater samples can be collected by isolating a zone with casing and packers. To collect these samples, the borehole is first advanced to the depth at which a sample is required. Then casing is advanced to within 20 feet of the sample zone. Next, a pump and packers are lowered into the hole. The zone from which samples are to be collected is isolated with a packer, and water is pumped directly from the target zone.

Sample Handling

Sample preservation and sampling procedures are detailed in Section 4.0 of the QAPP. Additional information is provided in the Procedures Manual and in the appropriate SAP.

KEY CHECKS AND ITEMS

- Check entries to the soil boring log and field logbook in the field during sampling activities because the samples will be disposed at the end of the fieldwork, confirmation and corrections cannot be made later.

- Check that the sample numbers and intervals are properly specified.
- Ensure that drilling equipment is decontaminated prior to the beginning of work and between each borehole.
- All materials generated during sampling (debris, PPE, decontamination liquids, etc.) will be placed in 55-gallon drums or roll-off bins for storage pending analysis and disposal off site, as outlined in SOP 39, Standard of Practice H-83, and Appendix D of the project *Soil and Groundwater Management Plan*.

ATTACHMENT A

Examples of Soil Bore Logs

CH2MHILL

PROJECT NUMBER	BORING NUMBER SHEET OF

SOIL BORING LOG

PROJECT _____ LOCATION _____

ELEVATION _____ DRILLING CONTRACTOR _____

DRILLING METHOD AND EQUIPMENT _____

WATER LEVELS _____ START _____ FINISH _____ LOGGER _____

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION

REV 9/96 FORM D1586

PROJECT NUMBER: 326128.01.16.EN

BORING NUMBER: *MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006 / **DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
5			6	SP	**POORLY GRADED SAND (SP)** - very lt brn (10YR7/3), =2% fines, 98% f to m lithic quartz sand, subang to subrnd, dry - fine roots, iron staining, some iron oxide coating on grains	Hand augured to 5' bgs
10			10	SP	- slightly moist - dry	Rapid drill rate, no chatter
15				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - lt yellowish brn (10YR6/4), 45% gravel up to 7cm, 50% f to m sand, 5% fines, loose, met subang gravel, dry(moist@ 17')	
20			16	SW	- cobble present in slough - one subrnd chert gravel - Possible Fluvially Reworked Alluvium - lt grey (10YR7/2), subang to rnd met gravel up to 9cm, 2% to 5% fines - dk yellowish brn (10YR4/4), mostly c sand subang to ang, met, some Miocene conglomerate gravel	
25				SW	- 65% sand, 30% gravel up to 4cm, 5% fines	
30				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dk yellowish brn (10YR3/6), 35% gravel up to 4cm, 55% m to c sand, 10% silty fines, met clasts are grain supported some mm siltstone - some oxide staining	
35				SW	**WELL GRADED SAND w/ GRAVEL AND CLAY (SW)** - dk yellowish brn (10YR3/6), 30% subang met gravel up to 7 cm, 55% subrnd to subang m to c sand, 15% clayey fines, m density, moist	Drill rate slowed to clean out 8" pipe

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
			2.5	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dr yellowish brn (10YR3/6), 30% gravel, 60% sand, 10% silty fines	Drilling smooth but preceeds less rapidly
40			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - 40% subang met gravel up to 6cm, 55% subrnd to ang sand, 5% fines - more gravel below 38' - gravel is mostly fine	
45						
50			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - Pale brn (10YR6/3), 30% subang met gravel up to 5cm, 60% subrnd to subang m to c met sand, 10% silty fines, wet	Soil sample collected
				SP	**POORLY GRADED SAND w/ GRAVEL (SP)** - pale brn (10TR6/3), 30% f subang gravel up to 2 cm, 65% mostly c sand, =2% fines	
55				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 40% subang met gravel up to 9cm, 55% f to c met sand, 5% silty fines, clast supported, m density, wet	
60			9.5	GW	**WELL GRADED GRAVEL w/ SILT AND SAND (GW)** - brn (7.5YR5/4), 55% subang to ang met gravel up to 4cm, 25% f to c sand, 20% silty fines, dense, moist to dry - soil dries out	Collected Isoflow sample
65					- lt grey (10YR7/2) and powder dry - moist sandy zone, 55% gravel, 35% sand, 10% fines - dry silty lt grey GW below 65'	Drill rate slows to 2' / min
70				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 35% subang met gravel up to 4cm, 60% subrnd sand, 5% silty fines, loose, moist to wet	Moderate Drill Rate

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
	X		6	SP	**POORLY GRADED SAND w/ SILT (SP)** - brn (7.5YR4/4), 5% subrnd to subang met gravel up to 4cm, 85% f to c sand, 10% fines, poorly graded, wet, no odor	
145	X		3	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 20% subang to subrnd gravel up to 6cm, 60% f to c sand, 20% silty fines, well graded, m consolidated, met, wet, no odor	
150	X		5	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 25% subang to subrnd up to 4cm met gravel, 60% well graded f to c sand, 15% fines, wet, no odor	
155	X		4	SW	**WELL GRADED SAND w/ SILT AND SAND (SW)** - dr yellowish brn (10YR4/4), 10% subang to subrnd up to 3cm met gravel, 75%well graded f to c sand, 15% fines, moist to wet	
	X		2	SW	**SILTY SAND (SM)** - brn (7.5YR4/4), 5% ang to subrnd met gravel up to 1.5cm increasing with depth, 85% poorly graded m to c sand, 10% fines, loose, wet	
	X		2	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 15% subang to subrnd up to 2.5cm met gravel, 75% well graded f to c sand, 10% fines, mostly met, trace chert, loose, wet, no odor	Collected Isoflow sample
160	X		4	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 25% subang to subrnd gravel up to 6.5cm, 60% m to c sand, 15% silty fines, well graded, m consolidated, met, wet, no odor	Drill rate = 0.75' to 1.5' / min
165	X		4	SW	**SILTY SAND (SW)** - mottled dk reddish brn (5YR3/4), 10% subang to subrnd gravel up to 2.5cm, 50% well graded f to m sand, 40% silt, metamorphic, dry to damp, no odor, interbedded sandy silt laminations	
170	X		5.5	SW	**SAND w/ GRAVEL (SW)** - dk reddish brn (5YR3/4), 20% subang to subrnd gravel up to 5cm, 75% f to c sand, 5% fines, well graded, loose, met, wet	
175	X		2.5	SM	**SILTY SAND w/ GRAVEL (SM)** - brn (7.5YR4/4), 15% subang to subrnd gravel, 70% f to m sand, 15% fines, poorly graded, met,increasingly consolidated, slightly to moderately calcareous, moist to wet	

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PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION (SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.)	COMMENTS (DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.)
285			0	BR	**MIOCENE CONGLOMERATE BEDROCK (BR)** - 60% well graded subang to rnd gravel up to 10cm, 30% well graded sand, 10% fines, very calcareous, well consolidated to mostly hard, mod to very altered locally, mostly met, dry to moist	

Boring Terminated at 288 ft

ABBREVIATIONS

cc = continuous core run
brn = brown
lt = light
dk = dark
vf = very fine-grained
f = fine-grained
m = medium-grained
c = coarse-grained
vc = very coarse-grained
ang = angular
subang = subangular
subrnd = subrounded
rnd = rounded
br = bedrock formation
ss = sandstone
conglom = conglomerate
comptd = compacted
qtz = quartz

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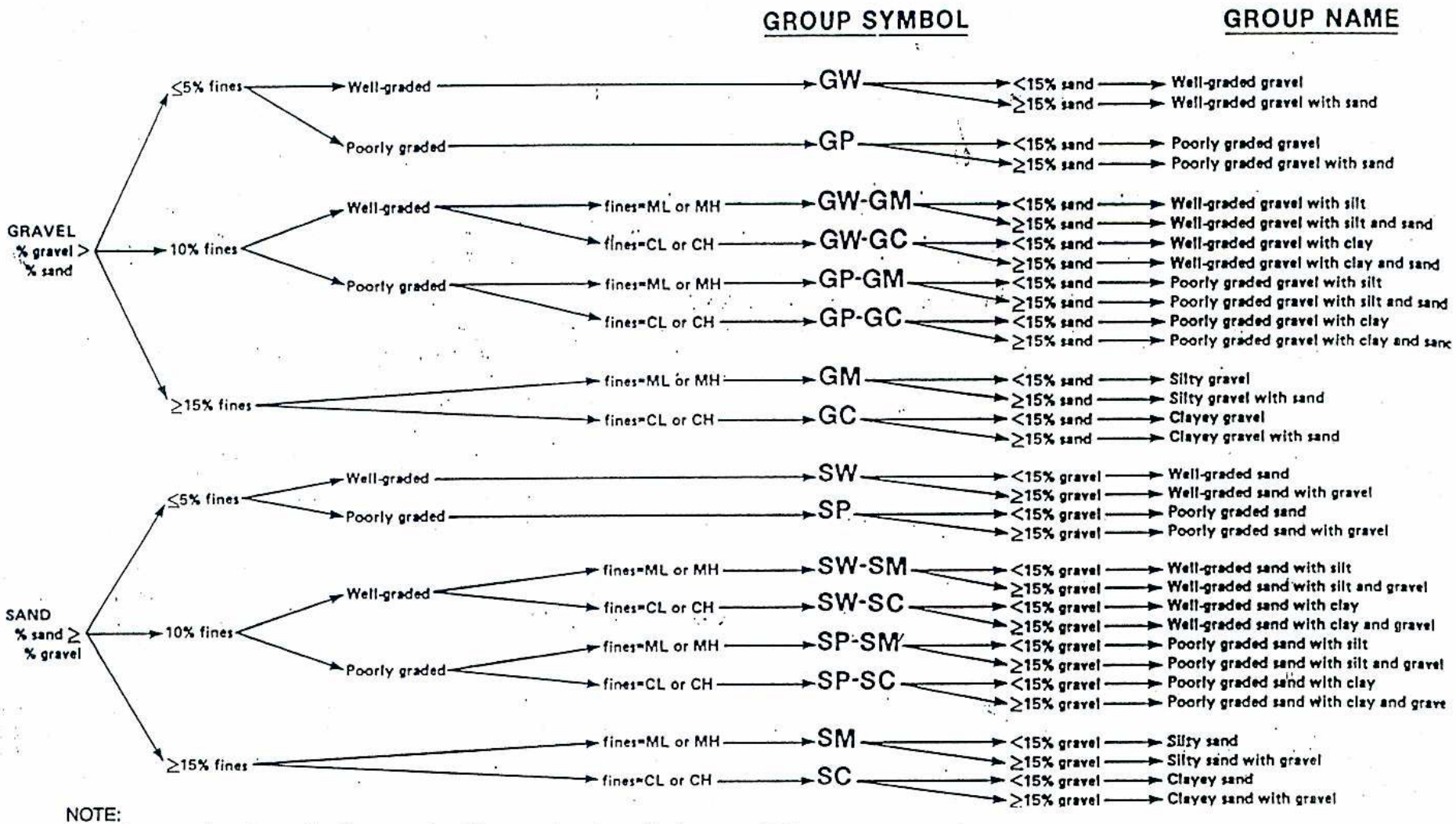
ATTACHMENT B

Unified Soil Classification System and Logging Criteria

GENERAL SOIL CATEGORIES			SYMBOLS	TYPICAL SOIL TYPES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVEL More than half coarse fraction is larger than No. 4 sieve size	Clean Gravel with little or no fines	GW	Well Graded Gravel, Gravel-Sand Mixtures
			GP	Poorly Graded Gravel, Gravel-Sand Mixtures
		Gravel with more than 12% fines	GM	Silty Gravel, Poorly Graded Gravel-Sand-Silt Mixtures
			GC	Clayey Gravel, Poorly Graded Gravel-Sand-Clay Mixtures
	SAND More than half coarse fraction is smaller than No. 4 sieve size	Clean sand with little or no fines	SW	Well Graded Sand, Gravelly Sand
			SP	Poorly Graded Sand, Gravelly Sand
		Sand with more than 12% fines	SM	Silty Sand, Poorly Graded Sand-Silt Mixtures
			SC	Clayey Sand, Poorly Graded Sand-Clay Mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILT AND CLAY Liquid Limit Less than 50%		ML	Inorganic Silt and Very Fine Sand, Rock Flour, Silty or Clayey Fine Sand, or Clayey Silt with Slight Plasticity
			CL	Inorganic Clay of Low to Medium Plasticity, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay
			OL	Organic Clay and Organic Silty Clay of Low Plasticity
	SILT AND CLAY Liquid Limit Greater than 50%		MH	Inorganic Silt, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silt
			CH	Inorganic Clay of High Plasticity, Fat Clay
			OH	Organic Clay of Medium to High Plasticity, Organic Silt
HIGHLY ORGANIC SOILS			PT	Peat and Other Highly Organic Soils

UNIFIED SOIL CLASSIFICATION SYSTEM

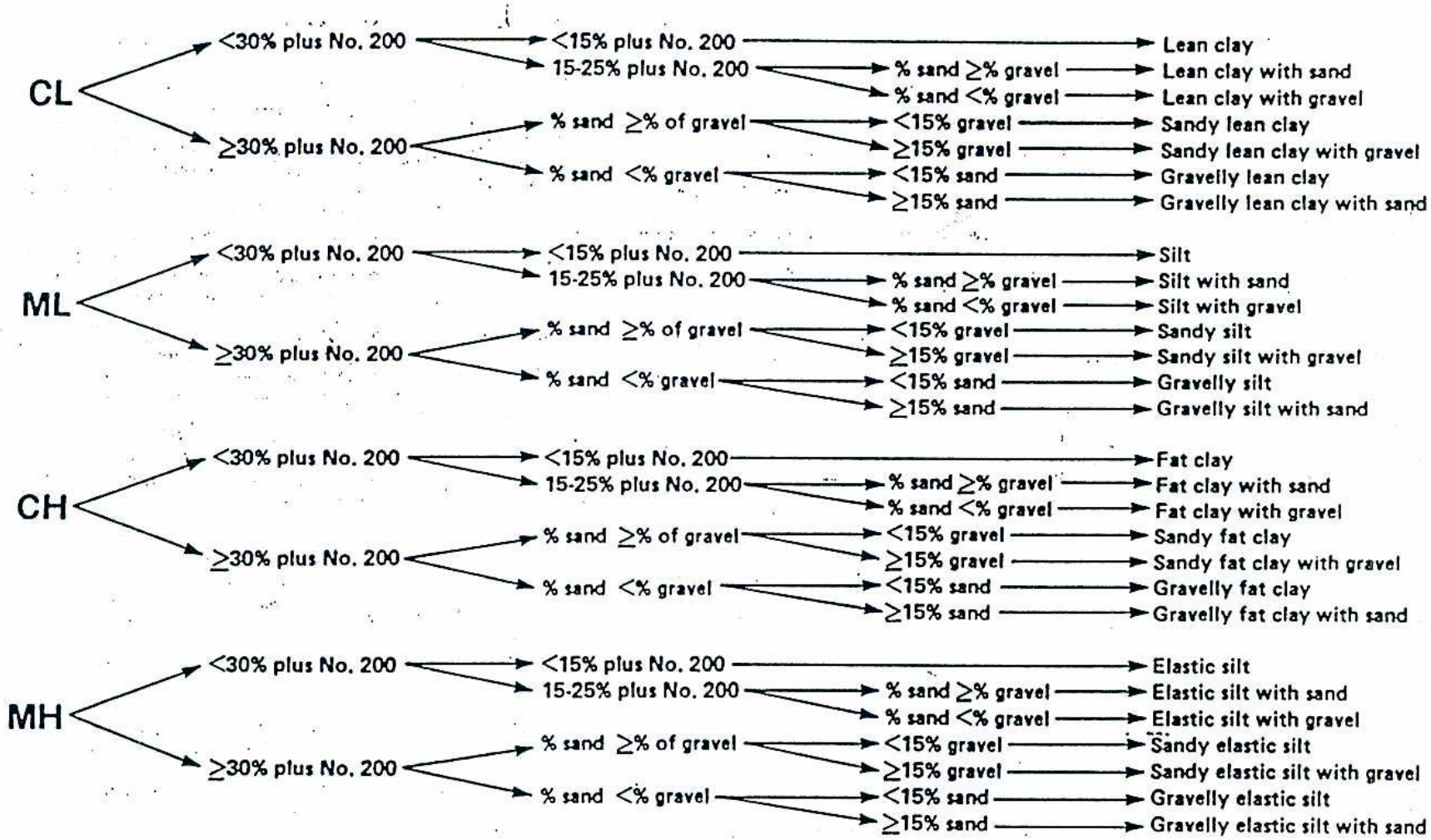
JOB NUMBER	DATE	APPROVED	PLATE



NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Coarse-grained Soil
(50% or more retained on No. 200 sieve)

Field Guide for Soil Classification and Logging Procedures



NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Fine-grained Soil
(50% or more passing No. 200 sieve)

Field Guide for Soil Classification and Logging Procedures

similar, the material is classified as poorly graded or well sorted. If fines represent less than 5 percent of the total mass, the symbol SP is used for a poorly-graded sand and SW for a well graded sand. If silts and/or clays exceed 12 percent, the symbols GC, SC, GM, and SM are used, respectively.

If the silts and clays are between 5 to 12 percent of the total sample weight, a dual classification with two group symbols is used. The first symbol is GW, GP, SW, or, SP, and the second is GC, GM, SC, or SM. The group name corresponds to the first group symbol plus the modifying words "with clay" or "with silt" to indicate the plasticity characteristics. If the fines plot on the CL-ML range on the plasticity chart (Figure 2-2), possible dual classification group names are:

GW-GM	well graded gravel with silt
GW-GC	well graded gravel with clay
GP-GM	poorly graded gravel with silt
GP-GC	poorly graded gravel with clay
SW-SM	well graded sand with silt
SW-SC	well graded sand with clay
SP-SM	poorly graded sand with silt
SP-SC	poorly graded sand with clay

If silts and clays exceed 12 percent of the total weight of sample, the modifiers "M" and "C" are used, respectively. If a sand or gravel has more than 15 percent of the other coarse-grained constituent, the words "with gravel" or "with sand" are added to the group name. A flow chart for classifying coarse-grained soils is presented in Figure 2-3.

2.2 Fine-grained Soils

Particles passing the No. 200 sieve are silts (M) and clays (C). These soils must undergo testing in order to differentiate between them. Typical tests used are: dry strength, dilatancy, toughness, and plasticity. These terms are further discussed in Tables 2-2 through Table 2-6. Silts have little or no dry strength when dry, while clays have considerable dry strength. Dry strength, dilatancy, and toughness are also used to identify the fine-grained fraction of coarse-grained soils.

TABLE 2-2
Criteria for Describing Dry Strength

Description	Criteria
None	The dry specimen crumbles into powder with the mere pressure of handling.
Low	The dry specimen crumbles into powder with some finger pressure.
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure.
High	The dry specimen cannot be broken with finger pressure. The specimen will break into pieces between the thumb and a hard surface.
Very high	The dry specimen cannot be broken between the thumb and a hard surface.

TABLE 2-3
Criteria for Describing Dilatancy

Description	Criteria
None	There is no visible change in the specimen.
Slow	Water appears slowly on the surface of the specimen during shaking, and does not disappear, or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking, and disappears quickly upon squeezing.

TABLE 2-4
Criteria for Describing Toughness

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness.
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness.

TABLE 2-5
Identification of Inorganic Fine-grained Soils from Manual Tests

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot form
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	None	High

TABLE 2-6
Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A 1/8-inch (3-mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to read the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier that the plastic limit.

Fine-grained soils are accurately determined in the laboratory using the Atterberg Limits test. This test include liquid limit, plastic limit, and plasticity index measurements. The liquid limit is the water content of a soil at the point of transition from a plastic to a liquid state. The plastic limit is the water content of a soil at the point of transition from a semisolid to a plastic state. The plasticity index is the difference between the liquid limit and the plastic limit.

As shown in the Figure 2-2, five fields have been identified. These include:

- Silty Clays (CL), Organic Silts (OL) or Organic Silty Clays (OL) of low plasticity
- Fat Clays (CH) and Organic Clays (OH)
- Inorganic Silts (ML) and Organic Silty Clays (OL) of low plasticity
- Silts (MH) and Organic Clays (OH) of a high plasticity
- Silty Clays to Clayey Silt (CL-ML) of low plasticity

Fine-grained soils with a liquid limit > 50 are modified by the symbol H (MH or CH), and those with a liquid limit < 50 are modified by the symbol L (ML or CL). Fine-grained soils containing 30 percent or more coarse-grained fraction should be modified by descriptive terms, such as "gravelly" or "sandy." If the coarse fraction is between 15 and 30 percent, the words" with sand and/or gravel" should be added to the group name. A flow chart for classifying fine-grained soils is presented in Figure 2-4.

2.3 Organic Soils

To classify organic soils, the percentage organic material present in the soil as well as the non-organic fines must be estimated. When the organic content ranges from 18 to 36 percent, the material is an organic clay or an organic silt, depending on the nature of the fine-grained constituents. When the organic content is between 36 and 90 percent, the material is designated a muck or peaty muck (OL or OH). A flow chart for classifying organic soil is presented in Figure 2-4. The term "peaty" is added if the organic remains are

SOP-B4

Boring Abandonment
Standard Operating Procedures for PG&E Topock Program

The purpose of this standard operating procedure (SOP) is to describe methods to abandon drill borings to the surface. The guideline covers all drilling methods and includes borings through surface casings.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan, work plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.

2) Applicable project work plan or monitoring plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan* (Procedures Manual), as required.

3) San Bernardino County Department of Health well abandonment (destruction) permit.

4) Topock Program Health and Safety Plan (HSP).

5) Blank sampling log and field notebook.

PREPARATION AND SETUP

1) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.

2) Initiate field logbook for sampling activity.

3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.

4) Inspect all required field equipment.

Equipment List

- Truck-mounted drilling rig, skid rig, or barge-mounted tripod rig
- Hollow-stem augers and associated equipment or either rotary-drilling or sonic- drilling equipment
- Steel or Schedule 40 PVC casing, of appropriate diameter for required installations (at least 6.25-inch inside diameter if surface casing is required)
- Approved water source
- Cement
- Bentonite

GUIDELINES

California Department of Water Resources, June 1991, Bulletin 74-90 (Supplement to Bulletin 74-81) *California Well Standards*.

PROCEDURES

Abandonment

1) The borehole will be grouted from total depth to the surface with bentonite-cement grout. The cement-bentonite grout will be installed continuously in one operation from the bottom of the space to be grouted to the ground surface.

2) The grout mixture will consist of 94 pounds of cement (1 bag) per 6 gallons of water and 2 to 3 pounds of powdered bentonite per bag of cement to reduce shrinkage.

3) The source of the water used in the grout mixture must be from a pre-approved source.

4) If there is any risk of borehole collapse upon removal of the drill casing, then the grout will be added prior to the removal of the drill casing. The grouting can be completed in stages, grouting 50 to 100 feet at a time, removing 50 to 100 feet of drill casing, and then repeating until the grout has reached the surface and the final casing removed.

5) When installing grout in soil borings, the grout will be installed through a tremie pipe that is placed inside the drill casing to the bottom of the borehole.

6) The production of grout will be completed to eliminate the preparation of excess/waste grout.

Waste Disposal

1) The soil cuttings are to be drummed and managed as described in SOP *Disposal of Waste Fluids and Soils* and the investigation-derived waste management plan.

2) Minimal quantities of grout may be included in the water or soil waste streams. The quantity of grout will be limited to that produced during cleaning of grouting equipment or decontamination of drill casing.

KEY CHECKS AND PREVENTATIVE MAINTENANCE

- Check that the drilling rig or soil-coring rig is in working order.
- Check that the borehole is grouted to the ground surface at the completion of drilling and sampling.

SOP-B5

Decontamination of Personnel and Equipment, Well Drilling, and Subsurface Sampling and Investigations
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure provides general guidelines for the decontamination of personnel, sampling equipment, and monitoring equipment used in potentially-contaminated areas.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan, which includes a health and safety plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan*, as required.

PREPARATION AND SETUP

1) Initiate field log sampling book for activity.
2) Inspect all equipment necessary to carry out activities detailed in event-specific SAP.
3) Review decontamination guidelines for equipment necessary to carry out activities.

Equipment List

- Demonstrated analyte-free, deionized water (specifically, ASTM Type II water)
- Distilled water
- Potable water; must be from a municipal water supplier, otherwise an analysis must be run for appropriate volatile and semivolatile organic compounds and inorganic chemicals (e.g., Target Compound List and Target Analyte List chemicals)
- 2.5% (W/W) Liquinox® and water solution
- Large plastic pails or tubs for Liquinox® and water, scrub brushes, spray or squirt bottles for Liquinox® solution, and distilled or deionized water, plastic bags, and sheets
- Department of Transportation (DOT)-approved 55-gallon drum for disposal of waste
- Nitrile or latex gloves
- Decontamination pad and steam cleaner/high pressure cleaner for large equipment

GUIDELINES

Personnel Decontamination

Decontamination should be performed after completion of tasks whenever personnel come in contact with contaminated (or potentially-contaminated) soils or fluids. Full or emergency decontamination should be performed when contaminant concentrations are not known and when potentially-contaminated fluids come into contact with skin beneath clothing, eyes, nose, or ears.

Procedures for full/emergency decontamination are to:

1) Remove contaminated clothing.
2) Step into containment area (decontamination pad or large pail).
3) Rinse away fluids and soil.
4) Wash skin with Liquinox® solution in such a way as to not abrade skin. (Liquinox® solution should be made with potable water and sufficient detergent to create foamy suds.) Eyes and mucus membranes in contact with contaminants must be washed with eye wash or drinking water continuously for at least 15 minutes.
5) Rinse with potable water.
6) If no other clothes are available, wash affected clothes in Liquinox® solution prior to donning. If other clothes are available, contaminated clothes may be isolated for later wash or disposed of along with personal protective equipment (PPE).
7) Any PPE worn (including disposable latex booties, gloves, and disposable coveralls) should be discarded into DOT-approved 55-gallon drum located at the MW-20 bench.
8) Dispose of wash and rinseate water in an appropriate container with other chromium contaminated fluids. These fluids may be taken to the MW-20 bench for treatment or to a Baker® tank within the PG&E facility for containerization.
9) Replace all appropriate clothing and PPE before resuming work or departing site.

Moist soil or water containing known concentrations of hexavalent chromium less than 50 parts per billion that comes into contact with hands need not require full decontamination. Dry soil containing chromium that comes into contact with clothing can also be decontaminated in an abbreviated manner.

Daily decontamination and minor exposure contact decontamination procedures are to:

1) Wash hands and skin that comes in contact with soils or water that may contain small concentrations of chromium as soon as possible after contact. Wash with Liquinox® solution and rinse with potable water.
2) If contaminated soil or water contacts hands through hole or over lip of gloves, remove gloves and wash hands thoroughly before donning new gloves.
3) Discard gloves into DOT-approved 55-gallon drum located on the MW-20 bench at the end of the day or event.

4) Remove coveralls or dry soils from clothing before leaving site. Clothing contaminated by moist soil or water containing hexavalent chromium should be removed and promptly washed.

5) At the end of the work day, shower entire body, including hair, either at the work site or at hotel.

Sampling Equipment Decontamination—Groundwater Sampling Pumps

Sampling pumps are decontaminated after each use as follows:

1) Don waterproof (nitrile or latex) gloves.

2) Run pump and reusable tubing through with Liquinox® solution (made with potable water) so that the pump and all portions or the tubing have been flushed with the solution for at least 30 to 60 seconds. More time is required if water is present in the tubing. If unsure, run for 2.5 minutes. Outside of the tubing should also be submerged and washed in the solution.

3) Run pump and reusable tubing through first rinse (with potable or distilled water) so that the pump and all portions or the tubing have been flushed with the solution for at least 60 seconds. More time is required if any suds are present in the pump or tubing.

4) Run pump and reusable tubing through second rinse (with distilled water) so that the pump and all portions or the tubing have been flushed with the solution for at least 30 seconds. More time is required if water from first rinse is present in tubing.

5) Equipment blank samples may be taken at this point using ASTM Type II water or distilled water as required by laboratory.

Sampling Equipment Decontamination—Other Equipment

Reusable sampling equipment is decontaminated after each use as follows:

1) Don nitrile or latex gloves.

2) Wash all equipment surfaces that contacted the potentially contaminated soil/water with Liquinox® solution (made from potable water). Water quality meters that are not placed within wells should not be washed with detergent, as this will degrade sensors; these meters should be double-rinsed. Any portion of equipment that is placed inside wells (including cables and pipe) and that comes in contact with moisture should be washed with detergent.

3) Rinse equipment and supplies with potable water, if the equipment is not used to collect groundwater or soil samples. Equipment used to collect samples or take water quality parameters should be rinsed with distilled water.

4) Air dry or towel dry with paper towels.

5) Collect all rinseate and dispose of in Baker® tank within the PG&E facility or Denbeste® tank at the MW-20 bench.

6) Decontamination materials (e.g., plastic sheeting, tubing, etc.) that have come in contact with used decontamination fluids or sampling equipment will be disposed of in DOT-approved 55-gallon drums if highly contaminated. If not contaminated, equipment can be washed and disposed of in trash.

7) Preserved bottles may need to be washed before being packed or handed without gloves. The outsides of filled bottles should be rinsed and toweled dry to prevent contact with strong acids or based.

Heavy Equipment and Tools

Heavy equipment such as drilling rigs, drilling rods/tools, and the backhoe will be decontaminated upon arrival at the site and between locations as follows:

1) Set up a decontamination pad in designated area.

2) Steam clean heavy equipment until no visible signs of dirt are observed. This may require wire or stiff brushes to dislodge dirt from some areas.

KEY CHECKS AND ITEMS

- Clean with solutions of Liquinox® and potable water. Rinse with distilled or deionized water if equipment is used to collect samples or water readings; otherwise, rinse with potable water.
- Equipment placed within wells should be thoroughly decontaminated and before being placed in a well. All potions of this equipment that come into contact with moisture should be decontaminated.
- Decontaminate filled sample bottles before relinquishing them to anyone.

SOP-B7

Homogenization of Soil and Sediment Samples
Standard Operating Procedures for PG&E Topock Program

The homogenization of soil and sediment samples is performed to minimize any bias of sample representativeness introduced by the natural stratification of constituents within the sample. Standard techniques for soil and sediment homogenization and equipment are provided in this SOP. These procedures do not apply to aliquots collected for volatile organic compounds (VOCs) or field gas chromography screening; samples for these analyses should NOT be homogenized.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan,* as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling logs.
5) Blank sampling logs and field notebook.

PREPARATION AND SETUP

1) Review event-specific SAP or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Initiate field logbook for sampling activity.

EQUIPMENT LIST

- Sample containers
- Stainless-steel spoons or spatulas
- Stainless-steel pans
- Phthalate-free gloves

PROCEDURES

Sample Homogenization

1) Soil and sediment samples to be analyzed for semivolatiles, pesticides, polychlorinated biphenyls, metals, cyanide, or field x-ray fluorescence screening should be homogenized in the field.
2) After a sample is taken, a stainless-steel spatula should be used to remove the sample from the split spoon or other sampling device. The sampler should not use fingers to do this, as gloves may introduce organic interferences into the sample.

3) Samples for VOCs should be taken immediately upon opening the spoon and should not be homogenized.

4) Prior to homogenizing the soil or sediment sample, any rocks, twigs, leaves, or other debris should be removed from the sample.

5) The sample should be placed in a decontaminated stainless-steel pan and thoroughly mixed using a stainless-steel spoon. The soil or sediment material in the pan should be scraped from the sides, corners, and bottom, rolled into the middle of the pan, and initially mixed.

6) The sample should then be quartered and moved to the four corners of the pan. Each quarter of the sample should be mixed individually, then rolled to the center of the pan and mixed with the entire sample again.

Equipment Decontamination

1) All stainless-steel spoons, spatulas, and pans must be decontaminated following procedures specified in SOP *Decontamination of Personnel and Equipment* prior to homogenizing the sample.

2) A composite equipment rinse blank of homogenization equipment should be taken each day it is used.

SOP-B9

Drilling--Sonic Method
Standard Operating Procedures for PG&E Topock Program

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP), Work Plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.

2) Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, and Field Procedures Manual and QAPP (Procedures Manual), as required.

3) Topock Program Health and Safety Plan (HSP)

4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available

5) Blank sampling log and field notebook

Equipment List:

- Drilling rig (Sonic)
- Drill rods and core barrel

GUIDELINES

PRIOR TO INTRUSIVE ACTIVITIES AT ANY DRILLING LOCATION THE AREA WILL HAVE BEEN CLEARED OF ALL UTILITIES AND THE CLEARANCE RECORDED IN THE FIELD LOGBOOK. It is also the field team leader's responsibility to confirm that all required access permits are in place.

Prior to the start of drilling, the area of site activity will be identified and delineated using stakes and/or flagging. The extent of impact will be mineralized at all times and the delineated area of activity decreased when possible. All sensitive vegetation or habitats will be delineated with stakes and/or flagging and no impact will occur in these areas.

Sampling depths and total depths of holes shall be determined by temporary marking of drill equipment, by reference to standard equipment dimensions (for example, 5-foot hollow-stem auger flights), or by measurement using a fiberglass tape. Final total depth measurements will be confirmed using a weighted fiberglass tape. Observations by the field geologist or engineer shall be recorded directly in the borehole log.

The field borehole log is the standard form used to document subsurface geologic conditions. The borehole log is divided into two areas. One portion contains spaces for noting information on the drilling and sampling methods. The second portion contains space for noting lithologic descriptions. All sheets shall be filled out completely, legibly, and in ink. The borehole log will be filled out in the field at the time of the drilling and sampling. The original logs shall be permanent records, and information on the logs may not be

erased. If corrections are needed, information shall be crossed out with a single line and the correction shall be initialed and dated.

The use of water and drilling fluid to assist in sonic drilling for monitoring well installation will be avoided, unless required for such conditions as running sands or drilling bedrock formations.

Temporary outer casing, drill rods, core barrels, and other downhole drilling tools will be properly decontaminated prior to the initiation of drilling activities and between each borehole location. Core barrels and other downhole soil sampling equipment will also be properly decontaminated before and after each use.

Sonic inner casing (sample tube) will have an inside diameter of at least 3.25 inches. Samples may be collected for chemical analysis. For sonic drilling, these samples are collected in a metal trough. A continuous core is collected and the sample interval is selected from the length of core run.

Surface casing may be installed where soil borings will penetrate a confining layer or when there is risk of eroding soil during the drilling process if water is used.

PROCEDURES

Instructions for Completing Soil Boring Logs

Soil boring logs will be completed in the field log books. Information collected will be consistent with that required for Form D1586 (attached), a standard CH2M HILL form or an equivalent form that supplies the same information. Procedures will follow the SOP "*Soil*

Non-Core Collection Drilling

At locations or depths from which core collection is not required, drilling may proceed without the recovery of soil cores. The drilling will include advancing the larger outer casing and the use of water to facilitate cuttings removal from the boring. The inner casing drill rods may or may not be used, depending on the cuttings recovery when drilling with the larger outer casing.

Continuous Core Drilling

At locations or depths when core collection is required, drilling will proceed using an outer casing and an inner core sample tube. The inner core sampling tube will be advanced first without the use of water. Before removal of the sampling tube, the outer casing will be advanced, using water only as needed for cuttings removal, to the same total depth as the inner casing. The outer casing will stabilize the boring when the sampling tube is removed. The process is repeated in 10 to 20 foot intervals, as the lithology of the boring permits.

The length of each drilling interval should be adjusted depending on the lithology and the quality and recovery percentage of the sample cores retrieved. At locations with very hard drilling (i.e. with large cobbles or hard materials) or when percent recovery decreases, the drilling interval should be decreased until such time that the conditions change.

After retrieval of the inner sampling core tube, the minimally disturbed sample cores will be collected into plastic liner sleeves in intervals of 2 to 3 feet. The plastic sleeves will be

immediately sealed on both ends. The cores will be used for visual descriptions and may be used for analysis for geochemical and geotechnical parameters.

KEY CHECKS AND ITEMS

- Check entries to the soil boring log and field logbook in the field during sampling activities because the cores will be disposed at the end of the fieldwork, confirmation and corrections cannot be made later.
- Check that the sample numbers and intervals are properly specified.
- Ensure that drilling equipment is decontaminated prior to the beginning of work and between each borehole.
- All materials generated during sampling (debris, PPE, decontamination liquids, etc.) will be placed in approved IDW storage containers pending analysis and disposal off site as outlined in SOP-B6, *Disposal of Waste Fluids and Solids (IDW)*.

SOP-B11

Site Clearance and Permitting
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures for site clearance and permitting at the Topock site. This SOP should be used to obtain proper site clearance and permits before any work is performed at a site.

REQUIRED DOCUMENTS

1) Applicable project work plan, event-specific sampling and analysis plan (SAP), and/or Procedures Manual, if applicable.
2) Topock Program Health and Safety Plan (HSP).
3) Site map with work locations identified.

PREPARATION AND SETUP

1) Review applicable project work plan, event-specific SAP, Procedures Manual, and HSP.
2) Identify locations where work will be performed, determine if any subsurface work will be needed.
3) Before the start of any work obtain approval by the appropriate land agencies (such as BLM, USFWS, County of San Bernardino). Activities located on PG&E property fall under the jurisdiction of the County; however, approval may also be required from BLM and/or USFWS for activities such as access, waste management, etc. Work in Topock, Arizona falls under the jurisdiction of the Arizona Department of Water Resources.
4) Before the start of any work obtain appropriate approval by the regulatory agencies. These include at a minimum the DTSC if in California, and ADEQ is in Arizona. Other regulatory approvals that may be required include, but are not limited to CDFG, USFWS, USACE and RWQCB. Approval from the Arizona Land Department may also be required for wells drilled in Arizona.

If subsurface work will be involved, follow the following steps:

1) Follow the guidelines of the Southern California Underground Service Alert (USA) agency to mark the edges of the work location as outlined on their web page (http://www.digalert.org). If in Arizona, the Arizona Blue Stake should be contacted for location of buried facilities (www.azbluestake.com). Make sure to:
   - Identify delineated areas with white markings with the requesters company name or logo within the pre-marked zones
   - Delineate the exact area of excavation with white paint through the use of dots or dashes, or a continuous solid line. Limit the size of each dash to approximately 6" in length and 1" width with interval spacing not less that approximately 4 feet. Dots of

approximately 1" diameter are typically used to define arcs or radii and may be placed at closer intervals in lieu of dashes. Limit width of lines to 1".

- For point locations (such as a soil boring or well) mark the exact location in the USA or Blue Stake box with a stake. Make sure the delineated area around the stake is of adequate radius (50 to 100 feet is appropriate for drilling).

2) Call USA at 1-800-227-2600 or Arizona Blue Stake at 1-800-782-5348 at least three working days before the start of work at the identified location and provide them with the information requested on the location request form. Be ready to give the location in terms of feet relative to I-40 and to Park Moabi Road when calling. You will be assigned a Dig Alert Number, file this number until work at the delineated area is complete. (The number does expire after two weeks and a new number may need to be obtained if work has been delayed.)

3) Mark the Dig Alert Number in the delineated area using white paint as soon as possible after calling USA or Arizona Blue Stake.

4) If the location is in a developed area, contact a private utility locator and have them perform a sweep of the delineated work area. Util-Locate at (866) 421-5325 is typically used for this service.

5) In some cases the utility companies may need to be contacted directly by CH2M HILL. If the following companies do not respond to the USA or Blue Stake ticket or if we are working in their easements, use the following contact information and procedures:

Southwest Gas: Main contact is Jim Default/702-365-2097
(The required minimum clearance distance from gas pipelines is 18-inches**.** Potholing may need to be performed in advance of design completion Southwest Gas should be called prior to construction activities). If Southwest Gas does not come to the site after the USA call, contact them at their Bullhead City office at (928) 763-7766

Southern California Gas Co.: Main contact is Frank Castro/818-701-4566; secondary contact is Martin Woodsworth/818-701-4543. If we need to work in their easement, we must provide a letter from BLM giving us permission to be on the property. Southern California Gas Co. also requires advance notification of construction activities. They may also require a copy of the design drawing, potholing activities, and the issuance of a "Non-Interference" letter, if applicable, before work can proceed. One of their representatives may need to be in the field when digging is occurring near their pipeline.

TransWestern Pipeline Co.: Main contacts are Ron Westbrook (ROW Department)/713-345-3067 and Mike Baxter (Operations)/928-757-3620. They may require potholing if proposed construction activities are near their pipelines. Crossing pipeline requires filling out a simple form.

Burlington Northern Santa Fe Railroad: Main contact is Greg Rousseau (BNSF)/909-386-4079. Prior to work in their easements submit the proper application with the $250 fee to the Staubach Company.

City of Needles Utility Dept: Main contact is Ron Myers/760-326-5700 (ext. 7 for the utilities department). Work activities may need to be a minimum of 10 to 15 feet from their utility poles.

6) Do not start subsurface work at the site until the delineated area has been marked or cleared by the appropriate utility agencies.

If the work includes a performing a well installation or abandonment, or drilling a boring in California:

1) Apply for a San Bernardino County well permit two to three weeks before the start of drilling (one permit per well; cost is /$212.00 per well). Obtain a permit application by calling the Environmental Health Services Department at 1-909-387-4666 (open Monday through Friday, 8:00 a.m. to 5:00 p.m. The fee schedule for permits is located at http://www.sbcounty.gov/ dehs/FEESCHEDULE/feeschedule.htm#wateranchor. Fill out the appropriate permit form and provide it to the California-licensed driller contracted to perform the well installation. The driller is expected to review and file the permit with the San Bernardino County Department of Environmental Health Services (Steve Sesler), address below.

   Environmental Health Services
   385 N. Arrowhead, 2nd Floor
   San Bernardino, CA 92415-0160

2) A well permit needs to be obtained from San Bernardino County for well abandonment by the same procedure described in #11. Check the 'destruction' box on the same permit form used for well installation.

3) A permit also needs to be obtained from San Bernardino County for any boring that reaches to or below the water table, even if a well is not actually installed. The permit process is the same as described in #11.

If the work includes a performing a well installation or abandonment, or drilling a boring in Arizona:

1) Apply for an Arizona Department of Water Resources (DWR) well permit two to three weeks before the start of drilling (one permit per well; cost is /$150.00 per well). Obtain a permit application by calling the DWR at 1-(602) 771-8500 (open Monday through Friday, 8:00 a.m. to 5:00 p.m. MST). All ADW permits and instructions can be found at http://www.azwater.gov/dwr/Content/Find_by_Category/Permits_Forms_Applications/default.htm
   Fill out the appropriate permit form (55-44A) and provide it to the Arizona-licensed driller contracted to perform the well installation. The driller is expected to review and file the permit with the Arizona Department of Water Resources address below.

   Arizona Department of Water Resources
   3550 N. Central Avenue
   Phoenix, AZ 85012

   Upon completion of the well, the driller must submit a Driller Report and Well Log (Form 55-55) to the DWR within 30 days. The form and instructions can be found on the DWR webpage.

2) A well abandonment permit needs to be obtained from the Arizona Department of Water Resources prior to well abandonment (form 55-38). Exploratory wells that are abandoned before the drill rig leaves the site are exempt from the well abandonment permit requirements. The well abandonment form and instructions are included as Attachment 4 and can be found at the ADW webpage . No fee is required for filing this form.

   Within 30 days of well abandonment a Well Abandonment Completion Report (Form 55-58) must be filed with the DWR.

SOP-B15

Volatile Organic Compound (VOC) Soil Sampling
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance for Volatile Organic Compound (VOC) sample collection from soil. Additional guidance for sample collection, preservation and handling is provided in Section 4.0 of the PG&E Quality Assurance Project Plan (QAPP). SOP-B2 and SOP-B3 *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (CH2M HILL, 2005) provides additional guidance for soil characterization and logging.

Required Documents

1) Event-specific planned sample table (PST).
2) Applicable project work plan or monitoring plan. Refer to the Procedures Manual and QAPP as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available.
5) Field notebook.
6) Database generated sampling logs.

Preparation and Setup

1) Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Coordinate with the Project Chemist for coolers, sample containers, and courier pickup of the samples.
3) Initiate field logbook for sampling activity.
4) Review sampling procedures and planned sample depths with field crew.
5) Field-check and set up equipment for sampling, decontamination, spill prevention, and health and safety.

Equipment List

- Pre-labeled soil sample containers appropriate for sample analysis and preservation as called for in PST and QAPP (Pre-weighed Vials, glass jars, auger sleeves, etc.)
- Soil sampling equipment (stainless steel trowel, spatula, EnCore™ Sampler, EasyDraw Syringe®, or a disposable plastic syringe with a barrel smaller than the neck of the soil vial with the cap removed from the plunger, etc.)
- Field notebook

- Sediment sampling logs generated from database
- Blue or black waterproof or permanent ink pens
- Trash bags
- Paper towels
- Decontamination equipment (Alconox® solution in spray bottle, brushes, buckets, rinse water spray bottle)
- Water level indicator
- Distilled water
- Coolers with ice
- Protective waterproof gloves (nitrile or latex)

SOIL SAMPLING LOGS DOCUMENTATION

Soil sampling logs or boring logs (SOP-B2 and SOP-B3 *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* [CH2M HILL, 2005]) will be completed at the time of sample collection. Items to be documented on the sampling log include:

6) **Sample Interval:** The top and bottom depth of each sample run should be recorded on the log. Sampling includes samples collected for analysis as well as retrieved for logging purposes.

7) **Sample Type and Number:** Enter the sample type and number consistent with the sampling and analysis plan at the correct depth intervals. An "x" should be placed across the vertical interval where the environmental soil, grab groundwater, or geotechnical sample was collected.

8) **Sample Recovery:** Enter the length of retrieved sample to the nearest inch of sample recovered. Record total length and percent of sample recovered.

9) **Sampling:** Sampling difficulties shall be noted. The top of the sample shall be marked on the container.

10) **Water Levels:** Water-level measurements, where groundwater is encountered, are required for each boring. Changes in soil moisture shall be noted and, if there is no water encountered, a note to that effect shall be included on the sediment sampling log. The date and time of water-level measurements shall be documented.

At a minimum, sample identifiers (IDs) should be noted on sampling logs at the depth collected. When time and space allows, a summary of analytical sample information can be included.

VOLATILE ORGANIC COMPOUNDS (VOC) SOIL SAMPLING - COLLECTION OF SAMPLES FOR ANALYSIS

It is recommended (EPA Method 5035A) that VOC soil samples be collected in a coring device to minimize volatilization and soil disturbance to prevent constituent losses. After

collection, the sample shall be immediately transferred to the sample vial (to be used for analysis) and stored for no longer than 48 hours at 4 C ± 2° C prior to analysis. Freezing the samples between -7 and -20° C within 48 hours and maintaining them frozen until analysis allows a 14 day holding time. Chemical preservation techniques are also available as options.

Use either a commercially available sampler (such as the EnCore™ Sampler or EasyDraw Syringe®) or a disposable plastic syringe to collect VOC soil samples. To use a syringe, cut the syringe end of the barrel off and removed the rubber 'cap' from the plunger, prior to sampling (barrel of the syringe needs to be smaller than the neck of the soil vial). One sampler is needed for each sample aliquot to be collected (typically the laboratory will supply the sampler along with the sample vials, but arrangements must be made prior to sampling).

11) Weigh 3 empty samplers and note the weight. Using the same 3 samplers collect several trial samples (try to collect 5.0 ± 0.2g). Weigh each trial sample (total weight – syringe weight = sample weight) and note the length of the soil column in the syringe. Use the data to determine the length of soil in the syringe that corresponds to 5.0 grams. The length of the soil column equal to 5 grams becomes the volume for the project location. Discard each trial sample.

12) The VOC sample collection process should be completed in the least amount of time as possible in order to minimize the loss of VOCs. Sample collection should be done with the least amount of disturbance/disruption as possible. Additional, exposure of the sampling location's surface layers should be considered if the material may have already lost VOCs or if it may have been contaminated by other means. Removal of surface layers can be accomplished by scraping the surface using a clean spatula, scoop, knife, or shovel.

13) Insert a clean coring tool into a freshly exposed surface; do not trap air between the sample and the plunger. For greater ease in pushing into the solid matrix, the front edge of these tools can be sharpened. The optimum diameter of the coring tool depends on the size of the opening of the collection vial (tool should fit inside mouth), the sample characteristics (e.g., particles size, cohesion), and volume of sample required for analysis. After an undisturbed sample has been obtained by pushing the barrel of the coring tool into a freshly exposed surface, quickly wipe the exterior of the barrel with a clean disposable towel. Transfer the sample into a pre-weighted vial by gently pushing the plunger, (use extreme care to ensure none of the preservative is lost if the sample is collected into a pre-preserved vial – water, methanol or NaHSO4), verify the sealing surfaces are clean, and secure the cap (the transfer should take less than 10 seconds). **Note: Samples are collected in pre-weighed and pre-labeled vials provided by the laboratory; no additional labels are to be added to the vials!** Complete the label attached by the laboratory (fill in sample ID-only). All vials from one sample location will be placed into a zip-lock bag and the sample information shall be recorded on a label attached to the bag.

14) As a last resort non-cohesive granular samples (sand, gravel, or a mixture of gravel and fines) that can not be easily obtained or transferred using coring tools, can be quickly sampled using a decontaminated stainless steel spatula or scoop. Decontamination is

covered in section 3.3 of the PG&E Program QAPP and in SOP-B5 *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (CH2M HILL, 2005).

15) As with the collection of aqueous samples for volatiles, collect at least 3 replicate samples. This will allow the laboratory an additional sample for reanalysis, if needed. The replicate samples should be taken from the same soil stratum or the same section of the solid waste being sampled, and within close proximity to the location from which the original sample was collected.

16) In addition, if a VOC sample is the only sample to be collected at a given location, collect at least one additional aliquot for the determination of percent moisture. Trip blanks and equipment blanks should be collected per the PG&E Program QAPP. However, trip blanks do not apply to samples that have been frozen upon collection.

17) Transport the sample at 4° C, to the lab in less than 48 hours or freeze (reagent water preserved samples to between -7 and -20° C) within 48 hours and transport frozen.

18) Complete Soil Sampling Logs and Chain of Custody Logs.

SOP-B16

Field-portable X-Ray Fluorescence Soil Sampling
Standard Operating Procedures for PG&E Topock Program

This Standard Operating Procedure (SOP) describes the analysis of in situ and ex situ soil and debris samples using a field portable x-ray fluorescence (XRF) instrument. SOP-B2 and SOP-B3 in the *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (SAFPM) (CH2M HILL, 2005) provides additional guidance for soil characterization and logging.

Required Documents

1. Event-specific planned sample table (PST).
2. Applicable project work plan or monitoring plan. Refer to the SAFPM and the *PG&E Program Quality Assurance Project Plan, Revision 2, Topock Compressor Station, Needles, California* (CH2M HILL, 2012) as required.

1. Topock Program Health and Safety Plan.

3. Field notebook.
4. Database generated chain-of-custody.
5. XRF Functional Check Log

Preparation and Setup

1. Review event-specific PST or event-specific field instructions, previous sampling logs, SAFPM, and health and safety plan.
2. Coordinate with the project chemist for coolers, sample containers, and courier pickup of the samples.
3. Initiate field logbook for sampling activity.
4. Initiate electronic file for XRF instrument download.
5. Review sampling procedures and planned sample depths with field crew.
6. Field-check and set up equipment for functional checks, sampling, decontamination, spill prevention, and health and safety.

Equipment List

- Niton XRF meter and stand
- Spare battery chargers
- Field notebook
- Trowel for smoothing soil surfaces

- Reusable plastic bags or stainless steel tray
- Disposable sample cups with x-ray film and lids
- X-ray window film (Mylar, Kapton, Spectrolene, polypropylene, or equivalent; 2.5 to 6.0 micrometers thick)
- Disposable scoops, stainless-steel spoons, or other appropriate mixing tools
- Appropriate quality assurance/quality control (QA/QC) standards and blank sand
- Chemwipes
- Decontamination equipment (Alconox solution [or equivalent] in spray bottle, brushes, buckets, rinse water spray bottle) for mixing tools and trowels
- Protective waterproof gloves (nitrile or latex)

XRF Analysis Documentation

The XRF sample results will be recorded by the associated software in an Excel format. The files will be downloaded at the end of each day and emailed to the project chemist for review. Any additional sample logging and sample collection should follow the protocol and procedures found in the appropriate SOP. Detailed notes should be recorded in the sampler's field notebook or in a log generated from the field database. Items to be documented on the sampling log include (include as much of the following information in the XRF software as possible):

1. Record type of boring or excavation equipment and the total boring or excavation depth.
2. If multiple samples are being collected at one location at a variety of depths, record all sample depths.
3. Record date and time of sample collection in addition to the full sample ID that is listed in the PST.
4. Sampling difficulties shall be noted (that is, difficult slope or abnormal debris in sample location).
5. Analysis start time and the source count time (that is, 60, 90, or 120 seconds, etc.) will be documented on sample collection sheet. Analysis and count time are automatically recorded in the XRF software.

Field-portable XRF Soil Sampling, Collection of Samples for Analysis

In Situ Sample Preparation

When the soil moisture is less than 20 percent, the error associated with moisture may be minimal. If areas are encountered where the moisture content is greater than 20 percent (moisture is visible), consult with the project chemist for options available for proceeding with field analysis.

For in situ analysis of soil:

1. Remove large or nonrepresentative debris from the selected location. This debris includes rocks, gravel, vegetation, and concrete.
2. Homogenize the location chosen for analysis by mixing in place an area approximately 4 inches by 4 inches by 3 inches deep using a clean (or decontaminated) stainless-steel or disposable spoon. Smooth and firmly tamp the location to provide as flat and smooth an area as possible.
3. Stretch a section of x-ray window film over the area to be tested to maintain a dust-free environment for the nose of the instrument. (Use in situ analysis for metals-only samples.)
4. To initiate a reading, position the nose of the XRF against the x-ray film, squeeze the shutter release, and firmly press the instrument flat against the surface. Source count times for in situ analysis usually range from 3 to 5 minutes, varying among instruments and depending on requirement detection limits.
5. After the in situ field screening is performed, inspect the nose of the instrument for contamination, which may affect future analysis. If necessary, clean it with a soft cloth or tissue.

For confirmation samples, or where samples for organic analysis are to be collected, the soil samples should be treated as ex situ samples, below.

For in situ analysis of debris:

1. In some cases, the large or nonrepresentative debris removed in Step 1 above may need analysis. The debris for analysis can include rocks, wood, concrete, etc.
2. Analyze debris that is too large or difficult to homogenize by locating multiple locations on the surface of the debris that are as flat and smooth as possible. Scan a minimum of three locations or approximately 10 percent of the surface area (whichever is greater).
3. Stretch a section of x-ray window film over the area to be tested to maintain a dust-free environment for the nose of the instrument. (Use in situ analysis for metals only samples.)
4. To initiate a reading, position the nose of the XRF against the x-ray film, squeeze the shutter release, and firmly press the instrument flat against the surface. Source count times for in situ analysis usually range from 3 to 5 minutes, varying among instruments and depending on requirement detection limits.

After the in situ field screening is performed, inspect the nose of the instrument for contamination, which may affect future analysis. If necessary, clean it with a soft cloth or tissue.

Ex Situ Sample Preparation

For ex situ analysis:

There are several possible correct methods for the ex situ analysis of samples. The area that previously would have been homogenized for the in situ analysis should be scooped out and placed into a clean (or decontaminated) stainless-steel or disposable pan (do not use

plastic if organic analysis will be performed on any of this homogenized sample) using a stainless-steel or disposable spoon or spatula (do not use plastic if organic analysis are associated with the homogenized sample). The sample should then be thoroughly mixed (homogenized) using the same spoon or spatula.

1. The preferred method is to setup the portable field stand in an area where the XRF can be stationed and left in place for the day. Use the Niton software and a laptop computer to setup the method criteria and control the XRF instrument during the soil analysis.

    a. Starting with the previously homogenized sample, use the supplied soil sieves, bowl, and mortar to generate a finely ground well homogenized sample. (Note: This step is not required if the soil sample was passed through a sieve during the homogenization step.)

    b. Transfer the prepared sample into a new sample cup (order replacement supplies from Niton), place the X-ray film over the cup, and snap the lid in place. Place the sample cup in the portable field test stand. The XRF points upward, the sample rests on top of the XRF with the X-ray film directly in contact with the nose of the XRF cup lid facing down.

    c. Using the computer, start the analysis. The source count time should be at least 2 minutes for chromium. Consult previous analysis to determine if multiple scan frequencies are required (or contact the project chemist).

    d. Prepare the next sample while the XRF is analyzing the current sample.

2. An alternative method to using the portable field stand is to identify the sample for XRF analysis and homogenize the sample (as described above).

    a. Transfer the sample to a re-sealable plastic bag and firmly molded into a flat smooth surface.

    b. Use the Niton software and a laptop computer or the included PDA to setup the method criteria.

    c. To start the analysis, position the nose of the XRF against the flat smooth surface of the sample and squeeze the shutter release (or press the start button on the laptop or PDA). Be sure to maintain constant pressure against the sample. If contact is broken, the analysis will need to be restarted. The source count time for ex situ analysis usually range from one to two minutes, depending on the required detection limits (see 1c above for count times).

    d. After the ex situ field screening is performed, inspect the nose of the instrument for contamination, which may affect future analysis. If necessary, clean it with a soft cloth or tissue.

3. Transfer the sample to a labeled glass jar for shipment to the confirmation laboratory (if applicable).

Sample Analysis

In today's modern XRF models:

1. An X-ray source is used for detection. Expose the sample to the X-ray source for a minimum of 1 minute. Longer exposure times may be needed depending on the media that is being analyzed and the required detection levels. The time needed for analysis will be determined in the field by analyzing standards that have concentrations of the metals of concern near the required detection levels. Better detection limits can usually be obtained by homogenizing the sample, increasing the exposure time, and using two or more scan frequencies. Use a minimum of a 2-minute exposure for chromium analysis.
2. When the XRF instrument displays the results they include the analyte, the result, and a percent confidence (displayed as a ± value). The result is displayed as nondetect for analytes that do not meet the percent confidence established in the instrument. The lower the required detection levels, the longer the analysis time required to meet the percent confidence.
3. Download saved data from XRF instrument daily (if data are collected in PDA). Foreword the data files to the project chemist daily.
4. All samples collected for offsite confirmation will also be analyzed using the XRF and will be treated as ex situ samples.

Using older models:

1. Expose the sample to the energy source for a minimum of 1 minute. Longer exposure times may be needed depending on the media that is being analyzed as well as the age of the detector (non X-ray detectors). The time needed for analysis will be determined in the field by analyzing standards that have concentrations of the metals of concern near the required detection levels. Better detection limits can usually be obtained by homogenizing the sample, increasing the exposure time. Use a minimum of a 2-minute exposure for chromium).
2. When the XRF instrument indicates the results for the suite of analyzed elements and their concentrations, it includes a standard deviation for the reported concentrations. An analyte concentration is considered **not detected** if the result value is **less than two times the standard deviation**. The lower the required detection levels, the longer the analysis time required to reduce the result's standard deviation.
3. Record the readings (electronically or documented on the sampling log). Review the standard deviations for the elements of interest and determine if a longer analysis time is needed to reduce the standard deviations, thereby allowing the desired accuracy and precision for the concentrations. The standards will be analyzed using increasingly longer times until the required detection level is achieved.
4. Record values in field notebooks.
5. Download saved data from XRF instrument daily.
6. Samples collected for offsite confirmation will also be analyzed using the XRF and will be treated as ex situ samples.

Calibration

Two forms of calibration are important with XRF testing: an energy calibration and a sample matrix calibration.

Energy Calibration

The Niton XLi 702 automatically re-calibrates the energy scale when powered on. The energy scale can also be re-calibrated by pressing "Reset" on the instrument. The energy calibration should be performed every two hours.

Sample Matrix Calibration

Modern XRF instruments, such as the Niton Xli 702, do not require site specific calibrations to account for sample matrix effects. United States Environmental Protection Agency Method 6200 allows both fundamental parameters and Compton normalization as two techniques to eliminate site specific calibrations. Niton uses the Compton normalization method to automatically correct for sample specific matrix effects. The XRF is calibrated internally at the factory on NIST standard reference soil samples. Ensure the annual factory calibration certification is on file. This internal calibration is used for subsequent field work, without need for adjustment or recalibration at other sites.

Quality Assurance and Quality Control (Functional Checks)

Even though no onsite calibration will be performed, the method does require QA/QC functional check-testing protocols. The QA/QC that will be used to document that the XRF is operating properly will have the following steps:

- A startup operations check
- Analysis of a blank sample (clean sand)
- Analysis of standard sample(s)
- Analysis of duplicate samples
- QA/QC procedures will be compliant with manufacturer's instructions.

1. At the beginning of each day perform QA/QC functional check procedure or when the instrument is turned on after more than 2 hours of down time or if the operating environment changes, such as a temperature change of more than 20 degrees Fahrenheit.

2. Two types of blanks should be analyzed, an instrument blank and a method blank. An instrument blank sample (silicon dioxide, provided by Niton) will be analyzed at the start and end of each day and once every 20 samples, to confirm proper zero calibration of the XRF. The blank will be analyzed following the procedure for the ex situ sample analysis. A method blank is used to monitor for any field induced contamination. The method blank should follow any preparation procedures performed on the samples, such as mixing or ex situ analysis. **A method blank will be analyzed each day**.

3. A set of three to ten QC samples will be collected from the site during the initial field activities. These samples will be well homogenized, and a portion sent to the offsite laboratory for characterization. The remaining sample will be collected in re-sealable bags, labeled, and stored with the XRF for use as standards. Three to five of the on-site standards will be analyzed at the start of each day. The results of the standards will be plotted against the original XRF results and a correlation value will be calculated. A

correlation coefficient of 0.90 or greater must be achieved to meet the project objectives. A running log of all onsite standards analyzed will be maintained. One of the standards will be analyzed after every 20 samples. The readout from the XRF **must be within 20 percent relative percent difference of the known QC sample concentration**.

4. The last QA/QC step will be to analyze duplicate samples (two separate aliquots) at a rate of 1 in 10. These duplicate measurements must be within 35 percent of each other for the analysis to continue. If the sample results are not in agreement, then the reason for this discrepancy must be determined.

5. The Niton XL3t 600 displays both concentration and precision for each sample analyte measurement. The precision displayed by the Niton's 95 percent (2-sigma level) confidence intervals; whereas the precision calculated in EPA method 6200 is at a 68 percent (1-sigma) level. The Niton also calculates and displays detection limits for analytes if the concentration is below three standard deviations. This bypasses the need for replicate measurements on low-level standards.

Note: Volatile organic compounds, semivolatile organic compounds, and other organic samples cannot be collected from the homogenized soil if plastic is used for homogenizing or after XRF analysis, if contacted by plastic.

SOP-B17

Standard Operating Procedure for the Installation of Permanent Soil Gas Sampling Implants

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This procedure is recommended as a practical approach for installation of permanent soil gas implants using a hand auger or hydrovac where the intent is to collect shallow soil vapor samples, and continuing with hydrovac and/or hollow-stem auger to collect deeper soil vapor samples. This SOP should be used where its application is consistent with the project's data quality objectives and in conjunction with SOP B18 *Standard Operating Procedure for the Collection of Soil Gas Samples from Soil Gas Probes Using Summa™ Canisters.* Only persons trained in the collection of soil gas samples should attempt this procedure.

1. Implant/Probe System Set-up

1.1 Obtain all necessary equipment for hand auguring or hydrovac to 5 feet below ground surface (BGS), and for hydrovac or hollow stem augering to depth greater than 5 feet BGS.

1.2 This technique can only be used in the vadose zone, not below the water table.

1.3 Several screen lengths are available (3", 6", 14", 21") but for discrete intervals required in Vapor Intrusion investigations, a 6" screen is recommended.

1.4 It is necessary to coordinate the hardware (i.e. size of tubing, fittings, sampling interface assembly, etc.) that mates the soil gas probe sampling line to the sampling system (i.e. Tedlar bags, Summa canisters, etc.). This step is critical to achieve a leak free system. All connections should be inert gas tight compression fittings (i.e. Swagelok® or equal) and all sample transfer lines should be made of Teflon® tubing.

1.5 Prior to installation of implants at a given location a utility survey must be completed, the necessary permits acquired, and in the case of private property - permission granted.

1.6 The drilling system must be decontaminated prior to use. Steam cleaning is the preferred method of decontamination. Once decontaminated, the auger/drill rod must be shown to be free of contaminates. As a minimum, a suitably sensitive organic vapor meter should be used for this purpose. Any probe that does not pass decontamination should not be used.

1.7 Handle and store decontaminated hand augers and drill rods in a manner that prevents contamination.

2. Implant Installation

2.1 Assemble the hand auger and/or other coring device. Auger/hydrovac/drill to the desired depth. Be sure that the final depth of the hole includes extra depth to include length of the screen. (i.e. for 5' BGS with a 6" screen, push the probe to 5'6", for 15' BGS with a 6" screen, push the probe to 15'6").

2.2 Attach the ¼" Teflon tubing to the implant. Use sufficient tubing so that at least 2' will be left above ground. Plug the exposed end of the tubing with a cap.

2.3 Remove the auger/drill rod and put a section of PVC pipe down the hole. The PVC pipe is helpful to help center the implant in the middle of the hole and to be sure that the filter

pack material makes it to the bottom of the hole. Thread the implant and tubing down the inside of the PVC pipe until it reaches the bottom.

2.4 Determine the volume of glass beads or sand (#2/12 or #2/16) needed to fill the space around the implant plus an additional 6″ space above the implant. Pour the sand/beads into the hole as the PVC pipe is slowly removed. Do not pull on the tubing. Remove the PVC pipe from the hole completely once the filter pack material has been set in place.

2.5 Determine the volume of dry bentonite needed to fill the next 1 foot of hole. Pour dry bentonite into the hole until it measures 1 foot above the sand pack.

2.6 Determine the volume of hydrated bentonite needed to fill the hole to 6″ below the upper nested probe. Place hydrated bentonite to the point 6″ below the upper nested probe. Measure the depth to make sure the upper probe will be installed at 5′6″ BGS.

2.7 Follow steps 2.2 through 2.4 for the installation of the upper nested probe.

2.8 Determine the volume of dry bentonite needed to fill the next 1 foot of hole. Pour dry bentonite into the hole until it measures 1 foot above the upper sand pack.

2.9 Determine the amount of hydrated bentonite needed to complete the hole. Pour in granular bentonite and hydrate. Repeat the procedure in 6″ increments to ground level.

2.10 Optional: Enlarge the hole and install the flushmount so that it is flush with the ground surface. Label probe tubing with location and depth. Coil the extra tubing inside the enclosure and cover.

2.11 Wait at least 48 hours before sampling.

2.12 When calculating dead volume, use the internal volume of the Teflon tubing, the internal volume of the implant, and the volume of the glass bead pack (assume 30% porosity).

2.13 The ground surface shall be replaced and repaired to original condition.

SOP-B18

Collection of Soil Gas Samples from Temporary and Permanent Soil Gas Probes using SUMMA Canisters and a Helium Leak Check

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1. Scope and Application

This procedure offers a practical approach for the collection of soil gas samples from soil gas probes from permanently installed vapor points into SUMMA canisters. Soil gas sample integrity is verified by using a real time helium leak checking procedure before taking each sample. This must be done after probe installation and before sampling as well as before each subsequent sample for permanent probes. This standard operating procedure (SOP) should be used in conjunction with CH2M HILL's SOPs: "Soil Gas Probe Installation SOP" or "Soil Gas Implant Installation SOP," and when its application is consistent with the project's data quality objectives. Only persons trained in the collection of soil gas samples should attempt this procedure.

2. Site-Specific Considerations

2.1. Prior to attempting soil gas sampling there should be an understanding of subsurface conditions at the site.

2.1.1. Depth to Groundwater – soil gas samples should be collected in the vadose zone (and above the capillary fringe). Generally, soil gas samples should not be collected at a depth above 5 feet below ground surface (bgs). Sampling at multiple depths should be considered.

2.1.2. Soil permeability **-** It may not be feasible to collect soil gas from tighter grain soils with little pore volume, such as clays; if there are clay layers present in the subsurface, these intervals should be avoided. For sampling in these soils, it is recommended to uses soil gas implants with a wider bore hole. Care should be taken during purging and sampling so that the vacuum in the sampling system never exceeds 7 "Hg (100 "water).

3. Other Considerations

3.1. A utility clearance should be performed prior to mobilization, as with all intrusive site work.

3.2. Soil gas sampling should not be performed until 48 hours after a significant rain event (>1 inch of rainfall).

4. Apparatus and Materials

4.1. The soil gas probes should be installed by a licensed driller.

4.2. Teflon tubing, ¼-inch outer diameter sample tubing.

4.3. Swagelok® ¼-inch nut and ferrule sets for connecting the probe tubing to the sampling manifold.

4.4. The helium leak check equipment, including the enclosure, helium cylinder (high purity helium), and helium detector (Dialectric MGD is preferred). The enclosure may be provided by the driller or can be constructed from polyvinyl chloride (PVC) pipe. The helium detector can be rented from an equipment rental company.

4.5. MultiRae five gas meter. (Optional if onsite atmospheric gas analysis is required)

4.6. Air pump for purging and electric supply for the pump (either generator or power inverter with adapter for car battery). Must be capable of a flow of 200 mls/min and a vacuum of 20 "Hg.

4.7. Sampling manifold consisting of Swagelok® gas tight fittings with three valves and one pressure gauge to attach the probe to the air pump and the sample canister. This manifold must be clean, free of oils, and flushed free of volatile organic compounds (VOCs) prior to use.

4.8. Canister, SUMMA polished, certified clean and evacuated. (Canisters are typically provided by the laboratory.)

4.9. Flow controller or critical orifice, certified clean and set at desired sampling rate. These are typically provided and set by the laboratory.

4.10. Negative pressure gauge, oil-free and clean, to check canister pressure. The pressure gauges are typically provided by the laboratory. The laboratory may either provide one pressure gauge to be used with all of the canisters, or a pressure gauge for each canister to be left on during sample collection. Sometimes the canisters are fitted with built-in pressure gauges that are not removable.

4.11. Shipping container, suitable for protection of canister during shipping. Typically, strong cardboard boxes are used for canister shipment. The canisters should be shipped back to the laboratory in the same shipping container in which they were received.

4.12. Wrenches and screw driver (clean and free of contaminants), various sizes as needed for connecting fittings and making adjustment to the flow controller A 9/16-inch wrench fits the ¼-inch Swagelok® fittings, which most canisters and flow controllers have.

5. System Set-up

5.1. Acquire all the necessary hardware and sampling equipment shown in Figure 1. Be sure to use ¼-inch outside diameter Teflon sample tubing. ***Do not connect the canister at this time***.

5.2. Assemble or obtain the necessary fittings and vacuum gauge to create a soil gas probe and sampling manifold as shown in Figure 1. This manifold must be clean, free of oils, and flushed free of VOCs prior to use. Note: use only gas tight fittings such as Swagelok® or equivalent. Be sure to place the helium leak check enclosure over the probe, and push the sample tubing through the hole in the cap before attaching the sampling manifold.

5.3. Adjust the purge system evacuation pump sampling rate to achieve the desired flow rate of 200 milliliters/min. This should be performed at the outlet of the vacuum pump prior to purging, either by using a suitable flow meter, or determining the amount of time required to fill a 1- liter Tedlar bag.

5.4. Summa canisters are pre-evacuated by the laboratory. The vacuum will need to be verified in the field prior to use with a pressure gauge.

5.5. Flow controllers (if used) should come pre-set by the laboratory to sample at a pre-determined rate based on specific project requirements (see Table 1 for the most common options). In some cases [that is, project-specific quality assurance (QA)], the flow rate will need to be verified in the field prior to use. This is accomplished with a bubble meter, vacuum source, and instructions supplied by the laboratory.

6. System Leak Checking and Purging

6.1. ***Physical Leak Check*** - Perform a leak check of the sample manifold system by:

6.1.1. Make sure the gas probe valve (valve #1) is closed and the sample valve (valve #2) is open.

6.1.2. Open the purge valve (valve #3) and start the purge pump. Verify that the flow is set to 200 milliliters per minute (ml/min).

6.1.3. Close the sample valve (valve #2) and achieve a vacuum gauge reading of approx. 15 inches of mercury ("Hg).

6.1.4. A leak-free system will be evident by closing off the purge valve (valve #3), turning off the purge pump, and observing no loss of vacuum within the sampling manifold system for a period of 30 seconds. Repair any leaks prior to use.

6.1.5. Record the leak check date and time on the field sampling log.

6.2. ***System Purge and Helium Leak Check*** -A purge of the soil gas probe and sampling manifold system is required before taking each sample. The helium leak check procedure is also performed during this step. This leak check will verify the integrity of the implant as well as the probe and ground interface. This is accomplished by:

6.2.1. Where the ground surface is soft, the helium leak check enclosure is pressed down slightly into the ground surface. In situations where the ground surface is hard (for example, asphalt), apply a slight downward pressure to achieve a buildup of helium in the leak check enclosure.

6.2.2. Start the flow of helium under the leak check enclosure at 200 ml/min. Try and position the tube so the helium is directed at the interface of the probe and the ground. Let the helium fill the enclosure for a couple of minutes.

6.2.3. Turn the helium leak detector on and make sure that the detector is not reading any helium before proceeding. Verify that the helium concentration inside the leak check enclosure is >10% by placing the probe of the helium detector into the hole where the sample tubing comes out or under the enclosure wall. It is not necessary to verify that the helium concentration is 100% as this is bad for the detector. Safety factors will be incorporated into measured purge gas helium concentration to verify the probe seal integrity.

6.2.4. Purging is carried out by pulling soil gas through the system at a rate of 200 ml /min for a time period sufficient to achieve a purge volume that equals at 3 dead volumes (internal volume of the in-ground annular space, sample line, and sampling manifold system). When calculating the dead volume, be sure to take into account the inside diameter and length of the Teflon sample tubing, as well as the probe outside diameter and retract distance for the annular space for temporary probes. For permanent probes, calculate the volume of the annular space using a nominal 30% porosity for the sand or glass bead pack. If during the purge (or sampling) the vacuum exceeds 7 "Hg, then reduce the pump flow rate. The system vacuum must stay below this level at all times.

6.2.5. Open the sample valve (valve #2) and the purge valve (valve #3) and start the purge pump. Verify that the flow rate is still 200 ml/min.

6.2.6. To start the soil gas probe purge, open the gas probe valve (valve #1) and close the sample valve (valve #2) at the same time, and start timing.

6.2.7. During the last 5 minutes of the purge (or the entire purge time if less than 5 minutes), attach a Tedlar bag to the purge pump exhaust on open the bag's valve.

6.2.8. If the vacuum gauge reads >7 "Hg during the purge, then close the purge valve (valve #3) and monitor the vacuum in the manifold and probe. If there is no significant change after a minute, then there is an insignificant amount of soil gas and the vacuum is too great to take

a soil gas sample. Several things can cause this. Consult with the project manager and take corrective action.

6.2.8.1. The soil formation is too 'tight' (that is, high clay or moisture content). Try using a lower flow rate. (temporary or permanent probe)

6.2.8.2. The soil formation is too 'tight'. Try a different depth or location. (temporary probe)

6.2.8.3. With a temporary probe system, the expendable tip may not have released when the probe was retracted. Try retracting the probe a little further, or use a long thin rod to poke the tip loose.

6.2.8.4. If water is visible in the flexible soil gas tubing, stop the purging immediately. It is not possible to take a soil gas sample at that depth or location.

6.2.9. At the end of the pre-determined purge time and after the system is verified to be leak free, close the purge valve (valve #3), close the valve to the Tedlar bag, and turn off the pump. Do not open the purge valve again. Doing so will result in loss of the purge integrity and will require re-purging.

6.2.10. Attach the Tedlar bag to the helium detector using a piece of flexible rubber tubing and open the valve. If a helium reading of >0.1%, or 1000 ppmv, is observed, then the probe leak check has failed and corrective action should be taken. This includes first checking the fittings and connections and trying another purge and leak check. It may also be necessary to remove the soil gas probe and re-install it in a nearby location. Using a limit of 0.1 % allows for a 10x safety margin to verify that the leak check was <1% (verify that this limit is consistent with appropriate project-specific agency guidance).

6.2.11. Remove Tedlar bag and turn off the helium leak detector.

6.2.12. Record the purge date, time, purge rate, leak check result, and purge volume on the field sampling log.

6.2.13. Immediately move on to the sampling phase. Little to no delay should occur between purging and sampling.

7. Sample Collection

7.1. 'Clean' sampling protocols must be followed when handling and collecting samples. This requires care in the shipping, storage, and use of sampling equipment. Cleanliness of personnel who come in contact with the sampling equipment is also important: no smoking, no eating, no drinking, no perfumes, no deodorants, no dry cleaned clothing, etc. Canisters should not be transported in vehicles with gas-powered equipment or gasoline cans. Sharpie markers should not be used for labeling or note-taking during sampling.

7.2. The SUMMA canisters are certified clean and evacuated by the laboratory to near absolute zero pressure. Care should be used at all times to prevent inadvertent loss of canister vacuum. ***Never open the canister's valve unless the intent is to collect a sample or check the canister pressure.***

7.3. Verify that the vacuum pressure of the canister is between 28 – 30 inches Hg. Do not use a canister that has an initial pressure less than 28 inches Hg because that canister likely leaked during shipment.

7.3.1. Remove the protective cap from the valve on the canister.

7.3.2. If using an external gauge, attach the gauge to the canister and open the valve. If the pressure gauge has two openings, make sure that the other opening is closed; the canister cap can be used for this. After taking the reading, close the canister and remove the gauge.

7.3.3. If using assigned pressure gauges, attach the pressure gauge to the canister, then attach the flow controller. When sample collection begins, record the initial pressure.

7.4. Attach the canister to the flow controller and then connect the flow controller to the sample valve (valve #2) on the sampling manifold. Open the sample valve (valve #2)

7.5. Before taking the sample, confirm that the sampling system valves are set as follows: 1) the purge valve (valve #3) is confirmed to be closed, gas probe valve (valve #1) is open, and 2) the sample valve is (valve #2) is open.

7.6. Slowly open the canister's valve approximately one full turn.

7.7. After sampling for the appropriate amount of time (determined from project instructions, see Table 1), close the sample valve (valve #2) and the canister's valve. If the canister has a built-in or assigned pressure gauge, allow the canister to fill until the vacuum pressure reaches 0 – 10 inches Hg. Remove the canister from the sampling manifold.

7.8. If using an external vacuum gauge, re-attach it, open the canister valve, and record the final pressure. Close the valve, remove the gauge, and replace and tighten the cap on the canister. Ideal pressure in the canister is between 0-10 inches Hg. More than 10 inches Hg can greatly increase reporting limits. Consult with the project team if this condition is encountered.

7.9. Record the sampling date, time, canister identification (ID), flow controller ID, and any other observation pertinent to the sampling event on the field sampling log. The temperature and barometric pressure should be recorded.

7.10. Fill out all appropriate documentation (sampling forms, sample labels, chain of custody, sample tags, etc.).

7.11. Disassemble the sampling system.

8. Sample Handling and Shipping

8.1. Fill out all appropriate documentation (chain of custody, sample tags) and return canisters and equipment to the laboratory

8.2. The canisters should be shipped back to the laboratory in the same shipping container in which they were received. The samples do not need to be cooled during shipment. DO NOT put ice in the shipping container.

8.3. When packing the canisters for shipment, verify that the valve (just past finger tight) and valve caps are snug (1/4 turn past finger tight), and use sufficient clean packing to prevent the valves from rubbing against any hard surfaces. Never pack the cans with other objects or materials that could cause them to be punctured or damaged.

8.4. Do not place sticky labels or tape on any surface of the canister!

8.5. Place a custody seal over the openings to the shipping container.

8.6. Make sure to insure the package for the value of the sample containers and flow controllers.

8.7. Ship canisters for overnight delivery.

9. Quality Control

9.1. Canister supplied by the laboratory must follow the performance criteria and quality assurance prescribed in U.S. Environmental Protection Agency (EPA) Method TO-14/15 for canister cleaning, certification of cleanliness, and leak checking. SOPs are required.

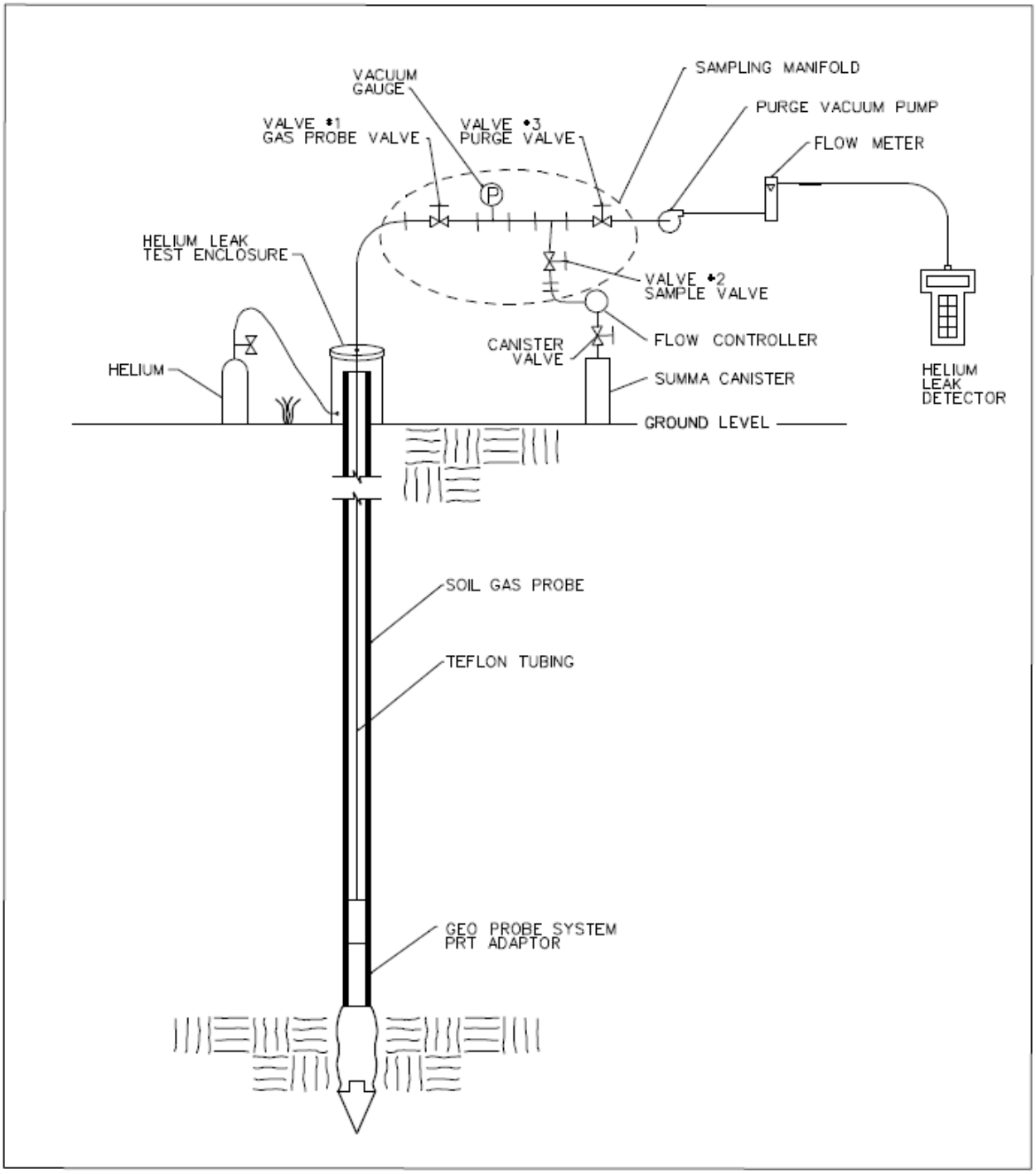
9.2. Flow controllers supplied by the laboratory must follow the performance criteria and QA prescribed in EPA Method TO-14/15 for flow controller cleaning and adjustment. SOPs are required.

Table 1 – Common Sampling Rates for Soil Gas Sampling

Can Size	Length of sampling time	Sampling Flow Rate (ml/min)
6 Liter	1 hour	90
6 Liter	8 hours	11.25
6 Liter	24 hours	3.75
1 Liter	5 minutes	180
1 Liter	1 hour	15
850 ml	5 minutes	150
850 ml	1 hour	12

Figure 1

Soil Gas Sampling System



CH2MHILL *Applied Sciences Laboratory*

Indoor Vapor Intrusion Assessment
Soil Gas Sampling Field Log

Sheet 1 of 2

Project Info

Project Name: _____ **Project # :** _____

By: _____ **Date:** _____

Structure

Identification: _____

Address: _____

Sample Location type:

- ☐ concrete slab on grade
- ☐ concrete footing w/crawl space
- ☐ basement
- ☐ Yard or Driveway
- ☐ other (describe) _____

Soil Gas Sampling System

Probe type (describe): _____

Probe to sample interface system (describe): _____

Sample collection type: ☐ Syringe ☐ Tedlar bag ☐ Summa canister

Other info (describe other aspects) _____

Soil Gas Probe Purging & Sampling Log

Sample location (show in diagram)	1	2	3	4
Sample Identification (field ID)				
Time Installed				
Depth of installed probe (feet bgs)				
Leak check, vacuum (probe/sampling interface)				
Calculated dead volume (1 purge volume), cc				
Calculated purge volume (3 purge volume), cc				
Purge rate, cc/min.				
Purge duration, min.				
Purge started (time of day)				
Purge vacuum, " Hg				
Max Helium Leak Check Reading				
Purge completed (time of day)				
Sampling period started (time of day)				
Sampling rate, cc/min				
Sampling vacuum, " Hg				
Sampling period ended (time of day)				

Observations and Comments: _____

Appendix B
Management Protocol for Handling and Disposition of Displaced Site Material

Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California

PREPARED FOR: Topock Remediation Project Files

PREPARED BY: Pacific Gas and Electric Company

DATE: October 3, 2012

This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The management of material that may be disturbed as a result of remedial activities but not displaced from its natural location, such as soil disturbed by foot or vehicle traffic along a pathway, is not within the scope of this protocol. This protocol is applicable to the handling and disposition of displaced materials only. Further, materials that were not part of the natural site condition (e.g., building materials, equipment, waste, debris, or imported fill[1]) are not included in this protocol.

1.0 Introduction

PG&E carefully plans Topock Remediation Project activities to minimize both the disturbance and displacement of site material. The land and soils are to be handled and managed with care and respect. Therefore, the protocol established in this plan is intended to minimize the amount of displaced material that leaves the site and instead, provide for eventual return, reuse, or restoration of the material onto the lands from which it was displaced. Through the application of this protocol and its incorporation into future work plans involving material displacement, it is anticipated that the goal of careful and respectful handling of soil material will be fulfilled.

In addition to addressing Tribal requests, this protocol was developed to comply with Mitigation Measure CUL-1a-8 as set forth in the certified Environmental Impact Report (EIR) and Mitigation Monitoring and Reporting Plan (MMRP) adopted by the California Department of Toxic Substances Control (DTSC). This measure requires PG&E to develop a Cultural Impact Mitigation Program (CIMP) as part of the final design of the approved groundwater remedy, and specifically subparagraph (g) requires the CIMP to include protocols for handling soil cuttings[2]. DTSC adopted this measure following its determination that the project area is a significant historical resource for California Environmental Quality Act (CEQA) purposes (Final EIR, p. 4.4-57). Similarly, as part of the consultation process for the Programmatic Agreement (PA) under Section 106 of the National Historic Preservation Act (NHPA), the U.S. Bureau of Land Management (BLM) determined that a traditional cultural property (TCP) eligible for inclusion on the National Register of Historic Places exists within the Area of Potential Effect (APE). Throughout this document, the term "site" refers to the area within the APE.

[1] For the purpose of this protocol, imported fill is defined as unconsolidated mixtures of sand, silt, and gravel (engineered gradations, or otherwise) that were not originally derived from inside the defined project boundary. Specific examples of imported fill material may include road base material, shading material used in pipeline trenches, or crushed rock used for railroad ballast.

[2] Mitigation Measure CUL-1a-8(g) states the following: Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site.

2.0 Statement from Fort Mojave Indian Tribe

The following statement was made by the Fort Mojave Indian Tribe regarding the site background and cultural significance:

> *The Topock site and adjacent lands are part of a larger geographical area referred to as a Traditional Cultural Landscape (TCL). The TCL is the ancestral home of the Fort Mojave Indian Tribe and other Native American Tribes including the Hualapai Nation, Colorado River Indian Tribes, Quechan Nation, Cocopah Tribe, and Yavapai-Prescott Nation. This entire TCL is of tribal religious significance. In some areas and at certain times, tribal members carry out various cultural activities and religious ceremonies.*
>
> *The very nature of the remedial activities being performed at the Topock Compressor Station involve disturbance to the TCL. Such activities as drilling, soil sampling, excavation, construction, monitoring, testing, vehicle movement, foot traffic, geophysical and other surveys, emplacement of markers, and discharge of water, solids, and other material disturb the sanctity of the land that is held in the hearts of Native Americans.*
>
> *In particular, the removal and disturbance of soils, both surficially and from the subsurface, is of concern to the Tribes because such actions are regarded as profound disruptions of the sacred landscape. While the nature and significance of this concern is not easily understood by non-Native Americans, perhaps the following excerpt, attributed to the Duwamish Chief Sealth, begins to aid in the understanding:*
>
>> *Every part of this country is sacred to my people. Every hillside, every valley, every plain and grove has been hallowed by some fond memory or some sad experience of my tribe. Even the rocks that seem to lie dumb as they swelter in the sun along the silent seashore in solemn grandeur thrill with memories of past events connected with the fate of my people, and the very dust under your feet responds more lovingly to our footsteps than to yours, because it is the ashes of our ancestors, and our bare feet are conscious of the sympathetic touch, for the soil is rich with the life of our kindred. (Chief Sealth, 1854)*
>
> *The Pacific Gas & Electric Company (PG&E), in its implementation of the remedial actions required by the United States Department of the Interior (DOI) and the California Department of Toxic Substances Control (DTSC) must commit to performing these actions in a manner that is respectful of Native American values.*

3.0 General Protocol for Management of Displaced Material (Mitigation Measure: CUL-1a-8[g])

This section presents each element of the protocol for the management of displaced material, including work planning, handling and short-term storage, contamination assessment, long-term storage, and final disposition. A graphical presentation of key elements of this process, and associated decision points, is presented on Figure 1 at the end of this document.

3.1 Work Planning

PG&E is required to prepare a work plan whenever a field activity is performed at the Topock site in support of a regulatory requirement or action. Through the established federal regulatory review process, these work plans are made available for review by process stakeholders and by the governments of affected Native American Indian Tribes (referred to as “Tribes” throughout this document) via the consultation process set forth in the PA’s Consultation Protocol, consistent with Section 106 of the NHPA. In addition to the information describing the scope of work, field logistics and other implementation details, work plans that involve activities that displace site material also describe the process for the management and disposition of the materials. Work plans finalized subsequent to the development of this protocol will include specific description of the process for involving the input of Tribe(s) regarding the management of the material that will be displaced as a result of the work. Key procedural information to be included in the work plan will include, but not be limited to, the following:

- Summary of measures planned to minimize the amount of disturbance that will be incurred.
- Notification procedures to inform the Tribe(s), involved regulatory agencies, and affected land owner(s) regarding the proposed activities that will disturb/displace soil or other materials.
- The location of proposed disturbance activities (e.g. access pathways) and displacement activities (e.g. drilling or sampling locations), including maps.
- Estimation of the volume and type(s) of material that will be displaced.
- The location and methodology for short-term storage of displaced material (see Section 3.2).
- Methods that will be used to assess whether contaminants are present (see Section 3.3).
- Methods that will be used to minimize the volume of material that may require long-term storage (see Section 3.4).
- The location and methodology for long-term storage (see Section 3.4).
- The anticipated location and methodology for final on-site disposition (see Section 3.5).

3.2 Handling and Short-term Storage

Material that is displaced as a result of Topock Remediation Project activities including drilling, excavation, sample collection, testing, construction, grading, or other activities will be handled on-site in accordance with the project-specific work plan. Displaced material that must be characterized for key chemical properties prior to identifying the appropriate final disposition method will be stored for the short term. Short-term storage areas and the protocol for handing material in these areas may vary by project. Depending on the type and volume of material displaced, location, land owner considerations, and other pertinent factors, short-term storage methods may include storage devices (e.g. bins) or properly maintained stockpiles that prevent this material from commingling with other areas of the environment. In some cases, short-term storage for characterization may not be necessary. For example, displaced material that is pre-characterized or characterized rapidly as work is conducted will be managed directly for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively).

Specific material handling and short-term storage details will be defined in the approved work plan for a given activity. Key details to be identified in the work plan include:

- The mode and location of short-term storage.
- The method of transfer from the point of origin to short-term staging area.
- Best management practices/regulatory requirements to prevent releases of the potentially contaminated material during transfer and storage.
- Best management practices to protect the material from weather, erosion, contamination, and vandalism while located in the short-term staging area(s).
- Method for segregation of soils based by location, as practicable and appropriate.

A key element of this handling protocol is the development of an inventory of all material displaced by Topock Remediation Project activities. Key information maintained in this inventory will include:

- Material displacement authorization – Specific work plan under which the work was conducted.
- Material origin – Specific location of the site.
- Material description (e.g., soil, rock, etc.).
- Date(s) of displacement or accumulation.

- Generating activity (e.g., drilling, excavation, etc.).
- Approximate volume of material stored.
- Short-term storage mode and location – Type of storage (including container identification number, as applicable) and location of short-term storage pending material characterization. In some cases, this information may need to be updated as containers are moved between areas of the site.
- Characterization status – Characterization sample information (e.g., date of submittal and laboratory used), date of receipt of results, and the contamination assessment based on comparison to screening criteria (see Section 3.3).
- Long-term storage mode and location – Type of storage (including container identification number, as applicable) and location of long-term storage pending decision regarding final disposition (see Section 3.4). In some cases, this information may need to be updated as containers are moved between areas of the site.
- Final disposition information – Indication of the on-site or off-site final disposition action identified through discussion with Tribe(s), agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment (see Section 3.5).

Once the displaced material has been managed through final disposition, it will no longer be tracked in the displaced material inventory.

3.3 Contamination Assessment

Key chemical property information will be used to determine the final disposition method, and specifically, whether displaced material is suitable for retention on-site for eventual return, reuse, or replacement, or if the material must be removed from the site for disposal in accordance with applicable State and Federal laws and regulations. Key information that will be considered to assess whether the material is contaminated, and therefore, whether the material can remain on-site or not, includes:

- Existing information including knowledge of the history of an area, or laboratory analytical results collected during previous phases of work. Use of existing information may preclude the need for additional analytical testing. When available, this information will be included in the work plan.
- Results of characterization samples collected for laboratory analysis, and observation of the physical properties of the material (e.g., white powder, burned material, boulders, etc.), as defined in the approved work plan for a given activity.
- Screening values for various analytes identified for the purpose of determining the appropriate material disposition method. Tables 1 and 2 at the end of this document present a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations. Screening values included on Tables 1 and 2 are defined in the following bullets, which will be modified as screening levels are added to these tables:
  - **Interim Screening Levels (Table 1)** – This is predominantly the background value. However, if the background value is not available then the lesser of the DTSC residential California Human Health Screening Level (CHHSL) or the ecological comparison value is used. If a CHHSL is not available, it is the lesser of the United States Environmental Protection Agency (USEPA) residential regional screening level or the ecological comparison value. This value is the most conservative, and it is assumed that the project-specific cleanup goal and/or Tribal screening level will be equal to or greater than this value.

- **Hazardous Waste Toxicity Characteristic Levels (Table 2) –** These values are used to determine if the material should be classified as a State or Federal hazardous waste. Specifically, total constituent concentrations expressed in milligrams per kilogram (mg/kg) will be compared to the hazardous waste characteristic levels in Table 2, and will be evaluated as follows:

  1. If the total constituent concentration exceeds the total threshold limit concentration (TTLC), the soil represented by the sample will be classified as a non-RCRA California hazardous waste. Additional evaluation of the soluble threshold limit concentration (STLC), as described in step 3 below, will not be performed.
  2. If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic (TC) level by about 20 times or more, the toxicity characteristic leaching procedure (TCLP) will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.
  3. If the sample has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by about 10 times or more, the California Waste Extraction Test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA California hazardous waste.
  4. If the sample has not been classified as a hazardous waste in steps 1, 2, or 3, or by other applicable hazardous waste standards, the soil represented by the sample will not be classified or managed as hazardous waste.

These values will be used to determine the final disposition of displaced material by comparing the representative concentration of a given volume of material to the screening values. The methodology for determining the representative concentration will be established in the project-specific work plan and should not be limited to a concentration-by-concentration comparison, but could include statistical estimates or averages based on multiple samples. Material that has a representative concentration that is equal to or below the interim screening level is suitable for return, reuse, or replacement on-site. Material that is characterized as hazardous waste must be disposed of off-site in accordance with applicable laws and regulations. Material that has a representative concentration that is greater than the interim screening level, but not classified as a hazardous waste, will be stored on-site until the project-specific cleanup goals are established. Until these goals are established, material that falls into this intermediate category will be retained on-site for “long-term storage” (see Section 3.4).

The screening levels included in Tables 1 and 2 must be updated as applicable regulations and project-specific decisions are made. PG&E will review this information as remediation work plans are developed and implemented. As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review and comment. Only agency approved values will be utilized.

3.4 Long-Term Storage

Following contamination assessment, some material may be determined to be non-hazardous waste but unsuitable for final disposition on-site because contaminants are present above the interim screening level. Per DOI comment on this protocol (received in February 2012), this material cannot be returned to the land until project-specific cleanup goals are finalized in the Record of Decision (ROD) and may be stored until that time. Once these goals are established the contamination will be re-assessed based on existing data, or additional data as determined necessary, using the cleanup goals in place of the interim screening level to determine final disposition (see Section 3.5).

The long-term storage area(s) and the protocol for handling material in these areas may vary by project. Depending on the type and volume of material that must be stored, location, land owner considerations, and other pertinent information, long-term storage methods may include storage devices (e.g. bins) or contained

stockpiles that prevent this material from migrating away from the designated storage area(s). Coordination with agencies, Tribe(s), and affected land owners regarding the acceptable mode and location of long-term storage is critical in design of the work plan. Further, specific measures should be incorporated into the implementation of the given work plan, such as field screening and material segregation strategies, to try and minimize the volume of material that may require long-term storage.

3.5 Final Disposition

Final disposition refers to the final action taken on behalf of the Topock Remediation Project as it relates to the management of material displaced during associated activities. This protocol has been designed with the purpose of minimizing the volume of material that is disposed of off-site. Material determined to have a representative concentration that is equal to or less than the project-specific cleanup goal will be retained on site for return, reuse, and/or restoration. Material determined to have a representative concentration that is greater than this value will be transported off site for disposal in accordance with applicable laws and regulations or treated on site if appropriate based on the selection of the final soil remedy. Material return, reuse, and/or restoration options associated with final disposition on site are discussed in Section 4.

4.0 Return, Reuse, and/or Restoration of Displaced Material

Final on-site disposition alternatives include the return, reuse, and/or restoration of the displaced material. The preferred disposition alternative(s) will be considered on a case-by-case basis with the regulatory agencies, Tribe(s), and affected land owner(s), as suitable material is identified. Material types may differ by physical or chemical properties, and therefore the preferred on-site disposition alternative may also vary. Alternatives that have been preliminarily identified include, but are not limited to:

- Replacement of material into original borings, trenches, or excavations, from which they were removed.
- Replacement of material into borings, trenches, or excavations other than those from which they were removed.
- Creation of topographical or landscape barriers to protect sensitive areas.
- Creation of berms or other structures (e.g., gabions) to prevent erosion.
- On-site road maintenance (this alternative may require sorting the material for different physical sizes).
- Stockpiling in designated areas.

The above list of final on-site disposition alternatives is preliminary, and should not be considered complete. Further, if material is found to contain concentrations of volatile organic compounds it may not be suitable for return, reuse, and/or restoration near buildings where vapor intrusion would be of concern. Coordination with agencies, Tribe(s), and affected land owners is critical in design of the work plan to identify the preferred on-site disposition alternative(s) and communication milestones, so the material can be efficiently managed.

Material displaced as part of past remediation project activities was managed in accordance with project-specific work plans. As a result, some material has been retained at the site because contaminant concentrations were below the Interim Screening Level (previously displaced material that has exceeded these levels was disposed off-site in accordance with the work plans). Therefore, previously displaced material is available for the return, reuse, and/or restoration alternatives included in the bullets above, or as additional uses are developed. As of June 2012, the estimated volume of material that has been retained and stockpiled through past remediation project activities is approximately 30 to 35 cubic yards.

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level		Interim Screening Level Source	Hazardous Waste Disposal Criteria
Dioxins and Furans (ng/kg)					
	1,2,3,4,6,7,8-HpCDD	NE		Not Established	NE
	1,2,3,4,6,7,8-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8,9-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8-HxCDD	NE		Not Established	NE
	1,2,3,4,7,8-HxCDF	NE		Not Established	NE
	1,2,3,6,7,8-HxCDD	NE		Not Established	NE
	1,2,3,6,7,8-HxCDF	NE		Not Established	NE
	1,2,3,7,8,9-HxCDD	NE		Not Established	NE
	1,2,3,7,8,9-HxCDF	NE		Not Established	NE
	1,2,3,7,8-PeCDD	4.6		DTSC Residential CHHSL	NE
	1,2,3,7,8-PeCDF	NE		Not Established	NE
	2,3,4,6,7,8-HxCDF	NE		Not Established	NE
	2,3,4,7,8-PeCDF	NE		Not Established	NE
	2,3,7,8-TCDD	4.6		DTSC Residential CHHSL	See Table A-3
	2,3,7,8-TCDF	NE		Not Established	NE
	OCDD	NE		Not Established	NE
	OCDF	NE		Not Established	NE
	TEQ Avian	16		Soil Ecological Comparison Value (ECV)	NE
	TEQ Human	50		Soil Ecological Comparison Value (ECV)	NE
	TEQ Mammals	1.6		Soil Ecological Comparison Value (ECV)	NE
Metals (mg/kg)					
	Aluminum	16,400		Background Level	NE
	Antimony	0.285		Soil Ecological Comparison Value (ECV)	See Table A-3
	Arsenic	11	*	Background Level	See Table A-3
	Barium	410	*	Background Level	See Table A-3
	Beryllium	0.672		Background Level	See Table A-3
	Cadmium	1.1	*	Background Level	See Table A-3
	Calcium	66,500		Background Level	NE
	Chromium, Hexavalent	0.83	*	Background Level	See Table A-3
	Chromium, total	39.8	*	Background Level	See Table A-3
	Cobalt	12.7	*	Background Level	See Table A-3
	Copper	16.8		Background Level	See Table A-3
	Cyanide	0.9		Soil Ecological Comparison Value (ECV)	NE
	Iron	55,000		EPA Residential RSL	NE
	Lead	8.39	*	Background Level	See Table A-3
	Magnesium	12,100		Background Level	NE
	Manganese	402	*	Background Level	NE
	Mercury	0.0125		Soil Ecological Comparison Value (ECV)	See Table A-3
	Molybdenum	1.37	*	Background Level	See Table A-3
	Nickel	27.3	*	Background Level	See Table A-3
	Potassium	4,400		Background Level	NE
	Selenium	1.47	*	Background Level	See Table A-3
	Silver	5.15		Soil Ecological Comparison Value (ECV)	See Table A-3
	Sodium	2,070		Background Level	NE
	Thallium	2.32		Soil Ecological Comparison Value (ECV)	See Table A-3
	Vanadium	52.2	*	Background Level	See Table A-3
	Zinc	58	*	Background Level	See Table A-3

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Pesticides (µg/kg)				
	4,4-DDD	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	4,4-DDE	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	4,4-DDT	2.1	Soil Ecological Comparison Value (ECV)	See Table A-3
	Aldrin	33	DTSC Residential CHHSL	See Table A-3
	alpha-BHC	77	EPA Residential RSL	NE
	alpha-Chlordane	430	DTSC Residential CHHSL	See Table A-3
	beta-BHC	270	EPA Residential RSL	NE
	delta-BHC	77	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table A-3
	Endo sulfan I	370,000	EPA Residential RSL	NE
	Endo sulfan II	370,000	EPA Residential RSL	NE
	Endosulfan sulfate	370,000	EPA Residential RSL	NE
	Endrin	21,000	DTSC Residential CHHSL	See Table A-3
	Endrin aldehyde	21,000	DTSC Residential CHHSL	NE
	Endrin ketone	21,000	DTSC Residential CHHSL	NE
	gamma-BHC (Lindane)	500	DTSC Residential CHHSL	See Table A-3
	gamma-Chlordane	430	DTSC Residential CHHSL	See Table A-3
	Heptachlor	130	DTSC Residential CHHSL	See Table A-3
	Heptachlor Epoxide	53	EPA Residential RSL	See Table A-3
	Methoxychlor	340,000	DTSC Residential CHHSL	See Table A-3
	Toxaphene	460	DTSC Residential CHHSL	See Table A-3
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	22,000	EPA Residential RSL	NE
	2-Methyl naphthalene	310,000	EPA Residential RSL	NE
	Acenaphthene	3,400,000	EPA Residential RSL	NE
	Acenaphthylene	1,700,000	EPA Residential RSL	NE
	Anthracene	17,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	38	DTSC Residential CHHSL	NE
	Benzo (a) anthracene	380	EPA Residential RSL	NE
	Benzo (a) pyrene	38	DTSC Residential CHHSL	NE
	Benzo (b) fluoranthene	380	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,700,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	380	EPA Residential RSL	NE
	Chrysene	3,800	EPA Residential RSL	NE
	Dibenzo (a,h) anthracene	110	EPA Residential RSL	NE
	Fluoranthene	2,300,000	EPA Residential RSL	NE
	Fluorene	2,300,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	380	EPA Residential RSL	NE
	Naphthalene	3,600	EPA Residential RSL	NE
	PAH High molecular weight	1,160	Soil Ecological Comparison Value (ECV)	NE
	PAH Low molecular weight	10,000	Soil Ecological Comparison Value (ECV)	NE
	Phenanthrene	1,700,000	EPA Residential RSL	NE
	Pyrene	1,700,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	3,900	EPA Residential RSL	See Table A-3
	Aroclor 1221	140	EPA Residential RSL	See Table A-3

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1232	140	EPA Residential RSL	See Table A-3
	Aroclor 1242	220	EPA Residential RSL	See Table A-3
	Aroclor 1248	220	EPA Residential RSL	See Table A-3
	Aroclor 1254	220	EPA Residential RSL	See Table A-3
	Aroclor 1260	220	EPA Residential RSL	See Table A-3
	Aroclor 1262	220	EPA Residential RSL	See Table A-3
	Aroclor 1268	220	EPA Residential RSL	See Table A-3
	Total PCBs	204	Soil Ecological Comparison Value (ECV)	See Table A-3
Semivolatile Organic Compounds (µg/kg)				
	1,1´-Biphenyl	3,900,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	18,000	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,800,000	EPA Residential RSL	NE
	2,4-Dichlorophenol	180,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,200,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	120,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,600	EPA Residential RSL	See Table A-3
	2,6-Dinitrotoluene	61,000	EPA Residential RSL	NE
	2-Chloro naphthalene	6,300,000	EPA Residential RSL	NE
	2-Chlorophenol	63,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,100,000	EPA Residential RSL	See Table A-3
	2-Nitroaniline	183,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,100	EPA Residential RSL	NE
	3-Nitroaniline	18,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	6,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,100,000	EPA Residential RSL	NE
	4-Chloroaniline	2,400	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table A-3
	4-Nitroaniline	24,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,100	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	240,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,100,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	180,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	260,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	24,000	EPA Residential RSL	NE
	Dibenzofuran	150,000	EPA Residential RSL	NE
	Diethyl phthalate	49,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	100,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	2,400,000	EPA Residential RSL	NE
	Hexachlorobenzene	300	EPA Residential RSL	See Table A-3
	Hexachloroethane	35,000	EPA Residential RSL	See Table A-3
	N-Nitroso-di-n-propylamine	69	EPA Residential RSL	NE
	N-nitrosodiphenylamine	99,000	EPA Residential RSL	NE

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Semivolatile Organic Compounds (µg/kg)				
	Pentachlorophenol	2,490	Soil Ecological Comparison Value (ECV)	See Table A-3
	Phenol	18,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	540	Regional Water Quality Control Board (RWQCB)	NE
	TPH as gasoline	540	Regional Water Quality Control Board (RWQCB)	NE
	TPH as motor oil	1,800	Regional Water Quality Control Board (RWQCB)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	1,900	EPA Residential RSL	NE
	1,1,1-Trichloroethane	8,700,000	EPA Residential RSL	NE
	1,1,2,2-Tetrachloroethane	560	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	43,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	3,300	EPA Residential RSL	NE
	1,1-Dichloroethene	240,000	EPA Residential RSL	See Table A-3
	1,1-Dichloropropene	1,700	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	49,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	22,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	62,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.4	EPA Residential RSL	NE
	1,2-Dibromoethane	34	EPA Residential RSL	NE
	1,2-Dichlorobenzene	1,900,000	EPA Residential RSL	NE
	1,2-Dichloroethane	430	EPA Residential RSL	See Table A-3
	1,2-Dichloropropane	890	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	780,000	EPA Residential RSL	NE
	1,3-Dichlorobenzene	530,000	EPA Residential RSL	NE
	1,3-Dichloropropane	1,600,000	EPA Residential RSL	NE
	1,4-Dichlorobenzene	2,400	EPA Residential RSL	See Table A-3
	1,4-Dioxane	18,000	DTSC Residential CHHSL	NE
	2,2-Dichloropropane	890	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,100,000	EPA Residential RSL	See Table A-3
	2,4,6-Trichlorophenol	6,900	EPA Residential RSL	See Table A-3
	2-Chlorotoluene	160,000	EPA Residential RSL	NE
	2-Hexanone	210,000	EPA Residential RSL	NE
	4-Isopropyltoluene	2,100,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	150	EPA Residential RSL	NE
	Acrylonitrile	55	EPA Residential RSL	NE
	Benzene	1,100	EPA Residential RSL	See Table A-3
	Bis (2-chloroethyl) ether	210	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,600	EPA Residential RSL	NE
	Bromobenzene	300,000	EPA Residential RSL	NE
	Bromochloromethane	270	EPA Residential RSL	NE
	Bromodichloromethane	270	EPA Residential RSL	NE
	Bromoform	61,000	EPA Residential RSL	NE
	Bromomethane	7,300	EPA Residential RSL	NE

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Volatile Organic Compounds (µg/kg)				
	Carbon disulfide	820,000	EPA Residential RSL	NE
	Carbon tetrachloride	250	EPA Residential RSL	See Table A-3
	Chlorobenzene	290,000	EPA Residential RSL	See Table A-3
	Chloroethane	15,000,000	EPA Residential RSL	NE
	Chloroform	290	EPA Residential RSL	See Table A-3
	Chloromethane	120,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	780,000	EPA Residential RSL	NE
	cis-1,3-Dichloropropene	1,700	EPA Residential RSL	NE
	Cyclohexane	7,000,000	EPA Residential RSL	NE
	Dibromochloromethane	680	EPA Residential RSL	NE
	Dibromomethane	25,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	180,000	EPA Residential RSL	NE
	Ethylbenzene	5,400	EPA Residential RSL	NE
	Hexachlorobutadiene	6,200	EPA Residential RSL	See Table A-3
	Hexachlorocyclopentadiene	370,000	EPA Residential RSL	NE
	Isophorone	510,000	EPA Residential RSL	NE
	Isopropylbenzene	2,100,000	EPA Residential RSL	NE
	m,p-Xylenes	3,400,000	EPA Residential RSL	NE
	Methyl acetate	22,000,000	EPA Residential RSL	NE
	Methyl ethyl ketone	28,000,000	EPA Residential RSL	See Table A-3
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	43,000	EPA Residential RSL	NE
	Methylcyclohexane	2,600,000	EPA Residential RSL	NE
	Methylene chloride	11,000	EPA Residential RSL	NE
	N-Butylbenzene	240,000	EPA Residential RSL	NE
	Nitrobenzene	4,800	EPA Residential RSL	See Table A-3
	N-Propylbenzene	240,000	EPA Residential RSL	NE
	o-Xylene	3,800,000	EPA Residential RSL	NE
	p-Chlorotoluene	5,500,000	EPA Residential RSL	NE
	sec-Butylbenzene	220,000	EPA Residential RSL	NE
	Styrene	6,300,000	EPA Residential RSL	NE
	tert-Butylbenzene	390,000	EPA Residential RSL	NE
	Tetrachloroethene	550	EPA Residential RSL	See Table A-3
	Toluene	5,000,000	EPA Residential RSL	NE
	trans-1,2-Dichloroethene	150,000	EPA Residential RSL	NE
	trans-1,3-Dichloropropene	1,700	EPA Residential RSL	NE
	Trichloroethene	2,800	EPA Residential RSL	See Table A-3
	Trichlorofluoromethane (Freon 11)	790,000	EPA Residential RSL	NE
	Vinyl chloride	60	EPA Residential RSL	See Table A-3
	Xylenes, total	630,000	EPA Residential RSL	NE

Notes:

This table presents a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes and screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations.

Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

Background	"Final Soil Background Investigation at Pacific Gas and Electric Company Topock Compressor Station, Needles, California" (CH2M HIll, May 2009)
DTSC CHHSL	California Department of Toxic Substances Control; California human health screening levels (OEHHA, 2005)
EPA RSL	United States Environmental Protection Agency Regional Screening Level, various dates. See Tables 3-1 to 3-8 of the Soil Investigation Part A Phase 1 Data Gaps Evaluation Report (CH2M HILL, 5/2011) for respective dates for each RSL.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis, 2008)
RWQCB	"San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels, Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater" (Table K-1). May 27, 2008
*	One or more screening levels (EPA RSL, DTSC CHHSL, ECV, or Soil SL) have values lower than the background level.
NE	not established
mg/kg	milligrams per kilogram
ng/kg	nanograms per kilogram
µg/kg	micrograms per kilogram

TABLE 2

Hazardous Waste Toxicity Characteristic Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Asbetos							
	Asbestos	1%	NE	NE	NE	NE	NE
Dioxins and Furans							
	2,3,7,8-TCDD	0.01	0.01	NE	0.001	NE	NE
Metals							
	Antimony	500	150	NE	15	NE	NE
	Arsenic	500	50	100	5	5	D004
j	Barium	10,000	1,000	2,000	100	100	D005
	Beryllium	75	7.5	NE	0.75	NE	NE
	Cadmium	100	10	20	1	1	D006
	Chromium, Hexavalent	500	50	NE	5	NE	NE
k	Chromium, total	2,500	50	100	5	5	D007
	Cobalt	8,000	800	NE	80	NE	NE
	Copper	2,500	250	NE	25	NE	NE
	Lead	1,000	50	100	5	5	D008
	Mercury	20	2	4	0.2	0.2	D009
l	Molybdenum	3,500	3,500	NE	350	NE	NE
	Nickel	2,000	200	NE	20	NE	NE
	Selenium	100	10	20	1	1	D010
	Silver	500	50	100	5	5	D011
	Thallium	700	70	NE	7	NE	NE
	Vanadium	2,400	240	NE	24	NE	NE
	Zinc	5,000	2,500	NE	250	NE	NE
Pesticides							
	4,4-DDD	1	1	NE	0.1	NE	NE
	4,4-DDE	1	1	NE	0.1	NE	NE
	4,4-DDT	1	1	NE	0.1	NE	NE
	Aldrin	1.4	1.4	NE	0.14	NE	NE
	alpha-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Dieldrin	8	8	NE	0.8	NE	NE
	Endrin	0.2	0.2	0.4	0.02	0.02	D012
	gamma-BHC (Lindane)	4	4	8	0.4	0.4	D013
	gamma-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Heptachlor	4.7	4.7	0.16	0.47	0.008	D031
	Heptachlor Epoxide	4.7	4.7	0.16	0.47	0.008	D031
	Methoxychlor	100	100	200	10	10	D014
	Toxaphene	5	5	10	0.5	0.5	D015
Polychlorinated Biphenyls							
	Aroclor 1016	50	50	NE	5	NE	NE
	Aroclor 1221	50	50	NE	5	NE	NE
	Aroclor 1232	50	50	NE	5	NE	NE
	Aroclor 1242	50	50	NE	5	NE	NE
	Aroclor 1248	50	50	NE	5	NE	NE
	Aroclor 1254	50	50	NE	5	NE	NE
	Aroclor 1260	50	50	NE	5	NE	NE
	Aroclor 1262	50	50	NE	5	NE	NE
	Aroclor 1268	50	50	NE	5	NE	NE

TABLE 2

Hazardous Waste Toxicity Characteristic Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

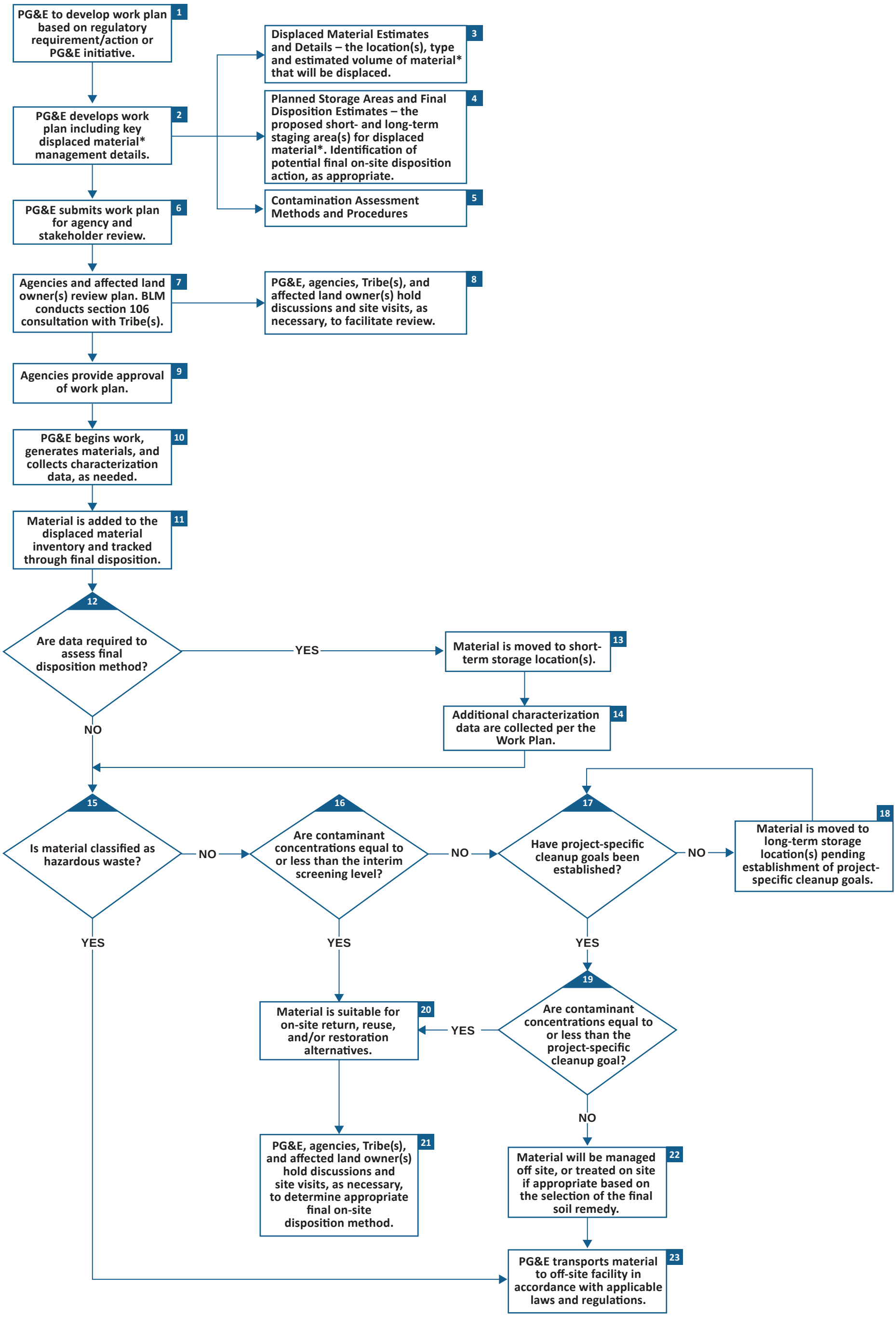
Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Polychlorinated Biphenyls							
	Total PCBs	50	50	NE	5	NE	NE
Semivolatile Organic Compounds							
	2,4-Dinitrotoluene	NE	NE	2.6	NE	0.13	D030
g	2-Methylphenol (o-Cresol)	NE	NE	4,000	NE	200	D023
g	3-Methylphenol (m-Cresol)	NE	NE	4,000	NE	200	D024
g	4-Methylphenol (p-Cresol)	NE	NE	4,000	NE	200	D025
	Hexachlorobenzene	NE	NE	2.6	NE	0.13	D032
	Hexachloroethane	NE	NE	60	NE	3	D034
	Pentachlorophenol	17	17	2,000	1.7	100	D037
Volatile Organic Compounds							
	1,1-Dichloroethene	NE	NE	14	NE	0.7	D029
	1,2-Dichloroethane	NE	NE	10	NE	0.5	D028
	1,4-Dichlorobenzene	NE	NE	150	NE	7.5	D027
	2,4,5-Trichlorophenol	NE	NE	8,000	NE	400	D041
	2,4,6-Trichlorophenol	NE	NE	40	NE	2	D042
	Benzene	NE	NE	10	NE	0.5	D018
	Carbon tetrachloride	NE	NE	10	NE	0.5	D019
	Chlorobenzene	NE	NE	2,000	NE	100	D021
	Chloroform	NE	NE	120	NE	6	D022
	Hexachlorobutadiene	NE	NE	10	NE	0.5	D033
	Methyl ethyl ketone	NE	NE	4,000	NE	200	D035
	Nitrobenzene	NE	NE	40	NE	2	D036
	Tetrachloroethene	NE	NE	14	NE	0.7	D039
	Trichloroethene	2,040	2,040	10	204	0.5	D040
	Vinyl chloride	NE	NE	4	NE	0.2	D043

Notes:

NE	not established
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
EPA HW	Environmental Protection Agency Hazardous Waste Code
TC	Toxicity Characteristic
TTLC	Total Threshold Limit Concentration
STLC	Soluble Threshold Limit Concentration
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure
WET	California Waste Extraction Test

Hazardous waste critiera exist for kepone, 2,4-D, mirex, pyridine, and 2,45-TP (Silvex); however, since they are not contaminants of potential concern at the Topock site, they are excluded from this table.

a	Total Threshold Limit Concentration (TTLC) from 22 CCR 66261.24(a)(2). Calculated based on the concentration of the elements, not the compounds.
b	Screening level is 10x Soluble Threshold Limit Concentraction (STLC). If screening level is exceeded in total analysis, California Waste Extraction Test (WET) should be run to evaluate whether STLC is exceeded.
c	Screening level is 20x RCRA Toxicity Characteristic (TC). If screening level is exceeded in total analysis, Toxicity Characteristic Leaching Procedure (TCLP) should be run to evaluate whether RCRA TC is exceeded.
d	Soluble threshold limit concentration from 22 CCR 66261.24(a)(2), measured using the WET. Calculated based on the concentration of the elements, not the compounds.
e	RCRA TC level from 22 CCR 66261.24(a)(1), measured using the TCLP.
f	A waste is assigned a RCRA waste code for each constituent where the results of the TCLP equal or exceed the RCRA TC level.
g	If o-, m- and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/L.
h	This footnote letter skipped intentionally.
i	In the case of asbestos and elemental metals, the specified concentration limits apply only if the substances are in a friable, powdered or finely divided state. Asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.
j	TTLC and STLC exclude barite. TTLC excludes barium sulfate.
k	For STLC, if the waste does not exceed the RCRA TC or exhibit another RCRA hazardous characteristic, the STLC is 560 mg/L, not 5 mg/L.
l	For TTLC, excludes molybdenum disulfide.



Notes:

* Throughout this figure the term "material" is defined as soil and rock that may be displaced (i.e., removed from the Earth) as a result of work activities including drilling, excavation, sample collection, testing, construction, grading, or other activities. This does not include materials that were not part of the natural site condition (e.g. building materials, equipment, or imported fill).

Throughout this figure, the term "site" refers to the area within the Area of Potential Effect (APE).

FIGURE 1
General Management Protocol for Handling and Disposition of Displaced Site Material
PG&E Topock Remediation Project
Needles, California

Pacific Gas and Electric Company®

PG&E TOPOCK COMPRESSOR STATION
COMBINED COMMENTS RECEVIED FROM: DOI, DTSC, FMIT, AND THE TRC
ON THE DRAFT (MAY 14, 2012) "MANAGEMENT PROTOCOL FOR HANDLING AND DISPOSITION OF DISPLACED SITE MATERIAL, TOPOCK REMEDIATION PROJECT, NEEDLES, CALIFORNIA" AND ASSOCIATED PG&E RESPONSES, FOR DISCUSSION

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
1	In redline	Page 3, Handling and Short Term Storage First paragraph	DTSC	In some cases, short-term storage for characterization may not be necessary.	List some examples for clarity.	In situations where characterization data is available prior to disturbance, or is made available during disturbance (e.g. field screening or expedited laboratory analysis), short-term storage may not be necessary. Text will be revised to read as follows (changes in bold): "In some cases, short-term storage for characterization may not be necessary. **For example,** displaced material that is pre-characterized **or characterized rapidly as work is conducted** will be managed **directly** for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively).	Resolved.
2	In redline	Page 3, Handling and Short Term Storage First paragraph	DTSC	Displaced material that is pre-characterized **per an agency approved work plan** will be managed for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively)	Strike "per an agency approved work plan". Comment: Data may come from other sources (e.g., opportunistic samples). No need to limit available data.	Text will be deleted. See revised text in response to comment 1.	Resolved.
3	In redline	Page 4, Handling and Short Term Storage Final bullet	DTSC	Final disposition information – Indication of the **on-site** or off-site final disposition action identified through discussion with Tribe(s), agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment (see Section 3.5).	Comment: Need to define "on-site/site/on site" used throughout the document to clearly understand where soil may end up.	The following statement has been added to the end of the second paragraph in Section 1.0: "Throughout this document, the term "site" refers to the area within the APE."	Resolved.
4	In redline	Page 4, Contamination Assessment First bullet	DTSC	Existing information including knowledge of the history of an area, or laboratory analytical results collected during previous phases of work. Use of existing information may preclude the need for additional analytical testing. When available, this information **should** be included in the work plan.	Replace "should" with "will".	Concur. The change has been incorporated.	Resolved.
5	In redline	Page 5, Contamination Assessment – (bullet) Hazardous Waste Toxicity Characteristic Levels Bullet 2	DTSC	If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic (TC) level by **about** 20 times or more, the toxicity characteristic leaching procedure (TCLP) will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.	Add word "about". Comment: Adding flexibility to conduct leach tests if the dry values are in the neighborhood. Do this due to potential for soil to be heterogeneous.	Concur. The change has been incorporated.	Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
6	In redline	Page 5, Contamination Assessment – (bullet) Hazardous Waste Toxicity Characteristic Levels Bullet 3	DTSC	If the sample has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by **about** 10 times or more, the California Waste Extraction Test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA California hazardous waste.	Add word "about".	Concur. The change has been incorporated.	Resolved.
7	In redline	Page 5, Contamination Assessment Last paragraph, last sentence	DTSC	As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review **and acceptance. Only agency approved values will be utilized.**	Add text in bold.	Concur. Final text based on discussion with DTSC: As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review and comment. Only agency approved values will be utilized.	Resolved.
8	1	End of document Table 2	DTSC	None.	The document does not speak to inside the fence line versus outside the fence line. If we use the Interim Screening Levels identified in this document for displaced soils originating from inside the fence line, there is a potential that more soil will be stored unnecessarily as inside the fence line soils would probably exceed background levels.	The management protocol currently addresses all material, regardless of area of origin, in the same way. A screening level specific to material inside the fence line may be established at a later date. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	Resolved.
9	2	End of document	DTSC	None.	Will inside the fence line soils versus outside the fence line soils be allowed to move back and forth? How does this tie into the on-site soil management plan (SMP) being developed by PG&E? Discuss components of the SMP in this protocol.	This management protocol will be applied to material displaced as a result of remediation project activities regardless of whether the material originated inside or outside the fence line. Therefore soils may move outside from inside, or potentially vice-versa depending on designated storage areas or reuse options. The SMP will mirror the concepts in this protocol. Because this document is the standard protocol and the SMP will be a standalone document as part of the operations and maintenance manual for the groundwater remedy, the SMP will reference this document and include additional detail, but we do not see a reason to reference the SMP in this protocol. Further, this management protocol will be updated as is determined necessary based on additional details included in the finalized SMP.	**Subsequent DTSC Comment:** The comment should be revised to clarify that the SMP is not limited to groundwater and is intended to ensure potentially contaminated soils are adequately identified and handled at the compressor station (inside the fence line). See absolute comment 154 from the RTC table (June 29, 2012) for the soils work plan. **PG&E Response:** The SMP is part of the final groundwater remedy design document, and therefore, is specific to groundwater. However, details regarding the management of potentially contaminated soils on the compressor station (inside the fence line) will be addressed in the Soil RFI/RI Work Plan (Appendix J – Displaced Soil and Hazardous Waste Management Procedures). Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
10	3	End of document Table 1	DTSC	None.	Interim Screening Level Source: Include soils screening levels for groundwater protection as screening criteria.	The Interim Screening Level represents the most conservative value, and are lower than the soil screening level for groundwater protection, with the exception of hexavalent chromium and molybdenum. The soil screening level for protection to groundwater for hexavalent chromium and molybdenum is below the background concentration for these metals. Final reuse decisions will be based on the more conservative Interim Screening Level or the project-specific clean up goal (or hazardous waste criteria), and therefore inclusion of soil screening levels for groundwater protection would not add a meaningful decision criteria to the protocol.	**Subsequent DTSC Comment:** Table 1 will need to be modified to identify that the soil screening level for molybdenum is below background. **PG&E Response:** Concur. The edit has been made. Resolved.
11	4	End of document Table 1	DTSC	None.	Interim Screening Level: The protocol should address screening criteria for vapor intrusion to indoor air, to ensure that vapor intrusion pathways will not be potentially created (e.g., do not place VOC impacted soil in areas that have, or likely to have enclosed structures such as MW-20 bench).	VOCs have not been detected in soils to date. Therefore there is no need to develop screening levels that are protective of indoor air from vapor intrusion pathways. However, the following statement will be added to second paragraph of Section 4.0: "Further, if material is found to contain concentrations of volatile organic compounds it may not be suitable for return, reuse, and/or restoration near buildings where vapor intrusion would be of concern."	Resolved.
12	5	End of document Table 1 - Notes	DTSC	None.	Include fluoride salts as they are COPC.	The note in Table 2 has been revised as discussed with DTSC.	Resolved.
13	6	End of document Table 2	DTSC	None.	Any listed wastes to be concerned with?	At this time we are not aware of any listed wastes that need to be considered for this management protocol. Additional soil data is pending collection as part of the soil investigation. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	Resolved.
14	In redline	Figure 1	DTSC	**Agencies direct** PG&E to develop work plan based on regulatory requirement or action.	Revised text: PG&E to develop work plan based on regulatory requirement/action **or PG&E initiative**.	Concur. The change will be incorporated.	Resolved.
15	In redline	Figure 1	DTSC	PG&E begins work and generates material.	Revised text: PG&E begins work and generates material **and characterization data**.	To clarify, the word "additional" will be deleted from the decision box two levels below the box commented on, and the original box will not be edited.	**Subsequent DTSC Comment:** Edits were not completed as stated in text. Box 10: Add "characterization" in front of "data". Box 12: Delete "additional" as proposed. **PG&E Response:** Concur. The edits have been made. Resolved.
16	In redline	Figure 1	DTSC	Material is suitable for **on-site** return, reuse, and/or restoration alternatives.	Define "on-site".	The following note has been added to the figure: "Throughout this figure, the term "site" refers to the area within the Area of Potential Effect (APE)."	Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
17	In redline	Page 5, Contamination Assessment Last paragraph, last sentence	DOI	As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review **and acceptance. Only agency approved values will be utilized.**	It is unclear what is meant by acceptance. (See also comment 7 [DTSC])	See response to comment 7 (DTSC).	Resolved.
18	In redline	Page 6, Long-term Storage First paragraph, second sentence	DOI	Per DOI comment on this protocol (received in February 2012), this material must remain on-site until project-specific cleanup goals are finalized.	For clarification, DOI stated that the material could not be returned to the land until cleanup criteria are finalized in the ROD and may be stored until that time.	To clarify, the text has been revised as follows: "Per DOI comment on this protocol (received in February 2012), this material cannot be returned to the land until cleanup criteria are finalized in the Record of Decision (ROD) and may be stored until that time."	Resolved.
19	1		FMIT	None.	The 5-14-12 draft protocol still does not address the matter of the existing inventory of displaced soils. It only looks forward to activities that will involve soil disturbance as part of future work plans. This comment has been made previously by FMIT, but the issue remains unaddressed. The existing inventory of displaced soils must be addressed in this protocol. It is not anticipated that the handling and disposition of the existing soil inventory would be different from procedures and policies for addressing future displaced soils. A section of this protocol must address disposition of the existing displaced soils inventory.	As stated in the first sentence of the document, the intent is for this management protocol to apply to material that is displaced as a result of past (as practical), present, and future activities associated with the Topock Remediation Project. To speak specifically to the inventory of previously displaced soils at the site, the following text has been added to the end of Section 4.0 (Return, Reuse, and/or Restoration of Displaced Site Material): "Material displaced as part of past remediation project activities was managed in accordance with project-specific work plans. As a result, some material has been retained at the site because contaminant concentrations were below the Interim Screening Level (previously displaced material that has exceeded these levels was disposed off-site in accordance with the work plans). Therefore, previously displaced material is available for the return, reuse, and/or restoration alternatives included in the bullets above, or as additional uses are developed. As of June 2012, the estimated volume of material that has been retained and stockpiled through past remediation project activities is approximately 30 to 35 cubic yards."	
20	2		FMIT	None.	The draft does not address soil disturbances associated with the soils investigation. It appears that only soils displaced as a result of the groundwater remedy activities are explicitly covered. Again, this point has been raised by FMIT but remains largely unaddressed. FMIT realizes the necessity and importance of PG&E's addressing the respective mitigation measure (CUL-1a-8[g]) but that measure does not exclude applying these procedures to all displaced soils. The issue of soil handling was initially raised by FMIT years ago, and was not intended to be limited to the fulfillment of a mitigation measure for, or the implementation of, the groundwater remedy. PG&E has apparently reframed the issue to limit the scope of the protocol, however, the FMIT is concerned with the disturbance and displacement of soils, regardless of the	Based on clarification received from FMIT during the June 15, 2012 call, the tribes want this protocol to be inclusive of all activities at the Topock Compressor Station. This topic has been tabled for future discussion with PG&E, and the protocol will not be modified at this time. DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: As indicated in the first paragraph of the Protocol, "*This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities*	The Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
					associated activity or remedial action at the Site, and expects the PG&E and the Agencies to examine and find solutions for the whole of the issue.	*associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities*". As cited, DTSC does not interpret the Protocol to be limited only to soil displaced as a result of groundwater remedy implementation. On the contrary, the scope appears to be sufficiently broad to cover all aspects of the environmental project conducted under the oversight of DTSC and the US Department of the Interior. DTSC is aware, however, that this protocol, once developed, could be submitted by PG&E to comply with a portion of Mitigation Measure CUL-1a-8 of the certified Final Environmental Impact Report where PG&E is to develop a protocol for handling soil cuttings to be included in the Cultural Impact Mitigation Program as part of the final design of the approved groundwater remedy. Currently, DTSC is in the process of conducting a California Environmental Quality Act (CEQA) evaluation for the soil investigation work plan. Based on the results of the soil CEQA evaluation, the same mitigation measure may be found to be appropriate for the soil investigation activities. Note that displaced soils from soil investigation activities will not be generated until after the soil CEQA evaluation is completed and the soil investigation work plan is approved.	
21	3		FMIT	None.	There is no commitment to minimize disturbances that are not associated with the listed activities as a result of incidental or associated activities (e.g., vehicles, etc.). PG&E is directing this primarily at CUL-1a-8[g], however, FMIT again requests that these procedures be a broader statement of policy committing to minimization or disturbance for all Site activities. Other soil disturbing activities that PG&E might perform should also 'voluntarily' follow this protocol.	See response to comment 20 (FMIT). Per Aug-6, 2012 discussion, additional detail was added to the bullets in Section 3.1 regarding areas of disturbance and displacement.	
22	4		FMIT	None.	The application of soil criteria for the determination of reuse needs some additional flexibility. Since there will likely be (or should be) several discrete soil samples with chemical concentrations for a given amount of soil, it is the average of these values for that soil accumulation that should be used. This is justified because exposure occurs over an area and the soil will be further mixed when it is placed back on the site.	The specific process for characterization of displaced site material is an example of a detail that would be included in the project-specific work plan. DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: In addition to potential concentration-by-concentration comparison between the disturbed soil and screening criteria, DTSC does not object to considering other alternative methods as long as the methods will yield data that are representative of the material in question, are in accordance with waste classification regulations, and standard practice for classifying materials such as	As of the September 7, 2012 letter, the Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached. The document has been revised per the direction in the September 18, 2012 letter in response to the September 7, 2012 letter (as detailed in the column to the left).

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
						investigation derived soil cuttings for the purposes of determining proper disposal. DTSC concurs with the approach that additional details regarding this issue can be addressed in the individual work plans. PG&E Comment – The sixth paragraph on page 5 has been revised to read as follows (text additions are in **bold**): "These values will be used to determine the final disposition of displaced material **by comparing the representative concentration of a given volume of material to the screening values. The methodology for determining the representative concentration will be established in the project-specific work plan and should not be limited to a concentration-by-concentration comparison, but could include statistical estimates or averages based on multiple samples**. Material that **has a representative concentration that** is equal to or below the interim screening level is suitable for return, reuse, or replacement on-site. Material that is characterized as hazardous waste must be disposed of off-site in accordance with applicable laws and regulations. Material that **has a representative concentration that** is greater than the interim screening level, but not classified as a hazardous waste, will be stored on-site until the project-specific cleanup goals are established. Until these goals are established, material that falls into this intermediate category will be retained on-site for "long-term storage" (see Section 3.4)."	
23	5	Table 1	FMIT		Why is the "Project-specific Cleanup Goal" differentiated from the "Tribal Screening Level"? The Tribal land use scenario is the most appropriate future land use and the calculation of risk-based concentrations is a "Project-specific Cleanup Goal" and not a screening level.	Based on discussion during the June 15, 2012 call, it is premature to have the project-specific cleanup goals and the tribal screening levels included on Table 1 since they have yet to be determined. Therefore, these columns will be deleted from Table 1. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	
24	6		FMIT		The overall logic that would set screening criteria according to the location of origin of the soil is flawed. Soil disturbances often involve commingling of soils to various depths, while the potential exposure scenarios usually relate to materials at or near the surface. The depth of soil placement/reuse should be considered in the decision for reuse.	Separation of displaced soil to this level of detail (shallow vs. deeper) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint, but could be accomplished. However, current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios. The document will be revised as additional screening levels are developed.	The Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
						DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: DTSC supports PG&E's response in the RTC summary table that separation of displaced soil to this level of detail (shallow vs. deep) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint. The current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios. More importantly, the decision to reuse soil that is above screening criteria regardless of depth ultimately rests on the respective land owners who own the land where the displaced soil will be reused. If potentially contaminated soils will be reused, the land owner must agree to a land use covenant restricting the use of their land after backfilling. DTSC believes that this issue cannot be managed at a global level since the decision is dependent on location, depth, concentration of material and landowner acceptance, DTSC believes that this issue can be deferred and handled on a case-by-case basis, potentially during the individual work plan, to first determine if there are potential locations that will require deep backfill, and more importantly, the individual land-owners preference on this issue. **PG&E comment – Additional detail regarding potential material reuse scenarios that are specific to a given work plan will be included in the individual work plans, as necessary.**	
25	7	Figure 1	FMIT		We suggest adding a number to each block in the diagram for clarity. In the "second to the last block" it says "Material must be managed offsite." If contaminant concentrations are less than or equal to (<) project-specific cleanup goal, why couldn't they be treated onsite if appropriate and feasible?	Numbers will be added to flow chart boxes. The text in the "second to last block" will be modified to read as follows: "Material will be managed off site, or treated on site if appropriate based on the selection of the final soil remedy." Additional text has also been added to Section 3.5.	
26	1	Page 4, Contamination Assessment	Hualapai / TRC		Key information that will be used in assessing whether the displaced material is contaminated is discussed in Section 3.3 Contamination Assessment. Within this section it is stated that contamination determinations of displaced materials can be based on "existing information including knowledge of the history of an area" and "observation of the physical properties of the material". It is unclear however, how physical observation or historical knowledge of an area can be used in comparisons against the quantitative interim screening values provided in	Examples of key physical properties have been added to the second bullet in Section 3.3, and now reads as follows: "Results of characterization samples collected for laboratory analysis, and observation of the physical properties of the material (e.g., white powder, burned material, boulders, etc.), as defined in the approved work plan for a given activity." Regarding "existing information/history of an area", see response to comment 27 (Hualapai/TRC).	

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
					Tables 1 and 2.		
27	2	Page 4, Contamination Assessment Third bullet.	Hualapai / TRC	The specific analytes and interim screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations.	Section 3.3 Contamination Assessment states that "the specific analytes and interim screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations." This statement appears to suggest that the interim soil screening levels that are provided in Tables 1 and 2 are not to be consistently applied to all displaced soils but rather the origin and fate of the displaced soil will dictate which analyte will be evaluated and what interim threshold value is used. This is unclear and could use additional clarification.	The screening levels included on Tables 1 and 2 will be applied uniformly to all analytes included on the table. To clarify, the text "**and screening levels**" will be deleted from the statement. Regarding specific analytes, the protocol provides flexibility such that a subset of analytes included on Table 1 may be used to characterize displaced material, as determined appropriate. For example, material that is generated from an area not suspected of dioxin/furan contamination may not need to be characterized for dioxin/furan concentrations prior determining the appropriate disposition alternative.	
28	3		Hualapai / TRC		Interim screening values should not be based on background values. The use of background is unnecessarily over-conservative, the background data are based on a small yet variable group of samples, and use of the background threshold value will inevitably result in long term stockpiling of soils with no associated risk. Until a Tribal Screening level is developed it can still be safely assumed that the use of a CHHSL interim screening value will be equal to or greater than the Tribal Screening level and should be used in place of the background screening level.	The use of background is purposefully conservative until project-specific cleanup goals are established. While it is correct that this may result in long term storage of soils that are later determined to have no associated risk, agency input and concurrence is required if less conservative values are to be used.	
29	4		Hualapai / TRC		The use of ecological screening values (ECVs) should only occur in situations were displaced soils would be returned to surface locations. Most of the developed ECVs were developed based on exposures to terrestrial receptors which would not come into contact with subsurface soils. Clearly no significant pathway of exposure for ecological receptors exists for soils removed and replaced into deep boreholes. Therefore if ECVs are to be used it is suggested that there use be limited to the screening of only surface related soils.	See response to comment 24 (FMIT) and 28 (Hualapai/TRC).	

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
30	5		Hualapai / TRC		It was clearly stated in the Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil that "the ECVs, while based on information developed during the ecological risk assessment (ERA) scoping, are to be applied only to soil investigation planning in conjunction with background values. Specifically, the ECVs are not intended for use as either cleanup goals or as screening levels to eliminate COPECs." Furthermore within the Revised Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan (August 2008) PG&E states that "ECVs were developed to support the soil investigation data gaps assessment". Therefore it appears that the use of ECVs as interim screening levels for the determination of soil cleanup is outside of the scope of which these values were developed.	ECVs are only included on Table 1 for select analytes as the Interim Screening Level (see notes). However, the Interim Screening Level is not used for the determination of soil clean-up. The Interim Screening Level is used as the most conservative screening level to determine if the material is suitable for on-site return, reuse, and/or restoration alternatives. As presented on Figure 1, if the material contains contaminant concentrations greater than the Interim Screening Level (and below hazardous waste criteria), then it must stored until project-specific clean-up goals are established.	
31	6		Hualapai / TRC		There may be a need for rapid field analyses in order to, for example, place cuttings materials back down a bore hole or to work in very sensitive areas. Selected elements and possible field methods need to be discussed as part of the process to define screening levels.	It is conceivable that rapid field screening or laboratory analytical data may be necessary to make expeditious decisions related to the characterization of displaced material. However, these operational details are deferred to the project-specific work plan, where all details related to the implementation of the scope of work can be fully considered. The reference list of potentially applicable analytes and associated screening levels (Table 1) is being developed based on past operation information available for the Site, and therefore, is inclusive of all analytes of potential concern. However, this list is not dependant on the types of analytical methods (field or fixed-base laboratory) used for characterization of displaced site material.	
32	7		Hualapai / TRC		Other details were not presented in the report. For example, composite samples may be collected and analyzed in order to categorize a batch of soils. A displaced material tracking data base may be necessary in order to catalog the site locations, depths, methods of displacement, etc.	Many operational details, such as the method(s) for characterizing soils that are displaced as a result of Topock Remediation Project activities, are deferred to the project-specific work plan. See also the response to comment 22 (FMIT). Please refer to Section 3.2 (Handling and Short-term Storage) regarding plans to build an inventory of all material displaced by Topock Remediation Project activities.	

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

1820 East River Road, Suite 220
Tucson, AZ 85718
Phone: 520.881.7300
Fax: 520.529.2141

September 7, 2012

VIA ELECTRONIC MAIL

Mr. Jose Marcos, Geologist
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, CA 90630

Re: FMIT Comments on Revised Protocol on Displaced Materials, August 28, 2012

Dear Mr. Marcos:

Hargis + Associates, Inc. (H+A) on behalf of our client, the Fort Mojave Indian Tribe ("the Tribe" or "FMIT"), is hereby providing comments on the above-referenced revision to the Displaced Materials Protocol ("the Protocol"), in response to your email of September 4, 2012.

The Tribe is concerned over the suggestion that this Protocol is nearing finalization, yet there does not appear to be full resolution of Tribal comments. The Tribe agrees that this document has been prepared in a collaborative manner with frequent opportunity to exchange ideas and for the parties to provide input. Nevertheless, our review of the "Response to Comments," (RTC) prepared by the Pacific Gas & Electric Company (PG&E), characterizes the status of various tribal comments as "resolved." However, some of the issues that have been consistently raised by the Tribe during the process in fact remain unresolved. As you know from the correspondence of July 23, 2012, referenced below, the Tribe has concerns with the comment resolution process for the project in general.

The Tribe commented previously on the RTC process for the draft *Soil RCRA Facility Investigation/Remedial Investigation Work Plan (Work Plan), PG&E Topock Compressor Station, Needles, California.* Specifically, the last column of the RTC table identifies the resolution status of individual "Absolute Comments," much like the last column in PG&E's RTC for the displaced soils protocol. The Tribe took issue with the fact that the Agencies, the California Department of Toxic Substances Control (DTSC) and U.S. Department of the Interior (DOI), characterized the resolution status as "resolved," when in fact the Tribe had certain residual issues.

While the Tribe understands that the ultimate decisions for project matters remain the Agencies' responsibility, it is important that dissenting views of Tribes and stakeholders be documented in the record whenever the "resolution" overrides the concerns expressed throughout the process. On August 31, 2012, the Tribe received a letter from DOI and DTSC in response to the Tribe's letter of July 23, 2012, expressing concerns over the RTC process. The Agencies' letter recognized that several of the Tribe's issues in fact remain unresolved and indicated that DOI would request that PG&E remove the "resolved" notation from all Tribal comments. DOI further

Other Offices:
Mesa, AZ
San Diego, CA

indicated its willingness to consult with the Tribe on the matter and procedure for issue resolution.

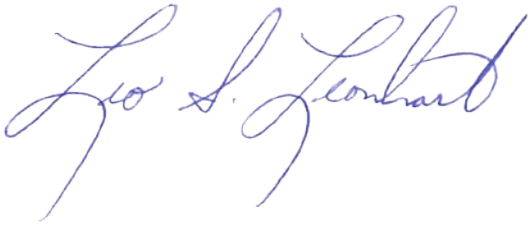
The RTC for the displaced soils protocol is unacceptable to the Tribe for the same reasons: the document seems to state that PG&E, not the Agencies, had made determinations in regard to issue resolution. This function properly belongs to the Agencies and must not be directly or indirectly delegated to a third party. Also, the document does not accurately reflect unresolved issues raised by the Tribe or document why they cannot be accommodated, if that is the case, a key part of meaningful collaboration and consultation. Perhaps finalization of the Protocol can await the Agencies' consideration of this letter and the conclusion any further discussions on this subject with the Tribes.

Accordingly, below, the Tribe hereby is identifying three items where the Tribal issues remain unresolved, and requests that either these issues be resolved jointly with the Tribe(s) or the reasons why these issues cannot be accommodated at this time be identified and documented within the RTC summary. The comments are attached.

Please contact me if you have questions concerning this letter.

Sincerely,

HARGIS + ASSOCIATES, INC.



Leo S. Leonhart, PhD, PG, CHG
Principal Hydrogeologist

Comments attached below

cc: K. Baker, DTSC
J. Bathke, Quechan
D. Bonamici, CRIT
M. Cavaliere, CH2M Hill
C. Coyle
M. Eggers, TRC
R. Escobar, Chemehuevi
W. Fisher-Holt, CRIT

D. Hubbs, Hualapai
P. Innis, DOI
L. Jackson-Kelly, Hualapai
J. McCormick, Cocopah
S. McDonald
N. McDowell-Antone, FMIT
Y. Meeks, PG&E
K. Morton, Cocopah
L. Otero, FMIT
R. Prucha, TRC
E. Rosenblum, TRC
C. Schlinger, TRC
M. Sullivan, CSUN
T. Williams, FMIT
W. Wright, TRC
A. Yue, DTSC

839.07 Displaced Materials

Fort Mojave Indian Tribe Comments on the Draft Soils Reuse Protocol that Remain Unresolved

Comments on the RTC

1. Comment 20 by FMIT.

   There are two separate issues that have been inappropriately combined. The first issue is the Tribe's position that this Protocol should apply to all aspects (*e.g.,* groundwater and soil) of the Topock Remediation Project. The second issue was the request by the Tribe that the Protocol be applied to all soil-related projects. This second issue was potentially addressed by moving it to discussions between PG&E and the Tribes directly. However, this resolution does not address the first issue. Therefore, the Tribe again requests that this Protocol be applied to all aspects of the Topock Remediation Project.

2. Comment 24 by FMIT and 29 by Hualapai/TRC.

   The comment and the comment's final sentence are two separate, but related issues regarding the application of the soil criteria to decide on the disposition of disturbed soils. One issue is that it should be the final location of disturbed soil replacement that determines the applicable criteria, not the source location of the disturbed soil. And second, when the final location of disturbed soil replacement is selected, if the location has deep (*i.e.,* below 2 feet bgs) backfill areas, and if future erosion is unlikely, then this deeper backfill soil may have less stringent acceptance criteria. While it is understood that the Protocol has criteria that are not depth-related, this issue of backfill depth can be used to decrease the amount of soil that must be removed from the site, thereby lessening the impact of the cleanup on the Site.

Comments on the August 30, 2012, Draft Protocol

1. Page 5, paragraph 6.

   FMIT has commented previously that when the Protocol describes a simple comparison between the material *(i.e.,* the disturbed soil) and the criteria, without further discussion, it gives the impression that concentration-by-concentration comparisons will be used. As discussed in the last teleconference, there may be other estimates of 'material concentration' that could be used (*e.g.,* average). While the RTC specifies that the procedure for this comparison will be addressed in specific work plans, the Tribe requests that this paragraph be edited to include the statement "material concentrations will be established for each soil pile in short-term storage. This concentration may include a statistical estimate for that soil pile." (Note: 'pile' may not be the correct word in this context and a substitute can be discussed.)

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
5796 Corporate Avenue
Cypress, California 90630

Edmund G. Brown Jr.
Governor

Sent Via Electronic Mail

September 18, 2012

Leo S. Leonhart, PhD, PG, CHG
Principal Hydrogeologist
Hargis + Associates, Inc.
1820 East River Road, Suite 220
Tucson, AZ 85718

RESPONSE TO SEPTEMBER 7, 2012 LETTER ON FMIT COMMENTS REGARDING REVISED PROTOCOL ON DISPLACED MATERIALS, PACIFIC GAS AND ELECTRIC COMPANY (PG&E), TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

Dear Dr. Leonhart:

The Department of Toxic Substances Control (DTSC) is in receipt of your letter dated September 7, 2012, which was sent on behalf of the Fort Mojave Indian Tribe (FMIT) pertaining to the FMIT concerns over the *"Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project"* (Protocol). DTSC appreciates the FMIT's input as provided in your letter, and believes that they will help greatly in quickly resolving any potentially unresolved issues related to the Protocol.

As you know, it has been nearly one year since your initial draft of what has evolved into the current version of the Protocol. Its development has been a collaborative effort between the various agencies, Tribes, stakeholders and PG&E as part of the displaced soil committee. The parties involved have met multiple times to discuss the details of the document and its implementation strategy. DTSC believes that these meetings throughout the past year demonstrate the commitment of all parties to completing this task and to provide meaningful input into its development.

After reviewing the August 28, 2012 version of the Protocol, DTSC believes that the document has captured the issues and the resolutions suggested during the yearlong dialogues of the committee. However, in your letter, you expressed, on behalf of the FMIT, concern over DTSC's suggestion that the Protocol is nearing completion, and your letter indicates that the response to comments (RTC) summary table does not accurately reflect unresolved issues raised by the Tribes. You specified three

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comments that the FMIT believes remain unresolved and you requested that these issues be resolved jointly with the Tribes or document the reasons why they cannot be accommodated at this time in the RTC summary table.

DTSC notes, however, that the 'resolved' status for comments listed on the RTC table were determined by the committee members during the various meetings after each comment was discussed. Never the less, DTSC will request PG&E to revise the RTC summary table for those three comments to reflect the FMIT's position. DTSC is providing the following discussion to clarify our understanding of the issues raised by the three specific comments. DTSC hopes that the responses adequately address the FMIT's comments so that the Protocol can continue to move forward.

1. Absolute Comment No. 20 by FMIT – According to the FMIT comment, the Protocol does not address soil disturbances associated with the soils investigation, and it appears that only soils displaced as a result of the groundwater remedy activities are explicitly covered. The FMIT requests that the protocol to be applied to all aspects (e.g., groundwater and soil) of the Topock Remediation Project.

As indicated in the first paragraph of the Protocol, *"This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities".* As cited, DTSC does not interpret the Protocol to be limited only to soil displaced as a result of groundwater remedy implementation. On the contrary, the scope appears to be sufficiently broad to cover all aspects of the environmental project conducted under the oversight of DTSC and the US Department of the Interior. DTSC is aware, however, that this protocol, once developed, could be submitted by PG&E to comply with a portion of Mitigation Measure CUL-1a-8 of the certified Final Environmental Impact Report where PG&E is to develop a protocol for handling soil cuttings to be included in the Cultural Impact Mitigation Program as part of the final design of the approved groundwater remedy.

Currently, DTSC is in the process of conducting a California Environmental Quality Act (CEQA) evaluation for the soil investigation work plan. Based on the results of the soil CEQA evaluation, the same mitigation measure may be found to be appropriate for the soil investigation activities. Note that displaced soils from soil investigation activities will not be generated until after the soil CEQA evaluation is completed and the soil investigation work plan is approved. DTSC will instruct PG&E to add a statement in the RTC summary table reflecting DTSC's position.

2. Absolute Comments No. 24 by FMIT and 29 by Hualapai/TRC – The Tribes request that the depth of the soil placement/reuse should be considered in the decision for reuse.

DTSC supports PG&E's response in the RTC summary table that separation of displaced soil to this level of detail (shallow vs. deep) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint. The current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios.

More importantly, the decision to reuse soil that is above screening criteria regardless of depth ultimately rests on the respective land owners who own the land where the displaced soil will be reused. If potentially contaminated soils will be reused, the land owner must agree to a land use covenant restricting the use of their land after backfilling. DTSC believes that this issue cannot be managed at a global level since the decision is dependent on location, depth, concentration of material and landowner acceptance, DTSC believes that this issue can be deferred and handled on a case-by-case basis, potentially during the individual work plan, to first determine if there are potential locations that will require deep backfill, and more importantly, the individual land-owners preference on this issue. DTSC will instruct PG&E to revise the RTC summary table to remove the 'resolved' status for this comment, incorporate DTSC's position, and indicate that additional detail can be included in the individual work plans.

3. FMIT Comment on page 5, paragraph 6 of the August 2012 draft protocol – The FMIT requests the inclusion of the statement, *"material concentrations will be established for each soil pile in short-term storage. This concentration may include a statistical estimate of the soil pile"*. In addition to potential concentration-by-concentration comparison between the disturbed soil and screening criteria, DTSC does not object to considering other alternative methods as long as the methods will yield data that are representative of the material in question, are in accordance with waste classification regulations, and standard practice for classifying materials such as investigation derived soil cuttings for the purposes of determining proper disposal. DTSC concurs with the approach that additional details regarding this issue can be addressed in the individual work plans. DTSC will instruct PG&E to update the Protocol and RTC summary table to incorporate the FMIT's proposed concept as a potential alternative.

Finally, your letter indicated that the FMIT has concerns with the comment resolution process for the project in general. The FMIT expressed similar concerns in a letter dated July 23, 2012. DTSC and the U.S. Department of the Interior provided a response to the FMIT letter on August 31, 2012. If you feel that this letter and the August 31, 2012 letter do not adequately address your general concerns regarding the comment resolution process for the project, we would like to meet with you to discuss any remaining concerns you may have.

DTSC hopes that this letter provided additional clarification and adequately addressed the FMIT's issues related to the Protocol. As always, DTSC appreciates the Tribes and stakeholders continuing involvement on the PG&E Topock project and we look forward to working with you in moving the overall project forward. If you have any questions, please feel free to contact me at (714) 484-5492.

Sincerely,

Jose Marcos, PG
Engineering Geologist
Department of Toxic Substances Control

cc: Ms. Karen Baker, DTSC
Mr. John Bathke, Quechan
Mr. Douglas Bonamici, CRIT
Mr. Mike Cavaliere, CH2MHill for PG&E
Ms. Courtney Ann Coyle, for FMIT
Ms. Margaret Eggers, TRC
Mr. Ron Escobar, Chemehuevi
Ms. Wilene Fisher-Holt, CRIT
Mr. Christopher Guerre, DTSC
Ms. Dawn Hubbs, Hualapai
Ms. Pamela Innis, DOI
Ms. Loretta Jackson-Kelly, Hualapai
Ms. Jill McCormick, Cocopah
Mr. Steven McDonald, for FMIT
Ms. Nora McDowell-Antone, FMIT
Ms. Yvonne Meeks, PG&E
Ms. Kendra Morton, Cocopah
Ms. Linda Otero, FMIT
Mr. Robert Prucha, TRC
Mr. Eric Rosenblum, TRC
Mr. Charlie Schlinger, TRC
Mr. Michael Sullivan, for FMIT
Mr. Timothy Williams, FMIT
Mr. Win Wright, TRC
Mr. Aaron Yue, DTSC

Appendix C
Construction and Operations Best Management Practices (BMPs) Plan for Soil Storage

Construction and Operations Best Management Practices (BMPs) Plan for Soil Storage

This Best Management Practices (BMPs) Plan for soil storage during construction and operations of the final groundwater remedy at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station has been prepared as required by the following Environmental Impact Report (EIR)[1] mitigation measures and Applicable or Relevant and Appropriate Requirements (ARARs):

- Mitigation measure AIR-1 requires the implementation of fugitive dust control measures during construction activities.
- Mitigation measure HYDRO-1 requires the implementation of BMPs to meet the substantive criteria of applicable federal, state, and local permit and regulatory requirements for stormwater discharges associated with construction and land disturbance activities.
- ARAR #34 requires the implementation of BMPs for stormwater runoff which comes in contact with construction activities (>1 acre of ground disturbance).

This BMPs Plan has been prepared to meet the above requirements, and in accordance with the substantive criteria of the NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ, Amended Order No. 2010-014-DWQ, Amended Order No. 2012-0006-DWQ, NPDES No. CAS000002 (California General Permit)[2] for construction activities in San Bernardino County, California, as well as the substantive criteria of the Arizona Pollutant Discharge Elimination System (AZPDES) General Permit AZG2013-001 for Stormwater Discharges associated with Construction Activity to Waters of the United States (General Permit) for construction activities in Mojave County, Arizona.

This BMPs Plan has been prepared by a California Qualified SWPPP Developer (QSD) and will be implemented under the direction of a Qualified SWPPP Practitioner (QSP). A summary of key BMPs identified for soil storage of the project is presented below in Section 1.0; inspection, monitoring, corrective actions, reporting, and recordkeeping information for the BMPs Plan is presented in Section 2.0; and workers training and education in Section 3.0.

The PG&E Site Manager and the Field Team Leader will have control over day-to-day activities, and will implement this BMP Plan under the direction of the QSP (see Section 2.2 for additional details on the BMPs Project Team).

1.0 Project BMPs

This section provides a summary of the Project BMPs. The specific EIR mitigation measures other than HYDRO-1 or project SOPs are referenced for each BMP category where appropriate. Figure C-1 at the end of this appendix shows the site topography and inferred surface water flow for the two soil storage areas located at Moabi Regional Park.

1.1 Erosion Control BMPs

Scheduling – In order to reduce the amount and duration of soil exposed by construction activities, a schedule will be established to coordinate construction activities and construction site BMPs while taking local climate into consideration. Construction site BMPs will be installed prior to start of construction and inspected prior to and after anticipated rain or erosion events. Sufficient lag time will be built into the schedule to allow for rain delays.

[1] California Department of Toxic Substances Control (DTSC). 2011. *Final Environmental Impact Report for the Topock Compressor Station Groundwater Remediation Project*. January.

[2] State Water Resources Control Board (SWRCB). 2009. Construction General Permit Fact Sheet. Adopted Order No. 2009-0009-DWQ. Sacramento, CA.

Preservation of Existing Vegetation – Existing vegetation shall be preserved whenever feasible. Preservation of existing vegetation shall be incorporated into the schedule prior to the commencement of clearing and grubbing or other soil disturbing activities. In the event that existing vegetation needs to be disturbed, areas that need to be preserved shall be marked with temporary fencing. All employees and subcontractors shall be informed on the limits of disturbance within the construction site and shall be instructed to keep clear of delineated areas.

Geotextiles and Mats – A natural (excelsior, straw, coconut, etc.) or synthetic (usually polyethylene) material will be used to reduce soil erosion by wind or water. Stockpiles will be covered and secured.

1.2 Sediment Control BMPs

Silt Fence – Silt fences will be placed below areas where sheet flows discharge from the site. They will also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas. Silt fences are most effective when used in combination with erosion controls around temporary spoil areas and stockpiles, and below other small cleared areas.

Fiber Rolls/Sediment Wattles – These consist of aspen wood excelsior, straw, flax, or other similar materials that are rolled and bound into tight tubular rolls and placed on the face of slopes at regular intervals depending on steepness of slopes to intercept runoff and reduce flow velocity. Rolls/wattles will be installed prior to start of construction activities to form a barrier around work areas and stockpiles and will be anchored down with stakes. If the stockpiles are on paved areas, gravel or sand bags are preferred; however, fiber rolls can be used and secured with gravel or sand bags. The fiber rolls/sediment wattles will be inspected prior to forecasted rain events and after rain events to ensure the fiber rolls are working properly. Sediment accumulated by the fiber rolls will be removed periodically to maintain the effectiveness of the fiber rolls.

Gravel Bag Berms – Gravel bag berms can be used as an alternative to fiber rolls and sediment wattles. If used, they shall be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. Gravel bags shall also be used, if necessary, during trenching activities when stockpiles are onsite. In the event that gravel bag berms are used as perimeter erosion control, the bags shall be placed two bags high. When used to anchor stockpiles, they shall be placed one bag high.

Sand Bag Berms – Sand bag berms can also be used as an alternative to fiber rolls and sediment wattles. If used, they will be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. The purpose is to allow sediment to settle from runoff before water leaves the construction site. Sand bags will also be used, if necessary, during trenching activities when stockpiles are left onsite.

Straw Bale Barriers – Straw bale barriers can also be used as an alternative to fiber rolls, gravel bag berms, and sand bag berms. Straw bale barriers intercept and slow down sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Straw bale barriers shall be placed one bag high.

1.3 Stockpile Management Control BMPs

Stockpile management procedures and practices are implemented to reduce or eliminate pollution to the air and stormwater from materials that are stockpiled. Stockpile protection is required year-round. Any stockpiles will be stored in the staging area and outside of the roadway right-of-way. Stockpiles will be located a minimum of 50 feet away from any concentrated flow of stormwater, drainage courses, and inlets. During the rainy season, stockpiles will be covered and anchored down with fiber rolls/sediment wattles, silt fences, gravel bags, sand bags, and/or straw bales. Additional stockpile management BMPs are presented in the subsections below.

Non-Hazardous Soil Above Interim Screening Levels. It is anticipated that all soil that is above soil screening levels will be placed in roll-off bins or similar containers. If it is necessary to stockpile displaced soil that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level, the following BMPs will be followed:

- Stockpiles will be constructed with liners and perimeter berms to prevent release or infiltration of liquids. Minimum 20-mil polyethylene sheeting or equivalent will be used for liners.
- Wind erosion will be prevented by use of a cover, applying Soiltac® or a similar soil stabilization product, or other suitable means. If a cover is employed it will be minimum 6-mil polyethylene sheeting or equivalent.
- The perimeter berm will be constructed of clean materials (such as hay bales or straw wattle under the liner).
- If a cover is employed, it shall extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the stockpile.
- Covers and perimeter berms will be secured in place when not in use and at the end of each workday and as necessary to prevent wind dispersion or run-off from precipitation events.
- Liquids that accumulate inside the berm will be pumped from the stockpile to a container or tank for characterization and disposal.
- If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until it is removed from the site.
- Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind-generated particulate matter.
- After the stockpile has been removed, all residual material shall be removed from the underlying and surrounding areas.

Non-Hazardous Clean Soil. Stockpiles of displaced soil outside of Soil RFI/RI Investigation Areas that is non-hazardous, clean, and suitable for immediate reuse will be stored following these BMPs:

- Stockpiles will be constructed with liner and perimeter berm to prevent release or infiltration of liquids. Minimum 20-mil polyethylene sheeting or equivalent will be used for liners.
- Wind erosion will be prevented by use of a cover, applying Soiltac® or a similar soil stabilization product, or other suitable means. If a cover is employed it will be minimum 6-mil polyethylene sheeting or equivalent.
- The perimeter berm will be constructed of clean materials (such as hay bales or straw wattle under the liner).
- If a cover is employed, it shall extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the stockpile.
- Covers and perimeter berms will be secured in place when not in use and at the end of each workday and as necessary to prevent wind dispersion or run-off from precipitation events.
- If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until it is removed from the site.
- Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind-generated particulate matter.
- After the stockpile has been removed, all residual material shall be removed from the underlying and surrounding areas.

1.4 Wind Erosion Control BMPs

To comply with EIR Mitigation Measures AIR-1a, AIR-1b, AIR-1c, and AIR-1e, wind erosion control will be applied as necessary to prevent nuisance dust and minimize the movement of sediment disturbed during construction. Specifically, the project site will be watered periodically with a water truck for short-term stabilization of disturbed surface areas to minimize visible fugitive dust emissions during dust episodes. A water truck also will be used to control dust on disturbed surfaces during visible dusting episodes. Loaded haul vehicles shall be covered on publicly maintained roads. Graded sites will be stabilized using soil binders or established vegetative cover, as necessary, upon completion of grading when subsequent development is delayed or expected to be delayed more

than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface area sufficiently to eliminate visible fugitive dust emissions. Non-essential earth-moving activities shall also be curtailed under high wind conditions (winds greater than 25 miles per hour).

1.5 Tracking Control BMPs

Stabilized Construction Entrance/Exit – A temporary construction entrance is defined as a stabilized point of entrance/exit to a construction site to reduce the tracking of mud and dirt onto private or public roads by construction vehicles. A temporary construction entrance will be established in the laydown area to minimize sediment tracking. The temporary construction entrance will be inspected routinely. To comply with EIR Mitigation Measure AIR-1d, project-related track out or spills on publicly maintained paved surfaces will be cleaned up within twenty-four hours.

1.6 Good Housekeeping BMPs

Good housekeeping measures are in addition to the above site-specific BMPs, and shall be implemented onsite for the duration of the Project.

- Cover and berm loose stockpiled construction materials that are not actively being used.
- Contain and securely protect stockpiled waste materials from wind and rain at all times unless actively being used.

1.7 Drums/Small Containers

Drums containing soils which are hazardous waste will be stored in a hazardous waste storage area and disposed of within 90 days of generation. Drums/small containers that contain soil that may be displaced in the vicinity of the groundwater remedy system that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level, will be stored following these BMPs:

- Only DOT-specification containers will be used for soil accumulation.
- Empty drums will be inspected and inventoried upon arrival onsite for signs of contamination and/or deterioration.
- Drums and small containers will be transported to the temporary accumulation areas on wood pallets and will be secured together with non-metallic banding.
- Drums will be placed within a bermed and lined area or otherwise will be provided with secondary containment.
- Adequate aisle space (e.g., 36 inches) will be provided for containers such as 55-gallon drums to allow the unobstructed movement of personnel and equipment for inspection purposes. Drums will be placed with no more than two drums per row. The column length must fit within the lined, bermed area.
- Each drum will be provided with its own label, and labels will be visible for inspection purposes.
- Drums will remain closed except when removing or adding soil to the drum. Closed means that the lid and securing ring must be on and securely tightened.

1.8 Roll-off Bins

- All empty roll-off bins will be inspected upon arrival onsite. Any roll-off containers arriving with contents, residual contamination, or deterioration will be rejected. Existing damage (dings, significant paint scratches, broken wheels, etc.), if not significant enough to result in rejection, will be documented upon arrival of the bin using photos and written documentation.
- Roll-off bins will be provided with covers and disposable liners.
- Covers will be properly secured, except when adding or removing soil.
- Old labels will be removed, and each bin will be provided with its own label. Labels will be visible.

- Roll-off bins containing soils that are hazardous waste will be stored in a hazardous waste storage area and disposed of within 90 days of generation.
- Roll-off bins containing clean soil can be stored anywhere on PG&E property or at other properties that have granted permission to PG&E.
- Roll-off bins that contain displaced soil that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level will be stored at designated locations. The bins will be covered and inspected at a specified frequency (see Section 2.0 for inspection frequencies).

2.0 Visual Inspection, Monitoring for Non-Visual Pollutants, Reporting, Training, and Recordkeeping

This section discusses visual inspections, monitoring for non-visual pollutants, reporting, workers training and education, and recordkeeping.

2.1 Visual Inspection after Qualifying Rain Event

In conformance with the substantive requirements of the Arizona General Permit (Order No. AZG2013-001) and California General Permit (Order No. 2009-0009-DWQ), visual inspections will be implemented to assess the effectiveness of BMPs related to soil storage, and to modify those BMPs, if necessary, to continue to reduce pollutants and impacts on receiving waters. Anticipated activities associated with the inspections include the following:

- Visually inspect BMPs and stormwater discharges at discharge locations within two business days (48 hours) after each qualifying rain event (producing precipitation of one-half inch or more of discharge). The objectives are to 1) identify whether BMPs were adequately designed, implemented, and effective, and 2) identify additional BMPs accordingly.
- Visually inspect the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.
- Record the time, date and rain gauge reading of all qualifying rain events.
- Implement corrective actions as appropriate.

Inspections are only required during the normal working hours. If an inspection day (except those required relative to a rainfall event) falls on a Saturday or holiday, the inspection may be conducted on the preceding workday. If the inspection day falls on a Sunday, the inspection may be conducted on the following Monday.

Inspections are not required under adverse conditions. The QSP is not required to inspect areas that, at the time of inspection, are considered unsafe for inspection personnel. Inspections may be postponed when conditions exist such as local flooding, high winds, or electrical storms, or situations that otherwise make inspections unsafe. The inspection must resume as soon as conditions are safe. Results of the inspection and any corrective action perform will be documented and kept onsite. An example Inspection and Corrective Action Report Form, which may be used for both Arizona and California inspections and corrective actions is included in Attachment 1.

2.2 Visual Inspection for Non-Stormwater Discharge

In addition, quarterly visual inspections will be conducted for non-stormwater discharge. The objective is to inspect for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources. Inspection records will include the personnel performing the visual observation (inspections), the dates and approximate time of the inspection, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges, if any.

2.3 Monitoring for Non-Visual Pollutants

Monitoring for non-visual pollutants will be conducted to determine whether pollutants that are known to occur on the soil storage sites and that cannot be visually observed or detected in storm water discharges, are being conveyed from the site by storm water.

The QSP will develop and implement the sampling and analysis requirements prior to the start of construction, to monitor for non-visual pollutants associated with soil storage activities. These requirements may be modified as needed to meet the monitoring objectives. Sampling and analysis is only required where the QSP believes pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. If sampling is required as determined by the QSP, samples will be collected down-gradient from potential discharge locations, in areas which can be safely accessed. In addition, a sample of stormwater that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) will be collected for comparison with the discharge sample. These samples will be collected during the first two hours of discharge from rain events that occur during business and daylight hours and which generate runoff.

Samples will be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i. of the Construction General Permit (SWPPP Appendix A) which states:

> *"Identify the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.)."*

2.4 Reporting

Annual reports include a summary and evaluation of all sampling and analysis results, original laboratory reports, and chain of custody forms, a summary of all corrective actions taken during the compliance year, and identification of any compliance activities or corrective actions that were not implemented. Annual reporting is a requirement of permitted SWPPP documents and reports are submitted electronically through SMARTs. Because this is not a permitted SWPPP, the annual reports will not be submitted through SMARTs. The annual reports will be submitted to DTSC (in compliance with mitigation measure HYDRO-1) and DOI.

2.5 Workers Training and Education

Prior to the beginning of construction, construction workers will be trained on the overall storm water management program and more specifically, on proper implementation of this BMPs plan. Persons directly responsible for compliance with the plan, such as inspectors, workers installing and maintaining the erosion control devices, and workers collecting stormwater samples, will receive additional training. New personnel that require stormwater management training after the start of construction will be provided training. Documentation of the training will be kept onsite.

In parallel, Operations staff will be trained on overall storm water management program and more specifically, on the proper implementation of this operations BMPs Plan for soil storage, as well as the Industrial SWPPP included as appendix to the O&M Plan (Volume 1 of the O&M Manual).

2.6 Record Keeping

The following records will be maintained onsite:

- This BMPs Plan and any updates necessary to reflect current conditions and to maintain accuracy.
- Copies of relevant documents that would affect the provisions or implementation of the BMPs Plan.
- Descriptions and dates of any incidences of significant spills, leaks, or other releases pertaining to soil storage that resulted in discharges of pollutants in stormwater to a regulated municipal separate stormwater systems or to waters of the U.S., the circumstances leading to the release and actions taken in response to the release and measures taken to prevent the recurrence of such releases.

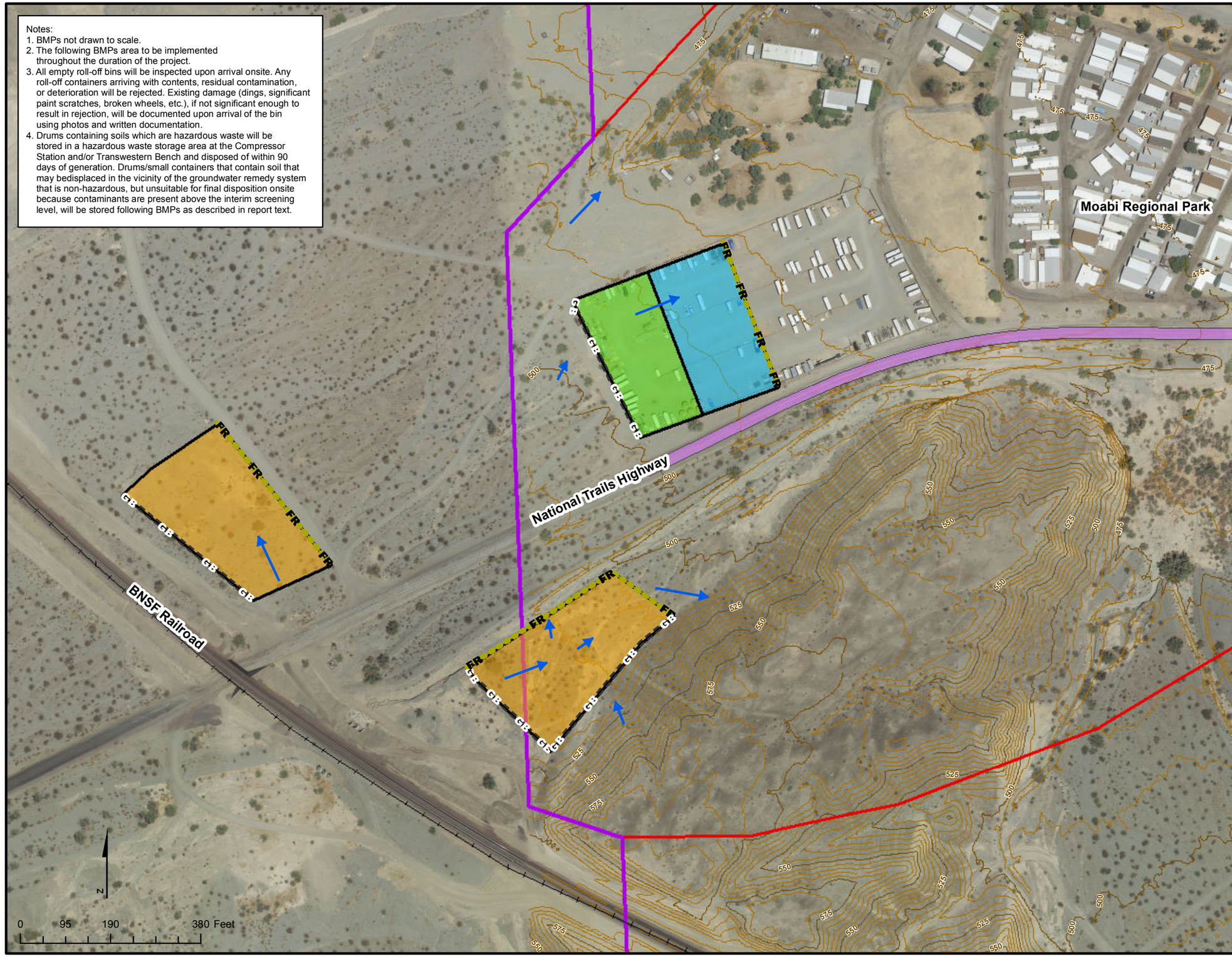
- Documentation of maintenance, including repairs of structural control measures, including the date(s) of discovery of areas in need of repair/replacement, date(s) that the structural control measure(s) returned to full function, and the justification for any extended repair schedules. The maintenance records shall include the date(s) of regular maintenance.
- BMP inspection reports and corrective action report forms (see Attachment 1 for an example of a corrective action report form which may be used for both California and Arizona).
- Annual reports.
- Training documentation.

2.7 BMPs Project Team

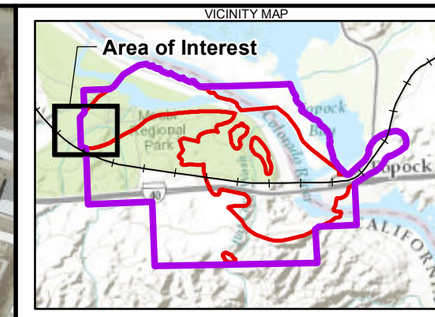
The BMPs Project Team members include:

- PG&E Site Manager, Curt Russell
- PG&E Environmental Inspector, Chris Smith
- Construction Project Manager, to be appointed – Operational control over construction plans and specifications
- QSD, Gino Nguyen (CH2M HILL) – BMPs Plan development
- QSP, to be appointed – Operational control over construction plans and specifications
- Site Contact, to be appointed
- Field Team Leader, to be appointed – Responsible for day-to-day activities
- Field Operators, to be appointed – Responsible for day-to-day activities

Notes:
1. BMPs not drawn to scale.
2. The following BMPs area to be implemented throughout the duration of the project.
3. All empty roll-off bins will be inspected upon arrival onsite. Any roll-off containers arriving with contents, residual contamination, or deterioration will be rejected. Existing damage (dings, significant paint scratches, broken wheels, etc.), if not significant enough to result in rejection, will be documented upon arrival of the bin using photos and written documentation.
4. Drums containing soils which are hazardous waste will be stored in a hazardous waste storage area at the Compressor Station and/or Transwestern Bench and disposed of within 90 days of generation. Drums/small containers that contain soil that may bedisplaced in the vicinity of the groundwater remedy system that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level, will be stored following BMPs as described in report text.



VICINITY MAP



LEGEND

- Flow Direction
- Gravel Bags
- Fiber Rolls
- Construction Work Area Including:
  - Remediation Wells
  - Monitoring Wells
  - Pipelines
- Long Term Remedy Support Area (1.2 acres approx.)
- Soil Storage Area (Each 1.5 acres approx.)
- Temporary Construction Laydown Area (1.3 acres approx.)
- Area of Potential Effects (APE)
- EIR Project Area
- Topographic Contour 25-foot Interval
- Topographic Contour 5-foot Interval

Notes:
1. This is a conceptual layout. Locations are approximate.
2. Descriptions of activities/functions anticipated for the construction support areas are included in the Construction/Remedial Action Work Plan.
3. Descriptions of activities/functions anticipated for the long-term remedy support areas are included in Section 3.5 of this BOD, and the O&M Manual.

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

FIGURE C-1
SOIL STORAGE AREAS AND PROPOSED BEST MANAGEMENT PRACTICES CONSTRUCTION AND OPERATIONS BEST MANAGEMENT PRACTICESPLAN FOR SOIL STORAGE

GROUNDWATER BASIS OF DESIGN REPORT
PRE-FINAL (90%) DESIGN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\GROMM\FigC1_PM_StagingRemedy_11x17.mxd

Attachment 1
Inspection and Corrective Action Report Form

2013 Construction General Permit
Inspection & Corrective Action Report Form

Section I. General Information (see instructions)

Name of Project		CGP Tracking No.	AZCON – _____	Inspection Date	___ / ___ / _____

☐ **Check box when using this form to inspect an inactive/ unstaffed construction site (this option applies to an entire site only).** See Part 4.2(4) of the permit. Inspect the site immediately before becoming inactive/ unstaffed and every 6 months thereafter and within 24 hours of each storm event of 0.5 inch or greater in 24 hours.

Inspector Name, Title & Contact Information	**Name:** _____ **Title:** _____ **Contact information:** _____
Present Phase of Construction	

Inspection Schedule (all days are calendar days) *(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply.)*

Routine Schedule: ☐ Every 7 days ☐ Every 14 days and within 24 hours of a 0.5" storm event

☐ Once per month, but not within 14 days of the previous inspection and within 24 hours of a 0.25" storm event

Reduced Schedule: once per month (but not within 14 days of the previous inspection) and before an anticipated storm event and within 24 hours of the end of each storm event of 0.5 inch or greater in 24 hours.

☐ Once per month (in stabilized areas)

☐ Once per month (where discharges are unlikely based on seasonal rainfall patterns)

☐ Once per month (where winter conditions exist and earth-disturbing activities are being conducted)

Discharge points within 1/4 mile of an impaired water or outstanding Arizona water (OAW): ☐ Every 7 days and within 24 hours of a 0.5" storm event

Was this inspection triggered by either a 0.25" or 0.5" storm event? ☐ Yes ☐ No

If yes, duration of storm event: ☐ < 1 hour ☐ < 6 hrs ☐ > 6 hrs

If yes, how was the storm event determined (either 0.25" or 0.5")?

☐ Rain gauge on site ☐ Weather station representative of site. Specify weather station source: _____

Total rainfall amount that triggered the inspection (in inches)**:** _____

Identify all sources of non-stormwater discharges occurring at the site and the associated control measures in place

sources of non-stormwater discharges:	control measures associated with the non-stormwater discharges:
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

Adverse or Unsafe Conditions for Inspection

Did you determine that any portion of the site was unsafe for inspection per CGP Part 4.2(6)? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

Note: *Inspections may be postponed when adverse or unsafe conditions exist such as local flooding, high winds, or electrical storms, or situations that otherwise make inspections unsafe. However, the inspection must resume as soon as conditions are safe.*

Section II. Description of Discharges and Condition of the Discharge Locations (CGP Part 4.3(11)) (see instructions)

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
1.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
2.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
3.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section II. CONTINUATION SHEET FOR: Description of Discharges and Condition of the Discharge Locations [Print additional sheets as necessary]

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section III. Condition and Effectiveness of All On-site Control Measures (Erosion and Sediment (E&S)), Stabilization and Pollution Prevention (P2) Practices (CGP Part 3.1.1 through 3.1.3) (see instructions)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
1.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
2.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

Section III. CONTINUATION SHEET FOR: Control Measure Condition and Effectiveness [Print additional sheets as necessary]

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

ADEQ Arizona Department of Environmental Quality	Section IV. Corrective Action Report Form

Section IV.A. – General Information

(Complete this section within 24 hours of discovering the condition that triggered corrective action)

Date/ Time Problem First Discovered	Date: ___ / ___ / _____ Time: _____ ___AM ___PM	Today's Date	___ / ___ / _____
Name and Contact Information of Individual Completing this Form	**Name:** _____ **Contact information:** _____		

What site conditions triggered the requirement to conduct corrective action? *(Check the box that applies)*

- ☐ A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 2 and/or 3
- ☐ A prohibited discharge described in Part 1.4 has occurred or is occurring
- ☐ ADEQ or USEPA has determined that modifications to the control measures are necessary to meet the requirements of Part 3.

Provide a description of the problem: (Provide description of the specific problem that triggered the need for corrective action, and the specific location where it was found. If you have already provided this explanation in an inspection report, you can refer to that report.)

Deadline for completing corrective action:

- ☐ Work will be completed no more than 7 calendar days after the date the problem was discovered (enter date): ____ / ____ / _____
- ☐ It is infeasible to complete work within the first 7 days, therefore, the work will be completed as soon as practicable following the 7th day (enter date): ____ / ____ / _____

If the estimated date of completion falls after the 7-day deadline, document the following: (1) The reason it is infeasible to complete work within 7 days, and (2) The schedule for installing and making the new or modified stormwater control operational in the soonest practicable timeframe.

NOTE: *Any corrective actions that result in changes to any of the stormwater controls or procedures shall be documented in the SWPPP within 7 calendar days of completing the corrective action work.*

Section IV.B. – Stormwater Control Modifications to be Implemented in Response to a Corrective Action Trigger [Print additional sheets as necessary]			
List of stormwater control(s) to be modified or replaced to correct the condition that required the Corrective Action	**Actual or Planned Completion Date**	**SWPPP Update Necessary?** **If yes, specify date SWPPP modified**	**Notes and observations**
1.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
2.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
3.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
4.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
5.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
6.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
7.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	

Section V. CONTINUATION SHEET for Miscellaneous Items (see instructions) **[Print additional sheets as necessary]**
Use this space for miscellaneous information or as continuation of items found elsewhere in this report.

Section VI. Certification and Signature (CGP Appendix B. 9.)

Section VI.A. – Certification and Signature by Contractor or Subcontractor performing the inspections (if applicable)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Contractor or Subcontractor: _____ Title: _____

Printed name : _____ Date: _____

Business / Agency: _____ Phone number: _____

Section VI.B. – Certification and Signature by Permittee (permittee / operator or a duly authorized representative is required to sign)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Permittee or
"Duly Authorized Representative": _____ Title: _____

Printed Name: _____ Date: _____

Business / Agency: _____ Phone number: _____

Appendix M
Best Management Practices Plan

Appendix M
Best Management Practices Plan for Groundwater Remedy Construction

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Attachment

1 Inspection and Corrective Action Report Form

Acronyms and Abbreviations

ARAR	applicable or relevant and appropriate requirement
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EIR	Environmental Impact Report
NPDES	National Pollutant Discharge Elimination System
PG&E	Pacific Gas and Electric Company
QSP	Qualified SWPPP Practitioner
SMART	Storm Water Multiple Application and Report Tracking System
SOP	Standard Operating Procedure
SWPPP	Storm Water Pollution Prevention Plan
TCS	Topock Compressor Station

APPENDIX M

Best Management Practices Plan for Groundwater Remedy Construction

This Best Management Practices (BMP) Plan for the construction of the groundwater remedy at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station (TCS) in Needles, California, has been prepared as required by the California Environmental Protection Agency, Department of Toxic Substances Control's 2011 *Final Environmental Impact Report* [EIR] *for the Topock Compressor Station Groundwater Remediation Project* mitigation measures as listed in the adopted Mitigation Monitoring and Reporting Program and applicable or relevant and appropriate requirements:

- **Mitigation Measure HYDRO-1** requires the implementation of BMPs to meet the substantive criteria NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities, Order No. No. 2009-0009-DWQ NPDES No. CAS000002, as well as other applicable federal, state, and local permit and regulatory requirements, even if a permit is not required pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), for purposes of ensuring the protection of receiving water quality. Mitigation measure HYDRO-1 also requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP) that will contain BMPs related to industrial activities (industrial SWPPP).
- **Mitigation Measure GEO-1a** requires the preparation of a grading and erosion control plan, including measures for controlling erosion or loss of topsoil during construction, operation and maintenance, and decommissioning.
- **Mitigation Measure AIR-1** requires the implementation of fugitive dust control measures during construction activities.
- **Applicable or Relevant and Appropriate Requirement #34** requires the implementation of BMPs for stormwater runoff that comes in contact with construction activities (>1 acre of ground disturbance).

This BMP Plan has been prepared to meet the above requirements and has been prepared in accordance with: (1) the substantive criteria of the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ, Amended Order No. 2010-014-DWQ, Amended Order No. 2012-0006-DWQ, NPDES No. CAS000002 (California General Permit) for construction activities in San Bernardino County, California and (2) the substantive criteria of the Arizona Pollutant Discharge Elimination System General Permit AZG2013-001 for Stormwater Discharges associated with Construction Activity to Waters of the United States (General Permit) for construction activities in Mojave County, Arizona.

Because the groundwater remedy is part of a CERCLA response action, remedial construction activities conducted onsite are covered under the permit exemption codified in Section 121(e)(1) of the CERCLA. While the permit exemption applies to the administrative or procedural elements (preparing and submitting permit applications and obtaining permits), the substantive requirements of applicable laws remain. The BMPs identified are consistent with the Arizona Department of Transportation 2012 *Erosion and Pollution Control Manual* and the 2009 *California Stormwater Quality Association Construction BMP Handbook*.

This BMP Plan has been prepared by a Qualified SWPPP Developer and registered civil engineer and will be implemented under the direction of a Qualified SWPPP Practitioner (QSP). A summary of key BMPs identified for the groundwater remedy construction is presented in Section 1.0; inspection, monitoring, corrective actions, reporting, and recordkeeping information for the BMP Plan is presented in Section 2.0; and workers training and education is presented in Section 3.0.

The PG&E Construction Manager and appropriate construction team will have control over day-to-day activities, and will implement this BMP Plan under the direction of the QSP (Section 2.7 of this plan contains additional details on the BMPs project team).

1.0 Best Management Practices for Groundwater Remedy Construction

This section provides a summary of the BMPs for construction of the groundwater remedy. The specific EIR mitigation measures that are addressed other than HYDRO-1 or project Standard Operating Procedures (SOPs), are referenced for each BMP category where appropriate.

Figure 1-1 shows typical erosion control for construction activities. Figures 1-2 through 1-5 show the site topography and inferred surface water flow, as well as the proposed erosion control BMPs for each major work area at the site (TCS, Interim Measure No. 3 Area, Topock Marina Area, and Park Moabi Area).

1.1 Erosion Control BMPs

1.1.1 Preservation of Existing Vegetation

Existing vegetation will be preserved to the maximum extent practicable to facilitate protection of surfaces from erosion and help control sediments. Throughout the design process, efforts have been made to locate remedy facilities along previously disturbed areas to avoid impacts to vegetation. Existing vegetation preserved whenever feasible during clearing and grubbing or other soil-disturbing activities. In the event that existing vegetation needs to be disturbed, areas that need to be preserved will be marked with temporary fencing. Employees and subcontractors will be informed of the limits of disturbance within the construction site and will be instructed to keep clear of delineated areas.

1.1.2 Geotextiles and Mats

A natural (excelsior, straw, coconut, etc.) or synthetic (usually polyethylene) material will be used to reduce soil erosion by wind or water.

1.1.3 Road Preparation and Maintenance

During road preparation activities, loose sediment will be uniformly compacted, consistent with the substantive San Bernardino County Building and Land Use Services Department requirements, to aid in reducing wind erosion. Ongoing road maintenance—(1) visual inspections to identify areas of erosion, (2) localized road repair and regrading, installation, and maintenance of erosion control features such as berms, silt fences, or straw wattles, and (3) grading for road smoothness—will be performed as needed to reduce potential for erosion.

1.2 Sediment Control BMPs

1.2.1 Silt Fence

Silt fences are perimeter controls, typically used in combination with sediment basins and sediment traps, as well as erosion controls, which are designed to retain sediment in place where soil is being disturbed by construction processes. They are also placed down slope of areas where sheet flows discharge from the site. They could also be used as interior controls down slope of disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas. Silt fences are most effective when used in combination with erosion controls along the perimeter of a project, below the toe or down slope of exposed and erodible slopes, along streams and channels, around temporary spoil areas and stockpiles, and below other small cleared areas, including spoils that have been treated by soil stabilization polymer products.

1.2.2 Fiber Rolls/Sediment Wattles

These consist of aspen wood excelsior, straw, flax, or other similar materials rolled and bound into tight tubular rolls and placed on the face of slopes at regular intervals, depending on steepness of slopes, to intercept runoff and reduce flow velocity. Rolls/wattles will be installed prior to start of construction activities to form a barrier around work areas and stockpiles and will be anchored down with stakes. If the stockpiles are on paved areas, gravel or sand bags are preferred; however, fiber rolls can be used and secured with gravel or sand bags. The fiber rolls/sediment wattles will be inspected prior to a forecasted rain event and after rain events to ensure the fiber rolls are working properly. Sediment accumulated by the fiber rolls will be removed to maintain the effectiveness of the fiber rolls.

1.2.3 Gravel Bag Berm

Gravel bag berms can be used as an alternative to fiber rolls and sediment wattles. If used, they will be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. The QSP will determine whether gravel bags will be placed along the upgradient side of equipment not in use. Gravel bags will also be used, if necessary, during trenching activities when stockpiles are onsite. In the event that gravel bag berms are used as perimeter erosion control, bags will be stacked, one on top of the other (two high). When used to anchor stockpiles, the bags will be placed one high.

1.2.4 Sandbag Berm

Sandbag berms can also be used as an alternative to fiber rolls and sediment wattles. If used, they will be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. The purpose is to allow sediment to settle from runoff before water leaves the construction site. Sandbags will also be used, if necessary, during trenching activities when stockpiles are left overnight. In the event that sandbag berms are needed, they will be placed around the staging area and trenching area.

1.2.5 Straw-bale Barrier

Straw-bale barriers can also be used as an alternative to fiber rolls, gravel bag berms, and sandbag berms. Straw-bale barriers intercept and slow down sheet-flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions, allowing sediment to settle. Straw-bale barriers also interrupt the slope length, thereby reducing erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills and ultimately gullies, into disturbed, sloped soils.

1.3 Waste and Materials Management Control BMPs

1.3.1 Material Delivery and Storage

Proper delivery and storage of materials will be implemented to ensure minimal discharge or elimination of discharge of these materials to the storm drain systems or waterways. Construction materials and equipment will be parked and stored in the staging area. The storage area will be covered during nonworking days and prior to and during rain events. Storage and transfer of toxic or hazardous materials will be on impervious surfaces. Employees and subcontractors will be trained on proper material delivery and storage practices. Safety Data Sheets will be supplied for materials stored or used onsite. Instructions on proper storage of materials will be posted in an conspicuous location. An inventory of materials delivered and stored will be maintained onsite.

1.3.2 Material Use

Proper use of materials will be implemented to ensure minimal or complete elimination of discharge to the storm drain systems or waterways. Material Safety Data Sheets will be supplied for materials used. Spill cleanup materials will be kept near the construction and staging areas. Leaks and spills will be cleaned up immediately using proper absorbent materials, which will then be disposed of as hazardous waste. Unless characterized as non-hazardous waste. Employees and subcontractors will be informed on the practices and procedures and must implement these procedures throughout the project.

1.3.3 Stockpile Management

Stockpile management procedures and practices are implemented to reduce or eliminate pollution to the air and stormwater from materials that are stockpiled. Stockpile protection is required year-round. Stockpiles will be stored in the primary work zone or staging area and outside of the roadway right of way. If feasible, stockpiles will not be left overnight. If stockpiles are left overnight due to the contractor schedule, they will be located a minimum of 50 feet away from any concentrated flow of stormwater, drainage courses, and inlets. During the rainy season, stockpiles will be covered with plastic and anchored down with gravel bags, sandbags, straw bales, and/or polymer soil stabilizer products.

Additional stockpile management BMPs for categories of soil generated during the groundwater remedy construction consistent with the Soil Management Plan are presented below.

1.3.3.1 RCRA and non-RCRA Hazardous Soil

Stockpiling of Resource Conservation and Recovery Act (RCRA) and non-RCRA hazardous waste/soil is not planned. It is anticipated that soil that is above soil screening levels will be placed in roll-off bins or other appropriate containers. If it is necessary to temporarily stockpile soil classified as RCRA or non-RCRA hazardous waste for up to 90 days to facilitate characterization or staging for offsite transportation, the liner will consist of a single sheet of material or multiple sheets with the seams sealed together. Hazardous waste stockpiles will use a minimum 20-mil liner if constructed on a foundation (for example, pavement or compacted soil) or a 60-mil liner if constructed in a location without a foundation (for example, unpaved, uncompacted soil). Stockpiles will be inspected, demarcated, and controlled as outlined in the Soil Management Plan.

1.3.3.2 Nonhazardous Soil above Interim Screening Levels

It is anticipated that soil above soil screening levels will be placed in roll-off bins or similar containers. If it is necessary to stockpile displaced soil that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level, the following BMPs will be followed:

- Stockpiles will be constructed with liners and perimeter berms to prevent release or infiltration of liquids. Minimum 20-mil polyethylene sheeting or equivalent will be used for liners.
- Wind erosion will be prevented by use of a cover, applying Soiltac, a similar soil stabilization product, or other suitable means. If a cover is employed, it will be minimum 6-mil polyethylene sheeting or equivalent.
- The perimeter berm will be constructed of clean materials (such as hay bales or straw wattle under the liner).
- If a cover is employed, it will extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the bermed area.
- Covers and perimeter berms will be secured in place when not in use, at the end of each workday, and as necessary to prevent wind dispersion or runoff from precipitation events.
- Liquids that accumulate inside the berm will be pumped from the stockpile to a container or tank for characterization and disposal.
- If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until the stockpiles are removed from the site.
- Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind-generated particulate matter.
- After the stockpile has been removed, residual material will be removed from the underlying and surrounding areas.

1.3.3.3 Nonhazardous Clean Soil

Stockpiles of displaced soil outside of soil RFI/RI investigation areas that are non-hazardous, clean, and suitable for immediate reuse will be stored following these BMPs:

- Stockpiles will be constructed with liner and perimeter berm to prevent release or infiltration of liquids. Minimum 20-mil polyethylene sheeting or equivalent will be used for liners.
- Wind erosion will be prevented by use of a cover, applying Soiltac, a similar soil stabilization product, or other suitable means. If a cover is employed, it will be minimum 6-mil polyethylene sheeting or equivalent.
- The perimeter berm will be constructed of clean materials (such as hay bales or straw wattle under the liner).
- If a cover is employed, it will extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the stockpile.
- Covers and perimeter berms will be secured in place when not in use, at the end of each workday, and as necessary to prevent wind dispersion or run off from precipitation events.

- If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until the stockpiles are removed from the site.
- Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind-generated particulate matter.
- After the stockpile has been removed, residual material will be removed from the underlying and surrounding areas.

1.3.4 Spill Prevention and Control

Spill prevention and control procedures and practices will be implemented in conjunction with the Waste Management Plan to prevent and control spills anytime chemicals and/or hazardous materials are stored on the construction site. Implementation of these procedures will minimize or prevent the discharge of spilled material into the drainage system or watercourses. Spills will be covered and protected from stormwater runon during rainfall and will not be buried or washed with water. Spills will be contained and cleaned up immediately and thoroughly. Kits with appropriate spill response equipment will be kept near the construction and staging areas. The materials used for cleaning will not be allowed to enter storm drains or watercourses and will be collected and disposed of in accordance with BMPs. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as non-hazardous.

1.3.5 Solid Waste Management

Solid waste management procedures and practices will be implemented at the beginning and throughout the Project. Solid waste, consisting primarily of asphalt concrete waste, shall be loaded directly onto trucks for offsite disposal. Loose debris will be picked up daily. A sufficient number of conveniently located trash and scrap receptacles will be provided to promote proper disposal of solid wastes. Receptacles shall be provided with lids or covers to prevent windblown litter. Additionally, a sufficient number of proper receptacles will be provided to promote proper disposal of hazardous wastes. Employees and subcontractors will be informed of these practices and will be required to follow solid waste handling and storage procedures.

1.3.6 Concrete Waste Management

Concrete waste management procedures will be implemented where concrete is used as a construction material or where concrete dust and debris result from demolition activities. The concrete waste containers will be placed a minimum 50 feet from any drainage ways. Washouts will include secondary containment so that there is no discharge into the underlying soil and onto the surrounding areas. Watertight containers with lids and secondary containment, manufactured for the expressed purpose of containing waste concrete and its liquid residue, may be used. Containers will be emptied or removed from the project site when 75 percent of the full capacity has been reached.

1.3.7 Sanitary/Septic Waste Management

Sanitary/septic waste management procedures and practices are implemented at construction sites when a temporary or portable sanitary/septic waste system exists. Sanitary facilities will be located away from drainage facilities, waterways, and from traffic circulation. In the event of high winds or a risk of high winds, temporary sanitary facilities will be secured with spikes or weighed down to prevent overturning. The sanitation subcontractor will monitor onsite sanitary/septic waste storage and disposal procedures weekly basis accordance with the sanitary/septic waste management BMPs. Wastewater will not be discharged or buried. Waste will be removed and disposed offsite. Regular waste collection should be arranged before facilities overflow. The sanitary facility will be located a minimum of 50 feet away from drainage facilities and away from waterways and traffic circulation.

1.3.8 Liquid Waste Management

Liquid waste management procedures will be employed to prevent the discharge of pollutants from liquid waste to the storm drain systems or watercourses. Liquid waste management will be applied if non-hazardous residuals or wastes are generated by construction activities. Employees and subcontractors will be informed that it is

unacceptable for liquid wastes to enter storm drain systems or watercourses. Employees and subcontractors will be educated on the proper practices of disposing liquid waste.

1.4 Wind Erosion Control BMPs

To comply with EIR Mitigation Measures AIR-1a, AIR-1b, AIR-1c, and AIR-1e, wind erosion control will be applied as necessary to prevent nuisance dust and to minimize the movement of sediment disturbed during construction. The project site will be watered periodically with a water truck for short-term stabilization of disturbed surface areas, including haul roads, to minimize visible fugitive dust emissions during dust episodes. A water truck also will be used to control dust on disturbed surfaces during visible dusting episodes. Water application rates will be optimized to the greatest practical extent while still maintaining dust control but controlling runoff from affected material. Water may be applied as a pre-wetting step or may be used during construction activities. Loaded haul vehicles will be covered on publicly maintained roads. Graded sites will be stabilized using soil binders, as necessary, upon completion of grading when subsequent development is delayed or is expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface area to eliminate visible fugitive dust emissions. Commercial dust control and soil stabilization products are typically polymer-or plant-based slurries, such as Soiltac or similar products. Nonessential earthmoving activities will also be curtailed or reduced under high wind conditions (sustained winds greater than 25 miles per hour).

1.5 Tracking Control BMPs

1.5.1 Stabilized Construction Entrance/Exit

A temporary construction entrance is defined as a stabilized point of entrance/exit to a construction site to reduce the tracking of mud and dirt onto private or public paved roads by construction vehicles. A temporary construction entrance will be established at applicable paved intersections and entry points to prevent sediment tracking. The temporary construction entrance will be inspected routinely. To comply with EIR Mitigation Measure AIR-1d, project-related track out or spills on publicly maintained paved surfaces will be cleaned up within 24 hours.

1.6 Non-stormwater BMPs

1.6.1 Water Conservation Practices

Water conservation practices will be implemented during the construction to avoid causing erosion and transporting pollutants offsite. Regular inspections will be conducted oh high priority areas. If necessary, washing of vehicles and equipment will be washed in designated wash areas. Washwater will be collected, stored, characterized and properly disposed according to the protocols described in the Waste Management Plan. Used oil, used antifreeze, and hazardous chemical recycling programs shall also be implemented as necessary. Employees and subcontractors will be informed on the requirements of water conservation practices and will be required to implement the practices.

1.6.2 Dewatering Operations

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation must be removed from a work location so that construction work may be accomplished. No water from dewatering will be discharged offsite without prior approval of the appropriate construction management team member.

1.6.3 Paving and Grinding Operations

Paving and grinding operations are practices to prevent or reduce the discharge of pollutants from paving operations using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors. Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes, have basic chemical properties than can raise pH levels outside of the permitted range. Paving and grinding activities will prevent or minimize materials from entering drainage systems by covering inlet structures and manholes with filter fabric. Residue from paving and grinding operations will be collected and disposed of properly. Sandbags may be used to contain materials in the disturbed area. Nuisance water will removed with excavation spoils. Excess saw-cut water can be

removed with a vacuum truck. Paving and grinding operations will not be conducted if rainfall is predicted. Additional care will be taken when managing these materials to prevent contact with stormwater flows.

1.6.4 Illicit Connection/Illegal Discharge Detention Reporting

Illicit connections are connections of the sanitary sewers to the storm sewer system. Illicit connection and illegal discharge detection and reporting will be implemented. Illicit connections or illegally dumped or discharged materials on the construction site will be reported to the Site Manager at the time of discovery. The site will be inspected regularly for evidence of illicit connections or illegal dumping or discharges. The construction contractor's Onsite Supervisor will report instances to the Site Manager immediately after he or she learns of them. Employees and subcontractors will be informed on the practices and will be required to implement the practices throughout the project.

1.6.5 Vehicle and Equipment Fueling

Vehicle and equipment fueling policy/procedures will be implemented to minimize or eliminate discharge of pollutants associated with fueling to storm drain systems or watercourses (see Remedy-SOP-02 for "Safe Fueling and Fueling Handling Policy"). Onsite refueling will be used where it is impractical to send vehicles and equipment offsite for fueling. Fueling will only occur onsite over proper secondary containment. Fuel areas will be kept clean using dry cleanup methods, such as sweeping or using rags and absorbents for leaks and spills, and will be covered to prevent contact with stormwater. Employees and subcontractors will be informed of the vehicle and equipment fueling practices, trained, and required to implement them. Spill kits and absorbent spill cleanup materials will be available in fueling areas and on fueling trucks.

1.6.6 Vehicle and Equipment Maintenance

Vehicle and equipment maintenance procedures will be used to minimize or eliminate the discharge of pollutants to storm drain systems or watercourses when onsite vehicle and equipment maintenance is necessary. Onsite vehicle maintenance is discouraged. Offsite maintenance facilities will be used whenever possible. Employees and subcontractors will be informed of the procedures and practices and will be required to implement these practices. The designated maintenance area will be located at least 50 feet from downstream drainage facilities and waterways and will be protected from stormwater runoff and onsite flooding.

1.6.7 Concrete Curing

Concrete is used in the construction of structures such as roadways, curbs, gutters, sidewalks, and structured foundations. Concrete is cured using both chemical and water methods. Proper handling, storage, application, and cleanup of curing compounds are required to minimize discharge of concrete-laden curing compounds with stormwater.

1.6.8 Concrete Finishing

Concrete finishing methods are used for paint removal, curing compound removal, and final surface finish appearances. Methods may include sandblasting, shotblasting, grinding, or high-pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing byproducts may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs (such as directing water from blasting operations away from inlets and watercourses and collecting contaminated water from infiltration) can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

1.7 Good Housekeeping BMPs

Good housekeeping measures will be implemented onsite for the duration of the project and include the following:

- Store chemicals in watertight containers (with appropriate secondary containment) in a completely enclosed storage cabinet, trailer, or sealed drums shed to prevent spillage and leakage.
- Minimize exposure of construction materials to precipitation.

- Cover waste disposal containers at the end of every business day and during rain events.
- Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water.
- Prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters.
- Immediately clean up leaked material and dispose of properly.
- Establish and maintain effective perimeter controls and stabilize construction entrances and exits to control erosion and sediment discharges from the site.
- Conduct regular stormwater tailgate meetings with the workforce when the project is staffed and work is underway.

2.0 Visual Inspection, Monitoring for Nonvisual Pollutants, Reporting, Training, and Recordkeeping

This section discusses visual inspections, monitoring for nonvisual pollutants, reporting, workers training and education, and recordkeeping.

2.1 Visual Inspection after Qualifying Rain Event

In conformance with the substantive requirements of the Arizona General Permit (Order No. AZG2013-001) and California General Permit (Order No. 2009-0009-DWQ), visual inspections will be implemented to assess the effectiveness of BMPs and to modify those BMPs, if necessary, to continue to reduce pollutants and impacts on receiving waters. Anticipated activities associated with the inspections include the following:

- Visually inspect BMPs and stormwater discharges at discharge locations within 2 business days (48 hours) after each qualifying rain event (producing precipitation of 0.5 inch or more). The objectives are to (1) identify whether BMPs were adequately designed, implemented, and effective and (2) identify additional BMPs accordingly.
- Visually inspect the discharge of stored or contained stormwater derived from and discharged subsequent to a qualifying rain event producing precipitation of 0.5 inch or more at the time of discharge. Stored or contained stormwater that will likely discharge after operating hours due to anticipated precipitation will be discharged during operating hours as necessary.
- Record the time, date, and rain gauge reading of qualifying rain events.
- Implement corrective actions, as appropriate.

Inspections are only required during the normal working hours. If an inspection day (except those required relative to a rainfall event) falls on a Saturday or holiday, the inspection may be conducted on the preceding workday. If the inspection day falls on a Sunday, the inspection may be conducted on the following Monday.

Inspections are not required under adverse conditions. The QSP is not required to inspect areas that, at the time of inspection, are considered unsafe for inspection personnel. Inspections may be postponed when conditions exist such as local flooding, high winds, electrical storms, or situations that otherwise make inspections unsafe. The inspection must resume as soon as conditions are safe. Results of the inspection and any corrective action performed will be documented and kept onsite. An example Inspection and Corrective Action Report Form is included in Attachment 1.

2.2 Visual Inspection for Non-stormwater Discharge

In addition, quarterly visual inspections will be conducted for non-stormwater discharge. The objective is to inspect for the presence of (or indications of prior) unauthorized and authorized non-stormwater discharges and their sources. Inspection records will include the personnel performing the visual observation (inspections), the dates and approximate time of the inspection, and the response taken to eliminate unauthorized non-stormwater discharges and to reduce or prevent pollutants from contacting non-stormwater discharges, if any.

2.3 Monitoring for Nonvisual Pollutants

Monitoring for nonvisual pollutants will be conducted to determine whether pollutants known to occur within the construction area and that cannot be visually observed or detected in stormwater discharges are being conveyed from the site by stormwater.

The QSP will develop and implement the sampling and analysis requirements prior to the start of construction to monitor for nonvisual pollutants associated with construction activities. These requirements may be modified as needed to meet the monitoring objectives. Sampling and analysis is only required where the QSP believes pollutants associated with construction activities have the potential to be discharged with stormwater runoff due to a spill or in the event there was a breach, malfunction, failure, and/or leak of a BMP. If sampling is required as determined by the QSP, samples will be collected downgradient from potential discharge locations in areas that can be safely accessed. In addition, a sample of stormwater that has not come into contact with disturbed soil or materials stored or used onsite (uncontaminated sample) will be collected for comparison with the discharge sample. These samples will be collected during the first 2 hours of discharge from rain events occurring during business and daylight hours and generating runoff.

Samples will be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required by the Construction General Permit which states:

> *Identify the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e., poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).*

2.4 Reporting

Annual reports include a summary and evaluation of sampling and analysis results, original laboratory reports, chain-of-custody forms, a summary of corrective actions taken during the compliance year, and compliance activities or corrective actions that were not implemented. Annual reporting is a requirement of permitted SWPPP documents, and reports are submitted electronically through the Storm Water Multiple Application and Report Tracking System (SMARTs). Because this is not a permitted SWPPP, the annual reports will not be submitted through SMARTs. The annual reports will be submitted to the California Environmental Protection Agency, Department of Toxic Substances Control (in compliance with HYDRO-1) and the U.S. Department of the Interior.

2.5 Workers Training and Education

Prior to the beginning of construction, construction workers will be trained on the overall stormwater management program and, more specifically, on proper implementation of this BMP Plan and the SOPs for the operation and maintenance of facility components. Refresher training will be performed periodically for unique definable phases of work, and at least annually. Persons directly responsible for compliance with the plan, such as inspectors, workers installing and maintaining the erosion control devices, and workers collecting stormwater samples, will receive additional training. New personnel requiring stormwater management training after the start of construction will be provided training. Documentation of the training will be kept onsite.

2.6 Recordkeeping

The following records will be maintained onsite:

- This BMP Plan and updates necessary to reflect current conditions and to maintain accuracy.
- Copies of relevant documents affecting the provisions or implementation of the BMP Plan.
- Descriptions and dates of incidences of significant spills, leaks, or other releases pertaining to construction resulting in discharges of pollutants in stormwater to a regulated municipal separate stormwater systems or to waters of the U.S., the circumstances leading to the release, and actions taken in response to the release and measures taken to prevent the recurrence of such releases.

- Documentation of maintenance, including repairs of structural control measures, including the date(s) of discovery of areas in need of repair/replacement, date(s) that the structural control measure(s) returned to full function, and the justification for any extended repair schedules. The maintenance records shall include the date(s) of regular maintenance.
- BMP inspection reports and corrective action report forms (Attachment 1).
- Annual reports.
- Training documentation.

2.7 BMPs Project Team

The BMPs project team members include:

- PG&E Site Operations Manager, Curt Russell
- PG&E Field Activities Supervisor, Chris Smith
- PG&E Construction Project Manager, Danielle Starring – Operational control over construction plans and specifications
- Qualified SWPPP Developer, Gino Nguyen (CH2M HILL) – Overall Implementation of BMP Plan
- QSP, to be appointed – Operational control over construction plans and specifications
- Construction Contractor(s), to be appointed – Responsible for day-to-day activities
    - Insert Figure 1-1, Erosion Control, Typical
    - Insert Figure 1-2, Erosion Control, Compressor Station
    - Insert Figure 1-3, Erosion Control, IM-3 Area
    - Insert Figure 1-4, Erosion Control, Topock Marina Area
    - Insert Figure 1-5, Erosion Control, Park Moabi Area

Notes:

1. This figure shows typical BMPs in typical locations. The actual type, number and location of the BMPs will be determined in the field by the contstuction contractor and may vary from whats currently dipicted.

2. Any temporary stockpiles will be underlain with plastic, surrounded with fiber rolls or gravel bags, and covered par Stockpile Management BMP (SM).

3. Street sweeping and vacuming will be completed daily or whenever tracking of dirt is observed on paved areas per Street Sweeping and Vacuming BMP (SSV).

4. The following BMPs are to be implemented throughout the duration of the project if required.
   - Scheduling
   - Preservation of Existing Vegetation
   - Material Use
   - Spill Prevention and Control
   - Water Conservation Practices
   - Illicit Connection/Illegal Discharge
   - Wind Erosion Control

5. All non-stormwater and accumulated precipitation in excavation will be removed in compliance with Dewatering Operations BMP(DW) and with locaal project specific permits and regulations. No groundwater wil be discharged without the prior approvl of the SCE representative.

6. Water from pavement sawcut operations will be contained per Paving and Grinding Operations BMP (PGO).

7. All concrete finishing will comply with the Concrete Finishing BMP (CF).

8. All concrete curing will comply with Concrete Curing BMP (CC).

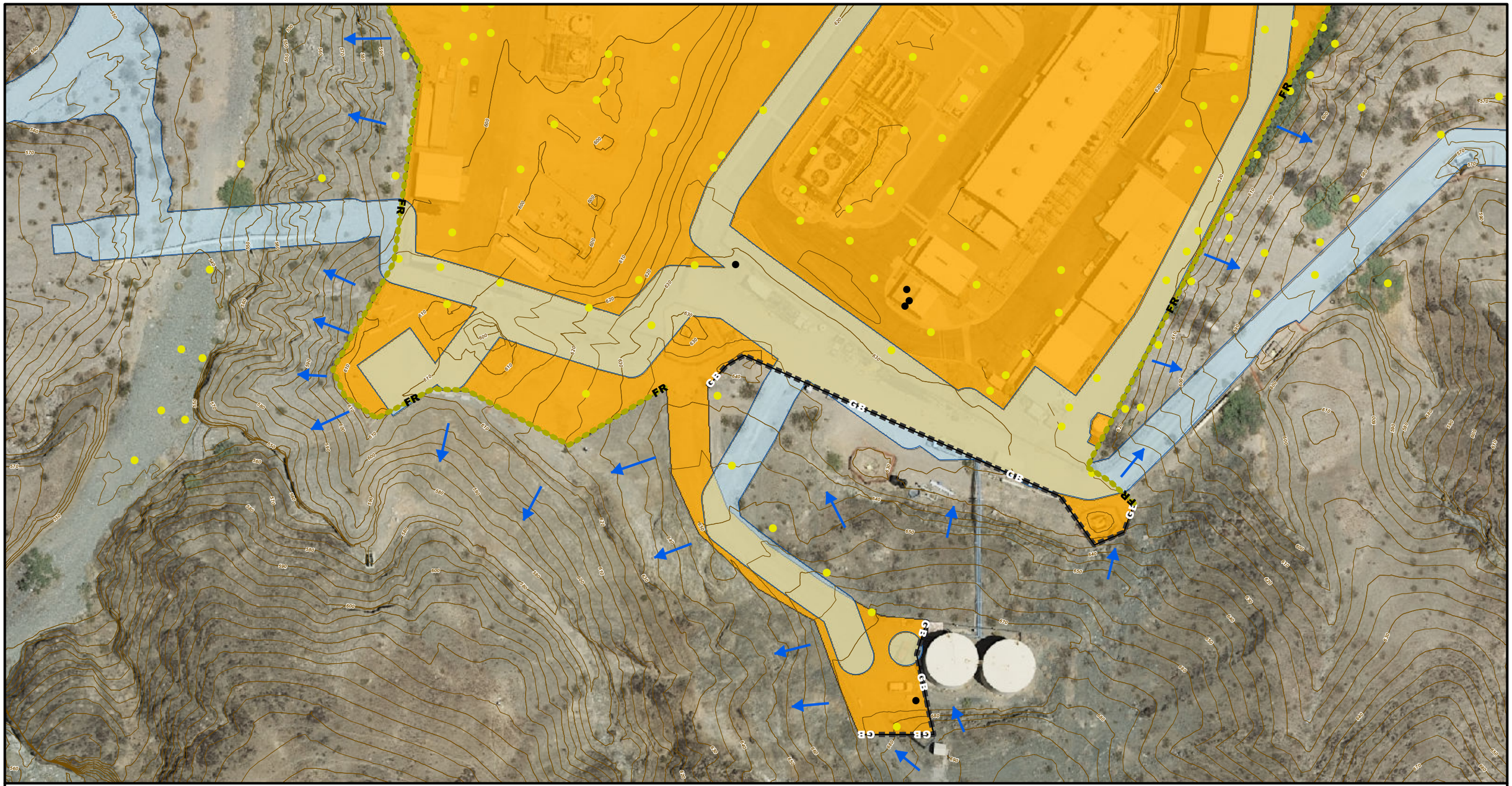
LEGEND

- New Well
- Existing Well
- Proposed Staging Area
- Temporary Facilities To Suppor Construction
- Construction Work Area Including:
  - Remediation Wells
  - Monitoring Wells
  - Pipelines
- Stabilized Construction Entrance/Exit
- Liquid Waste Management (LWM)
- Geotextile, Mats, Plastic Covers, and Erosion Control Blankets (GT)
- Stockpile Management (SM)
- Gravel Bags (GB)
- Fiber rolls/sediment wattles/sand bags/straw bales/silt fence (FR)
- W C M — Concrete Waste Management (CWM)
- W H M — Harzardous Waste Management (HWM)
- M D — Material Delivery (MD)
- S S — Sanitary/Septic Waste Management (SS)
- W S M — Solid Waste Management
- V F — Vehicle and Equipment Fueling
- V M — Vehicle and Equipment Maintenance

0 25 50 100 Feet

FIGURE 1-1
EROSION CONTROL, TYPICAL
GROUNDWATER REMEDY CONSTRUCTION/
REMEDIAL ACTION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Document Path: D:\zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\CMS\ErosionControl\ErosionControL_Typical.mxd



LEGEND

- New Well
- Existing Well
- Proposed Staging Area
- Temporary Facilities To Suppor Construction
- Construction Work Area Including:
  - Remediation Wells
  - Monitoring Wells
  - Pipelines

Erosion Control Measures

- Flow Direction of Run-off
- Gravel Bags (GB)
- Fiber rolls/sediment wattles/sand bags/straw bales/silt fence (FR)

Notes:
1. BMPs not drawn to scale.
2. The following BMPs area to be implemented throughout the duration of the project.

0 37.5 75 150 Feet

N

FIGURE 1-2
EROSION CONTROAL, TOPOCK COMPRESSOR STATION
GROUNDWATER REMEDY CONSTRUCTION/
REMEDIAL ACTION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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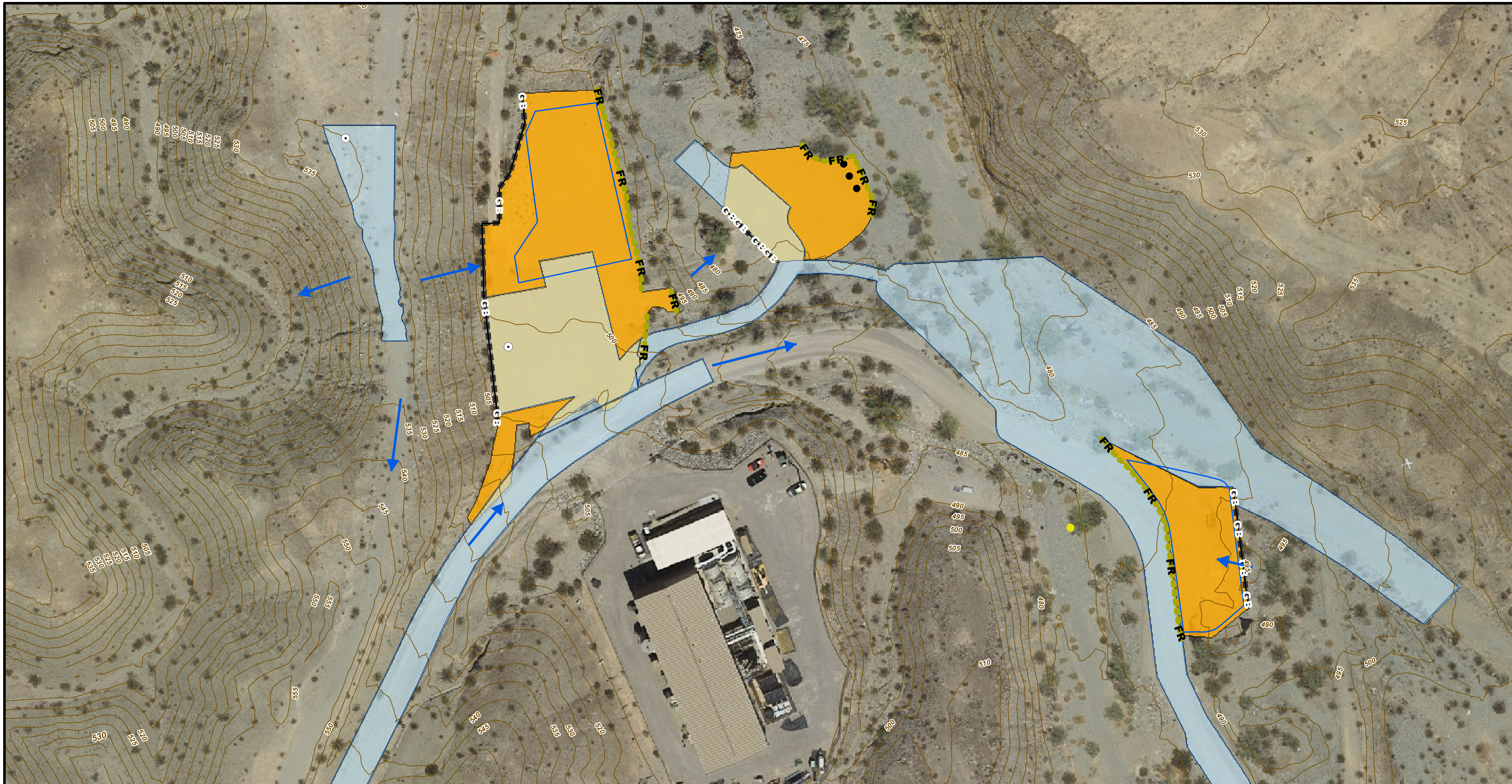

LEGEND

- New Well
- Existing Well
- Soil Sample Location
- Proposed Staging Area
- Temporary Facilities To Suppor Construction
- Construction Work Area Including:
  - Remediation Wells
  - Monitoring Wells
  - Pipelines

Erosion Control Measures

- Flow Direction of Run-off
- Gravel Bags (GB)
- Fiber rolls/sediment wattles/sand bags/straw bales/silt fence (FR)

Notes:
1. BMPs not drawn to scale.
2. The following BMPs area to be implemented throughout the duration of the project.

0 30 60 120 Feet

N

FIGURE 1-3
EROSION CONTROL, IM-3 AREA
GROUNDWATER REMEDY CONSTRUCTION/
REMEDIAL ACTION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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LEGEND

- New Well
- Existing Well
- Proposed Staging Area
- Temporary Facilities To Suppor Construction
- Construction Work Area Including:
  - Remediation Wells
  - Monitoring Wells
  - Pipelines

Erosion Control Measures

- Flow Direction of Run-off
- Gravel Bags (GB)
- Fiber rolls/sediment wattles/sand bags/straw bales/silt fence (FR)

Notes:

1. BMPs not drawn to scale.
2. The following BMPs area to be implemented throughout the duration of the project.

0 45 90 180 Feet

N

FIGURE 1-4
EROSION CONTROL, TOPOCK MARINA AREA

GROUNDWATER REMEDY CONSTRUCTION/
REMEDIAL ACTION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

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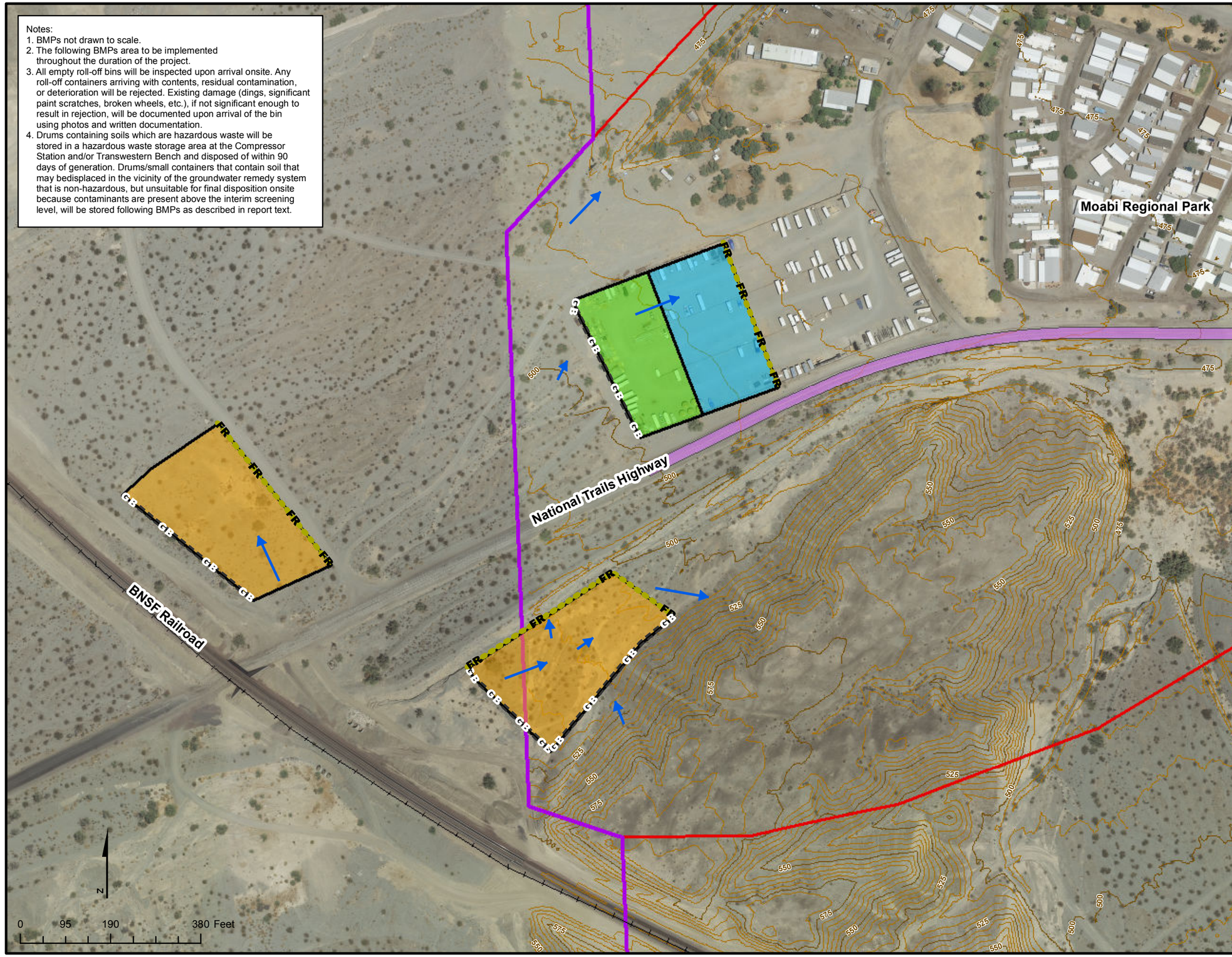
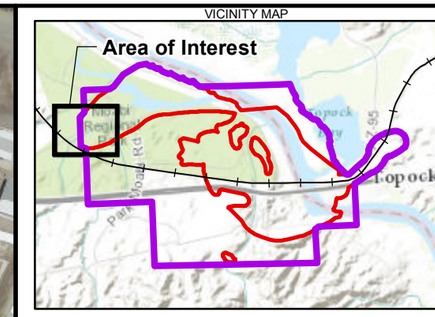
Notes:
1. BMPs not drawn to scale.
2. The following BMPs area to be implemented throughout the duration of the project.
3. All empty roll-off bins will be inspected upon arrival onsite. Any roll-off containers arriving with contents, residual contamination, or deterioration will be rejected. Existing damage (dings, significant paint scratches, broken wheels, etc.), if not significant enough to result in rejection, will be documented upon arrival of the bin using photos and written documentation.
4. Drums containing soils which are hazardous waste will be stored in a hazardous waste storage area at the Compressor Station and/or Transwestern Bench and disposed of within 90 days of generation. Drums/small containers that contain soil that may bedisplaced in the vicinity of the groundwater remedy system that is non-hazardous, but unsuitable for final disposition onsite because contaminants are present above the interim screening level, will be stored following BMPs as described in report text.



VICINITY MAP



LEGEND

- Flow Direction
- Gravel Bags
- Fiber Rolls
- Construction Work Area Including:
  - Remediation Wells
  - Monitoring Wells
  - Pipelines
- Long Term Remedy Support Area (1.2 acres approx.)
- Soil Storage Area (Each 1.5 acres approx.)
- Temporary Construction Laydown Area (1.3 acres approx.)
- Area of Potential Effects (APE)
- EIR Project Area
- Topographic Contour 25-foot Interval
- Topographic Contour 5-foot Interval

Notes:
1. This is a conceptual layout. Locations are approximate.
2. Descriptions of activities/functions anticipated for the construction support areas are included in the Construction/Remedial Action Work Plan.
3. Descriptions of activities/functions anticipated for the long-term remedy support areas are included in Section 3.5 of this BOD, and the O&M Manual.

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

FIGURE 1-5
EROSION CONTROL,
MOABI REGIONAL PARK AREA
GROUNDWATER REMEDY CONSTRUCTION/
REMEDIAL ACTION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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Attachment 1
Inspection and Corrective Action Report Form

2013 Construction General Permit
Inspection & Corrective Action Report Form

Section I. General Information (see instructions)

Name of Project		CGP Tracking No.	AZCON – _____	Inspection Date	___ / ___ / _____

☐ **Check box when using this form to inspect an inactive/ unstaffed construction site (this option applies to an entire site only).** See Part 4.2(4) of the permit. Inspect the site immediately before becoming inactive/ unstaffed and every 6 months thereafter and within 24 hours of each storm event of 0.5 inch or greater in 24 hours.

Inspector Name, Title & Contact Information	**Name:** _____ **Title:** _____ **Contact information:** _____
Present Phase of Construction	

Inspection Schedule (all days are calendar days) *(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply.)*

Routine Schedule: ☐ Every 7 days ☐ Every 14 days and within 24 hours of a 0.5" storm event

☐ Once per month, but not within 14 days of the previous inspection and within 24 hours of a 0.25" storm event

Reduced Schedule: once per month (but not within 14 days of the previous inspection) and before an anticipated storm event and within 24 hours of the end of each storm event of 0.5 inch or greater in 24 hours.

☐ Once per month (in stabilized areas)

☐ Once per month (where discharges are unlikely based on seasonal rainfall patterns)

☐ Once per month (where winter conditions exist and earth-disturbing activities are being conducted)

Discharge points within 1/4 mile of an impaired water or outstanding Arizona water (OAW): ☐ Every 7 days and within 24 hours of a 0.5" storm event

Was this inspection triggered by either a 0.25" or 0.5" storm event? ☐ Yes ☐ No

If yes, duration of storm event: ☐ < 1 hour ☐ < 6 hrs ☐ > 6 hrs

If yes, how was the storm event determined (either 0.25" or 0.5")?

☐ Rain gauge on site ☐ Weather station representative of site. Specify weather station source: _____

Total rainfall amount that triggered the inspection (in inches)**:** _____

Identify all sources of non-stormwater discharges occurring at the site and the associated control measures in place

sources of non-stormwater discharges:	control measures associated with the non-stormwater discharges:
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

Adverse or Unsafe Conditions for Inspection

Did you determine that any portion of the site was unsafe for inspection per CGP Part 4.2(6)? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

Note: *Inspections may be postponed when adverse or unsafe conditions exist such as local flooding, high winds, or electrical storms, or situations that otherwise make inspections unsafe. However, the inspection must resume as soon as conditions are safe.*

Section II. Description of Discharges and Condition of the Discharge Locations (CGP Part 4.3(11)) (see instructions)

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
1.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
2.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
3.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section II. CONTINUATION SHEET FOR: Description of Discharges and Condition of the Discharge Locations [Print additional sheets as necessary]

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section III. Condition and Effectiveness of All On-site Control Measures (Erosion and Sediment (E&S)), Stabilization and Pollution Prevention (P2) Practices (CGP Part 3.1.1 through 3.1.3) (see instructions)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
1.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
2.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

Section III. CONTINUATION SHEET FOR: Control Measure Condition and Effectiveness [Print additional sheets as necessary]

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

ADEQ Arizona Department of Environmental Quality	Section IV. Corrective Action Report Form

Section IV.A. – General Information

(Complete this section within 24 hours of discovering the condition that triggered corrective action)

Date/ Time Problem First Discovered	Date: ___ / ___ / _____ Time: _____ ___AM ___PM	Today's Date	___ / ___ / _____
Name and Contact Information of Individual Completing this Form	**Name:** _____ **Contact information:** _____		

What site conditions triggered the requirement to conduct corrective action? *(Check the box that applies)*

- ☐ A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 2 and/or 3
- ☐ A prohibited discharge described in Part 1.4 has occurred or is occurring
- ☐ ADEQ or USEPA has determined that modifications to the control measures are necessary to meet the requirements of Part 3.

Provide a description of the problem: (Provide description of the specific problem that triggered the need for corrective action, and the specific location where it was found. If you have already provided this explanation in an inspection report, you can refer to that report.)

Deadline for completing corrective action:

- ☐ Work will be completed no more than 7 calendar days after the date the problem was discovered (enter date): ____ / ____ / _____
- ☐ It is infeasible to complete work within the first 7 days, therefore, the work will be completed as soon as practicable following the 7th day (enter date): ____ / ____ / _____

If the estimated date of completion falls after the 7-day deadline, document the following: (1) The reason it is infeasible to complete work within 7 days, and (2) The schedule for installing and making the new or modified stormwater control operational in the soonest practicable timeframe.

NOTE: *Any corrective actions that result in changes to any of the stormwater controls or procedures shall be documented in the SWPPP within 7 calendar days of completing the corrective action work.*

Section IV.B. – Stormwater Control Modifications to be Implemented in Response to a Corrective Action Trigger [Print additional sheets as necessary]			
List of stormwater control(s) to be modified or replaced to correct the condition that required the Corrective Action	**Actual or Planned Completion Date**	**SWPPP Update Necessary?** **If yes, specify date SWPPP modified**	**Notes and observations**
1.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
2.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
3.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
4.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
5.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
6.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
7.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	

Section V. CONTINUATION SHEET for Miscellaneous Items (see instructions) **[Print additional sheets as necessary]**
Use this space for miscellaneous information or as continuation of items found elsewhere in this report.

Section VI. Certification and Signature (CGP Appendix B. 9.)

Section VI.A. – Certification and Signature by Contractor or Subcontractor performing the inspections (if applicable)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Contractor or Subcontractor: _____ Title: _____

Printed name : _____ Date: _____

Business / Agency: _____ Phone number: _____

Section VI.B. – Certification and Signature by Permittee (permittee / operator or a duly authorized representative is required to sign)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Permittee or
"Duly Authorized Representative": _____ Title: _____

Printed Name: _____ Date: _____

Business / Agency: _____ Phone number: _____

Appendix N
Aesthetics and Visual Resources Protection and Revegetation Plan
(On CD-ROM Only)

Final

Topock Compressor Station Groundwater Remediation Project Aesthetics and Visual Resources Protection and Revegetation Plan

Prepared for

Pacific Gas and Electric Company

September 2014

Prepared by

CH2M HILL, Inc., and E2 Consulting Engineers, Inc.

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Acronyms and Abbreviations

BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
compressor station	Topock Compressor Station
DOI	Department of the Interior
DTSC	Department of Toxic Substances Control
ER	East Ravine
GANDA	Garcia and Associates
GPS	global positioning system
I-40	Interstate 40
IRL	inner recirculation loop
IRZ	in situ reactive zone
PG&E	Pacific Gas and Electric Company
PPD	preconstruction photo documentation
Project	implementation of the groundwater remedy
RB	riverbank
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RPD	revegetation photo documentation
TCS	Topock Compressor Station
TWB	Transwestern Bench
U.S.	United States
USBR	United States Bureau of Reclamation

SECTION 1

Introduction

In December 1951, Pacific Gas and Electric Company (PG&E) began operations near Topock, Arizona, to compress natural gas supplied from the southwestern United States (U.S.) for transport through pipelines to PG&E's service territory in central and northern California. The Topock Compressor Station (TCS or compressor station) is approximately 15 miles southeast of Needles in San Bernardino County, California (Figure 1). The station is still active and is anticipated to remain active into the foreseeable future. Operations at the compressor station consist of six major activities: water conditioning, compressing natural gas, cooling compressed natural gas and compressor lubricating oil, wastewater treatment, facility and equipment maintenance, and miscellaneous operations.

Historical wastewater discharge from TCS operations to Bat Cave Wash and the East Ravine have resulted in chromium contamination in groundwater. In 1996, PG&E entered into a Corrective Action Consent Agreement with the California Department of Toxic Substances Control (DTSC) to oversee the investigation and remediation of the TCS site under California state law. DTSC is the California state lead agency charged with directing investigative activities in the action area in accordance with the Resource Conservation and Recovery Act (RCRA). The U.S. Department of the Interior (DOI) is the lead federal agency overseeing response actions for land under its jurisdiction, custody, or control near the TCS pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In January 2011, the DOI issued a Record of Decision (ROD) selecting the groundwater remedy for the site, and at the same time, DTSC adopted the final remedy for groundwater contamination at the site. DTSC also issued the Final Environmental Impact Report (FEIR) for the final remedy (DTSC 2011). Section 4.1 of the FEIR specifically addressed the aesthetics of the groundwater remedy project (the project), including a description of the existing visual quality of the landscape and an analysis of potential visual impacts resulting from the project.

Figures 2a through 2c show the planned final groundwater remedy system layout in California, Moabi Regional Park, and Arizona, respectively. The project is expected to operate for several decades (estimated duration between 30 and 50 years).

Generally, the project will include the following key features:

- An in situ reactive zone (IRZ) along the National Trails Highway that will use a line of wells that may be used as both injection and extraction wells to circulate groundwater and distribute an organic carbon source that will promote reduction of the hexavalent chromium to trivalent chromium.
- An inner recirculation loop (IRL) that comprises:
  - Extraction wells near the Colorado River (referred to as the riverbank [RB] extraction wells) to provide hydraulic capture of the deep hexavalent chromium groundwater concentrations, accelerate cleanup of the floodplain, enhance the flow of contaminated groundwater through the IRZ line, and control migration of IRZ-generated byproducts toward the Colorado River.
  - Injection wells to re-inject groundwater extracted from the RB extraction wells, which may be amended with an organic carbon source, in the upgradient portion of the hexavalent chromium plume to flush the plume through the IRZ.
- A TCS recirculation loop, which includes:
  - East Ravine (ER) extraction wells near the eastern end of the East Ravine to capture contaminated groundwater in the shallow bedrock.

  - Transwestern Bench (TWB) extraction wells near the eastern portion of the TCS parcel to capture contaminated groundwater downgradient of the compressor station.
  - TCS injection wells located within the compressor station for the re-injection of groundwater extracted from the ER and TWB extraction wells. The extracted water will be amended with an organic carbon source to promote reduction of hexavalent chromium to trivalent chromium and reduce elevated hexavalent chromium groundwater concentrations from the alluvial aquifer in the vicinity of the compressor station.
- The freshwater supply system will convey water from supply well(s) in Arizona to assist with flushing the chromium plume through the National Trails Highway IRZ and constrain the westward spread of carbon-amended water and in situ byproducts from the IRL.

Figure 3 provide a close-up of the currently proposed project features in the areas near the Colorado River between the Burlington Northern Santa Fe (BNSF) Railroad and the Bat Cave Wash outlet. This is an important area for this current revegetation plan because it comprises the area that is most sensitive from a visual quality impact analysis standpoint, as described in the following subsection.

1.1 Visual Quality Impact Analysis from the FEIR

The analysis included in the FEIR (DTSC 2011) evaluated potential impacts on aesthetics and visual quality from 14 key viewpoints (Exhibit 4.1-7 in Appendix A). The analysis determined that no project impacts would occur at four of the key viewpoints (7, 8, 12, and 13), and impacts would be less than significant at eight of the key viewpoints (Table 1). Only two key views (5 and 11) were identified to have potentially significant impacts on the visual quality of the landscape.

Key View 5 represents the views experienced by pedestrian visitors to the Topock Maze area located immediately west of the National Trails Highway overlooking the sandy terrace along the western side of the Colorado River (Exhibit 4.1-7 included in Appendix A). The analysis determined that temporary changes to the visual quality of this area during construction would be less than significant; however, the installation of wells, access roads, and removal of vegetation would result in a strong degree of contrast to the existing visual character of the sandy terrace, and the impacts to visual quality in this area were considered potentially significant (DTSC, 2011).

Key View 11 considers views of recreational boaters on the Colorado River looking southwest toward the sandy terrace on the eastern side if the National Trails Highway (Exhibit 4.1-7 included in Appendix A). The FEIR analysis was based on the potential introduction of up to 170 wells in this area that would result in the extensive removal of vegetation, as well as the potential alteration of riparian vegetation along the riverbank. This was considered to represent a potentially significant impact to the visual quality in this area.

TABLE 1
Summary of Key View Analysis
(Copy of Table 4.1-3 from FEIR [DTSC, 2011])

Key View	Viewer Group	Scenic Resource Representation	Proposed Project Visible?	Degree of Contrast (BLM)	Determination of Impact (CEQA)
1	Vehicular	Views from 1-40; an eligible scenic highway	Yes	Weak	Less than significant
2	Vehicular	Views from 1-40; an eligible scenic highway	Yes	Moderate	Less than significant
3	Vehicular	Views from 1-40; an eligible scenic highway	Yes	Weak	Less than significant
4	Vehicular	Views to "Needles" rock; a scenic vista	Yes	Moderate	Less than significant
5	Pedestrian	Views from Topock Maze; a scenic vista	Yes	Strong	Potentially Significant

TABLE 1
Summary of Key View Analysis
(Copy of Table 4.1-3 from FEIR [DTSC, 2011])

Key View	Viewer Group	Scenic Resource Representation	Proposed Project Visible?	Degree of Contrast (BLM)	Determination of Impact (CEQA)
6	Pedestrian	Views from Topock Maze; a scenic vista	Yes	Low	Less than significant
7	Pedestrian	Views to Topock Maze; a scenic vista	No	N/A	N/A
8	Pedestrian	None	No	N/A	N/A
9	Pedestrian	Views from Topock Maze; a scenic vista	Yes	Moderate	Less than significant
10	Recreational	Views from Chemehuevi Mountain; a scenic vista	Yes	Weak	Less than significant
11	Recreational	Views from Colorado River; a scenic resources corridor	Yes	Strong	Potentially significant
12	Recreational	None	No	N/A	N/A
13	Recreational	Views from Colorado River; a scenic resources corridor	Yes	Moderate	Less than significant
14	Recreational	None	No	N/A	N/A

Notes:
BLM = U.S. Bureau of Land Management
I-40 = Interstate 40
Boldface denotes that project features are visible from that key view and that the key view was selected for analysis.
Source: Data compiled by AECOM in 2009

1.2 FEIR Aesthetic Mitigation Measures

The following mitigation measures were included in the FEIR (DTSC, 2011) and are intended to reduce impacts resulting from implementation of the project on aesthetics and visual quality from Key Views 5 and 11. This report specifically addresses mitigation for impacts to mature plants and riparian vegetation in areas to be disturbed in relation to these two key views. Identification of mature plant specimens and impacts to culturally sensitive plant species have been addressed in other documents prepared for the project (Garcia and Associates [GANDA] and CH2M HILL, 2012; GANDA and E2 Consulting Engineers, 2013; E2 Consulting Engineers, 2014).

1.2.1 Mitigation Measure AES-1: Impacts on Views from Topock Maze Locus B, A Scenic Vista (Key View 5)

The proposed project shall be designed and implemented to adhere to the design criteria presented below.

- Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation consistent with CUL-1a-5.[1]

[1] Mitigation Measure CUL-1a-5 states, “Should any indigenous plants of traditional cultural significance and listed in Appendix PLA of this FEIR be identified within the project area, PG&E shall avoid, protect, and encourage the natural regeneration of the identified plants when developing the remediation design, final restoration plan, and IM-3 decommission plan. In the event that impacts on the identified plants cannot be avoided and such plants will be displaced, PG&E shall retain a qualified botanist who shall prepare a plant transplantation/monitoring plan which can be included as part of the Cultural Impact Mitigation Program (CIMP) referenced in CUL-1a-8 either by (1) transplanting such indigenous plants to an onsite location, or (2) providing a 2:1 ratio replacement to another location decided upon between PG&E and members of the Interested Tribes. Plans to transplant or replace such plants shall be approved by DTSC. In coordination with the qualified botanist, PG&E shall monitor all replanted and replacement plants for at least 5 years, and shall ensure at least a 75 percent survivorship during that time. This mitigation measure is not meant to

- Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.
- Plant material shall be consistent with surrounding native vegetation.
- The color of the wells, pipelines, reagent storage tanks, control structures, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete shall be used in place of standard gray concrete.
- The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in California to ensure the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.

1.2.2 Mitigation Measure AES-2: Impacts on Views from Colorado River, A Scenic Resources Corridor (Key View 11)

The proposed project shall be designed and implemented to adhere to the design criteria presented below.

- A minimum setback requirement of 20 feet from the water (ordinary high water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank.
- Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation.
- Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.
- Plant material shall be consistent with surrounding native vegetation.
- The color of the wells, pipelines, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.
- The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in California to ensure the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.

replace or subsume any actions required by state or federal entities with regard to the protection of species listed as rare, threatened, or endangered."

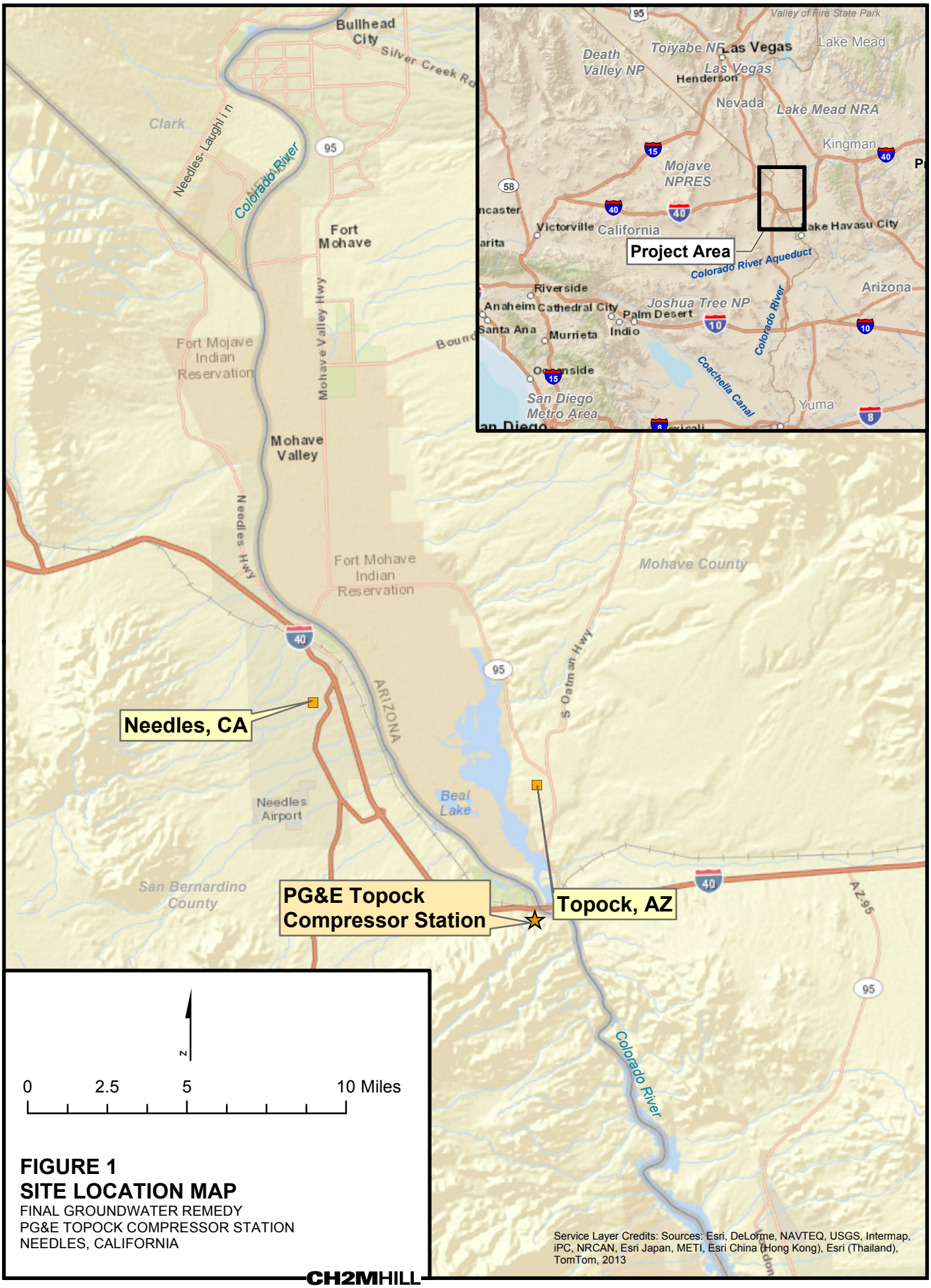

FIGURE 1
SITE LOCATION MAP
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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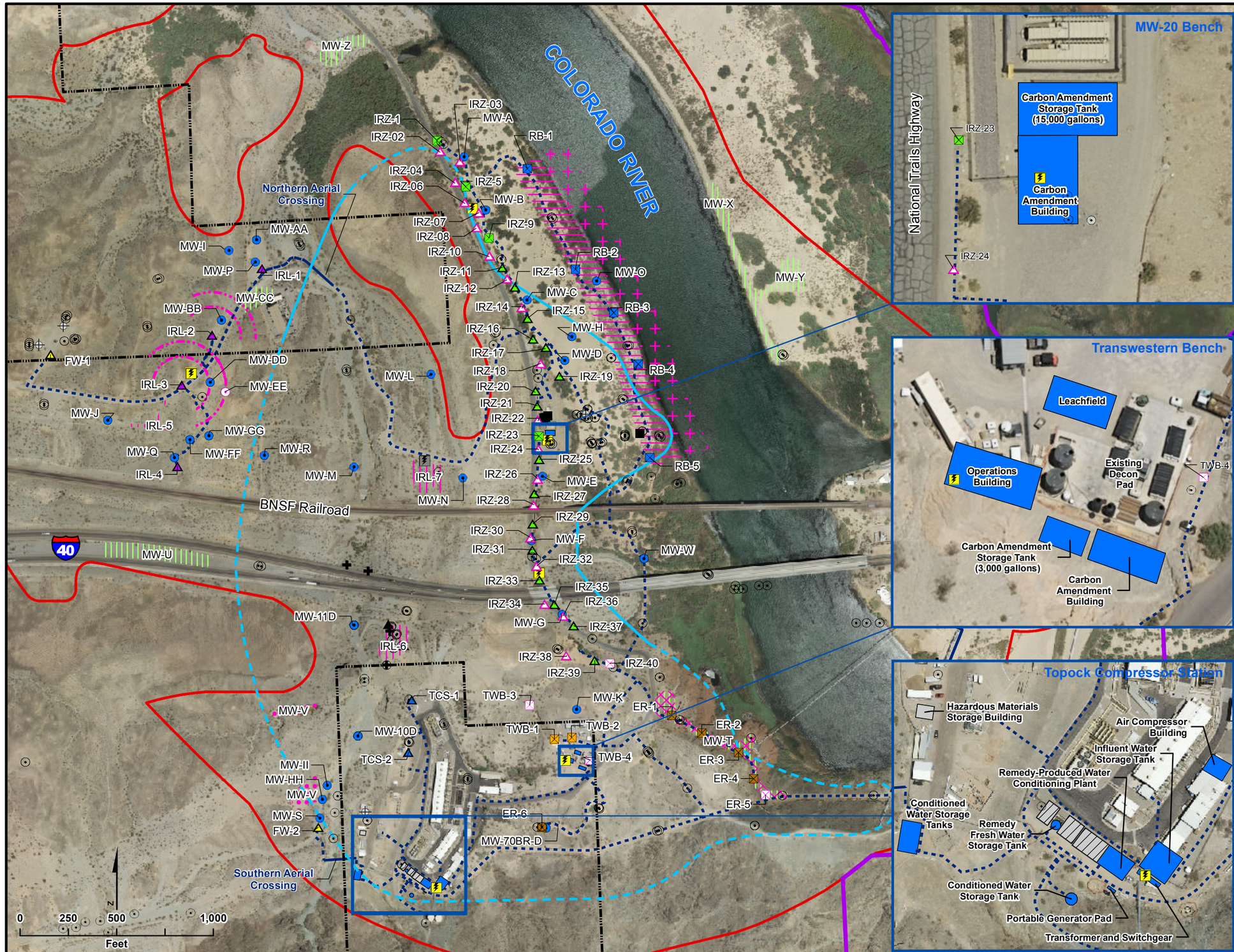


LEGEND

- Property Boundaries
- Area of Potential Effects (APE)
- EIR Project Area

Existing Wells:

- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:

(Items in Pink are Provisional)

- Extraction Well
- Injection Well
- Monitoring Well (MW-EE is a pending/future provisional monitoring well)
- Arc for IRL-2 and IRL-3 Arsenic Monitoring Wells [3]
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:

- Extraction, East Ravine
- Extraction, National Trails Highway (NTH) In-situ Reactive Zone (IRZ)
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Pipeline Corridor for Remedy

- Aboveground Pipe
- Underground Pipe/Conduit

Remedy Facilities

- Planned Transformer
- Future Provisional Transformer
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth ingroundwater based on fourth quarter 2013 sampling events. Dashed where based on limited data.

Note:

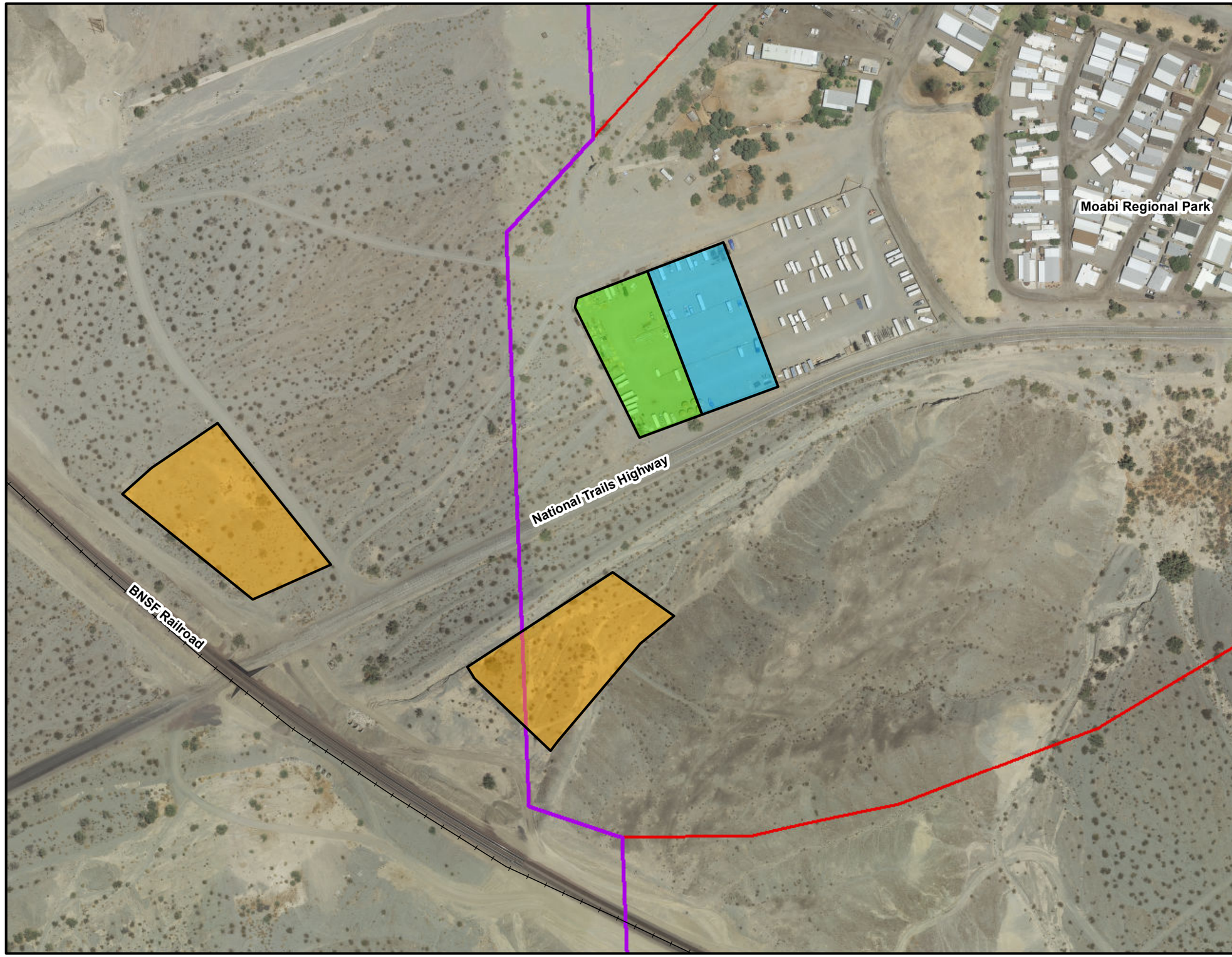
1. Note that in compliance with EIR mitigation measure CUL-1a-9, as well as PA and CHPMP mitigation measures, the pipeline along the dirt road west of National Trails Hwy is located in an existing, previously disturbed, access road. In addition, the location of the road and pipeline was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10, PA, and CHPMP mitigation measures.
2. All well and structure locations are approximate.
3. Arcs for IRL-2 and IRL-3 arsenic monitoring wells represent a range of potential well locations. Portions of the arcs are not suitable for well installation due to technical and/or cultural resources constraints.

FIGURE 2A
GENERAL REMEDY SYSTEM LAYOUT - CALIFORNIA

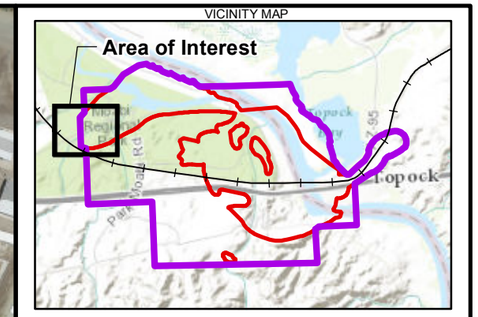
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\Vegetation\FIG2A_90pct_CAdetails.mxd



VICINITY MAP



LEGEND

- Long Term Remedy Support Area (1.2 acres approx.)
- Soil Storage Area (Each 1.5 acres approx.)
- Temporary Construction Laydown Area (1.3 acres approx.)
- Area of Potential Effects (APE)
- EIR Project Area

Notes:
1. This is a conceptual layout. Locations are approximate.
2. Descriptions of activities/functions anticipated for the construction support areas are included in the Construction/Remedial Action Work Plan.
3. Descriptions of activities/functions anticipated for the long-term remedy support areas are included in Section 3.5 of this BOD, and the O&M Manual.

N

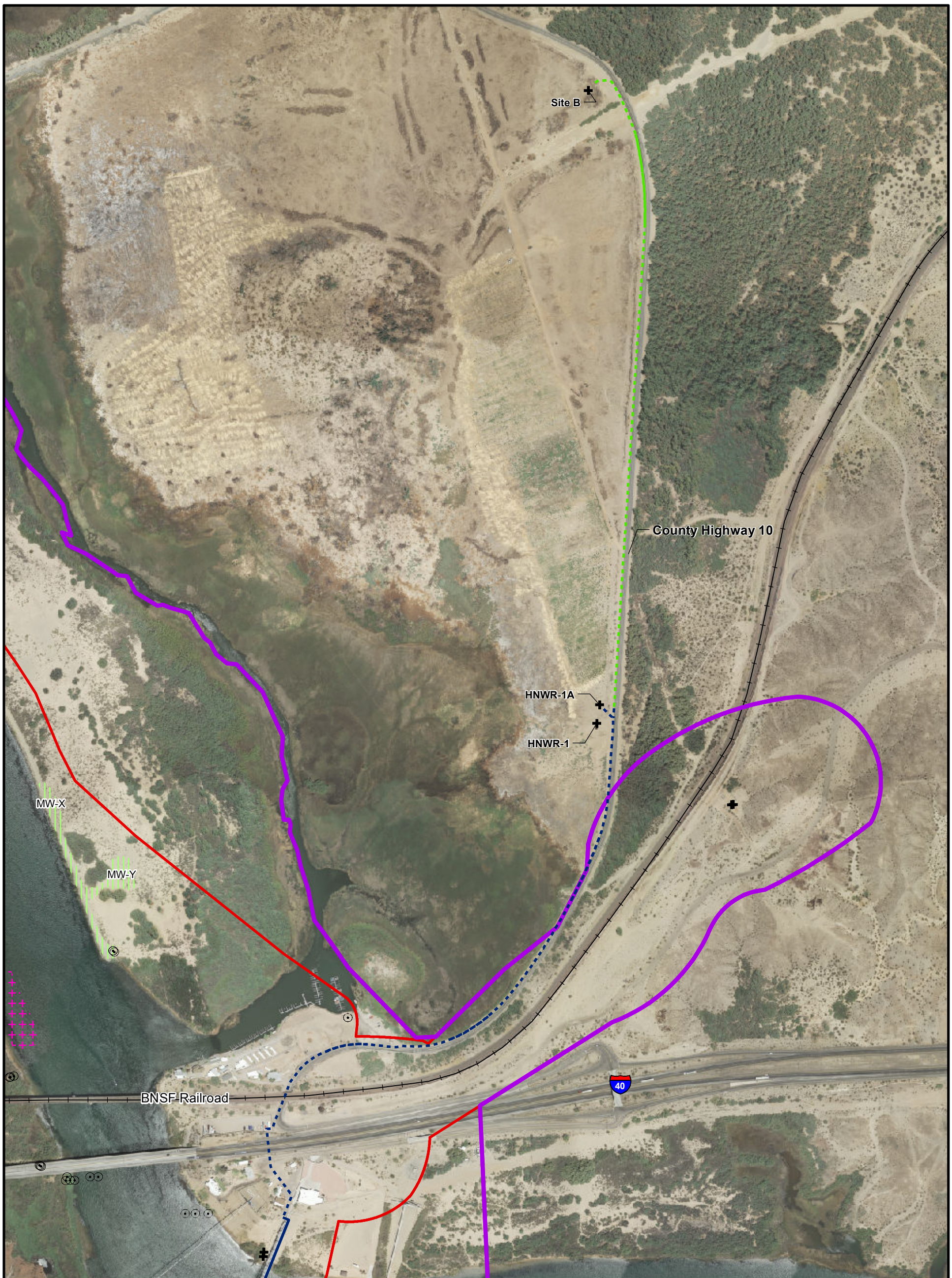
0 95 190 380 Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

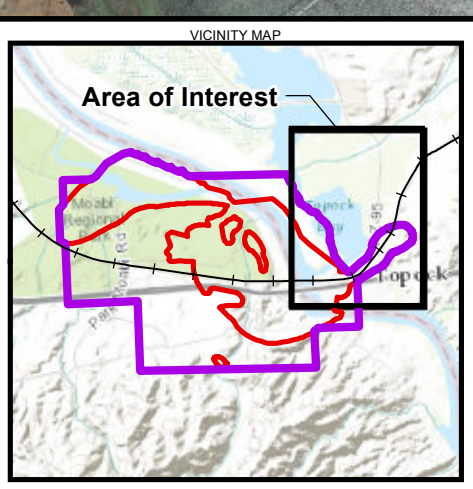
FIGURE 2B
GENERAL REMEDY SYSTEM LAYOUT - MOABI REGIONAL PARK
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\Vegetation\FIG2B_PM_StagingRemedy_11x17.mxd



VICINITY MAP



LEGEND

Existing Wells:

- Monitoring Well
- Water Supply Well

Planned Wells:

- Area for Monitoring Well (Applies to MW-X and MW-Y)

Provisional Wells:

- Area for Potential Slant Well Screens

Pipeline Corridor for Remedy

- Aboveground Freshwater Pipe
- Underground Freshwater Pipe
- Future Provisional/Contingent Fresh Water Pipe

- Area of Potential Effects (APE)
- EIR Project Area

Note:
All wells and remedy structure locations are approximate.

N

0 200 400 800 Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

FIGURE 2C
GENERAL REMEDY SYSTEM LAYOUT - ARIZONA
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\Vegetation\FIG2C_ArizonaFW_11x17.mxd

LEGEND

Existing Wells:
- Extraction Well
- Injection Well
- Monitoring Well

Provisional Wells:
- Injection Well
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)

Planned Wells:
- Extraction, NTH IRZ
- Extraction, Riverbank
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Remedy Monitoring Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

- Planned Transformer
- Future Provisional Transformer
- Proposed Access Routes

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/ Contingent Fresh Water Pipe
- Property Boundaries
- Area of Potential Effects (APE)
- EIR Project Area *EIR Project Area*

Remedy Facilities
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2013 sampling events. Dashed where based on limited data.

N

0 90 180 360 Feet

FIGURE 3
AESTHETICS AND VISUAL RESOURCES REVEGETATION PLAN

FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\MPRP\FIG3_AVR.mxd

SECTION 2

Description of Vegetation Related to Visual Quality of Key Views 5 and 11

The following subsections include a discussion of the vegetation resources associated with Key Views 5 and 11 that may be affected by the project. Although the FEIR evaluated views from the Colorado River specifically from Key View 11, this section provides a general description of all riparian habitats along the Colorado River in the project area.

2.1 Mature Vegetation

Mature plant surveys were completed in August 2011 by senior botanist Kim Steiner, PhD, and biologist, Morgan King. For the survey, a mature plant was defined as a living mature tree, large or prominent shrub, or tall predominately herbaceous plant that could add to the aesthetic value of the project area. Trees, shrubs, and herbaceous plants that would not currently add to the aesthetic value because of their small stature were not considered to be mature plants (for example, seedlings, immature plants, small perennials, and annuals). The results were summarized in the Mature Plants Survey Report was issued by GANDA and CH2M HILL (2012). The most abundant mature plants associated with the sandy terrace west of the Colorado River (the primary area included in Key Views 5 and 11) are arrow weed (*Pluchea sericea*) and the exotic and invasive salt cedar (*Tamarix ramosissima*). Arrow weed is widespread in many areas of the sandy terrace west of the Colorado River where it often forms dense, shrubby thickets (Photo 1). Salt cedar also is common on the sandy terraces adjacent to the Colorado River, especially to the south near the Interstate 40 (I-40) and the BNSF Railroad bridges that span the river. In many areas, salt cedar and arrow weed are intermixed (Photo 2), while in other locations, salt cedar occurs as scattered individuals (Photo 3) or forms dense thickets.

Salt cedar is an invasive exotic that has been used for erosion control on the banks of the Colorado River since the early 1900s (Barranco, 2001). Since that time, it has spread dramatically throughout the western states and is considered to be highly invasive in California because of its severe ecological impacts on local plant and animal communities, high reproductive output (a mature salt cedar tree can produce 600,000 seeds annually), and high dispersal capabilities (Barranco, 2001; DiTomaso, 1998).

PHOTO 1
Dense stand of arrow weed on the sandy terrace west of the Colorado River

PHOTO 2
Salt cedar and arrow weed on the sandy terrace west of the Colorado River

PHOTO 3
Scattered salt cedar on the sandy terrace west of the Colorado River

Other mature vegetation identified on the sandy terrace west of the river includes blue palo verde (*Parkinsonia florida*), honey mesquite (*Prosopis glandulosa*), creosote bush (*Larrea tridentata*), smoke tree (*Psorothamnus spinosus*), and catclaw acacia (*Senegalia greggii*). Blue palo verde is considered to be an important mature plant because it is a large, aesthetically pleasing native tree that is common to the area that is part of the Lower Colorado River Valley Subdivision of the Sonoran Desert scrub (Turner and Brown, 1994). Blue palo verde occurs in a few locations along the eastern side of the National Trails Highway (Photo 4). Honey mesquite is another large native tree growing in large clumps along the eastern side of the National Trails Highway (Photos 5 and 6), as well as in scattered locations along the upper banks of the Colorado River. Creosote bush is most common along the eastern side of the National Trails Highway, but it also occurs in a few scattered locations on the sandy terrace west of the Colorado River and is often intermixed with arrow weed and salt cedar (Photos 4 and 6). Smoke tree and catclaw acacia are associated primarily with the desert washes.

PHOTO 4

Large blue palo verde tree on east side of the National Trails Highway, scattered creosote bushes also present along the roadway in this area in background, vegetation to the left side includes creosote bush and salt cedar

PHOTO 5

Large clump of honey mesquite on east side of the National Trails Highway

PHOTO 6
Scattered creosote bush along the east side of the National Trails Highway, with honey mesquite on far right side of the photograph

2.2 Riparian Vegetation

It is commonly accepted that riparian vegetation occurs along the edges of streams, rivers and lakes where the plants grow in association with some type of persistent aquatic feature. However, such broad definition is oversimplified and fails to distinguish riparian vegetation from upland communities that may also occur in proximity to water (Fischer et al., 2001). The FEIR identifies riparian areas as a sensitive habitat, but provides no definition of such areas.

To adequately address impacts to riparian vegetation, it is critical to have a scientifically-based definition of riparian habitat. One such definition is provided by Johnson et al. (1984), that defines riparian as “pertaining to the banks and other adjacent terrestrial (as opposed to aquatic) environs of freshwater bodies, water courses, estuaries, and surface emergent aquifers (springs, seeps, oases), whose transported freshwaters provide soil moisture sufficiently in excess of that otherwise available through local precipitation to potentially support the growth of mesic vegetation.”

Another, more complete definition, was developed by the National Research Council (2002): “Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. They include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e., a zone of influence). Riparian areas are adjacent to perennial, intermittent and ephemeral streams, lakes and estuarine- marine shorelines.”

Both of these definitions indicate that proximity of vegetation to a water feature alone does not constitute riparian habitat. There must also be some degree of hydrologic influence on the vegetation by the adjacent water feature.

Using the above definitions of riparian habitat, riparian vegetation that is present within the project area includes areas of emergent vegetation along the edges of the Colorado River as well as the trees and shrubs growing immediately adjacent to the Colorado River that have a direct hydrologic connection with the river. Within the project area, there are vegetated areas along the terrace above the Colorado River that is referred to as the historical floodplain. This area is located east of National Trails Highway but outside of the 100-year floodplain and is the area where former dredged sands were historically deposited. The higher elevation and control of flows by upstream dams means that the historical floodplain is not subject to occasional flooding and now lacks a direct hydrologic connection with the river. For this reason, the historical floodplain is not considered riparian habitat.

Vegetation types considered to be riparian habitat using the above definitions include scattered patches of southern cattail (*Typha domingensis*), California bulrush (*Schoenoplectus californicus*), common reed (*Phragmites australis*), and giant reed (*Arundo donax*) growing along the edges of the Colorado River. Most of these riparian areas occur below the ordinary high water line or on the low terraces that are likely subject to regular flooding. Patches of emergent vegetation are found in scattered locations along the banks of the Colorado River and in the vicinity of the Topock Marina. Also included are areas with California bulrush along the outlet of Bat Cave Wash and areas with broad-leaved cattail (*Typha latifolia*) within the outlet of the East Ravine near the southern boundary of the project area. The largest of these wetland areas occurs on the western side of the river just south of the I-40 bridge and is characterized by dense growth of common reed, California bulrush, and patches of giant reed (Photos 7 and 8).

PHOTO 7
Emergent wetland vegetation along the banks of the Colorado River

PHOTO 8
Large wetland area south of Interstate 40 bridge along the western side of the Colorado River

Much of the riparian vegetation associated with the rocky banks adjacent to the water's edge is characterized by salt cedar and arrow weed (Photos 9 and 10) with occasional species such as broom baccharis (*Baccharis sarothroides*), giant reed, and honey mesquite also present in a few scattered locations.

PHOTO 9
Salt cedar and arrow weed along the western banks of the of the Colorado River

PHOTO 10
Salt cedar and arrow weed along the eastern banks of the of the Colorado River

SECTION 3

Assessment of Vegetation Impacts Related to Key Views

Throughout the design phase of the project, efforts have been made to avoid impacts to existing plants and natural habitats. To the extent possible, work activities have been designed to utilize existing roadways and previously disturbed areas. As the final design for the remedial action is developed, efforts will continue to minimize disturbance to natural vegetation. The following impact assessment is based on preconstruction surveys of work areas, staging areas and access routes that have been identified in the 60 percent design, as amended in a field constructability review conducted between April 7 through 10, 2014. For aesthetics and visual resources, this impact assessment focuses on Key Views 5 and 11 as these vantage points have been identified as having potentially significant visual impacts, and this impact assessment includes all riparian habitat along the Colorado River within the project area. Restoration for impacts to vegetation is discussed in the following section.

3.1 Impacts to Mature Vegetation

Mitigation measures included in the FEIR (DTSC, 2011) state that "existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases." Because of the ambiguity of what constitutes a mature plant, all medium- to large-sized trees, large or prominent shrubs, and tall predominately herbaceous plants were all included as "mature plants" during the 2011 surveys (GANDA and CH2M HILL, 2012). As noted above, the project infrastructure has been designed to minimize impacts to vegetation and allow preservation in place for mature plants. To the extent possible, access roads, well locations, and pipelines have been located in open areas with sparse to no vegetation (Photo 11). However, not all vegetation in this area is avoidable during construction activities that will include well installation and pipeline excavations.

During remedy design, priority will be given to preserving in place and avoiding impacts to mature plants. Where the impacts to mature plants cannot be avoided, design and construction implementation will preferentially seek to avoid impacts to native woody perennial native trees, such as blue palo verde and honey mesquite, because these species are valuable in terms of aesthetics and provide habitat for birds and wildlife species. With the exception of some creosote bushes, the majority of the vegetation impacts will occur to arrow weed and salt cedar on the historical floodplain that lies above the 100-year flood elevation below the National Trails Highway and the MW-20 bench.

Impacts to mature vegetation will include both temporary and permanent impacts. Temporary impacts would occur in areas where some vegetation clearing is needed to provide work space for well installation and construction activities that are associated with the excavation and installation of the pipeline infrastructure. In these areas, plants such as arrow weed, salt cedar and, to a limited extent, creosote bush, will either be trimmed or flattened, but the root systems of the plants will be left intact. Both arrow weed and salt cedar are adapted to frequent disturbance and will readily re-sprout if the root systems remain intact (Horton, 1977). Creosote bush also has a strong ability to naturally recover as long as the root system is not significantly disturbed.

Permanent impacts to mature plants will occur in areas where the root systems of the plants are significantly disturbed as a result of excavations for the pipelines. Permanent impacts may also occur at those locations where vegetation will be removed to create access roadways that will be used throughout the operation phase of the project for routine monitoring, inspection, and maintenance activities. The FEIR performed the impact analysis using the assumption that up to 170 wells could be located on the sandy terrace seen from Key View 5, which would result in the extensive removal of vegetation. As shown on Figure 3, 17 new wells would be located on the sandy terrace to the north and east of the existing water

storage tanks on the MW-20 bench that would potentially have a significant impact on the visual quality of this area (Figure 3). An additional 10 provisional wells could be installed immediately west of the National Trails Highway at a later date, if needed. As noted above, the project has been designed to minimize impacts to mature vegetation with access routes, wells, and pipelines located in areas with minimal vegetation to the extent possible (Photo 11). This also is evident for the visual simulations for Key View 5 included in the FEIR (Exhibit 4.1.9 in Appendix A).

PHOTO 11
To the extent possible groundwater remedy infrastructure such as access routes, wells and pipelines have been located in areas where minimal vegetation disturbance will be required

3.2 Impacts to Riparian Vegetation

The visual simulation for this key view included in the EIR (Figure 45.1-23 in Appendix A) assumed the removal of the tamarisk trees along the upper edge of the riverbanks in this area. The project has been designed to avoid impacts to all riparian and wetland vegetation along the Colorado River. In a few areas, RB wells will be installed in proximity to the Colorado River (Figure 3), but above (that is, outside of) the riparian vegetation zone. In these locations, mature trees, if present, will be left intact to provide a visual barrier between the wells and the river.

SECTION 4

Avoidance, Minimization, and Replanting Measures

This section provides information on avoidance and minimization measures that will be implemented to reduce impacts to vegetation resources and provides information on plant salvage and other replacement methods that will be used where long-term impacts to vegetation are unavoidable. The information included in this section also is intended to provide general guidance on replacement planting that may be used to offset mature plant losses that may occur.

The exact number of mature plants (trees and shrubs) permanently impacted and the specific locations for mitigation plantings will be determined once the final project design is complete and long-term access routes, well locations, and excavation areas have been determined. Given that the purpose of the mitigation plantings will be to minimize the impacts to visual quality, mature plants will be preserved in place to the maximum extent feasible. If mature plants cannot be preserved in place, the replacement planting or transplanting will occur as close to the permanent vegetation impacts as practicable. Access routes for monitoring, inspection and maintenance will be kept clear and no trees or shrubs will be planted directly over or within 10 feet of either side of the pipeline infrastructure to avoid potential pipeline damage from roots and allow for inspection and maintenance access as needed.

4.1 Design and Construction

Throughout the design process for the project, efforts have been made to locate pipelines and wells along roadways, pipeline rights-of-way, and other previously disturbed areas to avoid impacts to vegetation. Construction areas, as well as staging and storage areas, also have been located in previously disturbed and/or developed areas to minimize and avoid impacts to vegetation and other sensitive resources. To further minimize impacts, a biologist will conduct preconstruction surveys and areas of native vegetation and sensitive habitats in the immediate vicinity of the construction areas will be identified and clearly marked with flagging, fencing, and/or signage. Construction workers also will be provided with environmental awareness training regarding biological resources including sensitive species and habitats.

Implementation of the project will not be able to avoid impacts to all plants that are considered as mature. However, the field implementation and approach will be first to avoid mature vegetation wherever feasible. If mature pant impacts cannot be avoided, then the preference during implementation will be to avoid mature, native plants, such as honey mesquite and blue palo verde wherever feasible, even if this approach might preferentially impact tamarisk or arrow weed.

4.2 Habitat Requirements for Mitigation Planting

Native plants in the project area have different habitat requirements and ecological tolerances, which are reflected in the sites that they occupy. Blue palo verde is a relatively large tree associated with sandy areas, is widely distributed on the edges and bottoms of the ephemeral washes that dissect the upland alluvial terraces, and occurs along sandy roadsides. In contrast, the related hillside palo verde is a tree of shorter stature that is restricted to rocky hillsides above the Colorado River in the southern portion of the project area.

Western honey mesquite and screw bean mesquite typically grow in areas with root access to permanent underground water; however, western honey mesquite is more likely to occur in somewhat drier habitats than screwbean mesquite. While both species are salt tolerant, screwbean mesquite has a higher tolerance level than western honey mesquite (Miyamoto et al., 2004), an important consideration when planting mitigation trees. Transplanting or replacement planting of native species will be located in areas where the

species are growing to ensure appropriate environmental conditions are present for the establishment and survival. The exact planting locations will be determined as part of the final design based on the number of transplants and/or mitigation plantings and the locations and extent of the work areas and access routes.

4.3 Replacement Planting Procedures

Replacement plantings will be used to mitigate for permanent impacts to mature trees and shrubs through the use of container grown plant materials. Trees and shrubs including palo verde, western honey mesquite, screwbean mesquite, cattle saltbush, and big saltbush are relatively easy to propagate in a nursery and well adapted to transplanting with a minimal amount of care and maintenance (Bainbridge and Virginia, 1990; Bainbridge, 2007; Romney et al., 1989). Several commercial nurseries grow native plants from the Mojave Desert (Appendix B).

Depending on the number of trees and shrubs that are required for revegetation of disturbed areas, PG&E will consider contracting with a nursery that specializes in desert plant propagation to collect local seed and establish trees, shrubs, and other plants from onsite material before mitigation planting. This would ensure replacement plants are suitable for local environmental conditions. If only a small number of plants are required, appropriate available nursery stock may also be used.

Replacement planting for native trees including blue palo verde, hillside palo verde, western honey mesquite, and screwbean mesquite will consist largely of container-grown plants. Containers shall be long and narrow to encourage deep root growth such as Tall One Tree Pots (Steuewe & Sons, Inc., 4.5 inches wide by 14 inches deep). Seedlings/saplings shall be between 4 to 6 months old when transplanted to prevent the plants from becoming root-bound in the pots. Replacement planting of shrubs such as mesquite, cattle saltbush, big saltbush, and others shall be grown in 4- to 6-inch tube packs and transplanted when 9 to 12 months old.

Based on experimental results from the Mojave Desert, the median survival rate for species such as western honey mesquite is around 50 percent (Edwards et al., 2000; Grantz et al., 1998). Therefore, to achieve the desired density of plant species, the number of container grown plants should be more a higher ratio to account for anticipated mortality.

Transplanting of container-grown trees and shrubs typically is done in the late winter to early spring between February and April (Romney et al., 1989; Edwards et al., 2000). Planting holes shall be excavated using an 8- to 10-inch-diameter power auger to a depth equal or just slightly more than the depth of the container (Grantz et al., 1998). Carefully remove the saplings from the container and place against one side of the planting hole, using excavated soils to backfill around the roots. Do not add additional soil amendments, fertilizer, or mulch to the soil as these have been found to be unnecessary for desert trees and shrubs (Bainbridge et al., 2001; Romney et al., 1989). When backfilling, add water simultaneously to minimize air pockets. Be sure the soil is firmly packed around the roots, but not firmly compacted. Water thoroughly and slowly after the hole is completely filled.

Trees will be spaced to maintain a density similar to the area from which they are removed or in similar spacing based on undisturbed areas near the project, but no closer than 8 feet apart. Shrubs will be spaced in a density similar to the density in the undisturbed surrounding vegetation, but no closer than 3 feet apart. To ensure soil and other environmental factors are most favorable for establishment, replacement plants will be planted in areas where individuals of the same species are healthy and growing well.

Some type of initial herbivore protection (such as wire mesh or tree shelters placed around the seedlings) is necessary to ensure good survival and growth of transplanted trees and shrubs (Romney et al., 1989; Grantz et al., 1998). Plastic tree shelters such as Tree-Pee (Bailey's Inc.) have been found to result in significantly higher survivorship than using wire mesh (Grantz et al., 1998).

Transplanted trees and shrubs should be watered using deep irrigation pipes (Bainbridge, 2006; Bainbridge et al., 2001). Deep pipe irrigation has been shown to produce much better survival rates and to require less

water than other irrigation methods (Bainbridge et al., 2001). Bainbridge et al. (2001) had an establishment success rate of 71 percent for seedlings of western honey mesquite, by using only 5.3 gallons over 3.5 years with deep pipe irrigation when trees were planted with tubular tree protectors to minimize herbivory.

The method for using deep irrigation is described in Bainbridge (2006). For each transplanted tree or shrub, a hole is drilled to a depth of 20 to 30 inches with a soil auger. A polyvinyl chloride pipe (2 inches in diameter and 20 inches long with a series of 1/16-inch holes drilled 2 to 3 inches down one side beginning 7 inches below the top) is inserted to the bottom of the hole such that the side with holes faces the seedling or shrub with about 4 inches protruding above the ground surface for easy filling. The pipe shall be situated about 3 to 4 inches from the seedling. Two or three pipes can be situated around the root ball for transplanting shrubs or small trees.

Water (1 quart) will be directly applied to seedlings once every week for the first 8 weeks. Then irrigation pipes will be filled with 2 quarts every other week for at least 3 months after the initial watering. Watering will be continued at least until the end of August each year and will be done for the first 2 years after planting.

For relatively small areas where a large number of replacement trees may be needed, a gravity feed drip irrigation system from a large 4,000 to 5,000-gallon storage tank shall be used as an alternative watering method. This method will depend on the ability to situate the tank in an area accessible to a water truck for periodic refilling. This method was used successfully for the screwbean mesquite restoration project under the freeway bridge next to the Colorado River from 2006–2009 at TCS (C. Smith, pers. comm., 2013). For that project, newly planted trees were watered three times per week for about 3 to 4 hours per day for the first year and once per week in the subsequent 2 years.

There is generally no evidence that additional mulching enhances long-term survival and plant growth and some indication it may do more harm than good (Bainbridge et al., 2001), so no additional mulching is recommended. If tree seedlings or shrubs are planted from containers, inoculation of soil biota can be done by backfilling with excavated soil. In general, inoculation of soil biota is only required for severely degraded sites where the natural soil biota has been significantly depleted or is absent (Bainbridge and Virginia, 1990).

SECTION 5

Success Criteria, Monitoring, and Adaptive Management

Due to the fact that replacement saplings do not provide the same habitat value as mature trees, a mitigation ratio of 3:1 will be used to offset impacts to riparian trees. Replacement trees will be propagated from locally collected seeds and grown in a nursery for 1 year prior to planting in selected mitigation sites. The success criteria for mitigation plantings will be a final minimum plant replacement ratio of 2.25:1 (75% overall survival rate) of mitigation plantings at the end of a minimum 5-year monitoring period.

Monitoring will continue for a minimum of 5 years following mitigation plantings. In the event that mortality rates or trends in declining vigor of the mitigation plantings result in less than a minimum of a final 2.25:1 mitigation ratio, additional saplings will be planted. Any replacement plantings will be monitored for 5 years from the time of the initial planting to ensure that the mitigation success criteria have been met.

In order to account for anticipated mortality rates, the initial replanting will include twice as many saplings as required by the mitigation ratios. This initial higher planting ratio is intended to compensate for expected sapling mortality over time and ensure that the final mitigation ratios are obtained, while avoiding annual replanting for losses and costly repetitive propagation expenses. For example, if three palo verde trees will be removed during construction they would be replaced at a 3:1 ratio with seedlings grown from locally sourced seeds. The initial mitigation would therefore require nine replacement plantings. The success criteria would be 75% overall survival of these plantings after 5 years, resulting in a final mitigation ratio of 2.25:1 or survival of 6.75 (rounds to 7) out of nine initial plantings.

Taking into account expected mortality rates, the initial mitigation planting would be doubled to include 18 replacement plantings during the first year (see Table 2). It is anticipated that with the higher number of initial plantings and adaptive management at least 7 of the 18 saplings will become successfully established after 5 years. It is possible that even more plants may become established if adaptive management techniques result in increased survival. In the event mortality or trends in declining vigor indicate that success criteria will not be met, additional plantings and monitoring will be required to ensure that the final mitigation ratio is met.

TABLE 2
Example of Replacement Planting Ratios and Success Criteria

Number of Trees Impacted	3:1 Replacement Plantings	Initial Planting to Account for Anticipated Mortality	Final Success Criteria Minimum of 2.25:1 Replacement After 5 Years
3	9	18	7

Assuming 18 initial plantings with a potential 50% mortality rate and a final success criteria of 7 replacement trees

Monitoring	Anticipated Minimum Survivorship (Vigor Class of 2 or Greater)	Number of plantings Remaining*	Mortality Thresholds Triggering Additional Plantings	Number of plantings Remaining*
Year 1	90%	17	60% or less survivorship	11 or less
Year 2	80%	14	60% or less survivorship	11 or less
Year 3	70%	13	50% or less survivorship	9 or less
Year 4	60%	11	40% or less survivorship	7 or less
Year 5	50%	9	Success criteria not met	Less than 7

Note:
*Values are rounded to nearest whole number where required.

5.1 Tree and Shrub Assessment

Assessment of the vigor of trees and shrubs will utilize a modified index initially developed by Bainbridge et al. (2001):

- 0 = dead, stems brown brittle with no green or purple
- 1 = barely alive, stems still flexible with some green or purple
- 2 = some green or purple on stem, a few green leaves
- 3 = green or purple stem and a number of green leaves
- 4 = green or purple stem and green leaves, vigorous

5.2 Maintenance and Adaptive Management

Adaptive management involves learning from experience and modifying subsequent behavior in light of that experience. Data shall be collected and analyzed throughout the monitoring period and the results used to modify (adapt) restoration approaches, as appropriate, to ensure successful establishment of planted trees and shrubs to achieve the desired density and cover of plants in the revegetation areas. Maintenance and adaptive management will focus on the following areas: weed control, irrigation modification, herbivory protection, and mortality rates.

5.2.1 Weed Control

Weedy species, such as Russian thistle (*Salsola tragus*), Sahara mustard *(Brassica tournefortii*), and salt cedar can significantly affect growth and survival of transplants. Transplant and seed sites shall be relatively weed-free and shall be monitored regularly for weed infestations. It is much easier to prevent the establishment of weeds in an area than it is to eradicate weed populations once they have become established. Monitoring for weed seedlings of Russian thistle, Sahara mustard, and salt cedar will be done early in the growing season (March–April) to allow for treatment and removal of weedy species before flowering and seed dispersal. In addition, young weed seedlings can be removed by hand, thereby avoiding the need for more intensive mechanical or chemical treatments.

5.2.2 Irrigation Modification

The objective is to obtain the maximum survival rate of transplanted trees and shrubs; therefore, it may be necessary to modify the irrigation schedule and/or amount of water during the revegetation period. While irrigation will only be used during the initial establishment period, the condition of the plants will be monitored throughout the monitoring period of 5 years. If after the initial watering, plants show a notable decline in vigor, it may be necessary to increase the amount and/or timing of irrigation to prevent mortality and increase vigor. Care shall be taken not to overwater the plants.

5.2.3 Herbivory Protection

Tree and shrub protectors will be maintained until the plants are large enough to withstand herbivory or before the growth of the plant being impacted by the barrier. PG&E will be responsible for removing the tree and shrub protectors.

5.2.4 Mortality Rates

It is expected that the initial plantings will experience some level of mortality. If survivorship drops below target levels of 50 percent, additional plantings will be required. To prevent further mortality, adjustments to the watering regime and/or herbivore protection will be necessary, depending on the most probable cause of the mortality.

5.3 Photo-Monitoring Stations

Photo-monitoring stations will be established by a qualified vegetation ecologist or landscape architect in areas where vegetation impacts will occur as a result of the project in Key Views 5 and 11 to document preconstruction conditions. These photo points also will be used to monitor natural recovery of plant species as well as plant growth in the mitigation areas. The following methods and procedures are adapted from the U.S. Department of Agriculture's Photo Point Monitoring Handbook (Hall, 2002).

5.3.1 Objectives

The objectives of the photo monitoring include the following:

- Document the preconstruction site conditions of the project work areas in areas where vegetation impacts are considered potentially significant in terms of visual quality and aesthetics
- Document the post-construction site conditions before revegetation and mitigation of the project work areas where vegetation impacts are considered potentially significant in terms of visual quality and aesthetics
- Document natural regeneration and recovery of native plant species where the aboveground portion of trees and shrubs was removed but the root systems were left intact in areas where vegetation impacts are considered potentially significant in terms of visual quality and aesthetics
- Document landscape conditions in the construction sites including vegetation changes over time as well as general qualitative documentation of plant cover and vegetation condition in areas where vegetation impacts are considered potentially significant in terms of visual quality and aesthetics

5.3.2 Equipment

The following equipment will be needed for the photo monitoring:

- Digital camera
- Global positioning system (GPS) unit with sub-meter accuracy
- White board and black dry erase pen
- Compass
- Photo monitoring data sheets (Appendix C)

5.3.3 Methods

Before starting construction, multiple photo monitoring locations will be selected throughout the project area that will be used to document the pre- and post-construction conditions. This will be referenced to as preconstruction photo documentation (PPD). PPD will be completed to assist in restoration activities after remedy decommissioning. A subset of the PPD photo points will be located in areas to specifically document areas where existing vegetation and habitats will be impacted by project activities. These photo points will be referred to as revegetation photo documentation (RPD). The exact locations and views of the photo monitoring stations will be determined once the final project design has been completed and the limits of the work areas have been firmly established. Additional photo monitoring stations also will be established at revegetation/restoration sites as well as any reference plant community locations.

Once the photo monitoring sites have been determined, a GPS unit with submeter accuracy will be used to record the location of the camera position. Notes will be taken on the locations including any notable landmarks and other information that will assist in easily relocating the position. Photo point locations will then be mapped on aerial photographs that have roads and other major landmarks clearly labeled.

Once the scene to be captured by the photo point has been determined, record the compass direction of the camera view in both cardinal directions (north, south, southwest, etc.) and degrees. Subsequent photographs taken from the same photo point will be taken in the same direction each time.

On the data sheet, describe the scene including notable items in the view that mat help with reorientation of the camera during subsequent monitoring. Provide a general description of the photo point including plant species, ground cover, disturbance, vegetation condition, etc.

After the first photo monitoring event is completed, maps, directions, and instructions on the orientations and views for each photo location will be prepared that will be used as the basis for subsequent monitoring events at each location.

After photographing the selected scene at each location, it may be useful to include additional site photographs of particular features and plants to provide additional detail on the site. For each additional photo, include a description of the setting or conditions that are being documented and include the photos and additional information with the photo monitoring report.

5.3.4 Frequency

Photo monitoring will occur before starting construction and following construction concurrent with monitoring of the revegetation sites. Photo documentation will be taken for 5 years post-construction and will occur in years 1, 2, 3 and 5. Post-construction and RPD monitoring will occur with each vegetation monitoring event, and photos will be appropriately archived in monitoring reports for use during post-decommissioning restoration.

5.4 Reporting

Following each monitoring event, a monitoring report will be prepared. The first monitoring report will be prepared during the first year following completion of construction activities. The first monitoring report will include specific information on the number, species, and locations of trees and shrubs that were removed or otherwise permanently impacted during construction as well as the number, species, and locations of mitigation plantings. The report also will include information on areas where aboveground trimming of shrubs occurred, but belowground root systems were left intact. The first monitoring report will include pre- and post-construction photographs from the photo monitoring stations, as well as photographs of the revegetation sites. The first report also will include the necessary documentation to relocate the photo monitoring stations in subsequent years.

Additional monitoring reports will be prepared for the following year 2, 3, and 5 monitoring events. These reports will include observations of natural recovery in construction areas, with particular emphasis on those areas where the belowground roots were left intact. Assessment of the revegetation areas including the condition of the revegetation plantings, discussion of any problems, and recommendations for adaptive management actions needed to be taken to address the problems. These reports also will include photographs and information from each of the photo monitoring stations.

Monitoring reports will be submitted to DTSC within 90 days of the completion of each monitoring event.

SECTION 6

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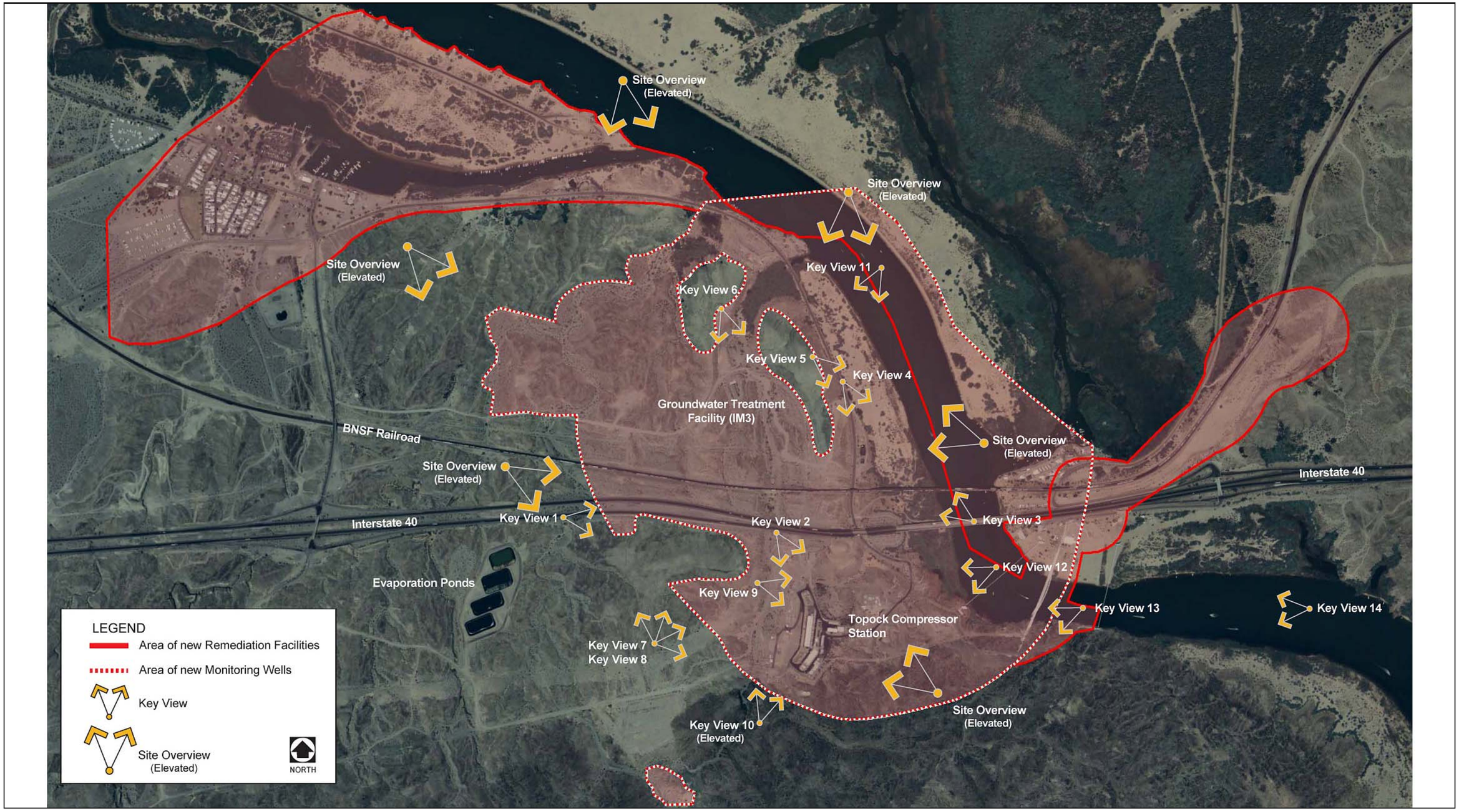
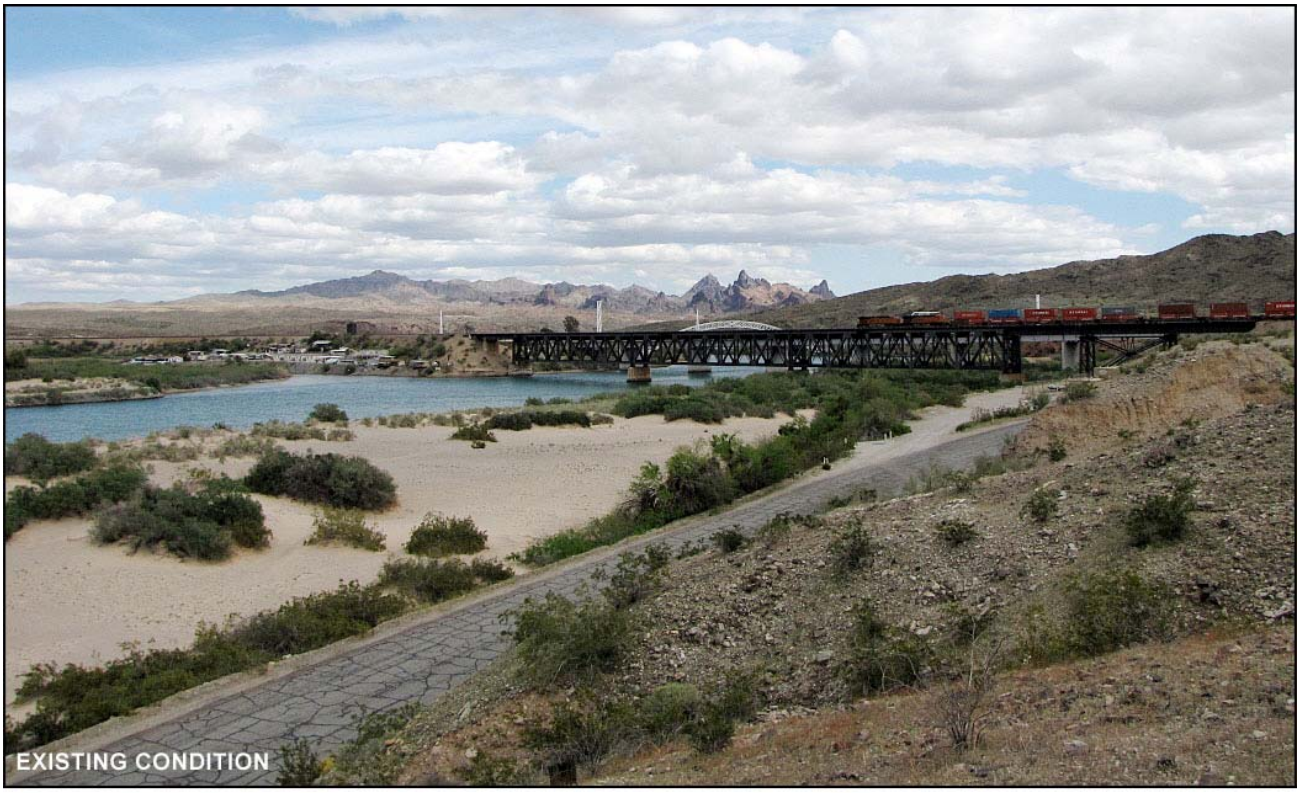
Appendix A
Map of Key Views and Photo Simulation for Key Views 5 and 11

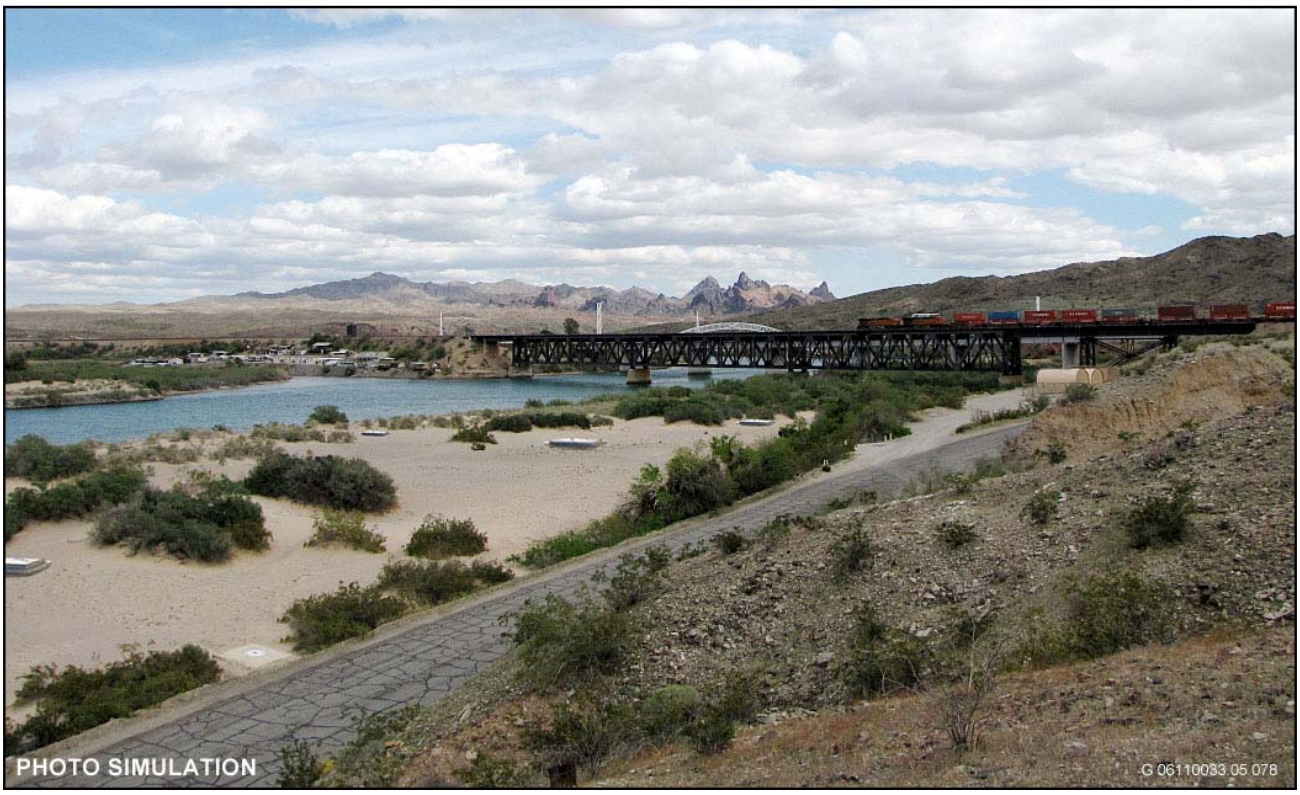


Source: Digital Globe 2009, AECOM 2010

Key View Map

Exhibit 4.1-7





Source: AECOM 2009

Key View 5, Existing Conditions Photo and Visual Simulation of the Proposed Project **Exhibit 4.1-19**

Appendix B
Commercial Nurseries that Grow Native Mojave Desert Plants

Ahakhav Native Plants Nursery
Colorado River Indian Reservation
25401 Rodeo Road
Parker AZ 85344
(928) 669-2664

El Nativo Growers
200 South Peckham Road
Azusa, CA 91702
(626) 969-8449
www.elnativogrowers.com
sales@elnativogrowers.com

High Country Gardens
2902 Rufina Street
Santa Fe, NM 87507
(800) 925-9387
www.highcountrygardens.com

LandscapeMart
8028 West Thunderbird Road
Peoria, AZ 85381-4612
(623) 298-6800
http://www.landscapemart.com/

Larners Seeds
P.O. Box 407
235 Grove Road
Bolinas, CA 94924
(415) 868-9407
info@larnerseeds.com
http://www.larnerseeds.com/_pages/wildflower_annual.html

Las Pilitas Nursery
8331 Nelson Way
Escondido, CA 92026
(760) 749-5930
www.laspilitas.com

Mountain States Wholesale Nursery
Litchfield Park, AZ 85340-2600
Phone: (623) 247-8509
Fax: (623) 247-6354
http://www.mswn.com/

Mountain Valley Growers
38325 Pepperweed Road
Squaw Valley, CA 93675
(559) 338-2775
http://www.mountainvalleygrowers.com

Misty Meadows Nursery
43601 Mesa Street
Banning, CA 92220
(951) 765-7542 or (951) 897-1585
mistymeadows@live.com
http://www.mistymeadowsnursery.com/601.html

Native American Seed
3791 North US Highway 377
Junction, TX 76849
(800) 728-0403
info@seedsource.com
http://www.seedsource.com/catalog/index.asp

Oak Hills Nursery
13874 Ranchero Road
Oak Hills, CA 92345
(760) 947-6261
oakhillsnursery@hotmail.com
http://www.oakhillsnursery.com
http://www.mojavedesertplants.com

Seedland, Inc.
9895 Adams Road
Wellborn, FL 32094
(386) 963-2080
sales@seedland.com
http://www.seedland.com/

S & S Seeds
P.O. Box 1275
Carpenteria, CA 93014
(805) 684-0436

San Marcos Growers
125 South San Marcos Road,
P.O. Box 6827
Santa Barbara, CA 93160
(805) 683-1561
http://www.smgrowers.com

Sheldon Nursery
4999 N. Sabino Canyon Rd.
Tucson, AZ 85750
520-529-0609
http://www.sheldonnursery.com
sheldonnursery1@yahoo.com

White Tank Nursery
P.O. Box 810
Waddell, AZ 85355
(623) 935-4276
info@whitetankpalms.com
http://www.whitetanknursery.com/index.html

Comstock Seed
917 Highway 88
Gardnerville, NV 89460
(777) 265-0090
sales@comstockseed.com
http://www.comstockseed.com

Appendix C
Photo Point Monitoring Datasheet

Pacific Gas and Electric Company
Topock Compressor Station
Photo Point Monitoring Data Sheet

Photo Point Station:_____ Date:_____

Observer:_____

Coordinates:_____ Datum:_____

Location Description:_____

_____

_____

_____

_____

_____

_____

Photo Direction: N NE E SE S SW W NW Compass Bearing:_____ Mag. or True North

Description of Setting (Including any vegetation, substrate and disturbance):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix O
Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats
(On CD-ROM only)

Final

Topock Compressor Station Groundwater Remediation Project Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats

Prepared for

Pacific Gas and Electric Company

September 2014

Prepared by

CH2M HILL, Inc., and E2 Consulting Engineers, Inc.

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Appendixes

A Vegetation Maps (with photo points) and Preconstruction Photographs
B Commercial Nurseries that Grow Native Mojave Desert Plants
C Photo Point Monitoring Datasheet

Acronyms and Abbreviations

BLM	United States Bureau of Land Management
CD	Consent Decree
CDFG	California Department of Fish and Game (now Department of Fish and Wildlife)
CDFW	California Department of Fish and Wildlife (formerly Department of Fish and Game)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
compressor station	Topock Compressor Station
C/RAWP	Construction/Remedial Action Work Plan
DOI	Department of the Interior
DTSC	California Department of Toxic Substances Control
ER	East Ravine
FEIR	Final Environmental Impact Report (for Topock Groundwater Remediation Project)
GPS	global positioning system
HNWR	Havasu National Wildlife Refuge
IM	Interim Measure
IRL	inner recirculation loop
IRZ	in situ reactive zone
ISA	International Society of Arboriculture
MMRP	Mitigation Monitoring and Reporting Program
msl	mean sea level
NHD	National Hydrographic Dataset
O&M	operation and maintenance
OHWM	ordinary high water mark
PBA	programmatic biological assessment
PG&E	Pacific Gas and Electric Company
PPD	preconstruction photo documentation
Project Area	Topock Groundwater Remediation Project AreaRB riverbank
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RPD	revegetation photo documentation
SWPPP	stormwater pollution prevention plan
TCS	Topock Compressor Station
TWB	Transwestern Bench

USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

SECTION 1

Introduction

In December 1951, the Topock Compressor Station (TCS or compressor station) began operations to compress natural gas supplied from the southwestern U.S. for transport through pipelines to Pacific Gas and Electric Company's (PG&E) service territory in central and northern California. The TCS is approximately 15 miles southeast of Needles in San Bernardino County, California (Figure 1). The compressor station is still active and is anticipated to remain active into the foreseeable future. Operations at the compressor station consist of six major activities: water conditioning, compressing natural gas, cooling compressed natural gas and compressor lubricating oil, wastewater treatment, facility and equipment maintenance, and miscellaneous operations.

Historical wastewater discharge from TCS operations to Bat Cave Wash and the East Ravine have resulted in chromium contamination in groundwater. In 1996, PG&E entered into a Corrective Action Consent Agreement with the California Department of Toxic Substances Control (DTSC) to oversee the investigation and remediation of the TCS under California state law. DTSC is the California state lead agency charged with directing investigative activities in the action area in accordance with the Resource Conservation and Recovery Act (RCRA). The U.S. Department of the Interior (DOI) is the lead federal agency overseeing response actions for land under its jurisdiction, custody, or control near the TCS pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In July 2005, PG&E and the Federal Agencies (DOI, Bureau of Land Management [BLM], Bureau Reclamation [USBR], and the U.S. Fish and Wildlife Service [USFWS]) entered into an Administrative Consent Agreement. In addition, PG&E and the United States also have entered into a Remedial Design/Remedial Action Consent Decree (CD) under CERCLA governing the groundwater remedy, which was entered by the U.S. District Court for the Central District of California in November 2013.

In January 2011, the DOI issued a Record of Decision (ROD) selecting the groundwater remedy for the site, and at the same time, DTSC also adopted the Final Remedy for the groundwater contamination. The 2013 CD requires the planning, design, construction, operation and maintenance (O&M), post-remediation monitoring, decommissioning, and restoration of the groundwater remedy selected in the ROD.

Implementation of the groundwater remedy (the project) consists of several phases, including construction, O&M, post-remediation monitoring, decommissioning, and restoration. Figures 2a through 2c show the planned final groundwater remedy system layout in California, Moabi Regional Park, and Arizona, respectively. The project is expected to operate for several decades (estimated duration between 30 and 50 years).

Generally, the final groundwater remedy will include the following key features:

- An in situ reactive zone (IRZ) along the National Trails Highway that will use a line of wells that may be used as both injection and extraction wells to circulate groundwater and distribute an organic carbon source that will promote reduction of the hexavalent chromium to trivalent chromium.
- An inner recirculation loop (IRL) that comprises:
  - Extraction wells near the Colorado River (referred to as the riverbank [RB] extraction wells) to provide hydraulic capture of the deep hexavalent chromium groundwater concentrations, accelerate cleanup of the floodplain, enhance the flow of contaminated groundwater through the IRZ line, and control migration of IRZ-generated byproducts toward the Colorado River.
  - Injection wells to reinject groundwater extracted from the RB extraction wells, which may be amended with an organic carbon source, in the upgradient portion of the hexavalent chromium plume to flush the plume through the IRZ.

- A TCS recirculation loop, which includes:
  - East Ravine (ER) extraction wells near the eastern end of the East Ravine to capture contaminated groundwater in the shallow bedrock.
  - Transwestern Bench (TWB) extraction wells near the eastern portion of the TCS parcel to capture contaminated groundwater downgradient of the compressor station.
  - TCS injection wells located within the compressor station for the reinjection of groundwater extracted from the ER and TWB extraction wells. The extracted water will be amended with an organic carbon source to promote reduction of hexavalent chromium to trivalent chromium and reduce elevated hexavalent chromium groundwater concentrations from the alluvial aquifer in the vicinity of the compressor station.
- The freshwater supply system will convey water from supply well(s) in Arizona to assist with flushing the chromium plume through the National Trails Highway IRZ and constrain the westward spread of carbon-amended water and in situ byproducts from the IRL.

1.1 Purpose

DTSC certified the Topock Groundwater Remediation Project Final Environmental Impact Report (FEIR; DTSC, 2011) for the project and adopted the Mitigation Monitoring and Reporting Program (MMRP) in January 2011. Mitigation Measure BIO-1, listed below, is part of the measures intended to protect biological resources in the FEIR and MMRP. This restoration plan has been prepared to address the portions of the MMRP highlighted in the boldface type below.

> ***Mitigation Measure BIO-1:*** *Areas of sensitive habitat in the Project Area have been identified during project surveys. These areas include floodplain and riparian areas, wetlands, and waters of the United States. Habitats designated by California Department of Fish and Game (DFG) as sensitive, including desert washes and desert riparian, are also included. To the extent feasible, elements of the project shall be designed to avoid direct effects on these sensitive areas. During the design process and before ground disturbing activities, a qualified biologist shall coordinate with PG&E to ensure that the footprints of construction zones, drill pads, staging areas, and access routes are designed to avoid disturbance of sensitive habitats to the extent feasible. DTSC shall be responsible for enforcing compliance with design and all preconstruction measures.*
>
> *. . .*
>
> *If during the design process it is shown that complete avoidance of habitats under DFG jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, a Section 1602 streambed alteration agreement shall be obtained from DFG and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a no-net-loss basis in accordance with DFG regulations and, if applicable, as specified in the streambed alteration agreement, if needed.* ***Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to DFG and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents.*** *Minimization and compensation measures adopted through the permitting process shall also be implemented.*

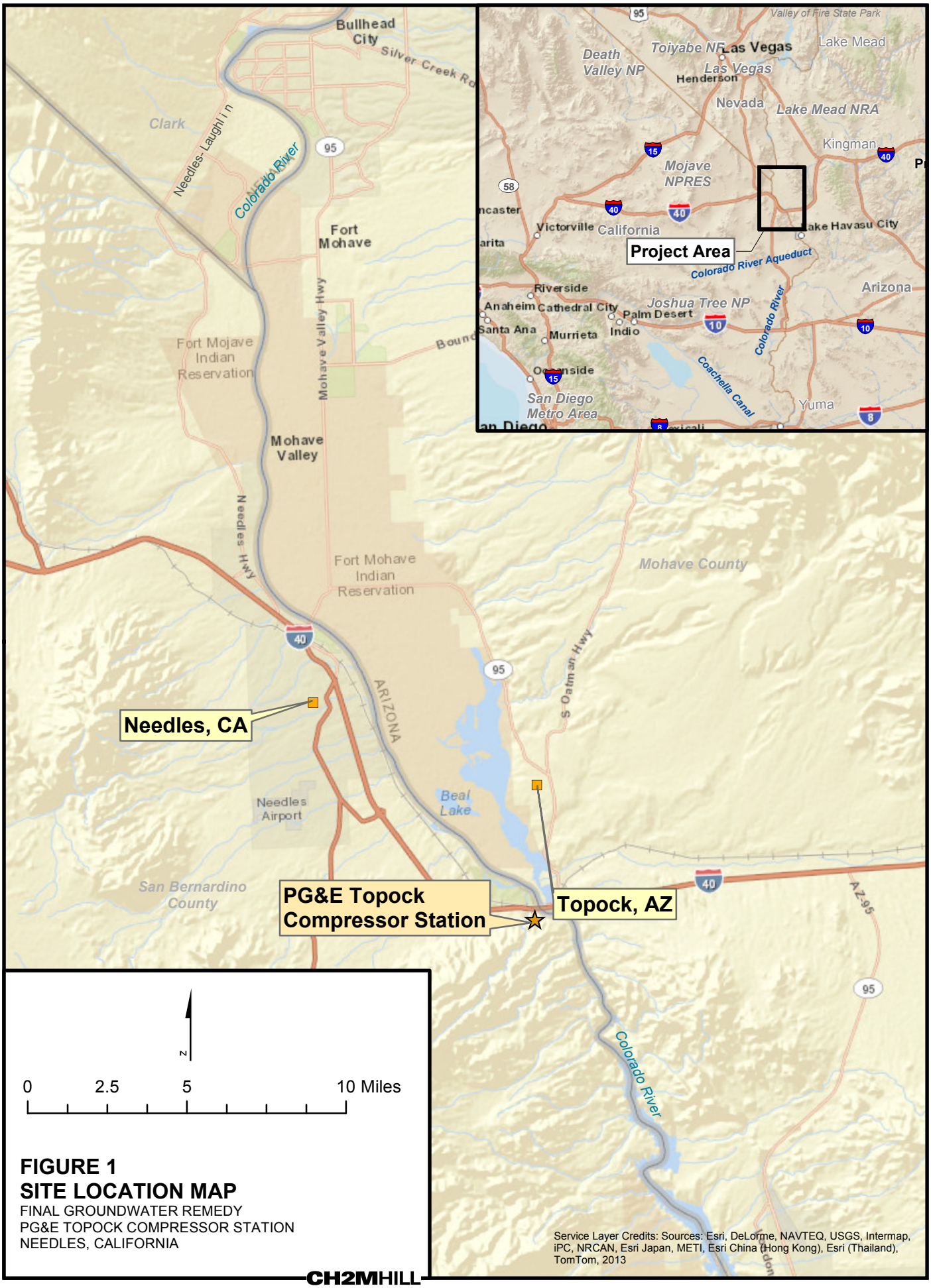
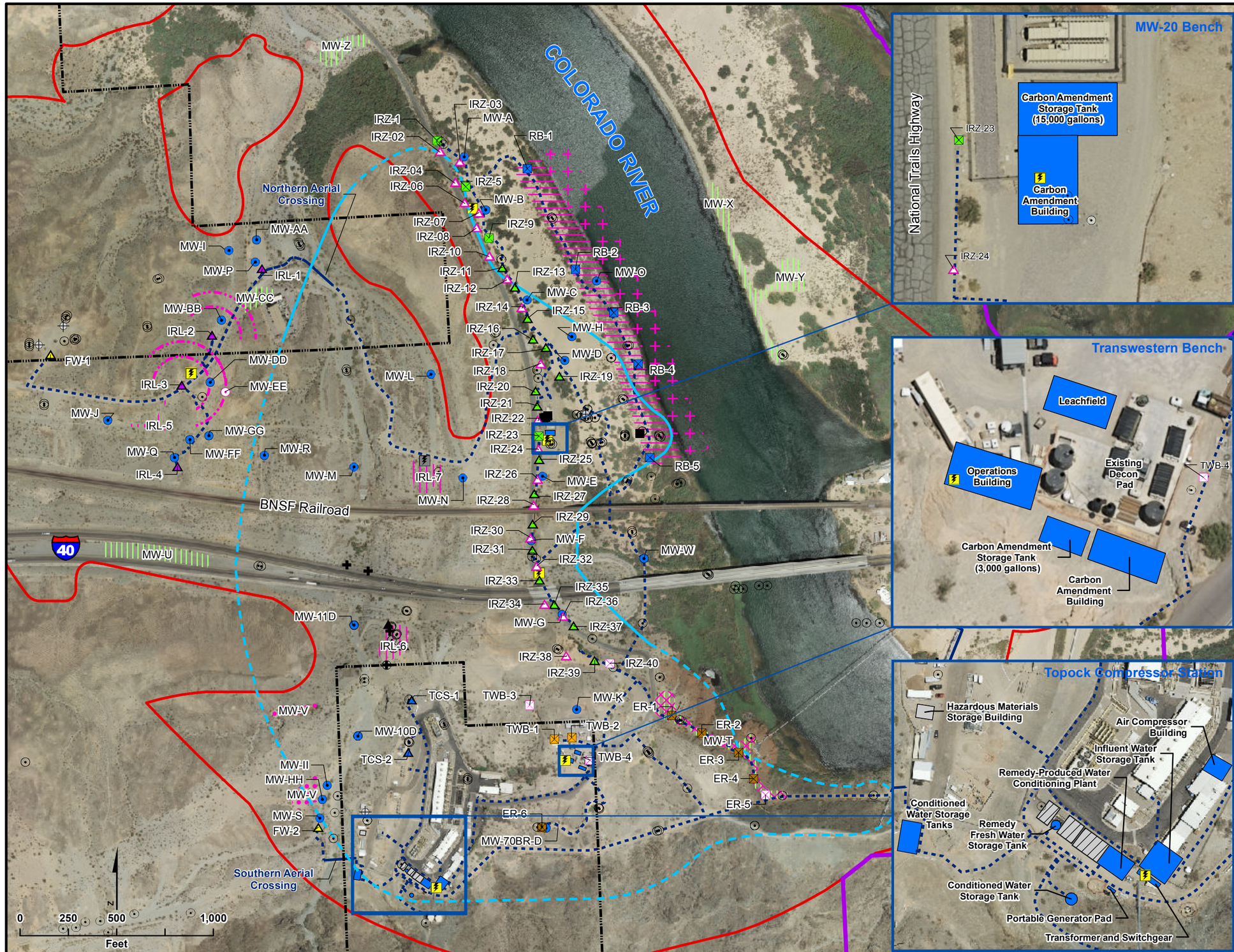


FIGURE 1
SITE LOCATION MAP
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\HNWR\FIG1_SiteLocationHNWR.mxd Date Saved: 6/19/2014 10:15:09 AM



LEGEND

- Property Boundaries
- Area of Potential Effects (APE)
- EIR Project Area

Existing Wells:

- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:

(Items in Pink are Provisional)

- Extraction Well
- Injection Well
- Monitoring Well (MW-EE is a pending/future provisional monitoring well)
- Arc for IRL-2 and IRL-3 Arsenic Monitoring Wells [3]
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:

- Extraction, East Ravine
- Extraction, National Trails Highway (NTH) In-situ Reactive Zone (IRZ)
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Pipeline Corridor for Remedy

- Aboveground Pipe
- Underground Pipe/Conduit

Remedy Facilities

- Planned Transformer
- Future Provisional Transformer
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth ingroundwater based on fourth quarter 2013 sampling events. Dashed where based on limited data.

Note:

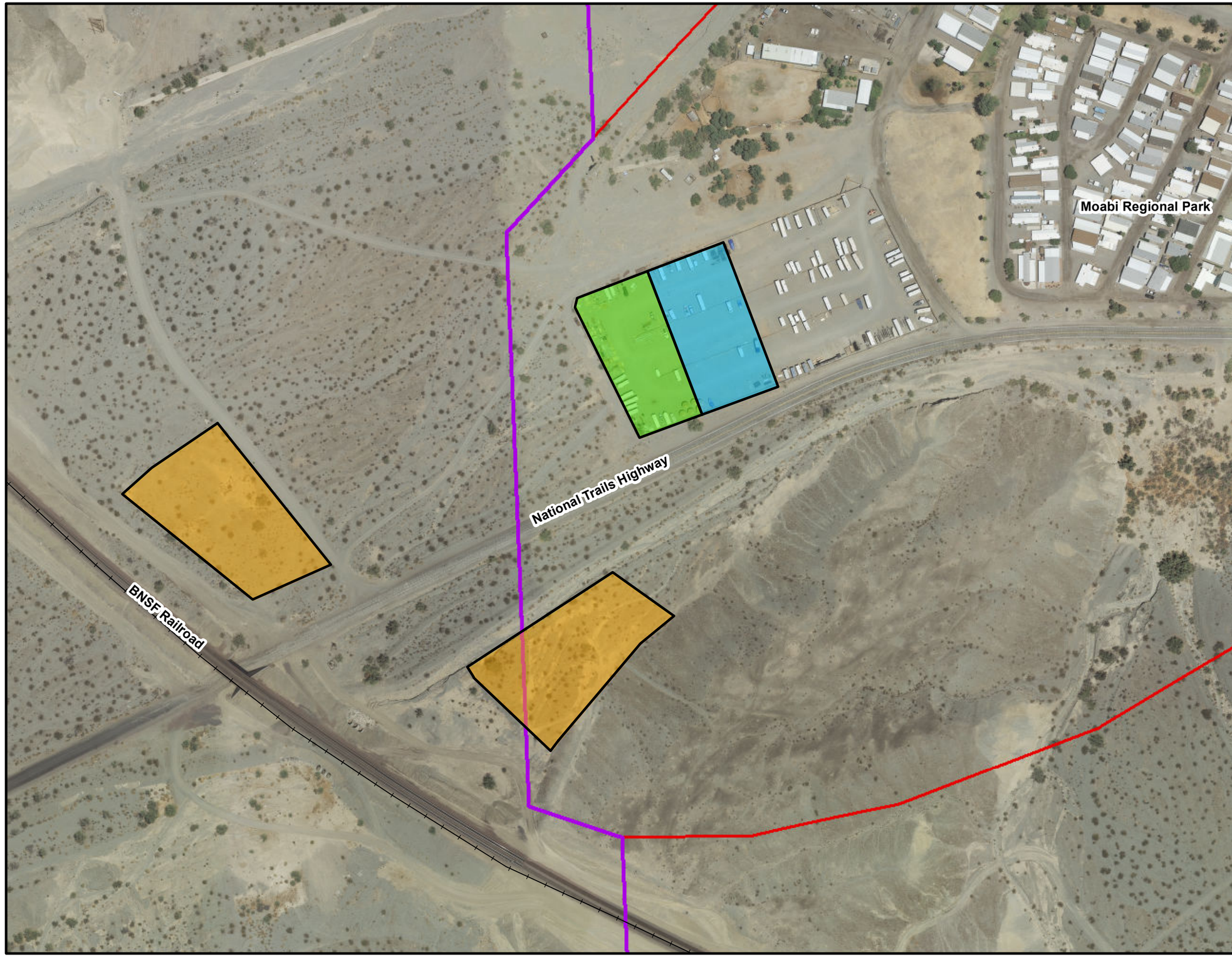
1. Note that in compliance with EIR mitigation measure CUL-1a-9, as well as PA and CHPMP mitigation measures, the pipeline along the dirt road west of National Trails Hwy is located in an existing, previously disturbed, access road. In addition, the location of the road and pipeline was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10, PA, and CHPMP mitigation measures.
2. All well and structure locations are approximate.
3. Arcs for IRL-2 and IRL-3 arsenic monitoring wells represent a range of potential well locations. Portions of the arcs are not suitable for well installation due to technical and/or cultural resources constraints.

FIGURE 2A
GENERAL REMEDY SYSTEM LAYOUT - CALIFORNIA

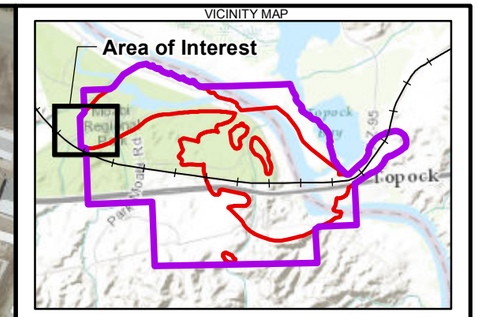
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\Vegetation\FIG2A_90pct_CAdetails.mxd



VICINITY MAP



LEGEND

- Long Term Remedy Support Area (1.2 acres approx.)
- Soil Storage Area (Each 1.5 acres approx.)
- Temporary Construction Laydown Area (1.3 acres approx.)
- Area of Potential Effects (APE)
- EIR Project Area

Notes:
1. This is a conceptual layout. Locations are approximate.
2. Descriptions of activities/functions anticipated for the construction support areas are included in the Construction/Remedial Action Work Plan.
3. Descriptions of activities/functions anticipated for the long-term remedy support areas are included in Section 3.5 of this BOD, and the O&M Manual.

N

0 95 190 380 Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

FIGURE 2B
GENERAL REMEDY SYSTEM LAYOUT - MOABI REGIONAL PARK
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\Vegetation\FIG2B_PM_StagingRemedy_11x17.mxd

Site B

County Highway 10

HNWR-1A

HNWR-1

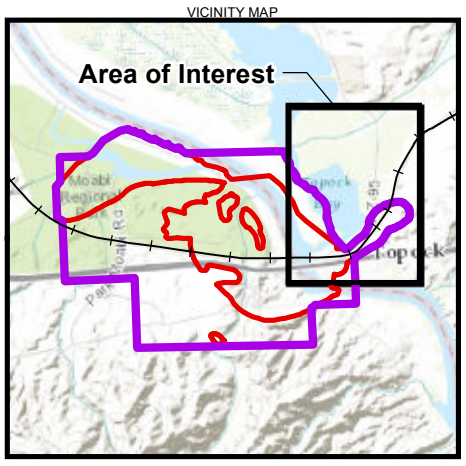
MW-X

MW-Y

BNSF Railroad

40

VICINITY MAP



LEGEND

Existing Wells:

- Monitoring Well
- Water Supply Well

Planned Wells:

- Area for Monitoring Well (Applies to MW-X and MW-Y)

Provisional Wells:

- Area for Potential Slant Well Screens

Pipeline Corridor for Remedy

- Aboveground Freshwater Pipe
- Underground Freshwater Pipe
- Future Provisional/Contingent Fresh Water Pipe

- Area of Potential Effects (APE)
- EIR Project Area

Note:
All wells and remedy structure locations are approximate.

N

0 200 400 800 Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

FIGURE 2C
GENERAL REMEDY SYSTEM LAYOUT - ARIZONA
FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2014\Vegetation\FIG2C_ArizonaFW_11x17.mxd

Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. ***These measures shall be achieved by developing and implementing a habitat restoration plan submitted to DFG, U.S. Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (USFWS) that is agreeable to these agencies, or, alternately, through the implementation of a habitat restoration plan consistent with the substantive policies of DFG, Bureau of land Management (BLM), and United States Fish and Wildlife Service (USFWS).*** *The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan. Alternately, if DFG declines to assert jurisdiction because it determines that Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(e)(1) applies, and during the design process it is shown that complete avoidance of habitats under DFG jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, the substantive mandates of a streambed alteration agreement shall be implemented, and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a "no-net-loss" basis in accordance with DFG regulations and, if applicable. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to DFG and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan developed consistent with the substantive policies of DFG, BLM and USFWS.*

A separate revegetation plan has been developed to specifically address impacts on the Havasu National Wildlife Refuge (HNWR), for mature plants, and culturally significant plants that may be affected by proposed groundwater remediation activities. Furthermore, a programmatic biological assessment (PBA) has been prepared to address potential impacts to federally listed species and was submitted into consultation on April 28, 2014. On March 6, 2013, Chris Hayes, Deputy Regional Manager for California Department of Fish and Wildlife's (CDFW) Inland Desert Region, confirmed in a letter that response actions conducted at the TCS site, specifically soil and groundwater investigations and remediation activities, are exempted from obtaining a Lake and Streambed Alteration Agreement under Section 121(e)(1) of CERCLA. However, to comply with Mitigation Measure BIO-1, PG&E must comply with the substantive elements that would be required in a Streambed Alteration Agreement for the project.

This habitat restoration plan provides detailed information on salvage, relocation and transplantation methods, and replacement planting for plant species in sensitive habitat areas that are within areas under the jurisdiction of CDFW pursuant to Section 1600 of the State of California Fish and Game Code. This report also includes proposed monitoring methods, survival criteria, and a discussion of adaptive management as required by FEIR mitigation measure BIO-1.

1.2 Goals and Objectives

The goal of the restoration plan for riparian vegetation and other sensitive habitats is to satisfy the requirements of Mitigation Measure BIO-1, which is intended is to protect and preserve certain sensitive habitats including rivers, streams, wetlands, and riparian habitat in the Topock Groundwater Remediation Project Area (Project Area). The Project Area includes the area studied in the FEIR (DTSC, 2011), as well as the areas associated with the potential soil stockpiles and the proposed freshwater supply system in Arizona. Note, however, no soil storage areas will occur within riparian areas. The Project Area in terms of this restoration plan includes any jurisdictional wetland or waters where the proposed final groundwater remedy action may occur.

The primary objective during implementation of the final groundwater remedy is to avoid and minimize disturbance of sensitive habitats and, where this is not possible, mitigate for disturbance through salvage or restoration planting. Final groundwater remedy actions that may results in impacts to sensitive habitats include construction, O&M, sampling and monitoring, decommissioning, and restoration.

1.3 Description of Sensitive Habitats in the Project Area

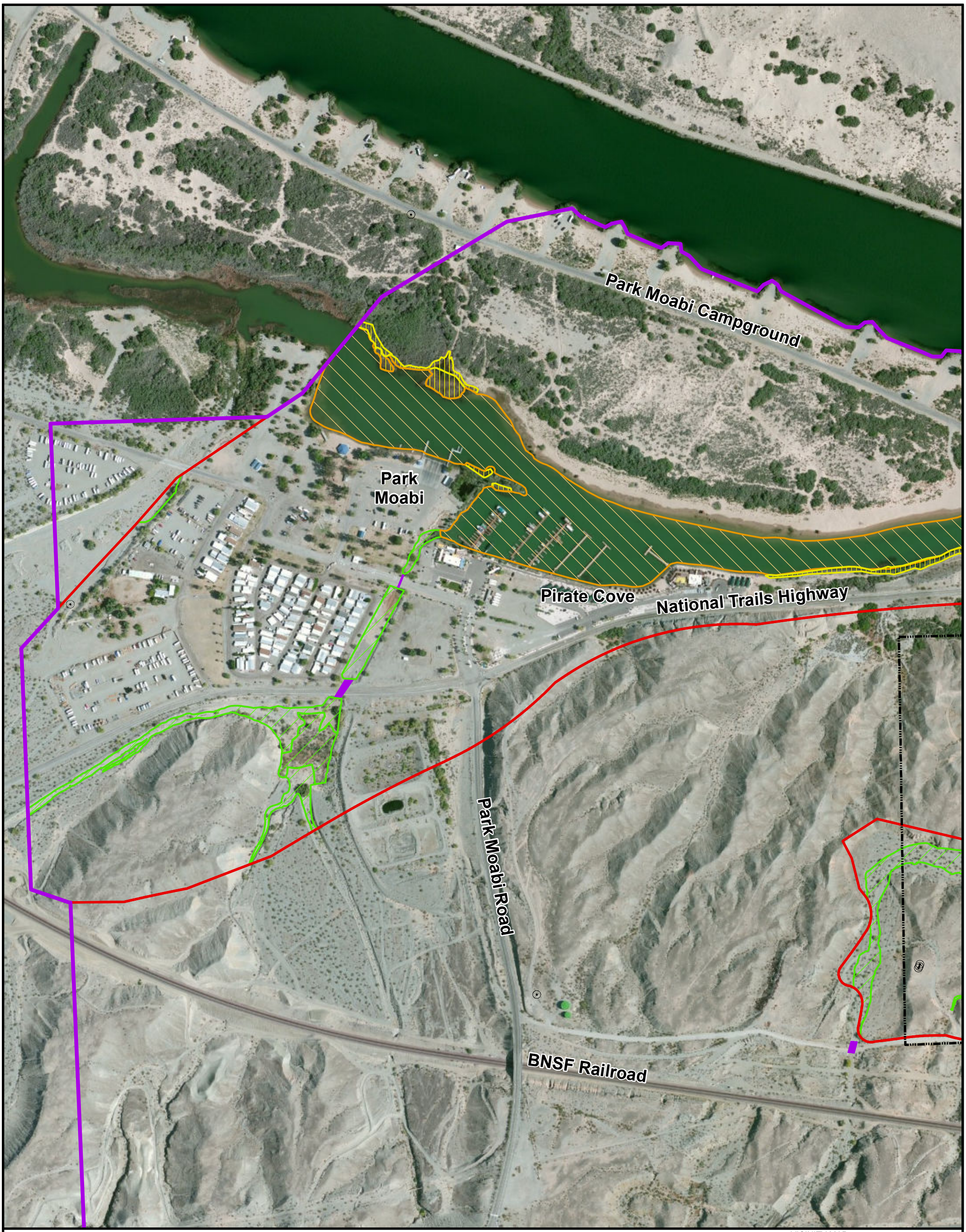
Primary sensitive habitats identified within the Project Area include riparian vegetation as well as rivers, streams (including ephemeral washes), and wetlands. These habitat types were identified and mapped as part of the wetlands delineation survey and CDFW jurisdictional memorandum (CH2M HILL, 2013 and 2014). The following sections provide a description of rivers and streams as well as associated riparian habitat that are considered to be sensitive habitats by CDFW, as directed by the groundwater remediation project FEIR (DTSC 2011). The distribution of these features is shown on Figures 3-1 through 3-6, and representative photographs are provided in Appendix A. A more detailed description of the specific vegetation impacts is provided in Section 1.3.6.

1.3.1 Colorado River

The Colorado River is the primary surface water feature in the Project Area. The river flows approximately 6,400 feet through the central part of the Project Area. Significant changes to the Colorado River hydraulic regime near the Project Area occurred after construction of Hoover Dam and Parker Dam. With the completion of Hoover Dam in 1936, annual spring floods and associated scouring events ended. With the completion of Parker Dam in 1938, and subsequent filling of Lake Havasu, the Colorado River channel between Needles and Topock rapidly aggraded (Metzger and Loeltz, 1973). By 1944, the aggradation of the river channel caused elevated groundwater levels and flooding in low-lying areas. In response to this condition, the USBR conducted extensive dredging of the river channel to maintain channel geometry and reduce flooding. These changes have had a significant impact on the natural floodplain processes and associated riparian vegetation in the Project Area.

The water elevations in the Colorado River fluctuate seasonally and daily due to upstream flow regulation from the Davis Dam, located approximately 41 river miles upstream of the Project Area. Data from the United States Geological Survey (USGS) river gauge at the Topock Marsh inlet shows that average flow rate ranges from a low of 14 cubic feet per second (cfs) in January to a high of 99 cfs in June (Figure 4). Daily surface water elevation data for the Colorado River have been measured near the Interstate-40 bridge since the middle of June 2003 as part of the ongoing monitoring program at the compressor station. The average water level elevation recorded for this period was 454.9 feet above mean sea level (msl), with a minimum of 450.6 feet above msl and a maximum of 458.7 feet above msl. Average monthly flow rates measured at the Topock Marsh inlet between January 1967 and September 2012 show a fluctuating, but controlled, rate of discharge that did not exceed a mean of 193 cfs (Figure 5).

Upstream of the Interstate-40 bridge, the river channel ranges from approximately 600 to 740 feet wide. Downstream of the bridge, the river traverses the exposed bedrock of the Chemehuevi Mountains, and the channel width narrows to approximately 435 feet. Throughout much of the Project Area, the channel banks are primarily characterized by steep slopes that have been armored with large boulders. The elevation at the top of the banks is approximately 466 feet above msl, more than 7 feet above the maximum flow level recorded in this area since 2003. Further south along the Arizona side of the Colorado River, near the inlet to the Topock Marina, the banks are slightly lower and have narrow sandy beaches and eroded sandy banks at elevations ranging from around 460 to 463 feet above msl.



LEGEND

Existing Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- ARC for IRL-2 and IRL-3 Arsenic Monitoring Wells
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:
- Extraction, East Ravine
- Extraction, NTH IRZ
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Injection/Extraction, Inner Recirculation Loop
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Transformers
- Planned Transformer
- Future Provisional Transformer

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/ Contingent Fresh Water Pipe
- Area of Potential Effects (APE)
- Property Boundaries

Remedy Facilities
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Wetland Delineation Boundary
- Culvert

CDFW Jurisdiction Areas
- CDFW Ephemeral Stream
- CDFW Riparian
- Colorado River
- Park Moabi Slough

N

0 420 Feet

Note:
CDFW = California Department of Fish and Wildlife

Source:
Wetland Delineation Completed March 13-17, 2012 R. Huddleston and K. Steiner. Update Completed July16-17, 2012 R. Huddleston and M. Fowler. Update Completed December 12-13, 2012 R. Huddleston.

VICINITY MAP

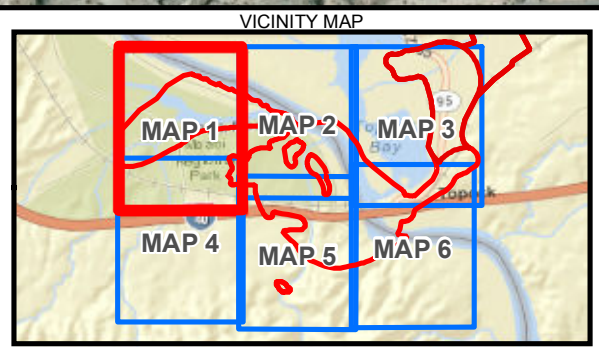
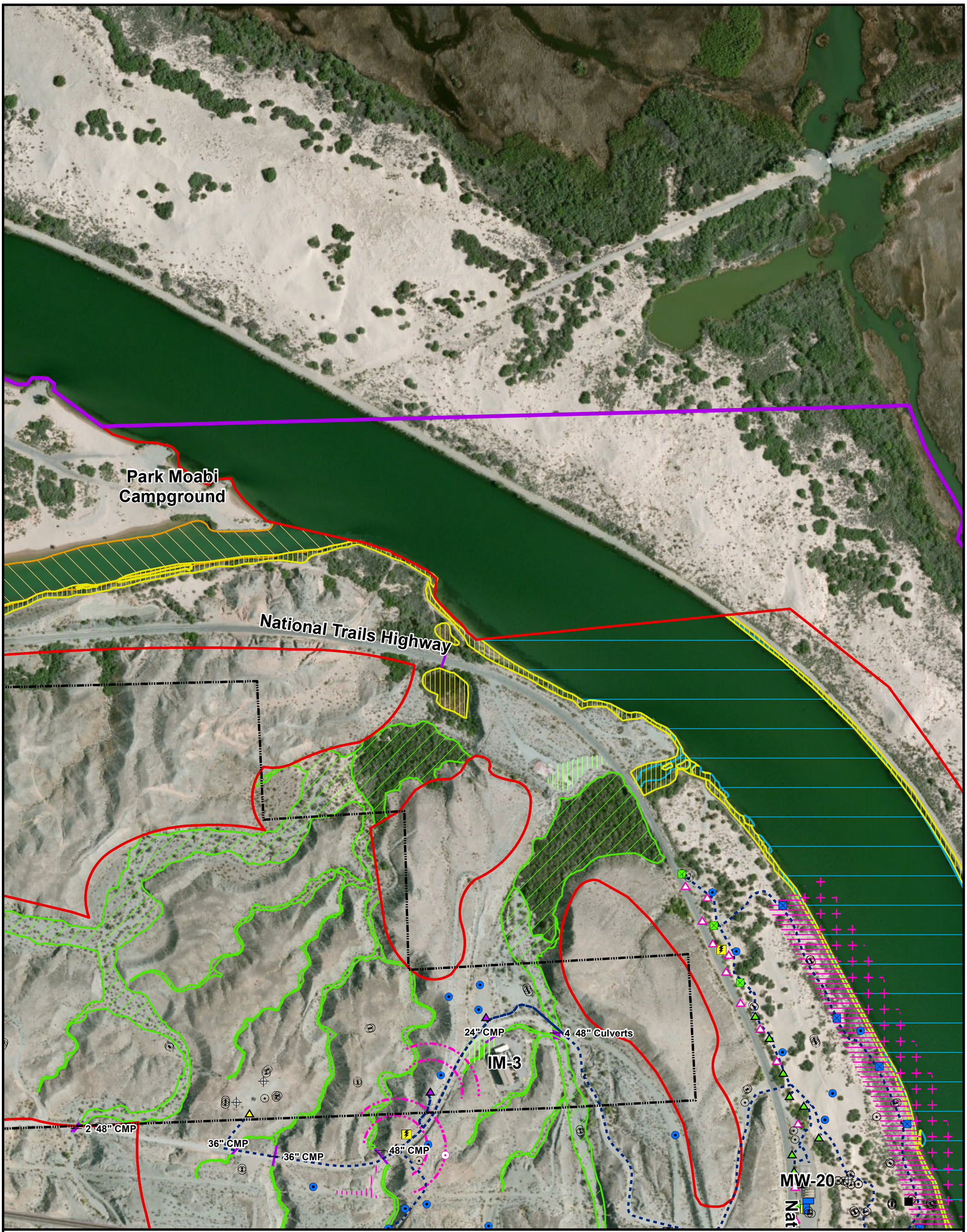


FIGURE 3-1
RIVERS, STREAMS AND RIPARIAN AREAS
Map 1 of 6
Final Groundwater Remedy
PG&E Topock Compressor Station
Needles, California



LEGEND

Existing Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- ARC for IRL-2 and IRL-3 Arsenic Monitoring Wells
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:
- Extraction, East Ravine
- Extraction, NTH IRZ
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Injection/Extraction, Inner Recirculation Loop
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Transformers
- Planned Transformer
- Future Provisional Transformer

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/ Contingent Fresh Water Pipe
- Area of Potential Effects (APE)
- Property Boundaries

Remedy Facilities
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Wetland Delineation Boundary
- Culvert

CDFW Jurisdiction Areas
- CDFW Ephemeral Stream
- CDFW Riparian
- Colorado River
- Park Moabi Slough

N

0 380 Feet

Note:
CDFW = California Department of Fish and Wildlife

Source:
Wetland Delineation Completed March 13-17, 2012 R. Huddleston and K. Steiner. Update Completed July16-17, 2012 R. Huddleston and M. Fowler. Update Completed December 12-13, 2012 R. Huddleston.

VICINITY MAP

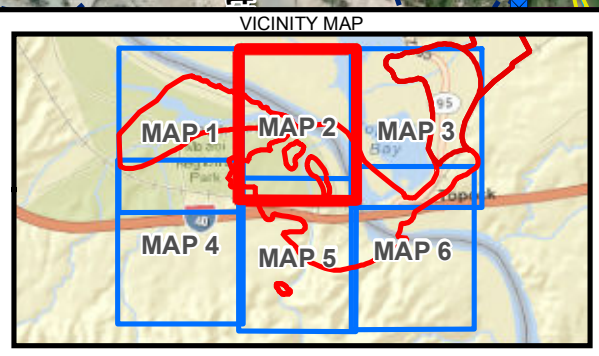


FIGURE 3-2
RIVERS, STREAMS AND RIPARIAN AREAS
Map 2 of 6
Final Groundwater Remedy
PG&E Topock Compressor Station
Needles, California

CH2MHILL

LEGEND

Existing Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- ARC for IRL-2 and IRL-3 Arsenic Monitoring Wells
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:
- Extraction, East Ravine
- Extraction, NTH IRZ
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Injection/Extraction, Inner Recirculation Loop
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Transformers
- Planned Transformer
- Future Provisional Transformer

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/ Contingent Fresh Water Pipe
- Area of Potential Effects (APE)
- Property Boundaries

Remedy Facilities
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Wetland Delineation Boundary
- Culvert

CDFW Jurisdiction Areas
- CDFW Ephemeral Stream
- CDFW Riparian
- Colorado River
- Park Moabi Slough

N

0 420 Feet

Note:
CDFW = California Department of Fish and Wildlife

Source:
Wetland Delineation Completed March 13-17, 2012 R. Huddleston and K. Steiner. Update Completed July16-17, 2012 R. Huddleston and M. Fowler. Update Completed December 12-13, 2012 R. Huddleston.

VICINITY MAP

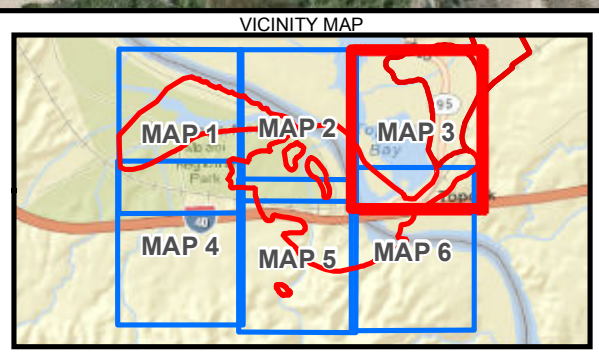
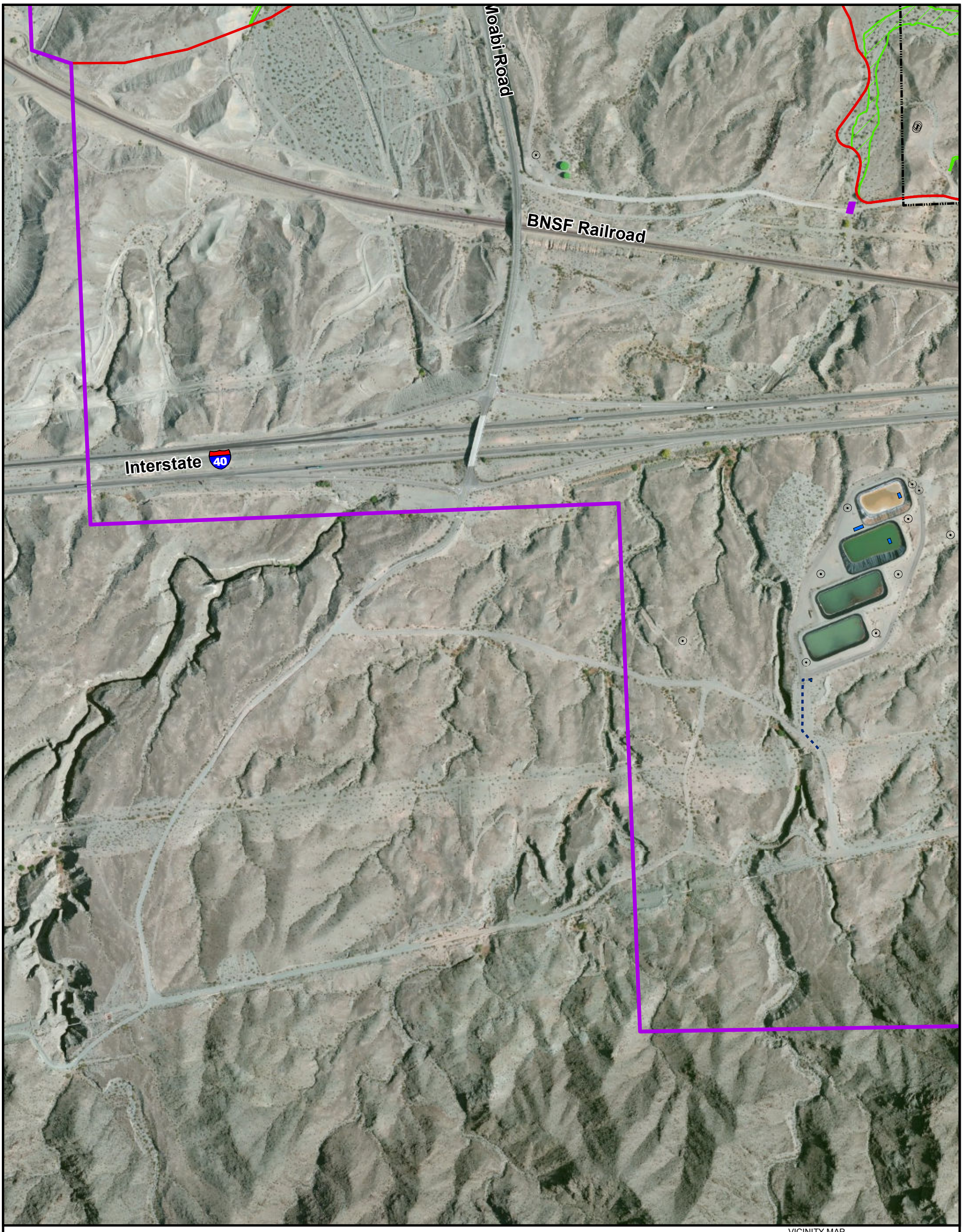


FIGURE 3-3
RIVERS, STREAMS AND RIPARIAN AREAS
Map 3 of 6
Final Groundwater Remedy
PG&E Topock Compressor Station
Needles, California



LEGEND

Existing Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- ARC for IRL-2 and IRL-3 Arsenic Monitoring Wells
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:
- Extraction, East Ravine
- Extraction, NTH IRZ
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Injection/Extraction, Inner Recirculation Loop
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Transformers
- Planned Transformer
- Future Provisional Transformer

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/ Contingent Fresh Water Pipe
- Area of Potential Effects (APE)
- Property Boundaries

Remedy Facilities
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Wetland Delineation Boundary
- Culvert

CDFW Jurisdiction Areas
- CDFW Ephemeral Stream
- CDFW Riparian
- Colorado River
- Park Moabi Slough

N

0 420 Feet

Note:
CDFW = California Department of Fish and Wildlife
Source:
Wetland Delineation Completed March 13-17, 2012 R. Huddleston and K. Steiner. Update Completed July16-17, 2012 R. Huddleston and M. Fowler. Update Completed December 12-13, 2012 R. Huddleston.

VICINITY MAP

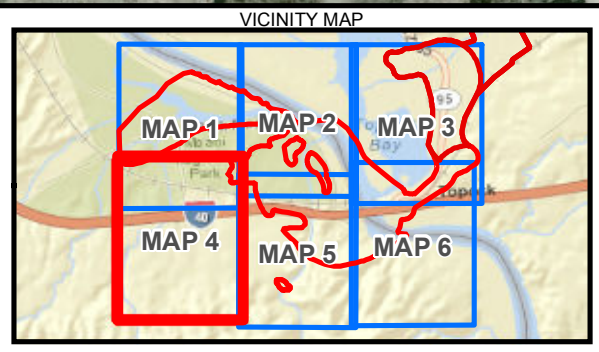
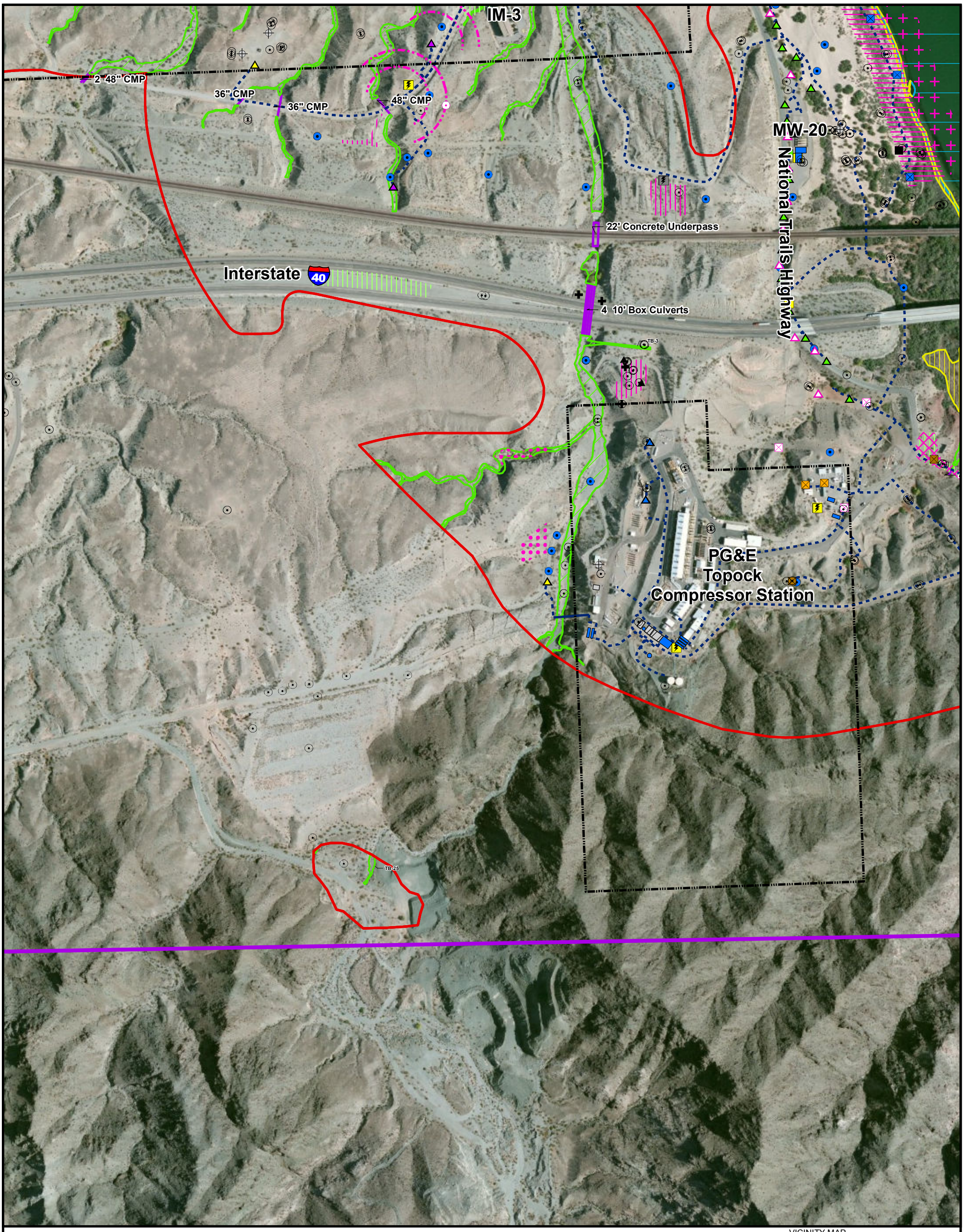


FIGURE 3-4
RIVERS, STREAMS AND RIPARIAN AREAS
Map 4 of 6
Final Groundwater Remedy
PG&E Topock Compressor Station
Needles, California



LEGEND

Existing Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- ARC for IRL-2 and IRL-3 Arsenic Monitoring Wells
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:
- Extraction, East Ravine
- Extraction, NTH IRZ
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Injection/Extraction, Inner Recirculation Loop
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Transformers
- Planned Transformer
- Future Provisional Transformer

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/ Contingent Fresh Water Pipe
- Area of Potential Effects (APE)
- Property Boundaries

Remedy Facilities
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Wetland Delineation Boundary
- Culvert

CDFW Jurisdiction Areas
- CDFW Ephemeral Stream
- CDFW Riparian
- Colorado River
- Park Moabi Slough

N

0 400 Feet

Note:
CDFW = California Department of Fish and Wildlife

Source:
Wetland Delineation Completed March 13-17, 2012 R. Huddleston and K. Steiner. Update Completed July16-17, 2012 R. Huddleston and M. Fowler. Update Completed December 12-13, 2012 R. Huddleston.

VICINITY MAP

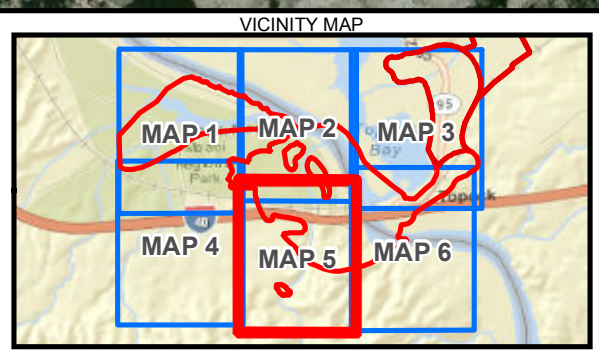
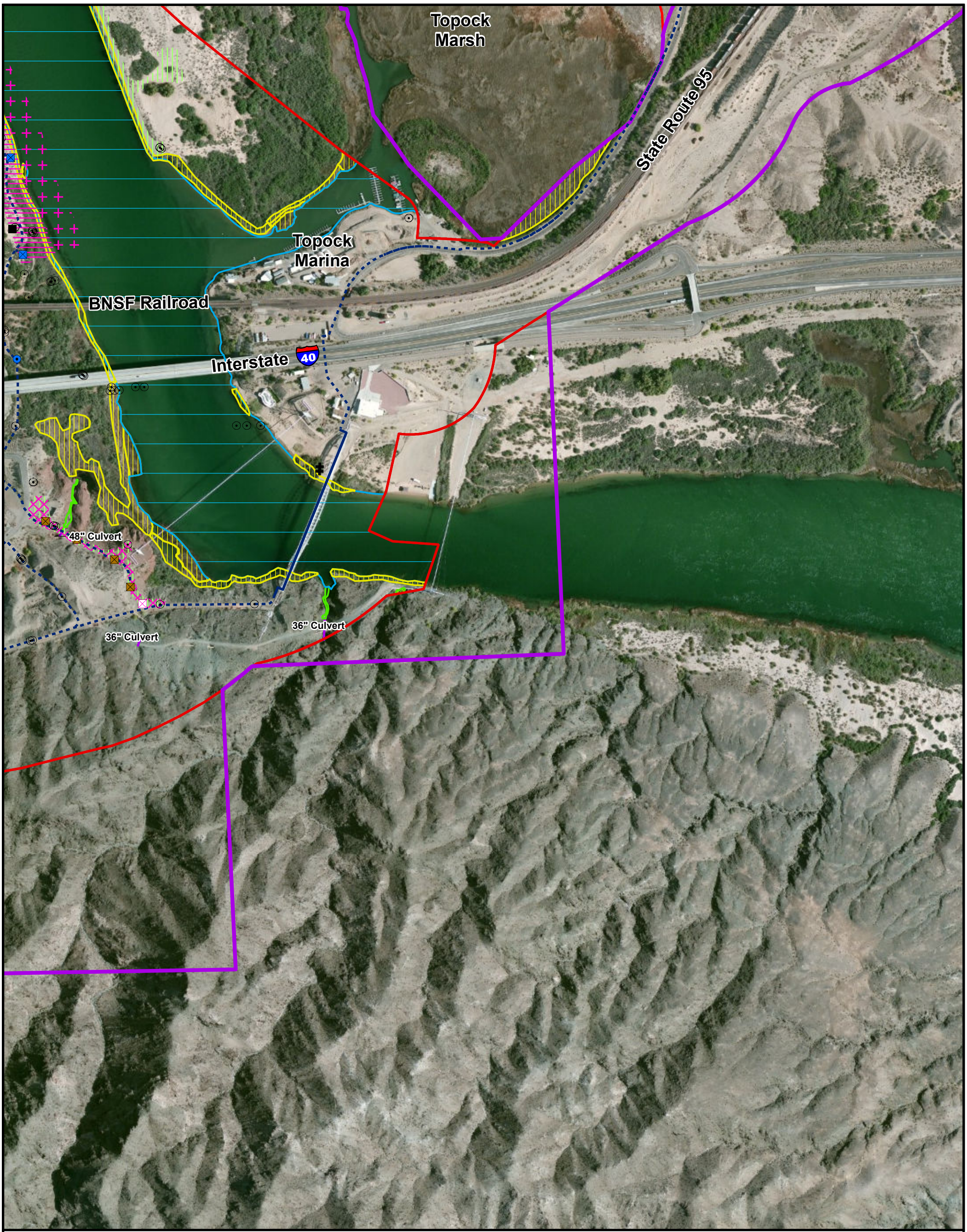


FIGURE 3-5
RIVERS, STREAMS AND RIPARIAN AREAS
Map 5 of 6
Final Groundwater Remedy
PG&E Topock Compressor Station
Needles, California



LEGEND

Existing Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- Water Supply Well

Provisional Wells:
- Extraction Well
- Injection Well
- Monitoring Well
- ARC for IRL-2 and IRL-3 Arsenic Monitoring Wells
- Area for East Ravine (ER) Wells (ER-7 to ER-11 and MW-T)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells (RB-6 to RB-9)
- Area for Monitoring Well (MW-V)

Planned Wells:
- Extraction, East Ravine
- Extraction, NTH IRZ
- Extraction, Riverbank
- Extraction, Transwestern Bench
- Injection, Freshwater
- Injection, Inner Recirculation Loop
- Injection, NTH IRZ
- Injection, Topock Compressor Station
- Injection/Extraction, Inner Recirculation Loop
- Remedy Monitoring Well
- Recirculation Well
- Area for Monitoring Well (Applies to MW-CC, MW-T, MW-U, MW-X, MW-Y, and MW-Z)

Transformers
- Planned Transformer
- Future Provisional Transformer

Pipeline Corridor for Remedy
- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/ Contingent Fresh Water Pipe
- Area of Potential Effects (APE)
- Property Boundaries

Remedy Facilities
- Proposed Remedy Structure
- Contingent Freshwater Pre-injection Treatment System
- Wetland Delineation Boundary
- Culvert

CDFW Jurisdiction Areas
- CDFW Ephemeral Stream
- CDFW Riparian
- Colorado River
- Park Moabi Slough

N

0 420 Feet

Note:
CDFW = California Department of Fish and Wildlife
Source:
Wetland Delineation Completed March 13-17, 2012 R. Huddleston and K. Steiner. Update Completed July16-17, 2012 R. Huddleston and M. Fowler. Update Completed December 12-13, 2012 R. Huddleston.

VICINITY MAP

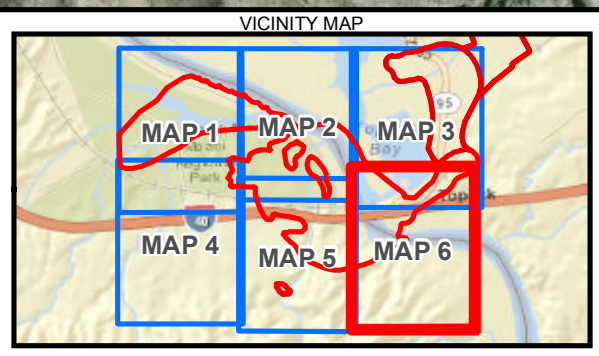
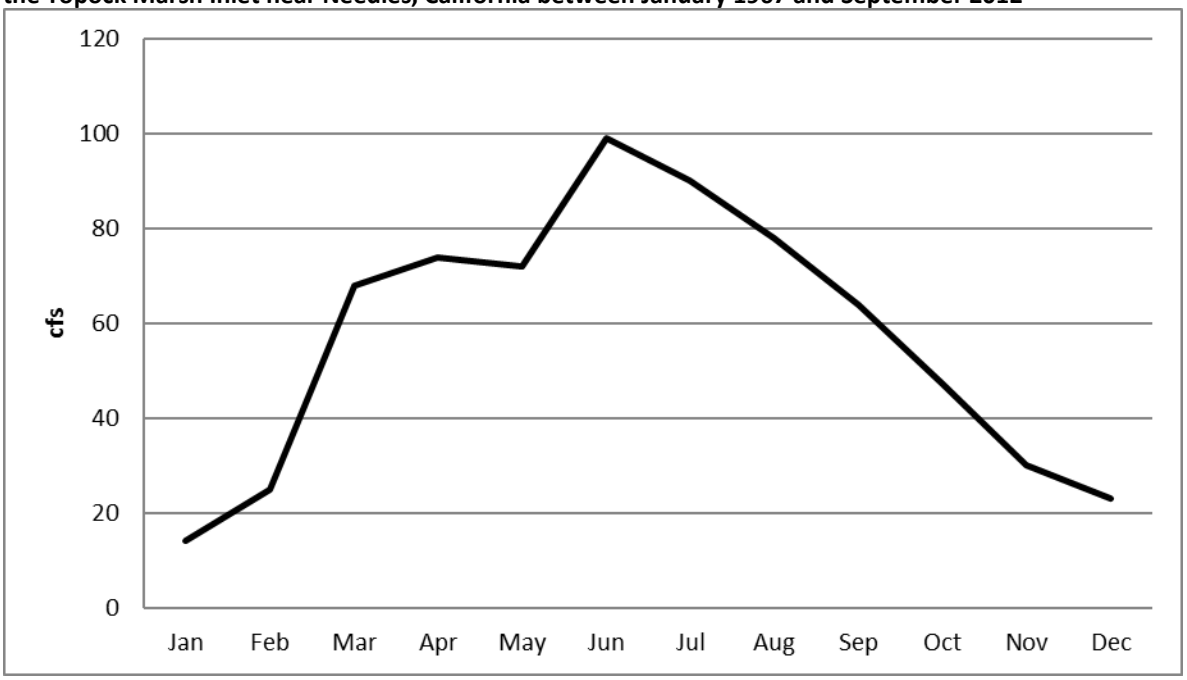


FIGURE 3-6
RIVERS, STREAMS AND RIPARIAN AREAS
Map 6 of 6
Final Groundwater Remedy
PG&E Topock Compressor Station
Needles, California

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MAPFILES\2014\MPRP\FIG3-X_CDFW_JURIS_WETLAND.MXD ECLARK1 9/4/2014 8:56:25 PM

CH2MHILL

FIGURE 4
Overall Monthly Average Flow Rate (cfs) for the Colorado River as Measured at the USGS River Gauge (09423550) at the Topock Marsh Inlet near Needles, California between January 1967 and September 2012



Because of controlled discharges regulated by upstream dams as well as past dredging and channelization along this reach of the Colorado River, there is no longer an active floodplain in the Project Area, and as described below, the riparian habitat is limited to a narrow band immediately along the channel banks of the river.

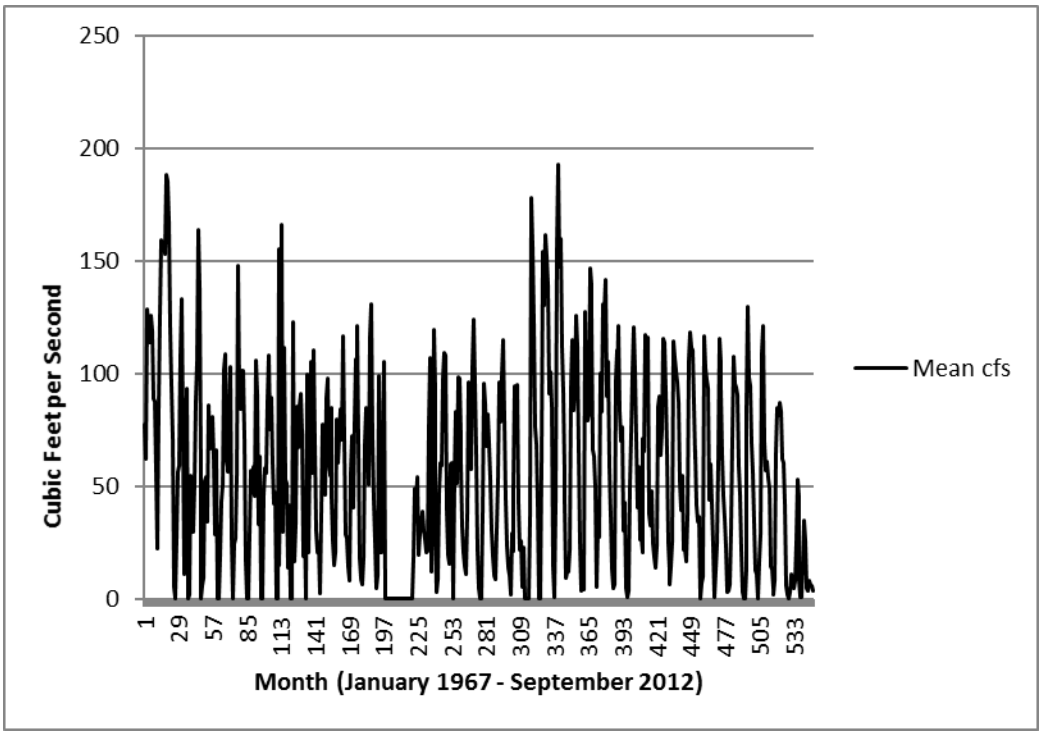
The only project activity in this area is the installation of a section of freshwater supply pipeline that will be installed along the existing natural gas line bridge that spans the Colorado River. The project will not result in impacts to the bank or channel of the Colorado River.

1.3.2 Park Moabi Slough

Park Moabi Slough was created by major dredging activities done by the USBR. Historical photographs indicate that much of the present shoreline, bank stabilization, and sand dune area features in the Park Moabi area were completed during in the mid-1960s. Within the Project Area, most of the areas along the channel are characterized by developed beaches, vacation cabins, boat docks, and boat ramps associated with the Pirate Cove Resort and Park Moabi. East of the developed areas, the southern shore of the slough is characterized by relatively steep sandy and rocky banks with dense vegetation. As with the Colorado River, no active floodplain is associated with the slough, and riparian vegetation, where present, is limited to a narrow band along the edges of the channel.

No project activities are associated with the Park Moabi Slough and, therefore, there will be no impacts to this area.

FIGURE 5
Monthly Average Flow Rate (cfs) for the Colorado River as Measured at the USGS River Gauge (09423550) at the Topock Marsh Inlet near Needles, California between January 1967 and September 2012
The data gap circa 1983-4 (or circa month 200) corresponds to the Colorado River flood after which the Topock gauge was replaced.



1.3.3 Ephemeral Washes West and North of the Compressor Station

Arid region ephemeral washes are a unique type of stream feature, which required the U.S. Army Corps of Engineers (USACE) to publish a number of guidance documents regarding the determination of jurisdictional limits in these areas, including *A Field Guide to Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the* Western United States (Lichvar and McColley, 2008) and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar, 2010). Unlike perennial or seasonal streams in wetter environments where the extent of federal jurisdiction is determined by the ordinary high water flows, the extent of jurisdiction of arid-region ephemeral washes includes all of the hydrogeomorphic floodplain units such as low-flow channels, active floodplain, and low terraces. In these areas, the federal jurisdictional limits are defined by the lateral extent of the active floodplain, which also is generally the extent of desert wash (riparian) vegetation. Therefore, the areas of ephemeral washes included in the wetlands delineation for federal waters of the U.S. were considered representative of area that would be regulated under state regulations by CDFW and are subject to the requirements of Mitigation Measure BIO-1.

The alluvial terraces along the southern side of the Colorado River and north of the Chemehuevi Mountains are characterized by numerous incised drainage channels and ephemeral washes. One of the largest ephemeral washes in the Project Area is Bat Cave Wash, a north-south trending channel that is immediately west of the TCS. Bat Cave Wash is shown as an intermittent blue line stream on the USGS Topock topographic quadrangle map and is included as an intermittent stream in the National Hydrographic Dataset (NHD).

Bat Cave Wash is a tributary of the Colorado River. Large volume surface flows are generally infrequent and occur only briefly in response to high-intensity rainfall events. Stormwater flows are conveyed directly into the river under a bridge along the National Trails Highway. Within the Project Area, the upper part of Bat Cave Wash is confined by steep rocky slopes and has an approximately 30-foot-wide gravel-cobble floodplain. Vegetation in the upper reaches of the wash is sparse, consisting of scattered shrubs such as Anderson's box-thorn (*Lycium andersonii*), catclaw acacia (*Senegalia* greggii), and desert lavender (*Hyptis emoryi*). As the wash continues downslope, the channel broadens to more than 190 feet wide in some areas. In this reach, multiple low-flow channels are present throughout the active floodplain. Vegetation cover also increases downslope with blue palo verde (*Parkinsonia florida*) and salt cedar (*Tamarix ramosissima*) trees scattered throughout the active floodplain. Other common shrubs on, or immediately adjacent to, the active floodplain include brittlebush (*Encelia farinosa*), creosote bush (*Larrea tridentata*), white bur-sage (*Ambrosia dumosa*), sweetbush (*Bebbia juncea*), and white rhatany (*Krameria bicolor*). Total vegetative cover throughout most of the wash is less than 30 percent, with the exception of a dense stand of salt cedar at the northern end of the wash, just south of the National Trails Highway.

Two freshwater supply pipelines will cross Bat Cave Wash. The upstream crossing is west of the TCS and will traverse Bat Cave Wash on an aerial pipe support bridge that will be immediately adjacent to an existing natural gas pipeline that spans the wash in this area. No impacts to riparian vegetation or the bed, bank, or channel would occur at this upstream crossing location. The downstream crossing is near the Interim Measure (IM) 3 water treatment plant and will include an aerial crossing over the channel with a steel support bridge complete with access ladders to allow for pipe inspections. The support footings for the pipe bridge will be located outside the channel on both sides, so no permanent impacts will occur to the bed, bank, or channel. However, there would be minor temporary impacts from placing equipment within the channel, and up to three mature blue palo verde trees that are adjacent to the wash may be removed during construction of the pipe bridge at this location.

A second large ephemeral wash is west of Bat Cave Wash and is referred to as the Western Drainage. There is no blue line stream indicated on the USGS Topock quadrangle map in this area nor is there any mapped feature in the NHD at this location. The active floodplain of this channel ranges from approximately 100 to 240 feet wide and is characterized by a sandy-pebble-cobble substrate with multiple low-flow channels. Scattered perennial vegetation throughout the channel includes blue palo verde, catclaw, Anderson's box-thorn, sweetbush, creosote bush, white rhatany, and cheesebush (*Ambrosia salsola*). Similar to Bat Cave Wash, a dense thicket of salt cedar and honey mesquite (*Prosopis glandulosa*) is at the northern (downslope) end of the wash feature. A large earthen dam has been constructed at the downstream terminus of this feature, and there is no longer a direct hydrologic connection to the Colorado River. A perennial pond is immediately north of the dam that is connected to a small wetland adjacent to the Colorado River via a large culvert that passes under the National Trails Highway. No project activities will occur in or adjacent to this wash.

Within the Project Area, several small, incised tributary drainages flow directly into either Bat Cave Wash or the Western Drainage system. These channels are characterized by a single low-flow channel and generally have sandy-gravel, cobbly, or rocky substrates. Most of the low-flow channels are devoid of vegetation or have only sparse, scattered herbaceous species such as spurge (*Chamaesyce* spp.), Spanish needle (*Palafoxia arida*), ovate plantain (*Plantago ovata*), and needle grama (*Bouteloua aristidoides* var. *aristidoides*). Common trees and shrubs along the lower slopes and channel edges in these areas include blue palo verde, catclaw acacia, Anderson's box-thorn, creosote bush, white bur-sage, white rhatany, and sweetbush. No project activities will occur in these tributary washes.

1.3.4 Park Moabi Drainages

Three ephemeral drainages are in the western part of the Project Area, originating south of the developed portion of Moabi Regional Park. Two of these drainages are shown as unnamed blue line streams of the USGS Whale Mountain Topographic quadrangle map and are included as intermittent streams in the NHD.

These ephemeral channels are characterized by relatively steep vertical side banks and sand-pebble-cobble beds that are largely devoid of vegetation. Scattered blue palo verde trees and occasional shrubs such as cheesebush, brittlebush, and creosote bush are present along the edges and side slopes of the channels. All three channels flow into a broad retention basin on the southern side of the National Trails Highway, west of Park Moabi Road. Six 48-inch-diameter culverts are in the northeastern corner of the retention basin that convey flows under the National Trails Highway into a broad U-shaped, routinely maintained, stormwater channel in the developed area of the park. At the time of the survey, the sandy-gravel substrate of the stormwater channel was devoid of vegetation because of recent maintenance activities.

At the northern end of the U-shaped channel, a 24-inch-diameter culvert is under a paved road that drains into a low topographic swale characterized by upland vegetation. The swale feature continues north where stormwater flows are discharged into Park Moabi Slough near the southwestern corner of the Pirate Cove Marina. No project activities will occur in these drainages.

1.3.5 Riparian Vegetation

Riparian vegetation includes areas of emergent vegetation along the edges of the Colorado River and Park Moabi Slough, trees and shrubs growing immediately adjacent to the Colorado River, and undeveloped areas of Park Moabi Slough and adjacent wetlands that have a direct hydrologic connection with the Colorado River. Vegetated areas along the low terraces above the high water limit of the Colorado River, which are not subject to occasional flooding, were not considered to be riparian habitat.

Riparian habitat associated with the Colorado River and Park Moabi Slough include scattered patches of southern cattail (*Typha domingensis*), California bulrush (*Schoenoplectus californicus*), common reed (*Phragmites australis*), and giant reed (*Arundo donax*) growing along the edges of the Colorado River and Park Moabi Slough. Most of these areas occur below the ordinary high water line or on low terraces that likely are subject to regular flooding. Patches of emergent vegetation are most common along the southern banks of the Park Moabi Slough, but also are found along the northern banks of the slough in the western-most part of the Project Area. Patches of emergent vegetation are less common along the Colorado River and occur in scattered locations along the southwestern bank as well as near the Topock Marina. Also included are areas with California bulrush along the outlet of Bat Cave Wash and areas with broad-leaved cattail (*Typha latifolia*) in the outlet of the East Ravine near the southern boundary of the Project Area.

Much of the riparian vegetation associated with the rocky banks adjacent to the water's edge is characterized by scattered patches of salt cedar and arrow weed (*Pluchea sericea*), with some locally dense areas of honey mesquite. Species such as broom baccharis (*Baccharis sarothroides*) and occasional sand bar willow (*Salix exigua*) are present along some of the sandy banks on the southern side of Park Moabi Slough.

Riparian habitat also includes adjacent wetlands that are immediately adjacent to the Colorado River or Park Moabi Slough. The largest such wetland is on the southern side of the Interstate-40 bridge on the western side of the Colorado River. A dense monoculture of common reed characterize this wetland. At the time of the wetland survey in February 2012, saturated soil and groundwater were present at a depth of 8 inches. Based on the location and elevation of this wetland, surface water is likely present in the summer months (May through July) because of higher flow levels of the Colorado River.

Another adjacent wetland is on the eastern side of the Colorado River, north of the Topock Marina. This wetland is characterized by a strip of emergent wetland immediately above the shoreline and includes a narrow band of low trees and shrubs further inland. Emergent vegetation is characterized by iris-leaved rush (*Juncus xiphioides*), dallis grass (*Paspalum dilatatum*), and marsh pennywort (*Hydrocotyle verticillata*) with scattered common reed and California bulrush. A shallow water table and saturated soils were present at 12 inches below ground surface at the time of the February 2012 survey. This area appears subject to some flooding during higher flows and appears to have saturated conditions in the upper part of the soil for most of the year. Immediately inland, the riparian vegetation is characterized by small salt cedar trees and shrubs, arrow-weed, broom baccharis, and scattered narrow-leaved willow. Herbaceous vegetation in this area is

limited to sparse common reed. A shallow water table was encountered at a depth of 15 inches below the ground surface during the February 2012 survey.

The third adjacent wetland is on the southern bank of the Colorado River at its confluence with the Western Drainage, approximately 600 feet downstream of the confluences of the Park Moabi Slough and the Colorado River. This low, depressional area is filled with dense growth of southern cattail. At the time of the February 2012 survey, shallow groundwater and saturated soil were present at a depth of 10 inches below the ground surface. A culvert connects this area to a pond on the southern side of the National Trails Highway. Given the low topographic position, hydrologic connection to the pond south of the road, and shallow groundwater noted at the time of the survey, this area likely is subject to shallow seasonal flooding for part of the year.

The fourth adjacent wetland occurs on the northern side of Park Moabi Slough northwest of the Moabi Regional Park parking area and boat ramp. This wetland is on the landward side of the shore zone and is characterized by iris-leaved rush, marsh pennywort, and dallisgrass with scattered southern cattail. Shallow groundwater and saturated soils were encountered at 11 inches below ground surface in this area during the February 2012 survey. This wetland area appears to be located in a topographic low area where some flooding likely occurs during periods of higher flows.

A pond is on the southern side of the National Trails Highway approximately 800 feet southeast of the confluence of Park Moabi Slough and the Colorado River. An earthen dam separates the pond from the ephemeral wash system that extends south. The pond is connected to the adjacent emergent wetland described above via a large culvert. The southern half of the pond is characterized by dense growth of southern cattail, while the northern part is open water. Several feet of water was observed in the pond during the February and July 2012 surveys. A beaver lodge was near the center of the pond at the edge of the cattails. It appears that at one time, this was part of the larger wash system that has been cut off by the earthen dam. This area was considered riparian habitat, as it is now functionally a small backwater area of the Colorado River (via culvert connections). The dam likely is associated with railroad construction and maintenance, but may be related to the later development of a “roadhouse” with a building and campground that operated west of this feature when Historic Route 66 and then the National Trails Highway were in use as primary travel routes, before Interstate 40 construction. No project activities will occur in these wetlands or riparian areas.

1.3.6 Vegetation Impact Assessment

The vegetation impact assessment specific to CDFW jurisdictional areas was completed using a geographical information system (GIS) to combine the expected project construction footprint based on the 90 percent design with previously mapped sensitive resources such as desert washes and riparian vegetation.

Focused surveys to identify and map all vegetation in the 90 percent design footprint were conducted between August 6 and 8, 2014. The vegetation assessment and inventory included any identifiable persistent perennials, succulents, and all woody shrubs and trees. Non-persistent perennial and annual plants were not included in the inventory. Most of the plants were individually mapped using a Trimble GEO XT global positioning system (GPS); however, some vegetation including dense stands of arrow weed, salt cedar, or abundant and widespread creosote bushes were mapped on aerial photos and later digitized into GIS. Plants that were just outside of the polygon footprint were generally not mapped unless they represented an important resource to avoid. Dead vegetation within the footprint was also not mapped. This methodology provided a fairly comprehensive inventory of vegetation, including sensitive habitat areas, within the 90 percent design project footprint.

For most species, the vegetative cover associated with individual perennial plants was approximated by buffering the mapped GPS points to approximate the canopy cover evident on the aerial photograph. Vegetation impacts and the associated estimated acreage impacts within the 90 percent design footprint

associated with sensitive habitats are shown in Table 1. Vegetation maps, photo points, and preconstruction photographs are provided in Appendix A.

It should be noted that the plant information depicted on the Appendix A maps shows a mixture of polygons and symbols, not the actual impact areas. The symbols may deviate slightly from the underlying aerial photograph images. These deviations are due to inherent sources of error associated with GIS technology which include: changes in vegetation cover since the aerial photograph base map was taken in 2011, satellite geometry over the course of the mapping, the "canyon effect" near buildings and very steep slopes, geo-referencing changes where measured vertical elevation deviates from actual, and effect of high temperatures on the accuracy of the GPS unit.

TABLE 1
Summary of Vegetation Impacts within the 90% Design Footprint within CDFW Jurisdictional Riparian Areas

Species	Number of Plants*	Estimated Acreage
Anderson's desert thorn (*Lycium andersonii*)	4	0.002
Beaver tail (*Opuntia basilaris*)	2	<0.001
Brittlebush (*Encelia farinosa*)	13	0.009
Catclaw acacia (*Senegalia greggii*)	18	0.032
Cheesebush (*Ambrosia salsola*)	62	0.028
Creosote bush (*Larrea tridentata*)	40	0.018
Desert lavender (*Hyptis emoryi*)	14	0.011
Honey mesquite (*Prosopis glandulosa*)	2	0.001
Blue palo verde (*Parkinsonia florida*)	8	0.019
Rush milkweed (*Asclepias subulata*)	1	<0.001
Smoke tree (*Psorothamnus spinosus*)	3	0.010
Sweetbush (*Bebbia juncea*)	127	0.058
White Rhatany (*Krameria erecta*)	8	0.003
Total Vegetation	**302**	**0.191**

Note:
* Number of plants and estimated cover within the 90 percent design footprint. Actual plant impacts will be less with implementation of avoidance measures in the field.

BOLDFACE species are those that will be transplanted or replaced with new plantings.

SECTION 2

Avoidance, Minimization and Salvage/ Replanting Measures

This section provides information on avoidance and minimization measures that will be implemented to reduce adverse effects on sensitive habitats and provide information on plant salvage and replanting methods that will be used where vegetation impacts are unavoidable. Specifics related to mitigation plantings and precisely how the plantings will take place within a restoration area (e.g., number of species, plant size and container type, locations, and irrigation system design) will be provided to the agencies for review in a separate Planting Plan prior to implementation. Furthermore, a separate Final Restoration Plan will be prepared to address restoration and planting after the final groundwater remedy system has been decommissioned and removed.

2.1 Design and Construction

Throughout the project design process, efforts have been made to locate pipelines and wells along roadways, pipeline rights-of-way, and other previously disturbed areas to avoid impacts to vegetation. Construction areas, as well as staging and storage areas, also have been located in previously disturbed and/or developed areas to minimize and avoid impacts to vegetation and other sensitive resources. To further minimize impacts, a biologist will conduct preconstruction surveys, and areas of native vegetation and sensitive habitats in the immediate vicinity of the construction areas will be identified and clearly marked with flagging, fencing, and/or signage. Construction workers also will be provided with environmental awareness training regarding biological resources including sensitive species and habitats.

The issue of soil stabilization is being addressed separately under a stormwater pollution prevention plan (SWPPP) that will be included in the C/RAWP and O&M Manual. However, the use of herbaceous vegetation covers as a soil stabilization technique is not being proposed for this project because this approach was not considered appropriate for this environment. Soil stabilization techniques will be an integral part of the SWPPP because these measures minimize dust and protect desert topsoil, particularly in areas of contamination or with minimal surface soil. Vegetative covers are not discussed further in this document.

Similarly, grading plans also will be developed and submitted for review as part of the 90 percent design submittal.

2.2 Habitat Requirements for Mitigation Planting

Native plants in the Project Area have different habitat requirements and ecological tolerances, which are reflected in the sites they occupy. Blue palo verde is a relatively large tree associated with sandy areas, is widely distributed on the edges and bottoms of the ephemeral washes that dissect the upland alluvial terraces, and occurs along sandy roadsides. In contrast, the related hillside palo verde is a tree of shorter stature that is restricted to rocky hillsides above the Colorado River in the southern portion of the Project Area.

Western honey mesquite and screwbean mesquite typically grow in areas with root access to permanent underground water; however, western honey mesquite is more likely to occur in somewhat drier habitats than screwbean mesquite. While both species are salt tolerant, screwbean mesquite has a higher tolerance level than western honey mesquite (Miyamoto et al., 2004), an important consideration when planting mitigation trees. To ensure appropriate environmental conditions are present for the establishment and survival, transplanting or replacement planting of native species will be sited in areas where the species are growing. The exact planting locations will be determined as part of the final design based on the number of

transplants and/or mitigation plantings, the locations and extent of the project work areas and the access routes.

2.3 Salvage/Replacement and Transplantation of Trees, Shrubs, and Wetland Plant Species

The following section provides general guidelines for salvage, transplant, and replacement of trees, shrubs, and wetland species.

2.3.1 Salvage and Transplanting Trees

Native trees identified in the project area can exceed 20 feet in height when mature. However, large individuals are unlikely to survive salvage and replanting because of “transplant shock” caused by extensive and unavoidable loss of roots. Therefore, salvage of native trees should be limited to small individuals or saplings whose root systems are small enough to excavate and transport with minimal damage. Such individuals are more likely to recover and survive the physiological stress of transplanting. In general, trees most suitable for transplanting will be less than 4 inches in diameter at the base of the trunk and no more than 6 feet tall. Trees shall be transplanted between November and March, when temperatures are cooler, trees are dormant, and irrigation demands are less. Transplanting will occur before bud break to allow the roots time to recover and proliferate before they are required to withstand excessive transpirational loads caused by higher ambient temperatures. To the extent possible, young trees will be relocated near the project work areas that have similar soil types, exposure, and drainage conditions, but distant enough that they will not be affected by future work activities. If no suitable transplantation areas are near the work area, the trees will be relocated to other sites within the Project Area where the species is known to occur and will not be affected by work activities.

The following transplanting specifications follow general guidelines from the International Society of Arboriculture (ISA) (2013) and the American Standard for Nursery Stock (2004).

To minimize the time the roots of a salvaged tree are exposed and to increase survivability, the transplant location will have been identified and a hole excavated before the tree is removed from the soil. The transplant hole will be large enough to accommodate the root system at the same depth or slightly shallower than the tree being moved. The initial hole shall be at least two to three times the width of the root ball near the surface and taper down to the size of the root ball at the bottom. The depth of the hole shall be no greater than the distance from the trunk flare[1] to the bottom of the root ball.

Where possible, pre-dig the perimeter of the root ball using a sharp spade or shovel to avoid breaking and tearing of the roots. Pre-digging the root ball can stimulate regeneration of roots and increase root density in the final root ball. If a backhoe is used to excavate the root ball, the initial hole shall be larger than the final root ball. The final root ball will be shaped by hand using loppers to cut the roots cleanly. Table 2 provides size guidelines for the minimum size of the root ball for transplanted trees.

Depth of the root ball is variable depending on the size of the tree but generally will be between 24 and 36 inches deep. The root ball shall taper along the sides slanting inwards slightly toward the base. If the soil is hard and compact, it may be necessary to add water before cutting the root ball. The final root ball shall stand on a pedestal before being undercut. Once the root ball has been cut and shaped, wrap the sides and top in burlap to secure the roots and soil. A skirt shall be left hanging to cover the bottom of the root ball. Secure the burlap wrapping with rope or twine before lifting from the hole. If necessary secure any branches with burlap or ropes to prevent damage and breaking. Pruning of branches generally should not be required, but if some branches need to be trimmed, it will be kept to a minimum with no more than 20 percent of the canopy removed in accordance with ANSI 300A Part 1 (American National Standard Institute 2008). Once

[1] The area at the base of the plants stem or trunk where the stem or trunk broadens to form roots

the root ball and branches have been secured, lift the tree straight up from the root ball to remove from the hole; do not lift by the trunk, as this can damage the trunk and roots.

TABLE 2
Size Guidelines for Root Balls when Transplanting Trees

Trees Height or Stem Diameter*	Minimum Root Ball Diameter (Inches)
Trees < 6 feet tall and/or stem < ¾ inch in diameter near the base	16
Trees > ¾ inch diameter and stem < 2 inches in diameter near the base	24
Trees 2-3 inches in diameter near the base	32
Trees 3 -4 inches in diameter near the base	42

Note:
*Stem diameter for trees less than 4 inches is measured at 6 inches above the ground surface

Transport the excavated tree immediately to its new location and lower it (by holding the root ball not the trunk) into the hole. Remove the burlap from around the root ball and backfill around the roots with the soil that was removed from the planting hole. Do not add additional soil amendments, fertilizer, or mulch to the soil, as these have been found to be unnecessary for desert trees and shrubs (Bainbridge et al., 2001). When backfilling, add water to minimize air pockets. Be sure the soil is firmly packed around the bottom of the root ball to ensure the tree is vertical and well supported. The remaining soil shall be tamped down lightly around the roots, but not firmly compacted. Water thoroughly and slowly after the hole is filled.

Staking of the trees shall be avoided, as staking often can result in detrimental effects such as reduced trunk taper, smaller root system development, and greater instability once the stakes are removed (ISA, 2013). If additional support is required, a single stake located upwind of the tree may be sufficient. The stake shall be driven into the ground outside the newly planted root zone. Stabilize the tree as low on the trunk as possible, while still providing support with broad, slightly elastic, material that will not damage the tree. Staking supports shall be removed within 2 years of the initial planting.

2.3.2 Shrubs

There is little available information on transplanting native shrubs. Most desert shrubs have extensive fibrous root systems that likely would be extensively damaged during excavation and transplanting. Some desert shrub species, such as creosote bush and arrow weed, are capable of regeneration as long as the roots remain intact and undamaged. In areas were vegetation clearing is necessary for temporary construction access, cutting or flattening the aboveground stems while leaving the root systems intact generally will facilitate natural regeneration in a relatively short time. Additionally, many desert shrubs are propagated by seed or nursery stock (Abella and Newton, 2009; Clary and Slayback, 1984). In areas where natural regeneration is not possible, seed collection from local material can be used to establish container plants that can be used to establish new shrubs in selected planting areas.

2.3.3 Wetland Plants

Common wetland plants in the Project Area, including cattails and common reed, can be salvaged by taking rhizome cuttings from areas where site disturbance is unavoidable. Rhizomes shall be a minimum of 2 inches long and typically re-establish best if they are removed shortly after bud break, but before extensive shoot elongation. Cuttings will be kept cool and moist until they can be transplanted. Rhizome cuttings shall be planted in soils that are moist to saturated for most or all of the year.

2.4 Seed Collection and Replacement Planting

Several methods for re-establishing vegetation will be implemented at the Project Area. The restoration method will depend on the site conditions as well as duration of remediation activities that affect sensitive habitats.

2.4.1 Seed Collection

Where transplanting of trees, shrubs, and herbaceous plants is not possible, seed can be collected from plants on site for mitigation. Rainfall is variable in the Project Area, and dry years can dramatically affect germination of annual plants as well as flowering and seed production of trees, shrubs, and perennial species. Therefore, seed collection should only occur during “good” years with sufficient rainfall to stimulate germination and abundant flowering of the target species. The specific number, species, and distribution of collection sites will vary according to size, density, continuity of populations, and the desired quantity of seed to be obtained. A general rule is to collect from a minimum of five collection sites at least 0.5 to 1 mile apart, and from no more than 20 percent of an individual plant’s seed crop. Collection from multiple populations in the Project Area may not be possible, since the number of known populations is limited for some species. If additional seed is needed, collections should be made from the regional project vicinity (within 10 miles if possible). Seed that is not used immediately should be stored in a cool, dry place until mitigation sites can be prepared or seeds can be sown in containers for propagation in a nursery. Reseeding of small disturbed sites (less than 0.5 acre) may be done by hand sowing in fall or early winter.

2.4.2 Replacement by Container-Grown Plants

Impacts to larger trees (over 4 inches in diameter) and shrub species will likely require replacement plantings using container-grown materials. Trees and shrubs including palo verde, western honey mesquite, screwbean mesquite, cattle saltbush, and big saltbush are relatively easy to propagate in a nursery and well adapted to transplanting with a minimal amount of care and maintenance (Bainbridge and Virginia, 1990; Bainbridge, 2007; Romney et al., 1989). Several commercial nurseries grow native plants from the Mojave Desert (Appendix B).

Depending on the number of trees and shrubs required for revegetation of disturbed areas, PG&E will consider contracting with a nursery that specializes in desert plant propagation to collect local seed and establish trees, shrubs, and other plants from onsite material before mitigation planting. This would ensure replacement plants are suitable for local environmental conditions. If only a small number of plants are required, appropriate available nursery stock may also be used.

Replacement planting for native trees including blue palo verde, hillside palo verde, western honey mesquite, and screwbean mesquite will consist largely of container-grown plants. Containers shall be long and narrow to encourage deep root growth such as Tall One Tree Pots (Steuewe & Sons, Inc., 4.5 inches wide by 14 Inches deep). Seedlings/saplings shall be between 4 to 6 months old when transplanted to prevent the plants from becoming root-bound in the pots. Replacement planting of shrubs such as mesquite, cattle saltbush, big saltbush, and others shall be grown in 4- to 6-inch tube packs and transplanted when 9 to 12 months old.

Based on experimental results from the Mojave Desert, the median survival rate for species such as western honey mesquite is around 50 percent (Edwards et al., 2000; Grantz et al., 1998). Therefore, to achieve the desired density of plant species, the number of container-grown plants should be a higher ratio to account for anticipated mortality.

2.4.3 Timing and Methods of Planting for Container-Grown Trees and Shrubs

Planting of container-grown trees and shrubs typically is done in the late winter to early spring between February and April (Romney et al., 1989; Edwards et al., 2000). Planting holes shall be excavated using an 8- to 10-inch-diameter power auger to a depth equal or just slightly more than the depth of the container

(Grantz et al., 1998). Carefully remove the saplings from the container and place against one side of the planting hole, using excavated soil to backfill around the roots. Do not add additional soil amendments, fertilizer, or mulch to the soil as these have been found to be unnecessary for desert trees and shrubs (Bainbridge et al., 2001; Romney et al., 1989). When backfilling, add water simultaneously to minimize air pockets. Be sure the soil is firmly packed around the roots, but not firmly compacted. Water thoroughly and slowly after the hole is filled.

2.4.4 Spacing and Locations

Trees will be spaced to maintain a density similar to the area from which they were removed or in similar spacing based on undisturbed areas near the project, but no closer than 8 feet apart. Shrubs will be spaced in a density similar to the density in the undisturbed surrounding vegetation, but no closer than 3 feet apart. To ensure soil and other environmental factors are most favorable for establishment, replacement plants will be planted in areas where individuals of the same species are healthy and growing well.

2.4.5 Grazing Protection

Some type of initial herbivore protection (such as wire mesh or tree shelters placed around the seedlings) is necessary to ensure good survival and growth of transplanted trees and shrubs (Romney et al., 1989; Grantz et al., 1998). Plastic tree shelters such as Tree-Pee (Bailey's, Inc.) have been found to result in significantly higher survivorship than using wire mesh (Grantz et al., 1998).

2.4.6 Irrigation for Salvaged and Transplanted Trees and Shrubs

Transplanted trees and shrubs should be watered using deep irrigation pipes (Bainbridge 2006; Bainbridge et al. 2001). Deep pipe irrigation has been shown to produce much better survival rates and require less water than other irrigation methods (Bainbridge et al., 2001). Bainbridge et al. (2001) had an establishment success rate of 71 percent for seedlings of western honey mesquite by using only 5.3 gallons over 3.5 years with deep pipe irrigation when trees were planted with tubular tree protectors to minimize herbivory.

The method for using deep irrigation is described in Bainbridge (2006). For each transplanted tree or shrub, a hole is drilled to a depth of 20 to 30 inches with a soil auger. A polyvinyl chloride pipe (2 inches in diameter and 20 inches long with a series of 1/16-inch holes drilled 2 to 3 inches down one side beginning 7 inches below the top) is inserted to the bottom of the hole such that the side with holes faces the seedling or shrub with about 4 inches protruding above the ground surface for easy filling. The pipe shall be situated approximately 3 to 4 inches from the seedling. Two or three pipes can be situated around the root ball for transplanted shrubs or small trees.

Water (1 quart) will be directly applied to seedlings once every week for the first 8 weeks. After the initial watering, irrigation water will be applied in the pipe(s) (2 quarts) every other week for at least 3 months and continue until the end of August. Watering will be continued at least until the end of August each year and will be done for the first 2 years after planting.

For relatively small areas where a large number of replacement trees may be needed, a gravity feed drip irrigation system from a 4,000 to 5,000-gallon storage tank shall be used as an alternative watering method. This method will depend on the ability to situate the tank in an area accessible to a water truck for periodic refilling. This method was used successfully for the screwbean mesquite restoration project under the freeway bridge next to the Colorado River from 2006–2009 at TCS (C. Smith, pers. comm., 2013). For that project, newly planted trees were watered three times per week for about 3 to 4 hours per day for the first year and once per week in the subsequent 2 years.

2.4.7 Mulch and Inoculation

There is generally no evidence that additional mulching enhances long-term survival and plant growth, and some indication it may do more harm than good (Bainbridge et al., 2001), so no additional mulching is recommended. If tree seedlings or shrubs are planted from containers, inoculation of soil biota can be done

by backfilling with excavated soil. In general, inoculation of soil biota is only required for severely degraded sites where the natural soil biota has been significantly depleted or is absent (Bainbridge and Virginia, 1990).

SECTION 3

Success Criteria, Monitoring, and Adaptive Management

Due to the fact that replacement saplings do not provide the same habitat value as mature trees, a mitigation ratio of 3:1 will be used to offset impacts to riparian trees. Replacement trees will be propagated from locally collected seeds and grown in a nursery for 1 year prior to planting in selected mitigation sites. The success criteria for mitigation plantings will be a final minimum plant replacement ratio of 2.25:1 (75% overall survival rate) of mitigation plantings at the end of a minimum 5-year monitoring period.

In the event that mortality rates or trends in declining vigor of the mitigation plantings result in less than a final 2.25:1 mitigation ratio, additional saplings will be planted. Any replacement plantings will be monitored for 5 years from the time of their initial planting to ensure that the mitigation success criteria have been met.

In order to account for anticipated mortality rates for desert mitigation plantings that may be as high as 50 percent, the initial planting will include twice as many saplings as required by the mitigation ratios. This initial higher planting ratio is intended to compensate for expected sapling mortality over time and increase the probability that the final mitigation ratios are obtained. For example, if three palo verde trees will be removed during construction they would be replaced at a 3:1 ratio with seedlings grown from locally sourced seeds. The initial mitigation would therefore require nine replacement plantings. The success criteria would be 75 percent overall survival of these plantings after 5 years, resulting in a final mitigation ratio of 2.25:1 or survival of 6.75 (rounds to 7) out of nine initial plantings.

Taking into account expected mortality rates, the initial mitigation planting would be doubled to include 18 replacement plantings during the first year (see Table 3). It is anticipated that with the higher number of initial plantings and adaptive management at least 7 of the 18 saplings will become successfully established after 5 years. It is possible that even more plants may become established if adaptive management techniques result in increased survival. In the event mortality or trends in declining vigor indicate that success criteria will not be met, additional plantings and monitoring will be required to ensure that the final mitigation ratio is met.

TABLE 3
Example of Replacement Planting Ratios and Success Criteria

Number of Trees Impacted	3:1 Replacement Plantings	Initial Planting to Account for Anticipated Mortality	Final Success Criteria Minimum of 2.25:1 Replacement After 5 Years
3	9	18	7

Assuming 18 initial plantings with a potential 50% mortality rate and a final success criteria of 7 replacement trees

Monitoring	Anticipated Minimum Survivorship (Vigor Class of 2 or Greater)	Number of Plantings Remaining*	Mortality Thresholds Triggering Additional Plantings	Number of Plantings Remaining*
Year 1	90%	17	60% or less survivorship	11 or less
Year 2	80%	14	60% or less survivorship	11 or less
Year 3	70%	13	50% or less survivorship	9 or less
Year 4	60%	11	40% or less survivorship	7 or less
Year 5	50%	9	Success criteria not met	Less than 7

Note:
*Values are rounded to nearest whole number where required.

3.1 Tree and Shrub Assessment

Assessment of trees and shrubs will use a modified index initially developed by Bainbridge et al. 2001:

- 0 = dead, stems brown brittle with no green or purple
- 1 = barely alive, stems still flexible with some green or purple
- 2 = some green or purple on stem, a few green leaves
- 3 = green or purple stem and a number of green leaves
- 4 = green or purple stem and green leaves, vigorous

3.2 Wetland Plants

Monitoring in areas where rhizomes of wetland plants were relocated will include initial photograph points immediately after transplanting and annual photographs from the same location. During annual monitoring, the cover of wetland plants will be visually estimated to determine if the mitigation ratio of 2:1 has been achieved in the transplant area. In addition, the overall condition of the plants will be evaluated relative to the condition of plants in undisturbed areas.

3.3 Maintenance and Adaptive Management

Adaptive management involves learning from experience and modifying subsequent behavior in light of that experience. Data shall be collected and analyzed throughout the monitoring period and the results used to modify (adapt) restoration approaches, as appropriate, to ensure successful establishment of transplanted species and the desired density and cover of plants. Maintenance and adaptive management will focus on the following areas: weed control, irrigation modification, herbivory protection, and mortality rates.

3.3.1 Weed Control

Weedy species, such as Russian thistle (*Salsola tragus*), Sahara mustard *(Brassica tournefortii*), and salt cedar can significantly affect growth and survival of transplants. Transplant and seeding sites should be relatively weed-free and should be monitored regularly for weed infestations. It is easier to prevent the establishment of weeds in an area than it is to eradicate weed populations once they have become established. Annual monitoring for weed seedlings of Russian thistle, Sahara mustard, and salt cedar early in the growing season (March through April) allows for treatment and removal of weedy species before flowering and seed dispersal. In addition, young seedlings can be removed by hand, avoiding the need for more intensive mechanical or chemical treatment.

3.3.2 Irrigation Modification

Because the objective is to obtain the maximum survival rate of transplanted individuals, it may be necessary to modify the irrigation schedule and/or amount of water during the restoration process. While irrigation will only be used during the initial establishment phase, the condition of the plants will be monitored throughout the monitoring period. If after the initial watering, plants show a notable decline in vigor, it may be necessary to increase the amount or timing of irrigation to prevent mortality and reduced vigor. Care shall be taken not to overwater the plants.

3.3.3 Herbivory Protection

Tree and shrub protectors will be maintained until the plants are large enough to withstand herbivory or before the growth of the plant being impacted by the barrier. The annual monitoring report shall recommend when removal of protectors is appropriate. PG&E will be responsible for removing the tree and shrub protectors.

3.3.4 Mortality Rates

It is expected that the initial plantings will experience some level of mortality. If survivorship drops below target levels listed in Table 3, additional plantings will be required. To prevent further mortality, adjustments to the watering regime and/or herbivore protection will be necessary, depending on the most probable cause of the mortality.

3.4 Photo Monitoring Stations

Photo-monitoring stations will be established at selected locations throughout the Project Area to document preconstruction conditions, natural recovery, and as part of the monitoring of revegetation and restoration areas. The following methods and procedure are adapted from the U.S. Department of Agriculture's Photo Point Monitoring Handbook (Hall, 2002).

3.4.1 Objectives

The objectives of the photo monitoring include:

- Document the preconstruction site conditions of the project work areas on the HNWR for restoration activities after decommissioning
- Document the post-construction site conditions of the project work areas on the HNWR
- Document changes in vegetation over time in the work areas, including natural regeneration and recovery of native plants
- Document revegetation and/or restoration sites, including vegetation changes over time as well as general qualitative documentation of plant cover and vegetation condition

3.4.2 Equipment

The following equipment will be needed for the photo monitoring:

- Digital camera
- GPS unit with sub-meter accuracy
- White board and black dry erase pen
- Compass
- Photo monitoring data sheets (Appendix C)

3.4.3 Methods

Before starting construction, multiple photo-monitoring locations will be selected throughout the Project Area that will be used to document the pre- and post-construction conditions. This will be referenced to as preconstruction photo documentation (PPD). PPD will be completed to assist in restoration activities after remedy decommissioning. A subset of the PPD photo points will be in areas to specifically document where existing vegetation and habitats will be affected by project activities. These photo points will be referred to revegetation photo documentation (RPD). The exact locations and views of the photo-monitoring stations will be determined once the final project design has been completed and the limits of the work areas have been firmly established. All PPD information will be included on the photo. Additional photo-monitoring stations will be established at revegetation and restoration sites as well as any reference plant community locations.

Once the photo-monitoring sites have been determined, a GPS unit with sub-meter accuracy will be used to record the location of the camera position. Notes will be taken on the locations including notable landmarks and other information that will assist in relocating the position. Photo-monitoring locations will then be mapped on aerial photographs that have roads and other major landmarks labeled.

Once the scene to be captured by the photo-monitoring point has been determined, record the compass direction of the camera view in both cardinal directions (north, south, southwest, etc.) and degrees. Subsequent photographs taken from the same photo point will be taken in the same direction each time.

On the data sheet, describe the scene including notable items in the view that may help with reorientation of the camera during subsequent monitoring. Provide a general description of the photo-monitoring point, including plant species, ground cover, disturbance, vegetation condition, etc.

After the first photo-monitoring event is completed, maps, directions, and instructions on the orientations and views for each photo-monitoring location will be prepared and be used as the basis for subsequent photo-monitoring events at each location.

After photographing the selected scene at each location, it may be useful to include additional site photographs of particular features and plants to provide additional detail on the site. For each additional photograph, include a description of the setting or conditions that are being documented and include the photographs and additional information with the photo-monitoring report.

3.4.4 Frequency

Photo monitoring will occur before starting construction and following construction concurrent with monitoring of the revegetation sites. Photo documentation will be taken for 5 years post-construction and will occur in years 1, 2, 3, and 5. Post-construction and RPD monitoring will occur with each vegetation monitoring event, and photographs will be appropriately archived in monitoring reports for use during post-decommissioning restoration.

3.5 Reporting

Following each monitoring event, a monitoring report will be prepared. The first monitoring report will be prepared during the first year following completion of construction activities. The first monitoring report will include specific information on the number, species, and locations of trees and shrubs that were removed or otherwise permanently affected during construction as well as the number, species, and locations of mitigation plantings. The report will include information on areas where aboveground trimming of shrubs occurred, but belowground root systems were left intact. The first monitoring report will include pre- and post-construction photographs from the photo-monitoring stations, as well as photographs of the revegetation sites. The first report will include the necessary documentation to relocate the photo-monitoring stations in subsequent years.

Additional monitoring reports will be prepared for the following year 2, 3, and 5 monitoring events. These reports will include observations of natural recovery in construction areas, with particular emphasis on those areas where the belowground roots were left intact, and assessment of the revegetation areas including the condition of the revegetation plantings, discussion of any problems, and recommendations for adaptive management actions necessary to address the problems. These reports will include photographs and information from each of the photo-monitoring stations.

Monitoring reports will be submitted to CDFW and USFWS within 90 days of completing each monitoring event.

SECTION 4

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Appendix A
Vegetation Maps (with photo points) and Preconstruction Photographs

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar
Footprint
CDFW Ephemeral Stream

N

0 10 20 40 Feet

Intersection of CDFW Ephemeral Streams against the Construction Footprint: 1 of 10

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar
Footprint
CDFW Ephemeral Stream

N

0 10 20 40 Feet

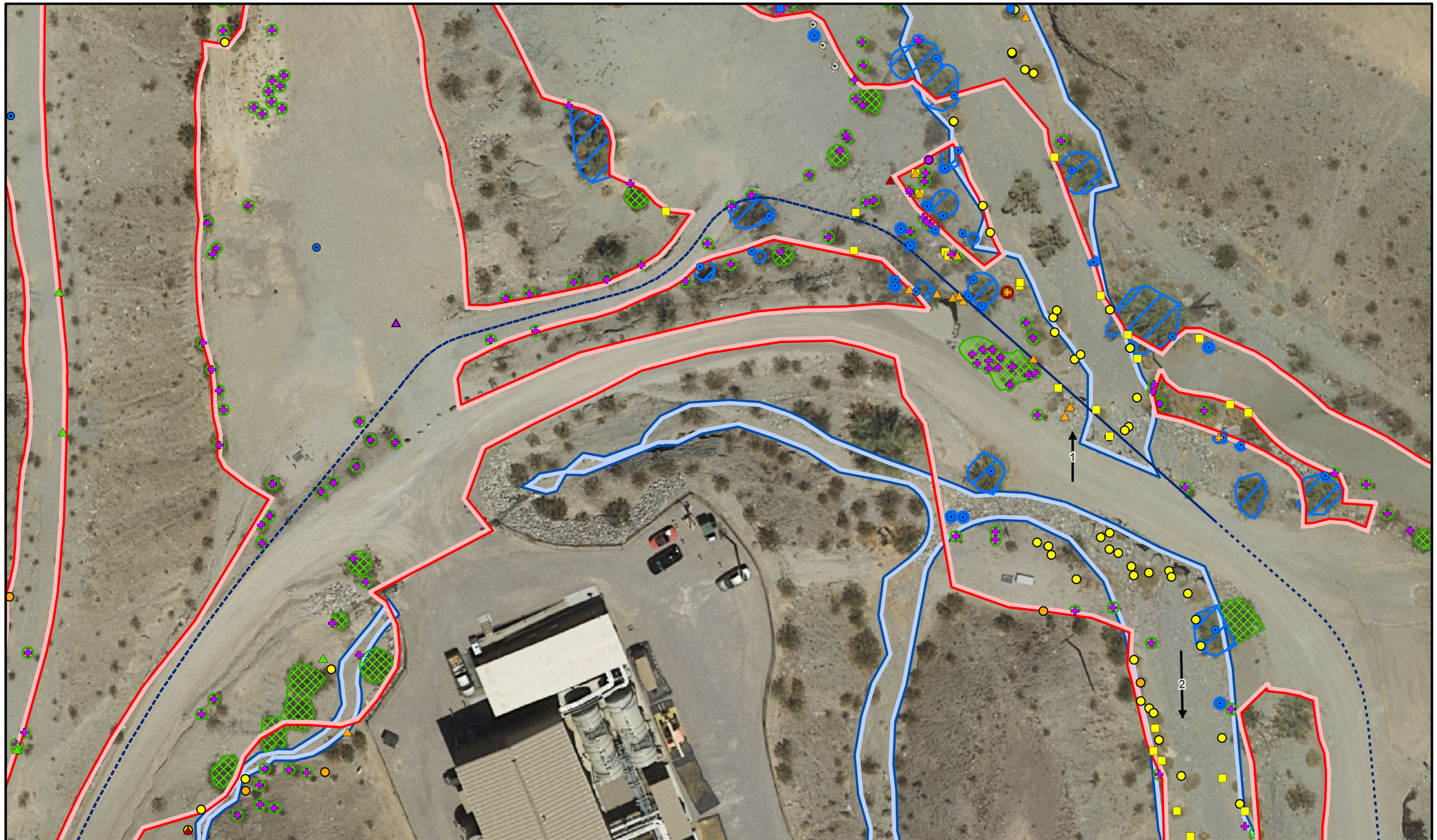
Intersection of CDFW Ephemeral Streams against the Construction Footprint: 2 of 10

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Bush seepweed
Catclaw acacia
Cattle saltbush
Cheesebush
Chia
Creosote bush
Desert Lavender
Desert Tobacco
Desert Willow
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar
Footprint
CDFW Ephemeral Stream

N

0 10 20 40 Feet

Intersection of CDFW Ephemeral Streams against the Construction Footprint: 3 of 10

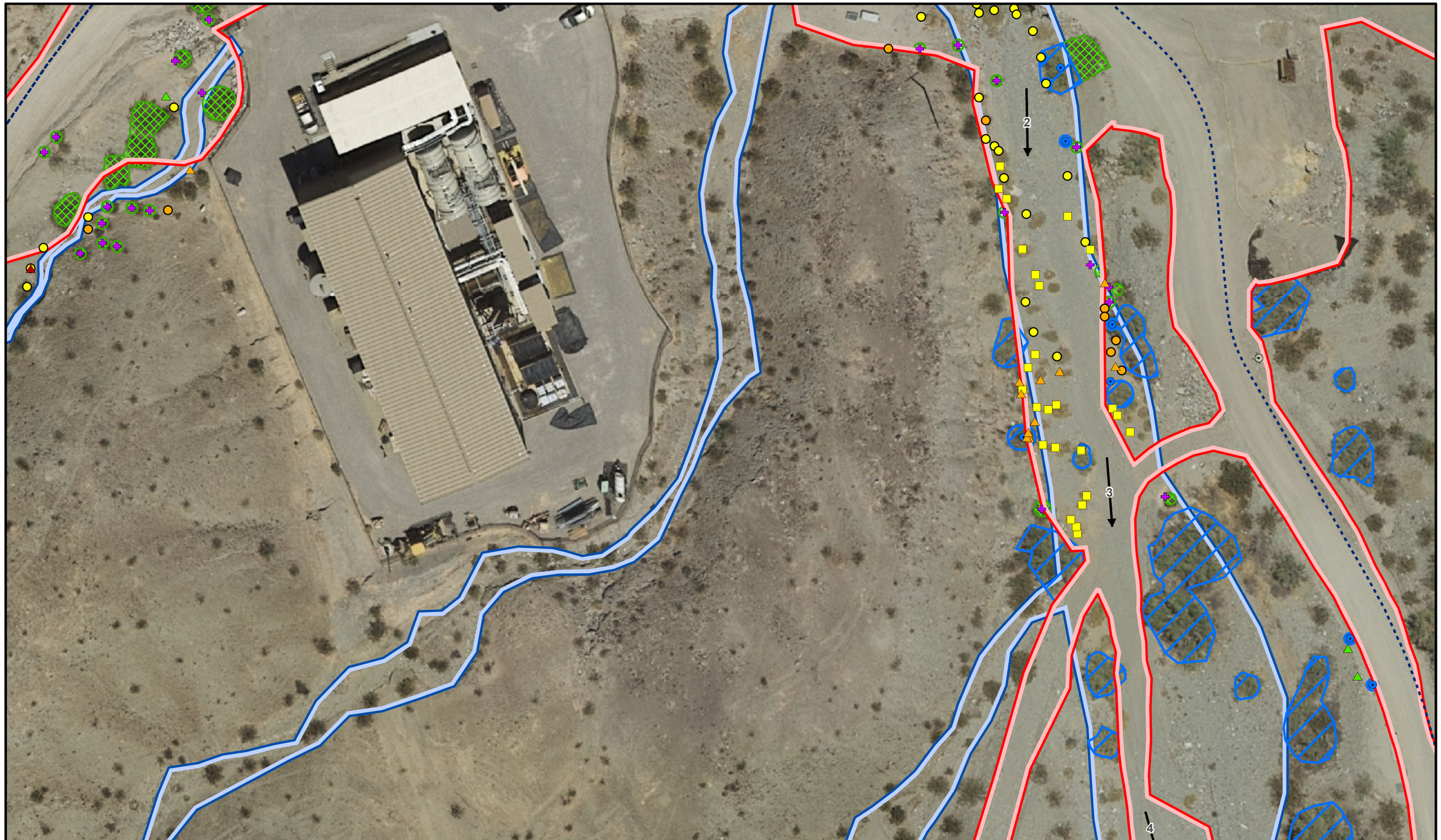


- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- CDFW Ephemeral Stream

N

0 10 20 40 Feet

Intersection of CDFW Ephemeral Streams against the Construction Footprint: 4 of 10

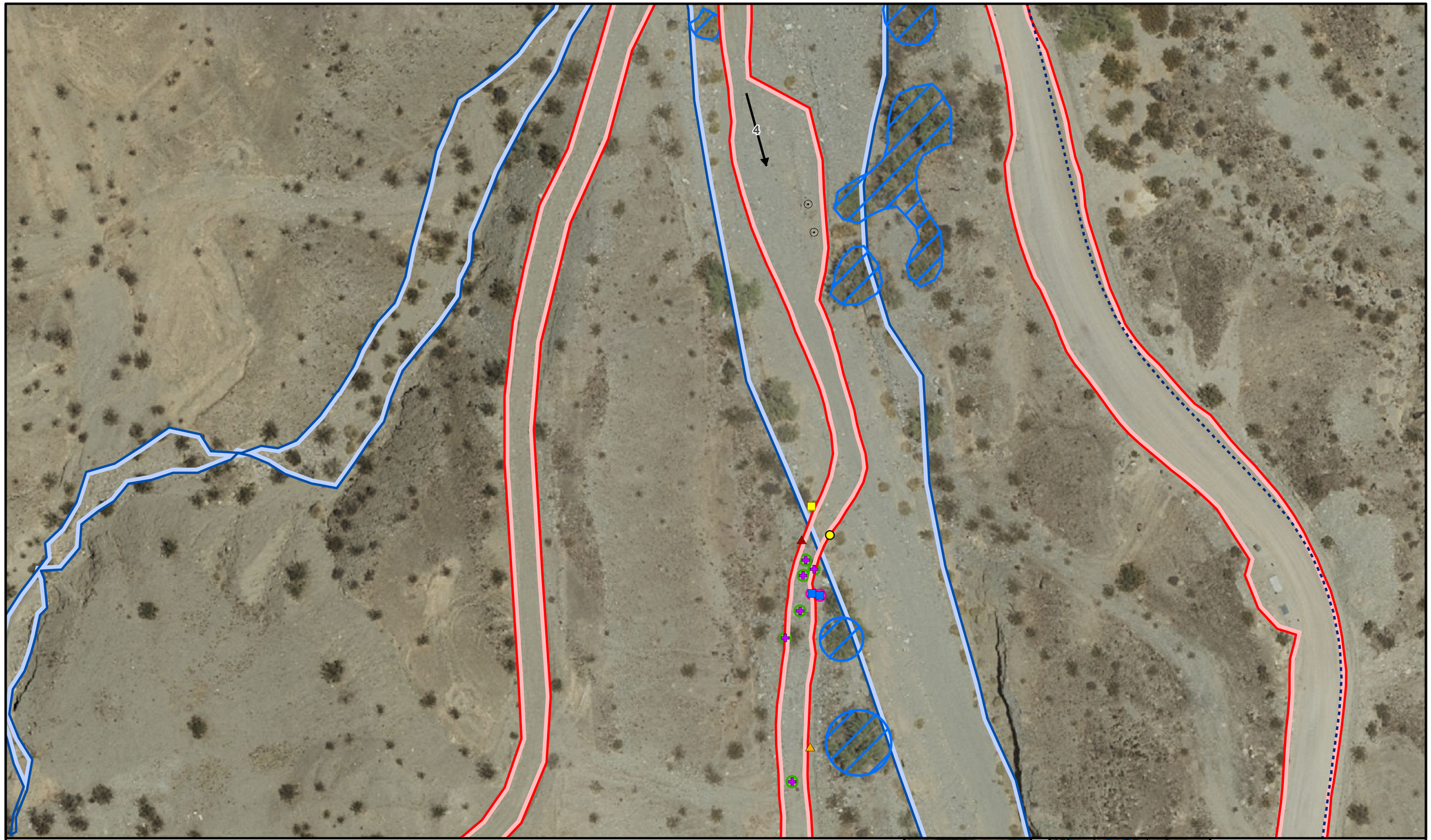


- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- CDFW Ephemeral Stream

N

0 10 20 40 Feet

Intersection of CDFW Ephemeral Streams against the Construction Footprint: 5 of 10



Anderson's desert thorn
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Burrow bush
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Catclaw acacia
Cattle saltbush
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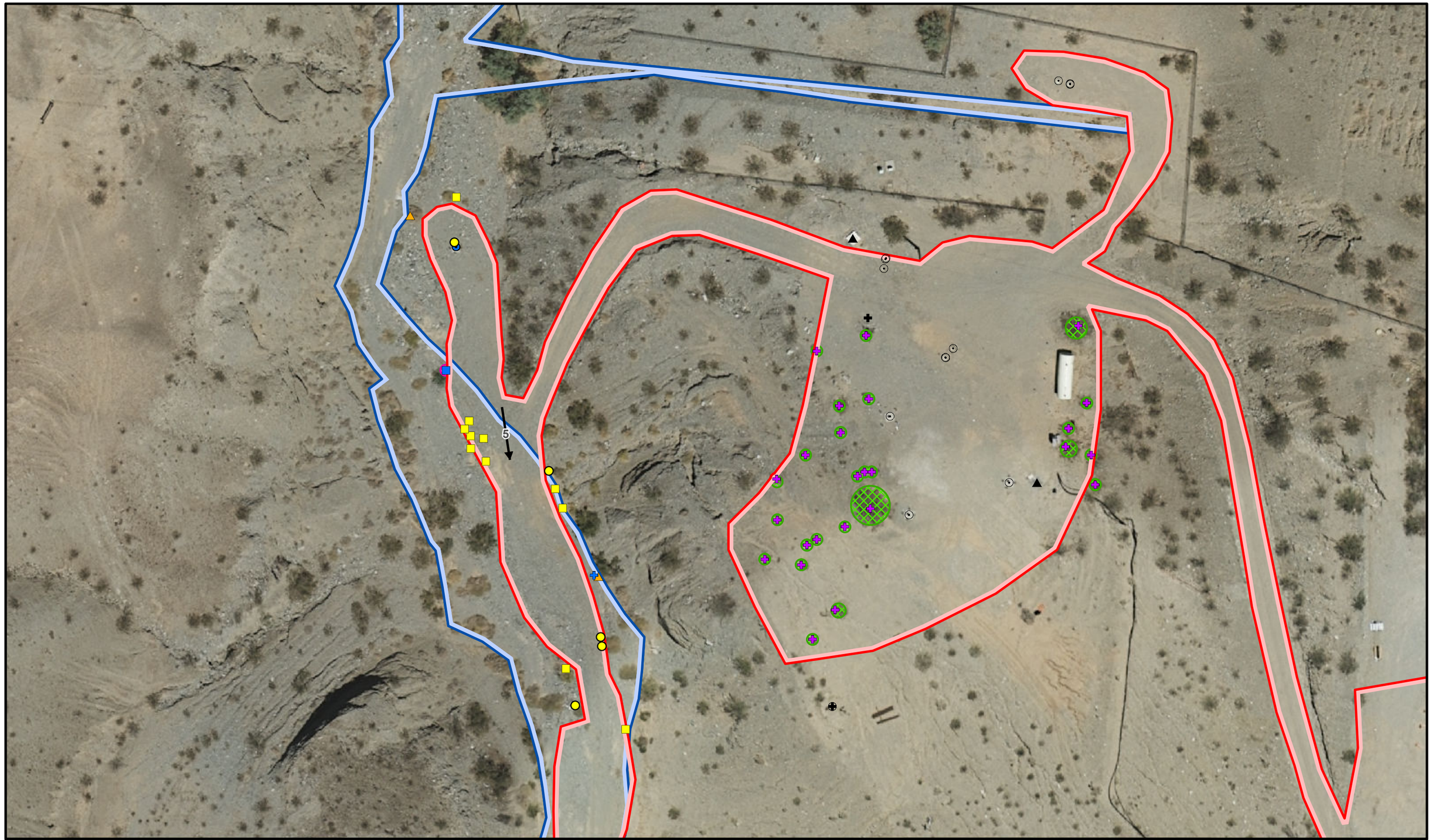
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Sweetbush
White rhatany
Photo Location and Direction
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar
Footprint
CDFW Ephemeral Stream

N

0 10 20 40 Feet

Intersection of CDFW Ephemeral Streams against the Construction Footprint: 6 of 10



- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
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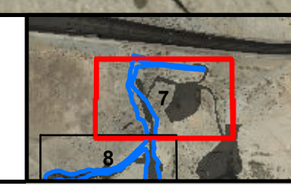
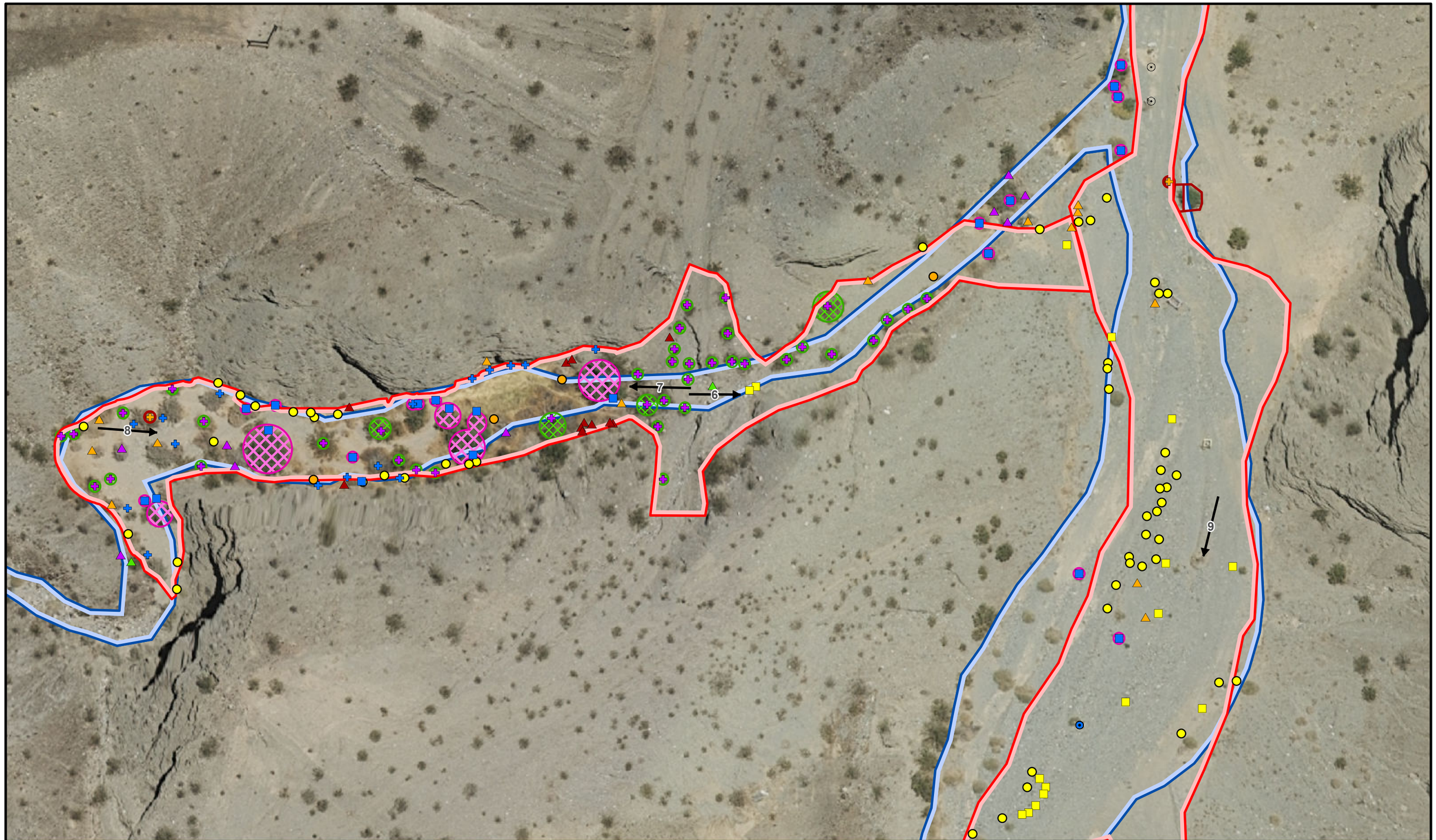
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



Intersection of CDFW Ephemeral Streams against the Construction Footprint: 7 of 10



- Anderson's desert thorn
- Arrowweed
- Beavertail
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- Burrow bush
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- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
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- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
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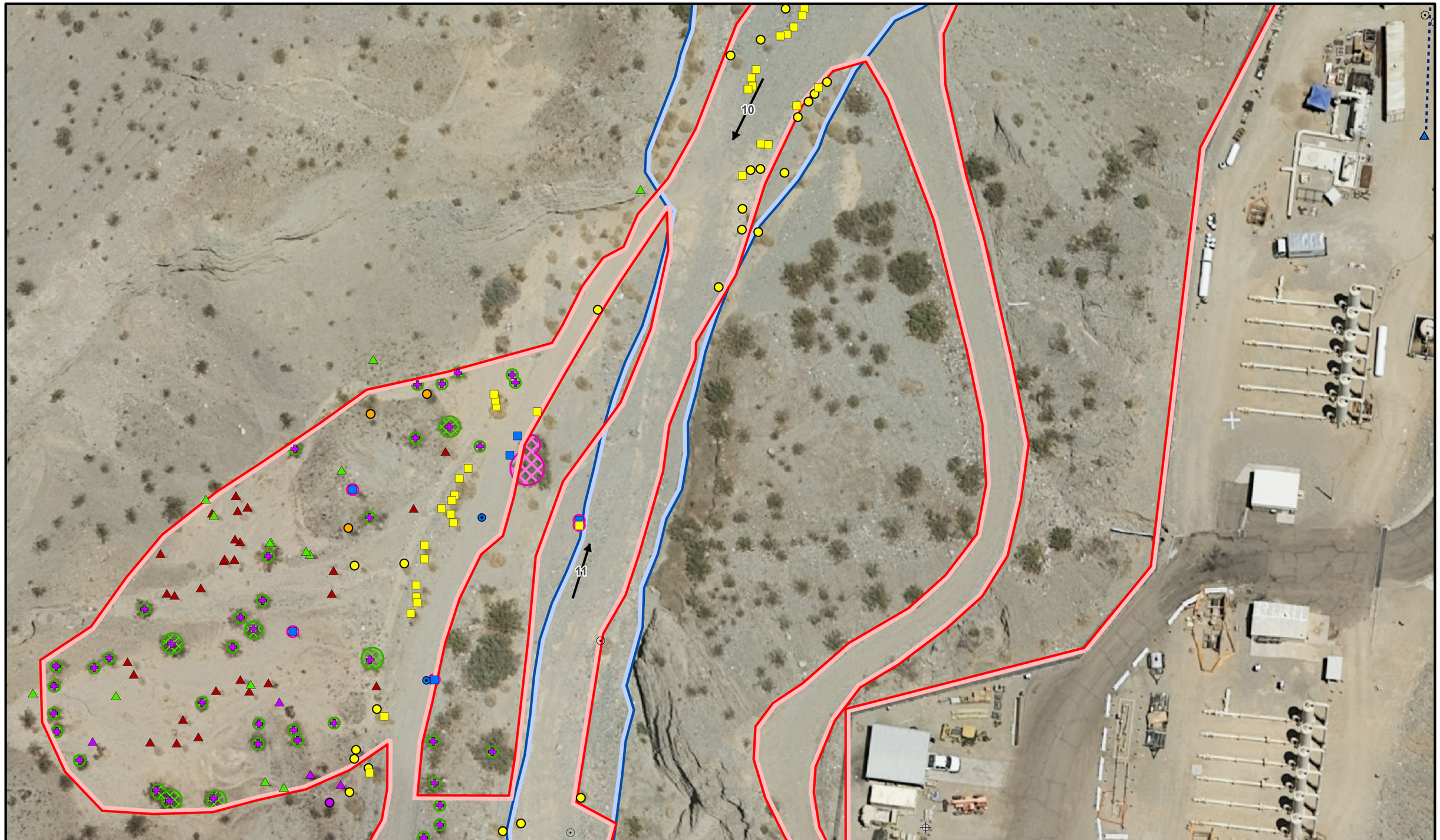
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- CDFW Ephemeral Stream

N

0 10 20 40 Feet

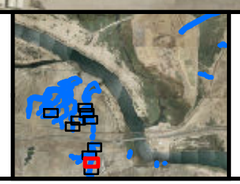
Intersection of CDFW Ephemeral Streams against the Construction Footprint: 8 of 10



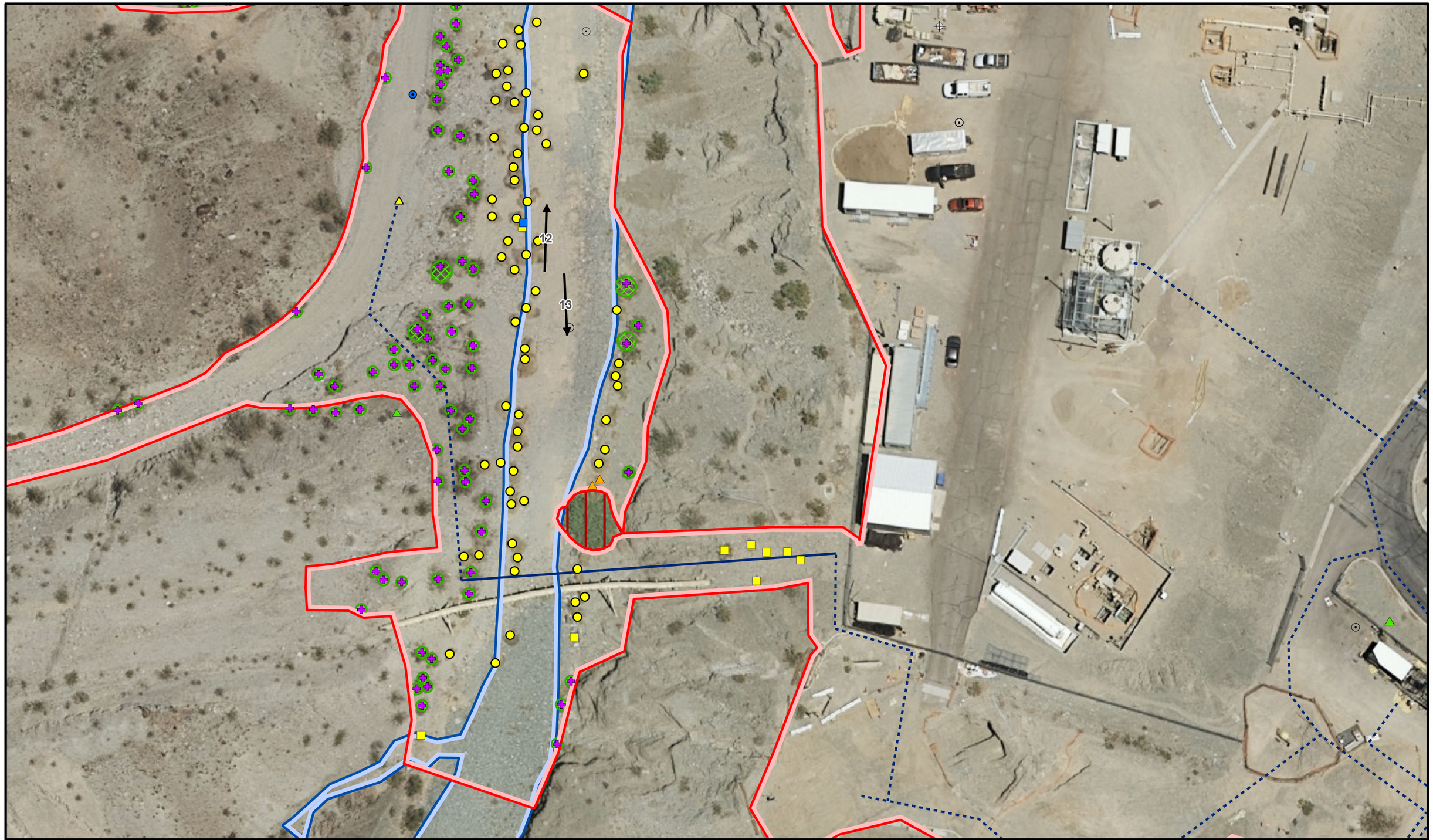
- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Bush seepweed
- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
- Desert Tobacco
- Desert Willow
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- CDFW Ephemeral Stream

N

0 10 20 40 Feet



Intersection of CDFW Ephemeral Streams against the Construction Footprint: 9 of 10



- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
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- Catclaw acacia
- Cattle saltbush
- Cheesebush
- Chia
- Creosote bush
- Desert Lavender
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- Salt cedar
- Silver cholla
- Sweetbush
- White rhatany
- Photo Location and Direction
- Arrowweed
- Palo Verde
- Catclaw acacia
- Creosote bush
- Honey Mesquite
- Salt Cedar
- Footprint
- CDFW Ephemeral Stream

N

0 10 20 40 Feet

Intersection of CDFW Ephemeral Streams against the Construction Footprint: 10 of 10

Photo 1 – Bat Cave Wash, August 7, 2014

Photo 2– Bat Cave Wash, August 7, 2014

Photo 3 – Bat Cave Wash, August 7, 2014

Photo 4 – Bat Cave Wash, August 7, 2014

Photo 5 – Bat Cave Wash, August 8, 2014

Photo 6 – Tributary to Bat Cave Wash, August 8, 2014

Photo 7 – Tributary to Bat Cave Wash, August 8, 2014

Photo 8– Tributary to Bat Cave Wash, August 8, 2014

Photo 9 – Bat Cave Wash, August 8, 2014

Photo 10 – Bat Cave Wash, August 8, 2014

Photo 11 – Bat Cave Wash, August 8, 2014

Photo 12 – Bat Cave Wash, August 8, 2014

Photo 13 – Bat Cave Wash, August 8, 2014

Appendix B
Commercial Nurseries that Grow Native Mojave Desert Plants

Ahakhav Native Plants Nursery
Colorado River Indian Reservation
25401 Rodeo Road
Parker AZ 85344
(928) 669-2664

El Nativo Growers
200 South Peckham Road
Azusa, CA 91702
(626) 969-8449
www.elnativogrowers.com
sales@elnativogrowers.com

High Country Gardens
2902 Rufina Street
Santa Fe, NM 87507
(800) 925-9387
www.highcountrygardens.com

LandscapeMart
8028 West Thunderbird Road
Peoria, AZ 85381-4612
(623) 298-6800
http://www.landscapemart.com/

Larners Seeds
P.O. Box 407
235 Grove Road
Bolinas, CA 94924
(415) 868-9407
info@larnerseeds.com
http://www.larnerseeds.com/_pages/wildflower_annual.html

Las Pilitas Nursery
8331 Nelson Way
Escondido, CA 92026
(760) 749-5930
www.laspilitas.com

Mountain States Wholesale Nursery
Litchfield Park, AZ 85340-2600
Phone: (623) 247-8509
Fax: (623) 247-6354
http://www.mswn.com/

Mountain Valley Growers
38325 Pepperweed Road
Squaw Valley, CA 93675
(559) 338-2775
http://www.mountainvalleygrowers.com

Misty Meadows Nursery
43601 Mesa Street
Banning, CA 92220
(951) 765-7542 or (951) 897-1585
mistymeadows@live.com
http://www.mistymeadowsnursery.com/601.html

Native American Seed
3791 North US Highway 377
Junction, TX 76849
(800) 728-0403
info@seedsource.com
http://www.seedsource.com/catalog/index.asp

Oak Hills Nursery
13874 Ranchero Road
Oak Hills, CA 92345
(760) 947-6261
oakhillsnursery@hotmail.com
http://www.oakhillsnursery.com, http://www.mojavedesertplants.com

Seedland, Inc.
9895 Adams Road
Wellborn, FL 32094
(386) 963-2080
sales@seedland.com
http://www.seedland.com/

S & S Seeds
P. O. Box 1275
Carpenteria, CA 93014
(805) 684-0436

San Marcos Growers
125 South San Marcos Road
P.O. Box 6827
Santa Barbara, CA 93160
(805) 683-1561
http://www.smgrowers.com

Sheldon Nursery
4999 N. Sabino Canyon Rd.
Tucson, AZ 85750
(520) 529-0609
http://www.sheldonnursery.com
sheldonnursery1@yahoo.com

White Tank Nursery
P.O. Box 810
Waddell, AZ 85355
(623) 935-4276
info@whitetankpalms.com
http://www.whitetanknursery.com/index.html

Comstock Seed
917 Highway 88
Gardnerville, NV 89460
(777) 265-0090
sales@comstockseed.com
http://www.comstockseed.com

Appendix C
Photo Point Monitoring Datasheet

Pacific Gas and Electric Company
Topock Compressor Station
Photo Point Monitoring Data Sheet

Photo Point Station:_____ Date:_____

Observer:_____

Coordinates:_____ Datum:_____

Location Description:_____

_____

_____

_____

_____

_____

_____

Photo Direction: N NE E SE S SW W NW Compass Bearing:_____ Mag. or True North

Description of Setting (Including any vegetation, substrate and disturbance):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

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_____

Appendix P
Cultural Resources Protocols

CUL-1a-2: Protocol to Preserve Tribal Members' Access to, and Use of, the Project Area
CUL-1a-3(c): Outreach to Visitors
CUL-1a-3(d): Post Off-Road Vehicle Use Signage
CUL-1a-7: Protocols for Nighttime Lighting
CUL-4: Discovery of Human Remains

CUL-1a-2: Protocol to Preserve Tribal Members' Access to, and Use of, the Project Area

CUL-1a-2: PROTOCOL TO PRESERVE TRIBAL MEMBERS' ACCESS TO, AND USE OF, THE PROJECT AREA

> As part of the CMI Workplan, PG&E shall develop a written access plan to preserve tribal members' access to, and use of, the project area for religious, spiritual, or other cultural purposes. This plan will allow access to the extent PG&E has the authority to facilitate such access, and be consistent with existing laws, regulations, and agreements governing property within the project area. The access plan may place restrictions on access into certain areas, such as the Compressor Station and the existing evaporation ponds, subject to DTSC review with regard to health and safety concerns and to ensure noninterference with approved remediation activities. This access plan may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the related stipulation (General Principle I.C) contained in the Programmatic Agreement (Appendix PA). PG&E shall demonstrate a good faith effort to coordinate with Interested Tribes by including communication logs as part of the CMI Workplan.

This protocol serves as PG&E's access plan to preserve Tribal members' access to, and use of, the project area for religious, spiritual, or other cultural purposes, to the extent that PG&E has the authority to facilitate such access, consistent with the requirements of this EIR mitigation measure (CUL-1a-2).

Land Ownership and Management

Most of the land in the project area is owned by the United States and managed by federal agencies. Portions of these federal lands are also utilized by other entities, such as the California Department of Transportation, San Bernardino County, Mohave County, and various utility companies through leases, easements, and rights-of-way. The rest of the land in the project area is owned by private or governmental parties, including Burlington Northern Santa Fe Railroad (BNSF), the Metropolitan Water District of Southern California, the Fort Mojave Indian Tribe, PG&E, and other owners of smaller parcels in Arizona.

Tribal Access Plan for Federal Properties

The U.S. Department of Interior, Bureau of Land Management issued an access plan on November 26, 2011 entitled "PG&E Topock Remediation Project Tribal Access Plan for Federal Properties" (Federal Tribal Access Plan). The Federal Tribal Access Plan was developed by BLM in collaboration with interested Tribes in accordance with the requirements in the Programmatic Agreement. It covers all aspects of Tribal access to federal properties in the project area and thus addresses the access issues related to federal properties for EIR mitigation measure CUL-1a-2. The Federal Tribal Access Plan is attached to this Plan as Attachment 1.

Tribal Access to Non-PG&E Private Parcels in the Project Area

PG&E does not have authority to unilaterally provide Tribal access to non-PG&E owned private parcels in the project area for religious, spiritual, or other cultural purposes. PG&E will seek Tribal access to non-PG&E owned private parcels to allow tribal monitoring during construction associated with implementing the groundwater remedy.

Tribal Access to PG&E Property

PG&E is committed to cooperate with all Interested Tribes to provide safe access for religious, spiritual, or other cultural purposes to PG&E property within the project area, as depicted on a map attached to this Plan as Attachment 2.

To obtain access to PG&E property the process is:

- The Tribe seeking access must send an email or call the assigned PG&E representative (initially identified as Curt Russell, Topock Site Manager, but subject to change upon written notification to the Interested Tribes) no less than seven (7) days prior to the date(s) of access, and specify: (1) the date(s) and time(s) for which access is sought; (2) the approximate number of individuals seeking access; and (3) the general purpose for the requested access to the property. The email address for Curt Russell is gcr4@pge.com and his telephone number is (760) 791-5884. In addition, PG&E will attempt to accommodate Tribal access requests made with less than seven (7) days prior notice, whenever possible.

- After consideration of the Tribe's request, PG&E shall notify the requesting Tribe via telephone and email, if available, regarding PG&E's determination of whether to grant the Tribe access. PG&E has the discretion to deny such access due to health and safety concerns and to ensure noninterference with approved remediation activities and Topock Compressor Station operations.

For safety and security purposes, Tribal representatives will contact PG&E on the date of access when they arrive at PG&E property. A PG&E escort is required for Tribal access to the Topock Compressor Station and other portions of PG&E's property that have hazards. PG&E will work with the Tribal government to arrange a mutually-agreeable time for PG&E to provide such escorted access. Tribal representatives must follow all PG&E safety and logistics requirements while they are on PG&E property. Any Tribal access to PG&E property for religious, spiritual, or other cultural purposes must not interfere with approved remediation activities or Topock Compressor Station operations. In the event such interference occurs, Tribal members will be required to leave PG&E's property.

Attachment 1
Federal Access Plan

BLM

U.S. Department of the Interior

Bureau of Land Management

PG&E TOPOCK REMEDIATION PROJECT

TRIBAL ACCESS PLAN

FOR FEDERAL PROPERTIES

Prepared by:
Department of the Interior
Bureau of Land Management
Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, Arizona 86404

NATIONAL SYSTEM OF PUBLIC LANDS

Date: November 26, 2011

PG&E TOPOCK REMEDIATION PROJECT TRIBAL ACCESS PLAN FOR FEDERAL PROPERTIES

I. Introduction

II. Surrounding Property Owners, Easements, and Right-of-Way Holders within the Topock Remediation Project Area of Potential Effect (APE)

III. Current Public Access Routes within the Topock Remediation Project APE

IV. Federally Managed Lands within the Topock Remediation Project APE closed by Emergency Closure in 2006

V. Management Prescriptions

VI. Privacy Prescriptions

VII. Appendices

1. Map Showing Surrounding Property Owners, Easements, and Rights-of-Way within the Topock Remediation Project APE

2. Topock Remediation Project Area Emergency Road Closure Document

PG&E TOPOCK REMEDIATION PROJECT TRIBAL ACCESS PLAN FOR FEDERAL PROPERTIES

I. Introduction

The Fort Mojave Indian Tribe believes that the entire landscape within which the Topock Remediation Project is being carried out is the significant cultural resource. The Bureau of Land Management (BLM) acknowledges that there is a Traditional Cultural Property (TCP) of religious and cultural significance to the Fort Mojave Indian Tribe and other Lower Colorado River Tribes within the presently identified Area of Potential Effect (APE) for the Topock Remediation Project that is eligible for inclusion on the National Register of Historic Places (NRHP). BLM also recognizes that the boundaries for this TCP may extend beyond the present boundaries of the expanded APE, but BLM believes that the Topock Remediation Project is not the proper forum for a determination of a proposed cultural landscape beyond what is required to complete the project for CERCLA cleanup actions.

The purpose of this Tribal Access Plan is to assure the rights of Tribes to access their places of spiritual and cultural importance located on federal lands contained within the boundary of the APE, including those recognized pursuant to the National Historic Preservation Act of 1966, as amended, the American Religious Freedom Act of 1978 and amendments of 1994, and Executive Order 13007 - Indian Sacred Sites.

This Tribal Access Plan assures that the Lower Colorado River Tribal governments and their members are able to freely exercise their religious rights in their aboriginal territories. Management of those parts of the Topock Remediation Project APE that are on federal land will be done in a manner that respects the cultural, religious, and spiritual importance of that portion of the TCP bounded by the APE. The federal lands within the APE will be managed in a way that minimizes incompatible land and resource uses while recognizing the important cultural, spiritual, and religious values held by the Lower Colorado River Tribes. In no manner will Tribes be subject to more restrictions than are imposed on the general public, as the point of this tribal access plan is to allow the Tribes greater, culturally appropriate access that that afforded to casual visitors without cultural ties to the area.

This Access Plan for Tribes to the Topock Remediation Project APE for traditional, religious, cultural, or spiritual purposes is and shall be interpreted in a manner consistent with the United States Constitution, applicable laws, regulations, and agreements governing property within the APE and in accordance with the stipulations in the Programmatic Agreement for the Topock Remediation Project, signed October 26, 2010. The PA defines the process by which compliance with the National Historic Preservation Act will be accomplished from this point forward. Stipulation I(C) of the Programmatic Agreement provides that access may not impede the Topock Remediation Project, may not create health and safety concerns and shall exclude the Topock Compressor Station and related facilities owned and/or operated by PG&E. Although the majority of the Tribes did not sign the Programmatic Agreement, they will nevertheless be consulted and afforded access in accordance with the Federal Government's responsibility for government-to-government consultation and in the exercise of its trust responsibilities.

II. Surrounding Property Owners, Easements, and Right-of-Way Holders within the Topock Remediation Project APE

Surrounding property owners, easement, and right-of-way holders within the Topock Remediation APE are shown on the map provided as Appendix 1. The parties holding such ownership, easements, and rights-of-way include: the Bureau of Land Management (BLM), the Bureau of Reclamation (BR),

the US Fish and Wildlife Service (USFWS), the Fort Mojave Indian Tribe, San Bernardino County, the Burlington Northern Santa Fe (BNSF) Railroad, Pacific Gas and Electric (PG&E), the Metropolitan Water District of Southern California, the California Department of Transportation (Caltrans), Mohave County, Southern California Gas, Trans-Western Gas Pipeline Company, Mojave Gas Pipeline Company, the City of Needles Electric Company, the Southwest Gas Corporation, Southwest Water Company, Mohave Electric Cooperative, Frontier Communications and various private property landowners within the APE in Arizona.

The Tribes will work with PG&E to obtain access to any fenced-off PG&E facility that is authorized to be on Federal Government land within the APE. PG&E shall grant access on a case by case basis and in coordination with the federal agency having jurisdiction over the lands. Portions of some of these areas may need to be controlled due to health and safety issues. Any restriction by PG&E on tribal access to such areas will be explained in writing to the tribe requesting access and the federal agency with jurisdiction. Any access granted to Tribes must include procedures established to ensure human health and safety, and shall not impede the Topock Remediation Project.

If the Tribes desire to obtain access to fenced-off facilities managed by other property managers (So Cal Gas Company, Trans-Western Gas Company, Caltrans, etc.) on Federal Government land within the APE, the federal agency with jurisdiction over the lands in question will work with the Tribes to obtain such access from the respective property managers.

III. Current Public Access Routes within the Topock Remediation Project APE

For the purposes of the Tribal Access Plan, a public road is any purposely constructed and legally designated right-of-way which is under the jurisdiction of the Federal Highway Administration, the State Highway Department, a county, a municipal government, or identified or maintained by one of the Federal land management agencies. Public roads do not include informal routes of passage created by off-road vehicle traffic. Public roads are open to public travel unless closed by order of the agency or local government having jurisdiction.

Motorized vehicle use, equestrian use, and the use of any other form of conveyance within the Topock APE are restricted to public roads as defined above. Allowable motorized vehicle uses near cultural resource sites and site complexes are restricted to activities that are compatible with the objective of preserving cultural resources.

Neither members of the public nor employees of the agencies or PG&E will be allowed by the agencies or PG&E to disturb Maze remnants, cairns, pottery sherds, the work stations of tribal ancestors, lithic scatters, earth figures, geoglyphs, petroglyphs, pictographs, ruins, rock rings, historic buildings, or any other artifacts that may be present on federally managed lands within the Topock APE.

Tribal members accessing the area may carry out cultural activities appropriate to their spiritual beliefs and practices, including but not limited to the burning of sage and leaving of offerings.

The BLM will review requests from Tribes for vehicular access to road-less sacred areas and consider authorizing such use on a case-by-case basis. Consistent with the Stipulations in the Programmatic Agreement, administrative access will be granted to Tribes so they may access the area(s) requested. Neither emergency nor permanent road closures would inhibit any Tribe's use of the APE for traditional cultural or religious purposes.

IV. Federally Managed Lands within the Topock Remediation Project APE Closed by Emergency Closure in 2006

For purposes of the Tribal Access Plan, *federally managed* lands mean any land managed by the BLM, BR, or USFWS. Such lands are generally open to public recreational use, including hunting

and fishing, subject to the regulations of the managing agency. Within the Topock Remediation Project APE, public entry to a portion of the northern half of the APE in California is closed by order of BLM dated July 31, 2006.

This northern portion of the APE was subject to an Emergency Closure in 2006 to protect both public safety and sensitive cultural and natural resources (refer to Appendix 2). Pursuant to Title 43 Code of Federal Regulations, Subpart 8364.1, the BLM, Lake Havasu Field Office, closed portions of roads on public lands within the Topock Remediation Project APE to motorized and mechanical vehicle use, to protect soils, vegetation and cultural resources that have been adversely impacted, or are at risk of being adversely impacted by off-highway vehicle (OHV) use.

This emergency road closure began August 1, 2006, and will remain in effect until adverse effects giving rise to the closure are eliminated, and measures are implemented to prevent recurrence of these adverse effects. The placement of notices, signs, and rock barriers used to block existing roads will be determined after the Federal Government's consultation with regional tribes has been completed. Comments offered by the Tribes will be taken into consideration before any measures are employed to block and sign roads. Law enforcement patrols and citations are used to enforce road closures. Signage includes the posting of narratives regarding penalties or citation to law.

V. Management Prescriptions

Management prescriptions will respect the traditional cultural practices of the Lower Colorado River Tribes that ascribe religious or other heritage values to properties within the APE. The BLM shall cooperate with the Tribes to allow them to select, access, and utilize harvesting areas (personal or Tribal use) for the collection of: a) medicinal, craft, or ceremonial plants, b) minerals (e.g., quartz, clay) or c) other natural materials, for traditional or ceremonial noncommercial use without specific authorization on federally managed lands.

The Tribes will request BLM's specific permission should they wish to build a fire anywhere within the Topock APE on federal lands. BLM will not unreasonably withhold such permission; however, this prescription is necessary for maintaining obvious health and safety standards within the setting which includes multiple high-pressure natural gas pipelines. BLM will consult with PG&E and other gas companies if fires are proposed in the vicinity of gas facilities.

Individual Tribal members and groups of such members, not to exceed approximately one hundred (100) persons, may utilize unfenced areas of the APE for traditional, religious, cultural, or spiritual purposes consistent with applicable laws, regulations, and agreements governing the federal property within the APE. However, should a Tribe or tribal member wish to camp or hold gatherings of Tribal members for more than a 24 hour period on federal lands, the Tribe or individual will need to inform BLM so that BLM can ensure that appropriate health and safety precautions are in effect. Notification of intent to undertake such an encampment or gathering will be submitted in writing, two weeks in advance to the BLM – Lake Havasu Field Manager.

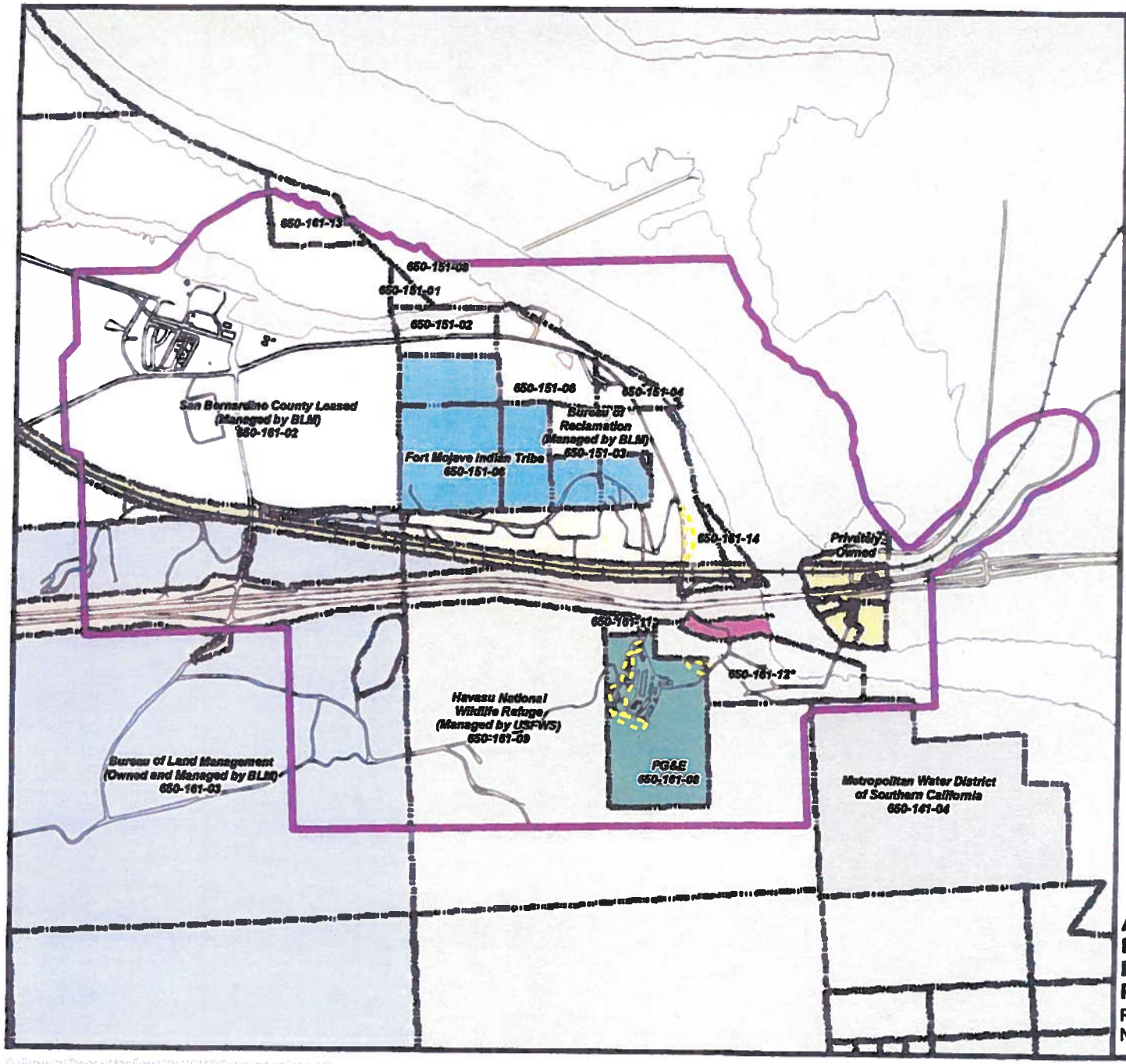
VI. Privacy Prescriptions

No federal agency, PG&E or any other party under the control of a federal agency or PG&E shall videotape, audiotape, photograph or otherwise record or monitor any tribal cultural activities on the land subject to this access plan. The tribes require privacy and maintenance of as natural and safe a setting as modern conditions permit, with appropriate aural and visual conditions, and may regard such monitoring or recording as substantial burdens on their practice of religion.

VII. Appendices

1. Map showing Expanded Topock Remediation Project APE and Property Owners within the APE

2. BLM AZ-330-06-2641-HO-AZZF Topock Project Area Emergency Road Closure Document



LEGEND

- Area of Potential Effects (APE)

Property Owner

- BNSF Railroad
- Bureau of Land Management (owned and managed by BLM)
- Bureau of Reclamation (managed by BLM)
- Caltrans Leased From Underlying Federal Owner
- Fort Mojave Indian Tribe Owner in Fee, With PG&E Easement and Access for Remediation
- Havasu National Wildlife Refuge
- Metropolitan Water Dirstrict of Southern California
- PG&E
- Privately Owned
- San Bernadino County
- San Bernadino County Leased (managed by BLM)
- MW-20 Bench Area

Note.
1. * = PG&E has a possessory interest on these parcels (650-161-11, 650-161-12) for the operation of a compressor station and associated pipelines.

0 500 1,000 2,000 Feet

Appendix 1
Map showing Expanded Topock Remediation Project APE and Property Owners within the APE
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

APPENDIX 2

UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Land Management

AZ-330-08-2641-HO-AZZF

AGENCY: Bureau of Land Management, Lake Havasu Field Office, Arizona

ACTION: Topock Project Area Emergency Road Closure

SUMMARY: Pursuant to Title 43 Code of Federal Regulations, Subpart 8364.1, the Bureau of Land Management, Lake Havasu Field Office, will close portions of roads on public lands to motorized and mechanized vehicle use. The purpose of the emergency closure is to protect soils, vegetation and cultural resources that have been adversely impacted, or are at risk of being adversely impacted, by off-highway vehicle (OHV) use. In addition, this closure is needed to alleviate congestion in the project area during Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remediation of hexavalent chromium in the groundwater at the Pacific Gas and Electric (PG&E) Topock Compressor Station in Needles, California. Copies of this Emergency Closure Notice and map are available at the BLM Lake Havasu Field Office, 2610 Sweetwater Avenue, Lake Havasu City, AZ 86406, phone (928) 505-1200.

EFFECTIVE DATES: This emergency road closure is in effect beginning August 1, 2008, and will remain in effect until considerable adverse effects giving rise to the closure are eliminated, and measures are implemented to prevent recurrence of these adverse effects.

FOR FURTHER INFORMATION CONTACT: Michael Dodson, Law Enforcement Ranger, Bureau of Land Management Lake Havasu Field Office, 2610 Sweetwater

Avenue, Lake Havasu City, AZ 86406, phone (928) 505-1200.

SUPPLEMENTARY INFORMATION: The BLM Lake Havasu Field Office and other entities have observed and documented considerable adverse effects to soils, vegetation, and cultural resources from motorized or mechanized vehicle use in this area. Based on this information, the BLM authorized officer has determined that motorized or mechanized vehicle use in this area is causing, and will continue to cause, considerable adverse effects. In addition, portions of roads in the emergency road closure area are utilized by Pacific Gas and Electric Company to control and remove hexavalent chromium from the groundwater. The emergency road closure in the area will help protect public safety and remediation efforts during CERCLA operations, by restricting motorized and mechanized use of the area. The public lands affected are closed to travel by motorized and mechanized vehicle use (including trucks, sport utility vehicles, all-terrain vehicles, cars, motorcycles, bicycles), except for authorized access to private lands and rights-of-way (ROW), use by fire and law enforcement vehicles, emergency activities, and other authorized government uses. The authorities for this emergency closure and restriction order are 43 CFR 8364.1 and 9268.3(d). BLM is implementing this action on 269 acres of public land in San Bernardino County, California. OHV use on the remainder of the public lands administered by the BLM Lake Havasu Field Office will continue to be managed according to existing Federal Register orders, and the 1985 Yuma District Resource Management Plan.

DESCRIPTION OF CLOSED AREA:

This emergency closure affects 269 acres of public lands and roads, subject to the exceptions below, located within the Topock Project area. Public lands in the following described tracts are hereby closed to motorized and mechanized vehicles:

T. 7 N., R. 24 E, portions of sections 5, 6, 7 and 8.

Private lands within the closure boundary are not under the jurisdiction of the BLM, and not affected by this emergency closure.

Exceptions to the Emergency Closure and Restriction Orders

Exceptions to this closure include emergency personnel (law enforcement, fire, medical), authorized BLM personnel, and persons authorized access to private lands and Rights of Way within the closure boundary

Penalties

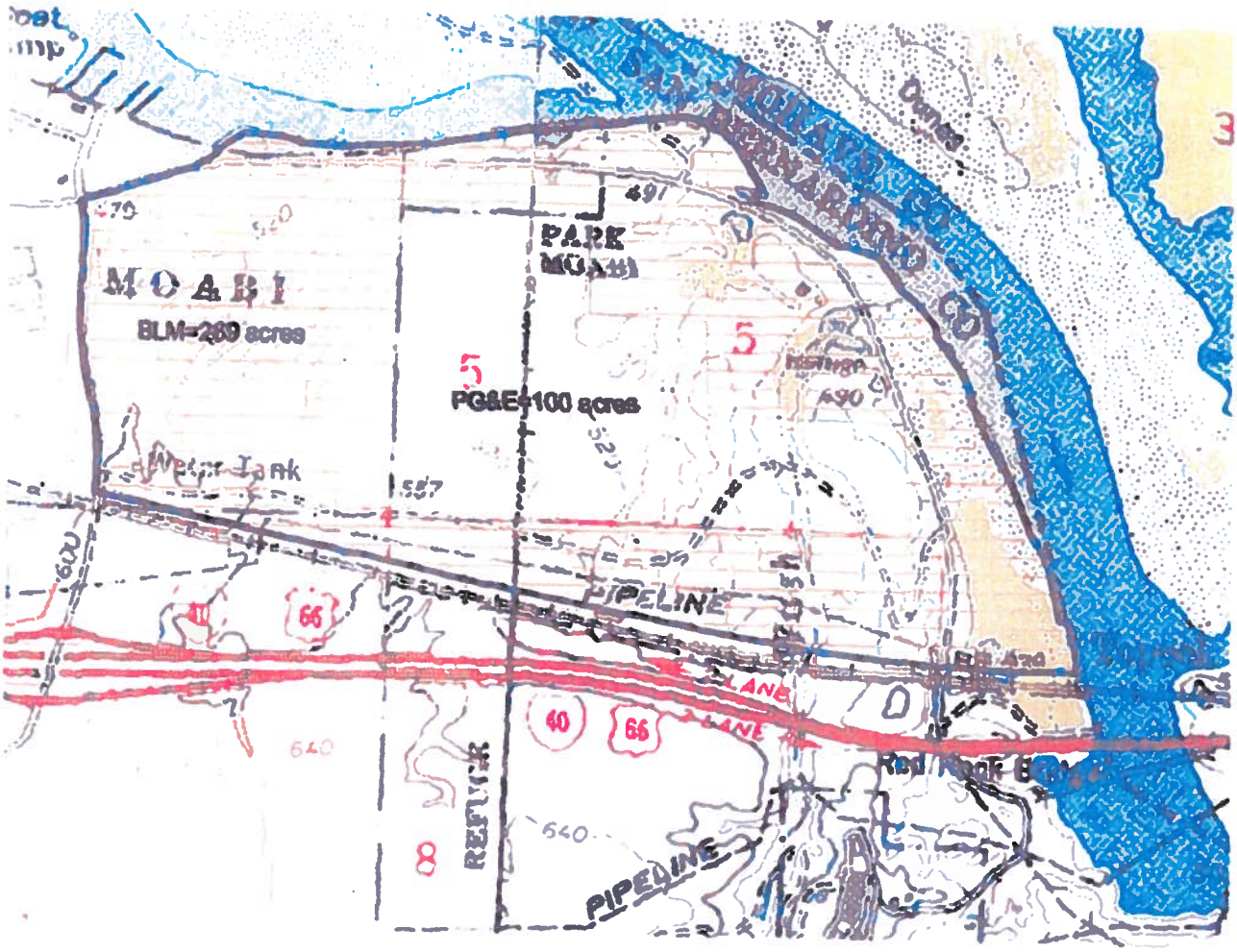
Under section 303(a) of the Federal Land Policy and Management Act (FLPMA) of 1976, (43 U.S.C 1733(a), and 43 CFR 8360-7, if you violate these closures or restrictions on public lands within the boundaries established, you may be tried before a United States Magistrate and fined no more than $100,000 or, imprisoned for no more than 12 months, or both Such violations may also be subject to the enhanced fines provided for by 18 U S C 3571

Date: July 31, 2008

Signed:

Timothy Z Smith, Field Manager
BLM Lake Havasu Field Office

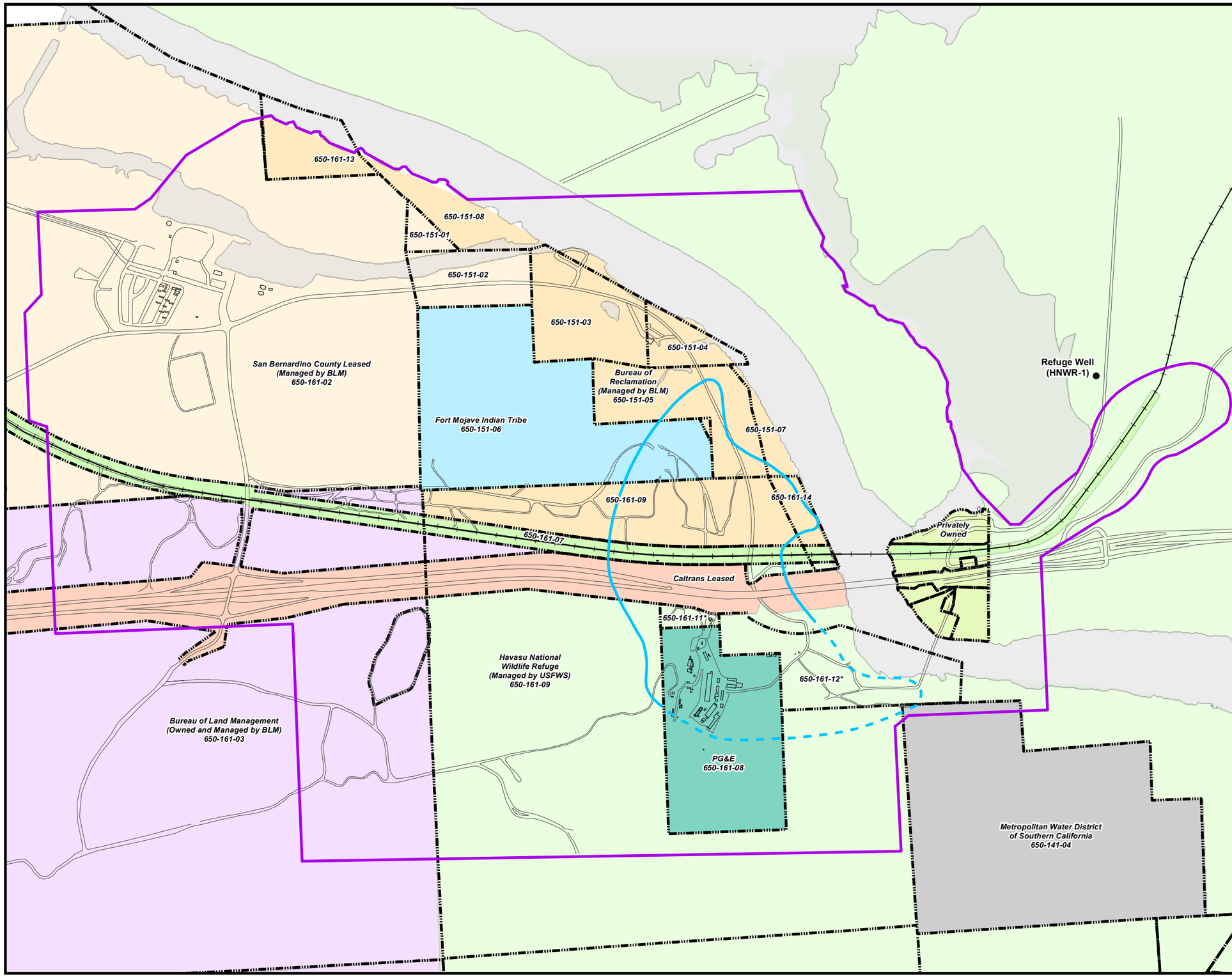
Topock Emergency Closure



N

0.2 0 0.2 0.4 Miles

Attachment 2
Surrounding Properties Map



LEGEND

- Refuge Well
- Area of Potential Effects (APE)
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.

Property Owner

- BNSF Railroad
- Bureau of Land Management (owned and managed by BLM)
- Bureau of Reclamation (managed by BLM)
- Caltrans Leased From Underlying Federal Owner
- Fort Mojave Indian Tribe Owner in Fee, With PG&E Easement and Access for Remediation
- Havasu National Wildlife Refuge
- Metropolitan Water Dirstrict of Southern California
- PG&E
- Privately Owned
- San Bernadino County Leased (managed by BLM)

Note:
1. * = PG&E has a possessory interest on these parcels (650-161-11,650-161-12) for the operation of a compressor station and associated pipelines.

0 350 700 1,400 Feet

N

FIGURE 2.4-1
SURROUNDING PROPERTY MAP

GROUNDWATER REMEDY BASIS OF DESIGN REPORT
INTERMEDIATE (60%) DESIGN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: D:\Projects\Topock\MapFiles\2013\CMS\60%Report\SurroundingProp.mxd

CUL-1a-3(c:) Outreach to Visitors

CUL-1a-3(c) OUTREACH TO VISITORS

CUL-1a-3(c): PG&E shall enhance existing measures to prevent and reduce incursions from recreational and/or other outside users from affecting unique archeological and historically significant resources, including resources within the Topock Cultural Area, by: Coordinating with BLM and San Bernardino County to facilitate an outreach effort to the staff at Moabi Regional Park, requesting that they communicate to visitors the parts of the project area that are off limits to off-road vehicle usage because of health and safety concerns, public lands management plans, or landowner requests. PG&E shall make a good faith effort to involve the surrounding tribes in this outreach effort, providing Interested Tribes with the opportunity to comment on outreach materials or provide a tribal cultural resources specialist the opportunity to participate in the outreach activities. As part of this outreach effort, PG&E shall work with Park Moabi and offer to design, develop, and fund the installation of an informational kiosk within Park Moabi that informs visitors of the work being done at the project site. PG&E shall involve the tribes to the maximum extent feasible, as determined by DTSC, in the design and development of the informational kiosk.

Implementation Procedures

Coordination with Stakeholders

The purpose of this Mitigation Measure is to inform Moabi Regional Park visitors about the restrictions to off highway vehicles (OHV) use in the project area and the need to protect cultural resources that occur within and near Topock. PG&E has implemented this Mitigation Measure by coordinating with BLM, San Bernardino Regional Parks Department, Park Moabi concessionaires, and Interested Tribes. PG&E has undertaken the following to facilitate implementation of the Mitigation Measure:

- PG&E met with BLM to gather informational materials regarding OHV activities and use; information that identifies areas designated as off-limits to OHV use; and areas open to OHV use. PG&E met with San Bernardino Regional Parks Department and Park Moabi concessionaires to discuss assistance with outreach activities to Moabi Regional Park visitors regarding OHV use restrictions. PG&E also discussed funding with Parks Department staff and concessionaires for the design and printing of informational materials for Parks Department staff and visitors; training sessions for Parks Department staff to appropriately implement outreach activities; and the installation of an information kiosk to inform Park visitors about OHV restrictions and other information pertaining to the protection of environmental resources in the project area.

- PG&E met with Interested Tribes to solicit their input and comments regarding outreach materials and to provide a tribal cultural resources specialist the opportunity to participate in the outreach activities.

Develop Draft Visitor Outreach Plans

PG&E will use the information gathered during meetings with BLM, San Bernardino Regional Parks Department, Park Moabi concessionaires, and Interested Tribes to facilitate the execution of the visitor outreach efforts. PG&E will:

- Develop draft visitor outreach materials;
- Develop a draft training session for Park Moabi visitor-contact employees;
- Develop kiosk design concepts and draft informational content; and
- Develop a draft plan for executing other outreach ideas identified during meetings.

Review of PG&E Draft Plans by Stakeholders

PG&E will consult with BLM, San Bernardino Regional Parks Department, Park Moabi concessionaires, and Interested Tribes and provide these stakeholders an opportunity to review and comment on any outreach plan prior to its implementation. In particular, PG&E will consult with the BLM regarding the accuracy of information on OHV use areas; the San Bernardino Regional Parks Department and Park Moabi concessionaires regarding implementation of visitor outreach activities; and the Interested Tribes regarding the content of all written materials and participation in training sessions for Parks Department visitor-contact employees.

Implementation of Outreach

PG&E will initiate conversations with key stakeholders (i.e. BLM, San Bernardino County, Park Moabi) within six months of the final approval of the groundwater remedy design.

CUL-1a-3(d): Post Off-Road Vehicle Use Signage

CUL-1a-3(d) POST OFF-ROAD VEHICLE USE SIGNAGE

CUL-1a-3(d): Posting signage to indicate those parts of the project area that are off limits to off-road vehicle usage due to possible health and safety concerns and to reduce potential damage to environmental resources. If agreed to by land owners and/or local, state, or federal management entities within the project area, PG&E shall work with the relevant land owner or land management entity to develop, design, and fund the installation of easily visible and clear signage. This may include coordination with BLM to install signage noting the designation of the area as an Area of Critical Environmental Concern owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.

Implementation Procedures

Coordination with Stakeholders

PG&E will meet with the local, state, or federal land owners and/or management entities within the project area to identify portions of their property that could be appropriate for designation as off-limits to off highway vehicles (OHV) use due to potential health and safety concerns and/or the presence of sensitive biological or cultural resources. PG&E will work with each stakeholder to design appropriate signage for each property and its associated resources.

Installation of Signage

PG&E will initiate conversations with key stakeholders (i.e. BLM, San Bernardino County, Park Moabi) within six months of the final approval of the groundwater remedy design.

CUL-1a-7: Protocols For Nighttime Lighting

CUL-1a-7: PROTOCOLS FOR NIGHTTIME LIGHTING

> CUL-1a-7: Nighttime construction-related activities shall be limited to work that cannot be disrupted or suspended until the following day, such as, but not limited to, well drilling and development or decommissioning activities. Lighting considerations, including the potential use of solar power for some lighting, shall be included as part of the remedial design plan to be developed with involvement of Interested Tribes and the U.S. Department of the Interior. To minimize construction and operations-related lighting impacts, the lighting in the remedial design plan shall include, at a minimum: (1) shrouding/shielding for portable lights needed during construction and operational activities; (2) installation of portable lights at the lowest allowable height and in the smallest number feasible to maintain adequate night lighting for safety; (3) shielding and orientation of lights such that off-site visibility of light sources, glare, and light from construction activities is minimized to the extent feasible. No additional permanent poles shall be installed for lighting. This mitigation measure is not meant to replace or subsume any actions required by the County or state or federal entities with regard to lighting required for minimum security and safety purposes.

Implementation Procedures

Nighttime Lighting

The Construction/Remedial Action Work Plan will include example circumstances whereby nighttime construction may be conducted and the standards that will be followed. These standards will be consistent with the Construction Lighting Principles. Construction Lighting Principles include: a determination by PG&E that nighttime work for construction activities is required; lighting only areas of active construction; a restriction on the installation of any new permanent poles for nighttime lighting; the use of portable lighting that includes shielding/shrouding (e.g., downward facing fixtures with cutoff shields to reduce light diffusion) to the extent feasible; the use of the lowest feasible amount of lighting at the lowest allowable height to maintain adequate night lighting for safety; orientation of lights such that off-site visibility of light sources, glare, and construction activities is limited; and designation of a responsible member of the construction crew (e.g., foreman or crew boss) to extinguish the lighting as soon as the nighttime construction work is completed.

Coordination with Stakeholders

The US Department of the Interior, Interested Tribes, and other stakeholders will be given the opportunity to comment on the design of outdoor lighting at groundwater remediation facilities through the design review process described in CUL 1a-8d. Details of the lighting design will be presented in the 90% design package.

Regulatory Requirements

The following lighting standards will be followed for the project:

- Construction Industry 29 CFR 1926.56 (lighting safety requirements)
- General Industry 29 CFR 1910.120 (HAZWOPER) (lighting safety requirements)
- San Bernardino County Code Title 8 Section § 83.07.040 Glare and Outdoor Lighting - Mountain and Desert Regions
- Mohave County Outdoor Light Control Ordinance 87-1

CUL-1a-13: Development of Cultural Sensitivity Education Program

CUL-1a-13: DEVELOPMENT OF CULTURAL SENSITIVITY EDUCATION PROGRAM

PG&E shall, in communication with Interested Tribes, develop as part of the CMI Workplan, a worker cultural sensitivity education program. The program shall be implemented before commencement of construction and throughout construction and operations as personnel are added. This program may include information provided directly by tribal entities either in written form or on video, in a manner consistent with Appendix C in the existing BLM Programmatic Agreement. The worker cultural sensitivity education program shall ensure that every person working on the project as an employee or contractor, before participating in design or outdoor activities at the project site, is informed regarding:

- The cultural significance of the Topock Cultural Area,
- Appropriate behavior to use within the Topock Cultural Area,
- Activities that are to be avoided in the Topock Cultural Area, and
- Consequences in the event of noncompliance.

1. Applicability

1.1 Program Implementation

The Program will be implemented prior to commencement of any ground-disturbing activity or construction and throughout construction and operations as personnel are added. As required by the Topock Remediation's Programmatic Agreement (PA), the training will be conducted by PG&E with participation from Interested Tribes[1] and Tribal Monitors, Archaeological Monitors, and Federal agency staff, as appropriate.

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[1] For purposes of this protocol and as defined in the EIR, Interested Tribes refers to the six tribes that have substantially participated in the various administrative processes surrounding remediation of the Topock Cultural Area with the California Department of Substances Control (DTSC), PG&E, and the U.S. Department of the Interior (DOI), including throughout development of the final remedy. Interested tribes include the Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Fort Yuma-Quechan Indian Tribe, and Hualapai Indian Tribe.

1.2 Training Required of All Staff, Consultants, and Workers

Personnel required to attend the training (which would include all workers doing remediation activities within the PA Area of Potential Effect (APE) or Groundwater Remediation Environmental Impact Report (EIR) Project Area will include each individual associated with construction or ground-disturbing activities throughout each phase of the project (including decommissioning and environmental reconstruction), including PG&E employees, consultants, contractors, and subcontractors ("workers").

1.3 Program Consistent with Appendix C of Programmatic Agreement

The Program will be consistent with the cultural sensitivity training outlined in the Tribal and Archaeological Monitoring Protocol provided as Appendix C to the PA for the Project. Appendix C states:

- Cultural sensitivity training will be required of all staff, workers, and contractors engaged in activities in the Topock Remediation Project Area of Potential Effect (APE) to familiarize them with the sacred nature of the area so that they will perform their jobs in a respectful manner.
- New personnel will be trained before they are allowed to do fieldwork within the Area of Potential Effects (APE).
- Training will be conducted by PG&E with participation by Tribes and Tribal Monitors, Archaeological Monitors, Federal agency staff, and PG&E supervising staff, as appropriate.
- Consistent with PG&E's stated policy, PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers, or contractors who do not comply.

2. Program Development

2.1 Types of Training Sessions

Cultural Sensitivity Orientation training:

- All PG&E and contract workers engaged in field activities will be trained prior to conducting fieldwork.
- All PG&E and contract workers engaged in design work will be trained as soon as practical after being assigned to work on the Topock Project.

Training during Field Project Orientation Meetings:

- Cultural sensitivity and cultural resource protection training will be conducted at each Field Project Orientation meeting conducted prior to each substantial project work phase, in addition to communication about onsite safety, communications, and biological protection standards.

Additional Training Opportunities:

- PG&E will work collaboratively with Tribes and agencies to identify and develop additional cultural sensitivity training opportunities.

2.2 Key Points of Training

Training will cover each of the following main topics:

Significance and Sensitivity of Topock Cultural Area

- Area is sensitive for archaeological/historical sites and for its spiritual importance to Tribes.

Appropriate Onsite Behavior

- Be respectful of tribal views regarding the cultural significance of the Topock Cultural Area and treat Tribal monitors with respect.
- PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers or contractors who do not comply.

Protection of Historically Significant Cultural Resources

- Avoidance, to the extent feasible, is key to protecting historically significant cultural resources, biological resources, endangered species and plants.
- Project area is mostly Federal land (BLM, FWS, and BOR) and also includes FMIT-owned land.
- Protection of sites is required by Federal and State law.
- PG&E will avoid and/or minimize adverse effects on historically significant cultural resources to the maximum extent practicable.

Worker Responsibility

- Avoid sensitive cultural resources to the extent feasible.
- Avoid fenced, barricaded, or closed locations.
- Keep equipment and personnel within designated routes.
- Avoid exploring the area when on free time.
- Do not disturb archeological sites and burials and do not collect artifacts; such activities are illegal.
- Communicate with PG&E representatives.
- Stay within work areas and do not wander.

Consequences of Noncompliance

- PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers, or contractors who do not comply.
- PG&E will document any knowledge of damage or destruction of any historically significant cultural resource, and when required, shall report any such damage or destruction to the appropriate legal authorities.

2.3 Training Approach and Materials

PG&E will develop an outline of information to be covered in the training. This outline will be shared with Interested Tribes for their input.

In addition, presentation materials may also be developed and used. PG&E will share these materials with Interested Tribes for their input. These materials may include the following:

- Printed guideline materials for each attendee.
- PowerPoint and/or video presentations.
- Existing presentations (such as the orientation presentation materials).
- Additional new presentations as developed or suggested by Interested Tribes.

2.4 Training Session Presentations

PG&E will be responsible for conducting these training sessions. PG&E will discuss with Interested Tribes their interest and willingness to participate in some of the training sessions and will attempt to coordinate schedules accordingly. At all training sessions, tribal representatives present will be offered the opportunity to share information with the trainees.

- Materials from the Tribes will not be used for other purposes.
- Tribes will maintain the resources they will use during the training.

Orientation subcommittee items will be included in this Program.

2.5 Training Session Scheduling

Field Project Orientation Meetings will be scheduled when required for the initiation of substantial fieldwork project phases. These meetings will be scheduled in advance and communicated to all stakeholders.

Training for new workers to the site will not be scheduled in advance. These sessions will take place on an ad-hoc basis on or before the first day of fieldwork for the new site worker.

Similarly, training for new employees involved with design work will take place on an ad-hoc basis as soon as practicable for the new design worker, but at a minimum, before the new worker works in the field.

2.6 Training Records

PG&E will develop a training checklist document which will be dated, signed by the trainee, and signed by the trainer.

CUL-4: Discovery of Human Remains

CUL-4 DISCOVERY OF HUMAN REMAINS

CUL-4: PG&E shall notify and communicate with Tribes pertaining to any discovery and treatment of Native American human remains and/or burial goods. Ground-disturbing activities during all Project phases may disturb as-yet undiscovered human remains or Native American burials and associated burial goods potentially resulting in damage. To the maximum extent feasible, Mitigation Measure CUL-4 shall be implemented in a manner consistent with mitigation required by local, state, and federal requirements. PG&E shall retain a Qualified Cultural Resource Consultant (Consultant), a qualified archaeologist and/or physical anthropologist with expert skill in the identification of human osteological (bone) remains. In the event human remains and/or burial goods are uncovered over the course of Project construction, operation and maintenance, or decommissioning activities, the following procedures shall be followed to ensure compliance with all applicable local, state, and federal laws (see also CUL-4 in the 2011 *DTSC Topock Compressor Station Final Remedy FEIR* and the *Mitigation Monitoring and Reporting Program* (MMRP) documents). PG&E is responsible for implementing these measures with DTSC oversight.

<u>Implementation Procedures</u>

- The Consultant and a designated tribal monitor(s) shall train construction personnel in the identification of human remains and potential burial goods so they may aid in their identification.

- The Consultant and tribal monitor(s) shall be in place at the start of each construction event to adequately oversee all ground-disturbing activities.

- Upon discovery of materials that may be human remains and/or burial goods, the construction contractor shall immediately suspend work within the vicinity of the discovery.

- A determination if the remains discovered are human shall be made by the Consultant.

- If determined to be human remains and/or burial goods, the Consultant (and tribal monitor), or construction contractor, shall protect the discovered materials remaining in the ground from additional disturbance.

- All subsequent action shall conform to the protocols established in the state health and safety codes and regulations of California or Arizona depending on the discovery location.

- The Consultant, PG&E archaeologist, or construction site supervisor shall contact the appropriate county coroner, and the PG&E and DTSC project managers immediately.

- The coroner will determine if the remains are recent in origin and if an investigation of the cause of death is required (see California Health and Safety Code §7050.5 or Arizona Code of Criminal Procedure Title 1, Article 49.04).

- If the coroner determines the human remains are **not** Native American and not evidence of a crime, project personnel shall coordinate with the Consultant to develop an appropriate treatment plan which may include contacting the next-of-kin to solicit input on subsequent disposition of the remains.

  - If no next-of-kin is found, or recommendations by the next-of-kin are considered unacceptable by the landowner, the landowner will reinter the remains with appropriate dignity in a location outside the project area where they would be unlikely to be disturbed in the future.

- If on **Federal land** and the coroner determines the human remains are Native American and not evidence of a crime, PG&E shall notify the BLM Havasu City field office and initiate compliance with applicable federal laws and regulations, including the Native American Graves Protection and Repatriation Act, in conformance with §8.2 and Appendix D (Plan of Action) of the *Cultural and Historic Properties Management Plan* (CHPMP).

- If on **non-Federal lands** and the San Bernardino or Mohave County Coroner determines that the human remains are Native American and not evidence of a crime, the Consultant shall pursue the following actions to determine the proper treatment and disposition.

  - In California, Project personnel shall contact the California Native American Heritage Commission (NAHC) to identify a most likely descendent (MLD) as required under California Public Resources Code §5097.98.

    - The MLD(s) shall be invited to inspect the area in which the human remains were found and provide treatment recommendations to the landowner and PG&E site manager in accordance with the provisions of PRC §5097.98.

    - Treatments may include reburial, scientific removal of the discovered human remains and relinquishment to the MLD(s), nondestructive analysis of human remains and/or other culturally appropriate treatment.

    - If the MLD(s) so requests, the landowner will reinter the remains with the appropriate dignity in a location outside the area of disturbance in a location unlikely to be disturbed in the future.

  - In Arizona, Project personnel shall contact the Arizona State Museum (ASM) as required by Arizona Revised Statute (ARS) §41-844.

- ASM will follow procedures identified in the ASM's *A.R.S. §41-844 and §41-865 Guidelines*, issued November 12, 2009, to notify tribes that occupy or have occupied the place of discovery, the Arizona Commission on Indian Affairs, and the intertribal council of Arizona.

- ASM shall convene a meeting of notified entities to determine proper disposition and treatment of the materials, including curation or reburial.

- If no person of direct kinship is identified or a group with cultural affinity, ASM shall follow procedures in §41-844.G. for disposition

Appendix Q
Site Security Plan

Report

Final Groundwater Remedy Site Security Plan,

Topock Compressor Station, Needles, California

Prepared for

Pacific Gas and Electric Company

September 2014

CH2MHILL®

155 Grand Avenue, Suite 800
Oakland, CA 94612

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Acronyms and Abbreviations

DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EIR	Environmental Impact Report
FCR	Field Contact Representative
PG&E	Pacific Gas and Electric Company

SECTION 1

Introduction

Pacific Gas and Electric Company (PG&E) is implementing the selected groundwater remedy for chromium in groundwater at the Topock Compressor Station in San Bernardino County, approximately 15 miles southeast of Needles, California, and west of the Colorado River. Remedial activities at the Topock site are being performed in conformance with the requirements of the Resource Conservation and Recovery Act Corrective Action pursuant to a Corrective Action Consent Agreement entered into by PG&E and the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in 1996. In addition, PG&E and the United States executed a Remedial Design/Remedial Action Consent Decree, on behalf of the Department of the Interior, under the Comprehensive Environmental Response, Compensation and Liability Act in 2012, which was lodged with the U.S. District Court for the Central District of California in January 2013 and will be effective upon approval by the court.

Implementation of the groundwater remedy consists of several phases, including design, construction, startup, operation and maintenance, post-remediation monitoring, decommissioning, and restoration. The project is currently in the remedial design phase, Pre-Final (90%) Design.

This Site Security Plan has been prepared to outline PG&E security plans and protocols for the groundwater remedy, including physical security measures, inspections, notification and reporting, and worker training and access.

1.1 Purpose and Objectives

Security measures and protocols identified in this plan are intended to fulfill the requirements of the DTSC's January 2011 *Final Environmental Impact Report for the Topock Compressor Station Groundwater Remediation Project* (EIR) Mitigation Measure Cul-1a-3b, which requires the preparation of a Site Security Plan outlining instructions for performing inspections of the project site and notifying land owners and DTSC of human-caused disturbance to project facilities or significant cultural resources. CUL-1a-3b requires:

> *The site security plan shall include, but not be limited to, instructions for PG&E personnel to inspect the project site routinely during construction and report any human-caused disturbance to project facilities and the surrounding environment to DTSC and the appropriate landowner, such as BLM, USFWS, or FMIT, as appropriate, depending on the ownership of the property involved in the incursion. Notification shall be within a specified period, as established in the site security plan for the event, and shall also be summarized as part of the periodic implementation status report, as approved by DTSC for remedy implementation. This measure does not impose any obligation on PG&E to perform law-enforcement duties on federal or private lands, but is intended to provide increased observation of potential intrusions into the project area during construction and operation of the final remedy that may impact significant cultural resources. PG&E staff, or assigned agents, should be instructed to report any outside disturbance to the environment personally observed over the course of the working day.*
>
> *Information shall be reported within a specific period, as established in the site security plan, to DTSC and the appropriate landowners, such as BLM, USFWS, or FMIT, depending on the ownership of the property intruded upon. The site security plan may also include the use of PG&E security cameras at major ingress/egress gates into the project site. Finally, if requested by the FMIT the plan may include the use of private security personnel to patrol the FMIT-owned parcel within the project area to prevent outside incursions.*

In addition, the Site Security Plan outlines additional PG&E-required security provisions for protection of equipment and facilities throughout the various phases of the remedy.

1.2 Site Security Approach

The selected groundwater remedy for the Topock site will be constructed and implemented over many years. Construction, functional testing, and startup will occur over approximate 3 to 5 years, and the system is expected to operate over several decades. Specific security measures many change over the course of the project.

Construction of the groundwater remedy will include:

- Performing mobilization and construction setup
- Installing approximately 135 groundwater wells (including provisional wells)
- Constructing more than 35,000 lineal feet of piping and conduit
- Constructing roads and temporary access areas
- Constructing aboveground infrastructure, including buildings, tanks, and power/controls as well as other supporting facilities.

The construction will occur over an approximately 35-acre area, with infrastructure installed on both the California and Arizona sides of the Colorado River. Remedial components will be constructed within a variety of settings, including the operating areas of the Topock Compressor Station, within the floodplain of the Colorado River, along and beneath existing transportation/utility corridors, and within washes and terraces. Owners of property where remedial systems will be installed include:

- Bureau of Reclamation (managed by the Bureau of Land Management)
- Havasu National Wildlife Refuge (managed by the Fish and Wildlife Service)
- San Bernardino County
- BNSF Railroad
- Fort Mojave Indian Tribe
- Southern California Metropolitan Water District
- Kinder Morgan

In addition, infrastructure is planned on county roadways or their rights-of-way (San Bernardino County, Mojave County) as well as roadways and rights-of-way of state transportation agencies (California and Arizona Departments of Transportation) and utility easements.

Much of the groundwater remedy infrastructure will be constructed below ground, including the groundwater wells and much of the piping and conduit. Following construction, functional testing, and startup, operation of the groundwater remedy will include system operation, routine maintenance, and sampling and data collection.

The approach to site security for the groundwater remedy facilities includes the following general principles:

- Security for remedial facilities located inside the Compressor Station will be provided for by the existing Compressor Station security system and are not addressed further in this plan.
- Remedial facilities outside of the Compressor Station will be equipped with security features/systems consistent with PG&E's current security standards. PG&E's security standards for remedial facilities at Moabi Regional Park will be established after the design is firmed up.
- PG&E is responsible for its employees and workers under direct contract, and PG&E has established worker-training procedures to limit the footprint of PG&E-performed activities. With regard to activities performed by site visitors and the general public, however, PG&E's worker training procedures are limited to the observation and notification protocols identified herein and do not obligate PG&E to perform law-enforcement duties on government or privately- lands.

- Construction contractors will establish and enforce their own separate security measures for safeguarding their equipment, materials, and constructed facilities.
- Separate from security measures discussed in this plan, the Hazardous Materials Business Plan and Health and Safety Plan outline control measures, such as temporary fencing or barriers for hazardous waste accumulation areas or work zones established for safety purposes that are otherwise accessible to the general public, as well as communication systems and signs that may be posted warning of the storage of hazardous materials or waste and emergency contact information. These measures are not repeated in this plan.

SECTION 2

Security Measures

2.1 Engineering Controls

Engineering controls are anticipated to be established for the purpose of safeguarding equipment, materials, and constructed remedial facilities; to ensure noninterference with remedy operations; and to protect the health and safety of personnel, the public, and the surrounding environment.

2.1.1 Engineering Controls during Construction

During construction, PG&E will establish a construction headquarters that is expected to be fenced, with controlled access, cameras, and a security system consistent with PG&E's current security standards. Separately, satellite staging areas will be established for use by construction contractors for storage of equipment and supplies. Some of the satellite staging areas may be fenced and locked and may include cameras and alarms. Lighting for security of construction equipment and materials will be temporary and will include: (1) shrouding/shielding for portable lights; (2) installation of portable lights at the lowest allowable height and in the smallest number feasible to maintain adequate night lighting for safety; and (3) shielding and orientation of lights such that offsite visibility of light sources, glare, and light is minimized to the extent feasible, in conformance with Mitigation Measure CUL-1a-7.

Construction contractors will have separately established security plans for safeguarding their equipment and materials. While contractors may elect to, and likely will, use the PG&E-established construction headquarters and satellite staging areas, contractors are solely responsible for the security of their equipment, materials, and associated property, even if stored at PG&E-established storage areas. The contractor/contractors may elect to install additional security measures; these measures need to be coordinated with and approved by PG&E or their responsible representative. Contractors are not allowed to establish new site staging areas without review and approval by PG&E or its representative. Installation, operation, and maintenance of security measures at non-PG&E-established areas, even if the area is approved by PG&E for use by the contractor, is the sole responsibility of the contractor.

Protocols for protective measures for archaeological/historic sites during construction are provided in the Cultural Impact Mitigation Program. Protective measures may include, but are not limited to, protective coverings of soil or riprap, onsite personnel to prevent access to sensitive areas, use of flagging, blaze orange mesh fencing secured to steel posts, bollards, natural barriers of rocks or piled brush, cables suspended between secure posts, and/or signage (for example, "This Area Closed" or "Exclusion Zone: Keep Out"). Such measures will be temporary (only as needed during construction) and will, to the extent practicable, not call undue attention to the nature of the resource being protected.

2.1.2 Engineering Controls during Operation and Maintenance

Site security measures for remedial facilities outside the compressor station will be equipped with security features/systems consistent with PG&E's current security standards. Such features are site specific, as necessary and, consistent with landowners' requirements, could include, but are not limited to, security fencing to protect the equipment and provide safety for personnel and the public; locks and chains to prevent unauthorized access; security devices and instrumentation; security communication systems; alarms to notify PG&E's security operations; key card systems; and security cameras.

The Basis of Design Report and 90% engineering design plans/drawings (see Appendix D of the 90% Basis of Design Report Report) contain the engineering controls for permanent facilities. Examples of security features to be installed at remedy facilities at the Transwestern Bench, MW-20 Bench, HNWR-1A well site, and the North and South Aerial Crossings (crosses Bat Cave Wash) are described below.

2.1.2.1 Transwestern Bench

Examples of security features to be installed at this site are as follows:

- A perimeter fence will be installed with a motorized main gate and a personnel gate. The main gate will have a security card reader and camera to monitor and prevent unauthorized access.
- Perimeter cameras will be installed at the Operations Building.
- The Operations Building will have card readers at entrances.

2.1.2.2 MW-20 Bench

Examples of security features to be installed at this site are as follows:

- Each new gate(s) will have a security card reader and camera.
- Additional perimeter cameras will be installed.
- Two motorized gates with security card readers and cameras will be installed.
- The carbon amendment building will have card readers at all entrances.

2.1.2.3 HNWR-1A Well Site

Examples of security features to be installed at this site are as follows:

- A perimeter fence will be installed.
- Security camera will be installed to monitor and prevent unauthorized access.

2.1.2.4 North and South Aerial Crossings of Bat Cave Wash

An example of a security feature to be installed at this site is as follows:

- Fences with lockable personnel gates with locks will be installed at each end of the two new pipe bridges

In compliance with the EIR mitigation measure CUL-1a-6, additional phone calls and alarms associated with remedial activities security systems will not be routed through PG&E's existing audible alarm annunciator system within the Compressor Station.

2.2 Inspections

Inspections will be performed to provide increased observation of potential intrusions during construction and operation of the final remedy that may impact significant cultural resources. Inspections for this purpose will be performed by site personnel during working hours and potentially by a security patrol during nonworking hours.

During working hours, inspections will be performed regularly by inspecting site work against preestablished work zones. The level of inspection will vary depending on the nature of the activity and the phase of the project. For construction and maintenance activities requiring staging of equipment and materials, work zones will be preestablished and demarcated with flags, fencing, or natural materials (rocks or piled brush) consistent with the Cultural Impact Mitigation Program. During the construction phase, PG&E has retained a qualified archaeologist, Applied EarthWorks, to define the construction zones and protective measures around archaeological or historical sites, and construction inspectors will review work activities routinely to ensure that the construction zones and protective measures are being maintained. For routine operation and maintenance functions following startup of the remedial system, inspections will occur less frequently and will be focused on those remedial facilities where vehicles and personnel routinely visit. Inspections will focus on ensuring that personnel are using designated travel routes and parking areas.

Inspections during working hours will focus on active construction, operation, and maintenance work performed by PG&E and its contractors. Inspectors will not be actively observing other landowner or leaseholder activities in the site vicinity nor activities by the public. Inspectors will stay on designated travel

routes; evidence of human presence outside the designated travel routes or work zones will not be cause for inspectors to further investigate.

Inspections during nonworking hours are anticipated to be provided by a private security patrol service. During nonworking hours, the private security patrol officer will visit a number of site locations regularly. At each location, the security officer will document the visit, the time and unusual circumstances on a signoff form. The signoff forms will be completed daily; completed forms will be maintained. To ensure that the security officer regularly travels around the site, electronic time and date recorders may be installed at designated locations. The security officer will check in at each recorder unit to record the time and date that he or she visited the location. If visitors are expected at the site during nonworking hours, the Site Manager or his designee will brief the site security officer, and the site security officer will be given specific instructions regarding the activities of scheduled visitors. If a visitor arrives at the site during nonworking hours and the site security officer did not receive prior notice regarding the visitor, the site security officer will immediately contact the Site Manager or his designee to obtain further instructions. If authorization is not obtained, the visitor will be asked to leave the site. The surrounding area is used for recreation, and the security patrol cannot control activities that are not on PG&E property or related to the construction and operation of the groundwater remedy. The security officer will note any activities observed offsite that may affect cultural or biological resources, such as dirt-bike riding or use of all-terrain vehicles.

During construction, PG&E will not be responsible for performing any security inspections at any contractor-established storage or staging areas, even if they are approved by PG&E.

2.3 Notification and Reporting

PG&E staff or assigned agents will be instructed to report any outside disturbance to the environment personally observed over the course of the working day. Should a designated inspector or assigned agent observe disturbance to the environment over the course of the working day, notification will be provided to PG&E, DTSC, and the corresponding landowner. Notification will be provided by telephone within 1 working day of observation. Information to be provided in the notification includes:

1. Location of observation
2. Date and time
3. Nature of activity
4. Whether the activity is associated with the groundwater remedy construction, operation or maintenance

Identified disturbances will be reported to DTSC and the respective landowner. Contact will be made by telephone with the following contacts:

- **DTSC:** Aaron Yue at 714/484-5439
- **Bureau of Land Management, Lake Havasu Field Office, Lake Havasu City, AZ:** General Phone: 928/505-1200 or Kim Liebhauser at 928/412-5008
- **United States Fish and Wildlife Service, Havasu National Wildlife Refuge, Needles, CA:** General Phone: 760/326-3853 or Linda Miller at extension 22
- **San Bernardino County:** Maureen Snelgrove at 909/855-5709 or Troy Burton at 909/387-2648
- **BNSF Railroad:** Scott Johnson (Corp Security) at 815/403-8214
- **Fort Mojave Indian Tribe:** Linda Otero at 928/768-4475 or 702/526-4679
- **Southern California Metropolitan Water District:** Bart Koch at 213/217-5646
- **Kinder Morgan:** Robert Cefalu at 928/727-5441

As appropriate, law enforcement will be contacted for security observations related to theft or vandalism:

- **Local Emergency Response:** 911
- **San Bernardino County Sheriff, City of Needles Police Department, Needles, CA:** General Phone: 760/326-9200
- **Mojave County Sherriff Department:** General Phone: 928/768-7055

In conformance with EIR Mitigation Measure CUL-1a-3b, notifications of disturbance to the environment will also be included in the quarterly EIR mitigation measure compliance monitoring reports to be submitted to DTSC quarterly during the construction period and annually during the operations and maintenance period.

2.4 Worker Training and Access

PG&E has an established worker training program for contractors and subcontractors under its direct control, pursuant to its commitment to constructing and operating the groundwater remedy in a manner respectful of the sacredness and sensitivity of the resources at and near the project area. PG&E will also establish access procedures for visitors associated with the project but who are not under PG&E control, such as regulators, landowners and leaseholders of land or facilities that touch the footprint of construction, utility companies, stakeholders, and tribal monitors. With the exception of the Topock Compressor Station, PG&E will not establish training or other responsibilities associated with members of the general public who are not associated with the groundwater remedy project.

2.4.1 Worker Training

Consistent with its obligations under the Programmatic Agreement's Monitoring Protocol, existing PG&E standard practice, and the EIR mitigation monitoring and reporting program requirements, cultural sensitivity training is required of staff, workers, and contractors engaged in activities within the Area of Potential Effect to familiarize these personnel with the sacred nature and cultural significance of the area so that they will perform their jobs in a respectful manner. The training will occur before performing onsite work.

This training includes discussion of appropriate behavior, activities that are to be avoided, and consequences for noncompliance. Consistent with these obligations, PG&E will not tolerate any disrespectful behavior in the field and will remove staff, workers, or contractors who do not comply with this section.

2.4.1.1 Cultural and Historical Resources

Cultural and historical resources sensitivity education has been a central part of the Topock remediation project to date. The existing education on cultural/historical resources sensitivity for Topock occurs via periodic training and project initiation meetings. Sensitivity training classes are conducted at least annually and are attended by all workers available to participate. Sensitivity training/education is also provided at project initiation meetings, typically held at the site and prior to field work. Site orientation will stress that site activities will be conducted in a respectful manner. New site workers will be required to receive the training before working on ground-disturbing activities. Sensitivity training will be provided by PG&E Site Operations Manager and the PG&E Remediation Resources Specialist, and PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate.

Many EIR mitigation measures associated with the groundwater remedy (CUL-1a-13, CUL-1b/c-4, CUL-4) are related to continued training of workers on cultural resources, historical resources, and the identification of human remains. PG&E will continue communications with Tribes on development of a worker cultural

sensitivity education program per CUL-1a-13, which will be implemented before construction, during construction, and during operation of the remedial facility.

2.4.1.2 Biological Resources

As with cultural and historical resources, biological resources sensitivity education has also been a central part of the Topock project. PG&E's education program covering threatened and endangered species and the general project management measures specified under the Programmatic Biological Assessment is provided at project initiation meetings, typically held at the site and prior to field work. The training is provided by the PG&E Topock Site Operations Manager, the PG&E Project Biologist, and supporting contract biologists. New employees will receive the training prior to working onsite.

In accordance with the Programmatic Biological Assessment, PG&E-designated Field Contact Representatives (FCRs) will be responsible for overseeing compliance with the general project management measures. The FCR has the authority to halt activities that pose a danger to listed species and/or are in violation with the management measures. A qualified biologist will conduct a preconstruction survey immediately prior to initiation of ground-disturbing activities. Within 60 days of completion of construction activities, the FCR and the qualified biologist will prepare a report for submittal to the Bureau of Land Management.

2.4.2 Visitor Access

During construction of the groundwater remedy, PG&E will establish a central meeting location (construction headquarters) for site visitors associated with the project but not under PG&E control, such as regulators, landowners and leaseholders of land or facilities touching the footprint of construction, utility companies, stakeholders and tribal monitors. Upon arrival at the site, visitors will check in at the designated construction headquarters first before entering the project site. At the construction headquarters, the visitor will sign the visitors' log and meet the designated PG&E representative for the site visit.

During operation and maintenance of the groundwater remedy, PG&E will establish a designated location for site visitors. Similar visitor check-in requirements will be established, as described above.

First-time visitors will be provided with natural and cultural resources awareness and site safety orientation prior to further work at the site and will complete a sign-off form before entering the site for the first time, acknowledging understanding of the site access requirements. Repeat visitors will be asked to renew their understanding of the site access requirements annually. A master list of companies and utilities and their employees and individuals who have signed the signoff form will be kept at a designated location and will be verified when each person arrives at the site.

Visitors to the site will meet the designated PG&E representative to verify that he/she is aware of the visit and to obtain instructions on access restrictions or considerations related to the purpose of the visit. To ensure safety for vehicular traffic on National Trails Highway, PG&E may arrange for transportation of visitors or otherwise organize consolidation of travel vehicles associated with the purpose of the visit. Visitors will not travel around the site without an escort unless the Site Manager or his designee permits otherwise. Visitors will be told not to enter restricted areas unless a cultural or biological monitor is present.

Visitor access procedures as described herein are intended to apply to visitors associated with the construction, operation, and maintenance of the groundwater remedy and are not intended to apply to parties that have established access rights to public and private land in the area, such as land owners/managers, utilities, law enforcement, concessionaires, or Compressor Station employees or suppliers.

2.5 Responsibilities

2.5.1 Regular Working Hours

Regular working hours have not yet been established for the remedy construction but will be set and communicated monthly. The Site Manager (Curt Russell) or designee is responsible for controlling access during working hours. When the Site Manager is not onsite, Field Activities Supervisor (Chris Smith) will act as an alternate for controlling site access. During working hours, the Site Manager or Field Activities Supervisor are responsible for being aware of who is on the site.

2.5.2 Nonworking Hours

Outside of established regular working hours and all day on nonworkdays, a private security firm may be employed to be responsible for patrolling the site and controlling access to constructed facilities.

PG&E will provide the site security firm with training regarding the procedures and rules outlined in this plan. The security officer on duty will be expected to understand security procedures and rules.

Appendix R
Waste Management Plan

Topock Remedial Action Work Plan, Waste Management Plan, PG&E Topock Compressor Station, Needles, California

Prepared for

Pacific Gas and Electric Company

September 2014

CH2MHILL®
155 Grand Avenue, Suite 800
Oakland, CA 94612

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Acronyms and Abbreviations

ARAR	applicable or relevant and appropriate requirement
BMP	best management practice
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOI	Department of Interior
EIR	Environmental Impact Report
IM-3	Interim Measures No. 3
MG	million gallons
PPE	personal protective equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
SDS	safety data sheet
STLC	soluble threshold limit concentration
TC	toxicity characteristic
TCLP	toxicity characteristic leaching procedure
U.S.C.	United States Code
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
WET	California Waste Extraction Test

SECTION 1

Introduction

This Waste Management Plan presents procedures for the proper collection, characterization, storage, transportation, and disposal of waste generated during the construction and startup of the groundwater remedy at the Topock Compressor Station (TCS) in Needles, California. Wastes generated from construction and startup activities will be managed onsite in compliance with the Environmental Impact Report (EIR) mitigation measures in the certified EIR (DTSC 2011), as adopted in the Mitigation Monitoring and Reporting Program (MMRP), and the applicable or relevant and appropriate requirements (ARARs) established in the Record of Decision (DOI 2010) and will be disposed of offsite in a manner consistent with applicable local, state, and federal laws and regulations.

SECTION 2

Expected Waste Streams

Expected waste streams from remedy construction and startup activities and their estimated quantities are described in this section.

2.1 Wastewater

Expected waste streams resulting from wastewater are as follows:

- **Wastewater generated from well installation, development, testing, and sampling.** The current estimated total volume of wastewater generated over the entire construction period is 25 million gallons (MG). It is expected that the majority of this wastewater stream will be trucked or conveyed to and managed onsite at the existing IM-3 treatment plant, TCS evaporation ponds, or injected into an appropriate well, subject to availability and in accordance with the substantive requirements. Excess or hazardous wastewater will be transported offsite for treatment/disposal.
- **Remedy-produced water generated during remedy startup, such as backwashing of wells.** This wastewater stream will be transported onsite via piping or trucking to the remedy-produced water conditioning plant (inside the TCS), conditioned by removing solids and pH adjustment, and transported via piping to the in-situ reactive zone wells for re-injection. The estimated total volume of remedy-produced water is 7.6 MG per year. No offsite transportation is anticipated for this waste stream.
- **Miscellaneous wastewater streams (for example, equipment decontamination, rainfall that collects in secondary containment areas).** These waste streams will be managed onsite via IM-3 and/or TCS evaporation ponds. During startup, these waste streams may be managed by piping or trucking to the remedy-produced water conditioning plant (inside the TCS). Excess wastewater will be transported offsite for disposal.
- **Water from hydrotesting of conveyance piping system.** It is anticipated that this water will be generally clean and therefore suitable for reuse in testing, dust control, backfill moisture control, and other similar onsite uses.

2.2 Displaced Soil

Displaced soil can include soil as the result of well drilling and installation of pipe trenches/access roads. Displaced soil will be managed in accordance with the Soil Management Plan, provided as Appendix L to this C/RAWP. After accounting for on-site processing and reuse of soils, approximately 4,000 cubic yards of non-hazardous soil and 11,000 cubic yards of clean soil will remain on site. The non-hazardous soil will include approximately 3,000 cubic yards of drill cuttings and 1,000 cubic yards generated by other construction activities. The clean soil will include approximately 3,000 cubic yards of drill cuttings and 8,000 cubic yards of soil generated by other construction activities. In addition, approximately 800 cubic yards of excavated bedrock are expected to be removed for the construction of remedial facilities inside the TCS. Excavated bedrock will be managed in a manner similar to oversized rocks in displaced soil. Based on contaminant concentrations at soil investigation areas near the Topock Compressor Station, soil to be generated from construction activities is not expected to be characterized as hazardous waste.

2.3 Precipitated Solids, Sludge, and Spent Filters Generated from Remedy-produced Water Conditioning Process

The amount of precipitated solids and sludge is estimated to be 1.6 tons (dry weight) per year, based on 7.6 MG per year of remedy-produced water, using 25 percent caustic to neutralize the first flush of well rehabilitation water. The amount of spent filters is estimated to be 0.45 ton (dry weight) per year. These waste streams will be transported offsite for disposal.

2.4 General Construction Waste

The following general construction waste streams will be transported offsite for recycling or disposal:

- Concrete and asphalt pavement rubble (from construction within roads, TCS)
- Construction and demolition debris (lumber, gypsum wallboard, glass, metal, roofing material, carpeting, plastic pipe, etc.)
- Used personal protective equipment (PPE)
- Miscellaneous waste, including trash, paper bags, cardboard boxes, office debris, etc.
- Empty drums/cans, unused chemicals/paints, used oil, used solvents, oily solids, and used fuel filters/ parts from equipment maintenance, etc.
- Universal waste, including batteries, electronic devices, lamps, aerosol cans, and mercury-containing equipment.
- Sampling equipment, such as calibration gas cylinders

2.5 Sanitary Waste

This waste stream will be handled by portable toilets, with the exception of the temporary facilities that may be able to tie into existing sanitary systems, such as the Compressor Station and the planned construction yard at Moabi Regional Park.

SECTION 3

Waste Characterization and Classification

3.1 General Requirements

The majority of construction-related wastes are anticipated to be non-hazardous and can be classified (their regulatory status determined) and disposed or recycled without prior characterization (testing to determine chemical or physical properties). Some wastes will require characterization prior to disposal so that they can be classified accurately. Wastes will be evaluated based on knowledge of the generating process, chemical composition of materials involved, and for environmental media, existing site characterization data. Waste classification will be performed following the hierarchy specified in California action-specific ARAR 74, Standards Applicable to Generators of Hazardous Waste (Title 22, California Code of Regulations [22 CCR] Section 66262.11) (DOI 2010), as follows:

- Determine whether the waste is exempt from regulation.
- Determine whether the waste is a listed hazardous waste.
- Determine whether the waste exhibits hazardous waste characteristics.
- If the waste is hazardous, determine whether waste-specific exclusions or restrictions apply.

Listed hazardous wastes are not present in environmental media at the site; therefore, classification of these materials will be based solely on hazardous waste characteristics. A listed waste determination will be performed for chemicals brought to the site as part of the construction process that must subsequently be disposed as waste.

Sampling and analysis for hazardous waste characteristics will use methods specified in SW-846, *Test Methods for Evaluation Solid Waste, Physical/Chemical Methods* (USEPA 2007). Test results will be compared to hazardous waste characteristic levels presented in 22 CCR Division 4.5, Chapter 11, Article 3, Characteristics of Hazardous Waste.

Waste material with the potential to be hazardous wastes will be characterized per the procedures outlined below. Note that once the characteristics or profile of a waste stream is established, PG&E will continue to use the same waste profile unless a process change indicates that the waste stream should be re-characterized.

3.1.1 Liquid Wastes

Liquids will be classified as hazardous waste if they exhibit hazardous waste characteristics. Characterization will be conducted as appropriate as defined in the following sections. Three expected liquid wastes at the site include liquid with a pH of 2.0 or below or 12.5 or above, a dissolved chromium concentration equal to or greater than 5 parts per million (ppm), and/or dissolved arsenic concentration equal to or greater than 5 ppm. Liquids will be evaluated for the presence of metals having hazardous waste toxicity characteristic levels specified in 22 CCR 66261.24 using the following approach:

- Liquid wastes containing less than 0.5 percent filterable solids will be analyzed for total metals, and the results will be compared with the Resource Conservation and Recovery Act (RCRA) toxicity characteristic (TC) limits in 22 CCR 66261.24(a)(1) and the soluble threshold limit concentrations (STLC) in 22 CCR 66261.24(a)(2). If any constituent exceeds the RCRA TC limit, the waste will be classified as RCRA hazardous. If no constituents exceed the RCRA TC limit, but one or more constituents exceed the STLC, the waste will be classified as non-RCRA hazardous. If neither limit is exceeded, the waste will be classified as nonhazardous.

- Liquid wastes containing 0.5 percent or more filterable solids will be analyzed using the toxicity characteristic leaching procedure (TCLP), and the results will be compared with the RCRA TC limits. If a

TC limit is exceeded, the waste will be classified as RCRA hazardous. If no TC limits are exceeded, the waste will be analyzed using the California Waste Extraction Test (WET), and the results compared with the STLCs. If one or more STLCs is exceeded, the waste will be classified as non-RCRA hazardous. If neither limit is exceeded, the waste will be classified as nonhazardous.

3.1.2 Solid Wastes

Solid wastes will be analyzed for total metals expressed in milligrams per kilogram, and the results will be evaluated as follows:

1. If the total constituent concentration exceeds the total threshold limit concentration in 22 CCR 66261.24(a)(2), material will be classified as a non-RCRA hazardous waste. Additional evaluation of the STLC, as described in Step 3 below, will not be performed.
2. If the total constituent concentration exceeds the numeric value of the RCRA TC level by 20 times or more, the TCLP will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the material will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in Step 3, will not be performed.
3. If the material has not been classified as hazardous waste in Steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by 10 times or more, the WET will be performed. If the constituent concentration in the WET exceeds the STLC, the material will be classified as a non-RCRA hazardous waste.

If the material has not been classified as a hazardous waste in Steps 1, 2, or 3, it will be classified as nonhazardous waste.

3.1.3 Miscellaneous Wastes

Miscellaneous waste, such as trash, paper bags, and cardboard boxes, will be disposed of as nonhazardous solid waste unless affected by potentially contaminated material or water. Potentially contaminated miscellaneous waste will be combined with other hazardous waste. Empty, used 55-gallon drums that formerly contained hazardous materials will be labeled with the word “empty” and the date emptied and will be returned to the original chemical supplier or turned over to a drum reconditioner. Drums being reconditioned will be removed from the site within 1 year.

3.2 Characterization Requirements for Specific Waste Types

Characterization requirements for specific waste types are provided below.

3.2.1 Calibration Gas Cylinders

Safety data sheets (SDSs) will be reviewed to verify that calibration gas is Division 2.2 nonflammable gas that can be disposed by venting to the atmosphere, as described in Section 4.2.3.

3.2.2 Surplus or Partially Used Chemicals

SDSs will be reviewed for surplus chemicals or container residues that do not meet the definition of “empty.” If SDS information is insufficient to determine waste classification, collect one representative sample and evaluate as described in Section 3.1.2. Analytical parameters will be selected based on the composition of the material involved.

3.2.3 Contaminated Concrete and Asphalt Rubble

Classified as nonhazardous unless visual evidence of contamination observed. Concrete and asphalt rubble that exhibits visual evidence of contamination (staining, residue, etc.) will be sampled by chipping or coring.

One composite sample will be collected at each location. Analytical parameters will be selected based on the history of activities performed in the area. Asphalt that exhibits oil stains in areas with no history of polychlorinated biphenyl use will not be sampled.

3.2.4 Concrete Saw-cutting Slurry

Concrete saw-cutting slurry will be tested for pH using USEPA Methods 9040C or 9045D. A single representative sample will be collected for each batch of waste.

3.2.5 Concrete Washout Water

Concrete washout water will be tested for pH USEPA Methods 9040C or 9045D. A single representative sample will be collected for each batch of waste, or it can be consistently determined that the waste is nonhazardous.

3.2.6 Decontamination Solutions

Solutions generated by decontaminating equipment that has handled hazardous waste or hazardous materials will be tested for the hazardous constituents to which the equipment has been exposed. Testing will not be necessary in cases where contaminants could not reasonably be expected to occur at hazardous waste concentrations in the decontamination solution. Water from rinsing groundwater sampling equipment will not be tested.

3.2.7 Groundwater from Well Installation, Development, and Sampling

Groundwater will be classified based on analytical results from nearby wells or analysis of groundwater samples once the well has been constructed. If these data are not available, a representative sample will be collected and analyzed for the metals specified in 22 CCR 66261.24(a)(2) (Title 22 metals) using USEPA Methods 6010B and 7470A.

3.2.8 Used Oil

Used oil must be tested for flash point, polychlorinated biphenyls, and halogens. Testing is the responsibility of the used oil transporter/recycler.

3.2.9 Oily Solids, Used Absorbents Containing Oil, and Oily Rags

Oily solids (soil and absorbents) will be presumed to be hazardous unless tested and determined to be nonhazardous. Testing will be based on the requirements of the disposal site for establishing a waste profile. Anticipated parameters are total petroleum hydrocarbons using USEPA Method 8015B and Title 22 metals using USEPA Methods 6010B and 7470A. Oily rags are presumed to be nonhazardous if they do not contain free liquids and will not be tested.

3.2.10 Paint Waste

If possible, paint waste will be classified based on composition information contained in the SDS for the paint and associated solvents/thinners. If testing is necessary, a representative sample will be analyzed for Title 22 metals using USEPA Methods 6010B and 7470A and volatile organic compounds using USEPA Method 8260B.

3.2.11 Personal Protective Equipment

PPE will be characterized based on whether it has come in contact with contaminants and the degree of contamination. If direct contact is experienced and the PPE is visibly contaminated, it will take on the same characteristics as the contacted media; however, PPE that shows no visible evidence of contamination will be disposed as nonhazardous waste. No sampling and analysis will be performed.

3.2.12 Remedy-produced Water Generated during Remedy Startup

Remedy-produced water generated during remedy testing and startup, such as backwashing of wells, will be characterized as described in Section 3.1.1.

3.2.13 Sampling Equipment

Disposable sampling equipment will be characterized based on whether it has come in contact with contaminants and the degree of contamination. Equipment that is visibly contaminated and cannot be decontaminated will take on the same characteristics as the contacted media; however, disposable sampling equipment that shows no visible evidence of contamination will be disposed as nonhazardous waste. No sampling and analysis will be performed.

3.2.14 Soil

Displaced soil will be characterized and classified in accordance with the Soil Management Plan, provided as Appendix L to this C/RAWP.

3.2.15 Solids, Sludge, and Spent Filters from Remedy-produced Water Conditional Process

Precipitated solids/sludge and spent filters generated from testing and startup of the remedy-produced water conditioning process will be characterized as described in Section 3.1.2.

3.2.16 Spent Solvents

If possible, spent solvent waste will be classified based on composition information contained in the SDS and knowledge of the process using the solvent. If testing is necessary, a representative sample will be analyzed for Title 22 metals using USEPA Methods 6010B and 7470 and volatile organic compounds using USEPA Method 8260B or other constituents specific to the process generating the waste. Spent solvents will be evaluated to determine whether they are a listed hazardous waste, as described in 22 CCR Division 4.5, Chapter 11, Article 4.

3.2.17 Stormwater from Secondary Containment

Stormwater may accumulate in secondary containment structures during construction, before the process using the structures becomes operational. This collected water will be considered stormwater unless visual evidence of contamination or pollutant sources identified, then it will be managed in accordance with Best Management Practices (BMP) Plan, provided as Appendix M to this C/RAWP.

3.2.18 Water from Hydrostatic Testing of Conveyance Piping

Water from hydrostatic testing of conveyance piping is presumed to be nonhazardous unless it exhibits visual evidence of contamination (sheen, discoloration, or suspended solids). Analytical parameters for water suspected to be contaminated will be selected based on the type of contamination observed.

3.3 Waste Profiles

Waste profiles will be prepared by PG&E based on the requirements of the disposal site.

3.4 USEPA Identification Numbers

The PG&E Topock Groundwater Extraction Site holds USEPA ID number CAR000151118.

SECTION 4

Management of Waste

This section contains procedures for onsite management of wastes temporarily stored and accumulated, as well as onsite management of construction wastewater.

4.1 General Waste Management Procedures

The following waste accumulation and handling procedures apply to all wastes. Additional or alternate management procedures for specific wastes are presented in Section 4.2.

4.1.1 Waste Storage Time Limit

Non-RCRA and RCRA hazardous wastes will be removed from the site within 90 days of the date that waste was first placed into the container or stockpiled. If accumulation begins in a satellite accumulation area the waste must be removed from the site within 1 year of the accumulation start date, or within 90 days from the date that the waste was transferred to a central accumulation area (Section 4.1.4). Nonhazardous waste should be removed from the site as soon as practical.

4.1.2 Labels

The labeling of waste containers will be in accordance with ARAR 79, Standards Applicable to Generators of Hazardous Waste (22 CCR 66262.34) and 49 CFR 172. Containers used to store/accumulate waste (including soil and groundwater) shall display one or more labels similar to the labels described below as soon as waste is placed in the container. Labels other than the ones shown below may be used as authorized by PG&E. A hazardous waste label must be used if there is a possibility that the waste will be classified as hazardous. Universal Waste labels must be used for hazardous waste that qualifies as Universal Waste (e.g., aerosol cans, batteries, lamps, and electronic devices); see Section 4.2.27.

4.1.2.1 “Analysis Pending” or “Waste Material”

WASTE MATERIAL

CLIENT ADDRESS:

CAUTION: THE CONTENTS OF THIS CONTAINER HAVE NOT BEEN CLASSIFIED AND MUST BE MANAGED AS HAZARDOUS WASTE UNTIL CLASSIFIED AND THEN MANAGED ACCORDINGLY.

MATERIAL: _____

SITE ADDRESS: _____

_____

_____

ACCUMULATION DATE: _____

GENERATOR: _____

GENERATOR PHONE: _____

MANIFEST NUMBER: _____

NOTE: THIS CONTAINER CANNOT BE SHIPPED UNTIL CLASSIFICATION IS COMPLETE (AS INDICATED BY EITHER A HAZARDOUS OR NON-HAZARDOUS LABEL ON THE CONTAINER).

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A temporary or handwritten label can be used until analytical results are received and reviewed. This label shall include the accumulation start date. These labels should only remain on the container for the length of time necessary to receive the results of waste characterization analyses, typically no longer than 2 weeks. Once results are received, the analysis pending label must be removed and the container relabeled, if necessary, within 10 days. An analysis pending label should not be used for wastes that have been classified as hazardous or nonhazardous based on generator knowledge, even if lab analysis of the waste is being performed.

4.1.2.2 “Hazardous Waste”

- Preprinted hazardous waste labels with the following information can be used:
  - Accumulation start date
  - Generator Name: PG&E Topock Groundwater Extraction Site
  - Generator Address
  - USEPA ID number: CAR000151118
  - Waste codes
  - Description of waste, including hazardous properties and physical state
  - USDOT proper shipping name
  - Manifest document number (added prior to transportation)
- A hazardous waste label, along with an analysis pending label, must be used if there is the possibility that the waste could be classified as hazardous. If the waste is suspected to be hazardous but analysis is being performed to confirm the classification, do not fill in the waste code or USDOT proper shipping name until the analytical results have been received.

4.1.2.3 “Nonhazardous Waste”

Preprinted labels with the following information can be used:

- Accumulation start date
- Generator Name: PG&E Topock Groundwater Extraction Site
- Generator Address
- Waste-specific information (for example, contaminated soil)

4.1.2.4 USDOT Hazard Class

The appropriate USDOT hazard class label will be placed on the container prior to loading onto the transport vehicle.

4.1.3 Segregation and Aggregation

Hazardous wastes will be segregated from nonhazardous wastes. Additionally, if incompatible wastes are generated (for example flammable and corrosive wastes), they must be segregated. Wastes of the same matrix, contamination and the same source may be aggregated to facilitate storage and disposal. Hazardous wastes will be aggregated only if they are from the same source and if they carry the same hazardous waste codes. Hazardous wastes will not deliberately be diluted.

4.1.4 Waste Accumulation Areas

4.1.4.1 Central or 90-day Hazardous Waste Accumulation Areas

Unless specifically designated as a satellite accumulation area (Section 4.1.4.2), hazardous waste accumulation areas will be managed as central or 90-day accumulation areas.

Central accumulation areas must be equipped with the following:

- Spill control and decontamination equipment suitable for the waste being accumulated
- Fire control equipment suitable for the waste being accumulated.
- Communication equipment to notify onsite personnel and summon external aid in an emergency.

Waste accumulation areas should not be located near storm drains or in locations where spilled material could be discharged to surface water.

4.1.4.2 Hazardous Waste Satellite Accumulation Areas

Satellite accumulation areas may be used to store hazardous waste at or near the point of generation at a location under the control of the operator of the process generating the waste. Satellite accumulation areas are limited to 55 gallons of each waste type. Within 3 days of reaching the 55-gallon limit, the container must be moved to a central accumulation area. In addition to the accumulation start date, satellite accumulation containers must be marked with the date that they are moved to a central accumulation area.

Satellite accumulation areas are not required to maintain the equipment described in Section 4.1.4.1 and are not subject to the inspections described in Section 4.1.8; however, meeting these requirements is still a good practice.

4.1.4.3 Nonhazardous Waste Accumulation Areas

Nonhazardous wastes must be accumulated in accordance with the best management practices specified in the BMP Plan (Appendix M).

4.1.5 Container Management

Wastes in containers shall be accumulated according to the following requirements, in accordance with California action-specific ARAR 84, Use and Management of Containers (22 CCR Division 4.5, Chapter 14, Article 9). A container is a device capable of being moved when full and not hard-plumbed or permanently attached to the ground or to other structures.

4.1.5.1 Containers

- Containers will be transported to the temporary accumulation area using proper handling methods, such as transportation by forklift on wood pallets, secured together with nonmetallic bonding, etc., as appropriate for the type of container being transported.

- Empty drums and other reusable containers that will be used for waste accumulation will be inspected and inventoried upon arrival onsite for signs of contamination and/or deterioration. Containers arriving onsite with contents will be rejected.
- Adequate aisle space (for example, 36 inches) will be provided for hazardous waste containers to allow the unobstructed movement of personnel and equipment. A row of drums should be no more than two drums wide.
- Each container will be provided with its own label, and the container will be oriented so that the label is visible. Labels will be replaced if they become damaged or faded. If a label is replaced, the original accumulation start date will be transferred to the new label.
- Containers will remain securely closed except when removing or adding waste.
- If a container becomes damaged or begins to leak, the contents will be immediately transferred to a new container, or the leaking/damaged container will be overpacked.
- Containers must be compatible with the waste being accumulated.
- Incompatible hazardous wastes must not be placed in the same container.

4.1.5.2 Additional Requirements for Roll-off Boxes

- Roll-off boxes shall be provided with covers and disposable liners. Liners will be disposed of with the waste contained in the roll-off box.
- When not in use, securely fastened covers will be installed on all roll-off boxes.
- Roll-off boxes will be labeled as described previously. Old labels, if present, will be removed as soon as the box is received onsite.
- Roll-off boxes will be filled only to the point where applicable weight limits will not be exceeded. This is typically half full for boxes containing soil. A box may be filled more than half full if it has been determined that the applicable weight limit will not be exceeded.
- Free liquids will not be placed in standard roll-off boxes. Containers designed to contain and transport free liquids (for example, phase separators) should be used for this purpose.
- Materials placed into the roll-off boxes will be equally distributed to prevent the box and truck from tipping.

4.1.5.3 Secondary Containment

- Container storage areas for hazardous waste with free liquids must have a containment system that includes an impervious base sloped to drain liquids away from the containers unless the container are elevated.
- Secondary containment must have a capacity to contain the single largest container or 10 percent of the volume of all containers plus precipitation from a 25-year, 24-hour storm.
- The containment system must be certified by a California-registered Professional Engineer.

4.1.6 Tank Management

Accumulation of hazardous waste in tanks must meet the following requirements, in accordance with California action-specific ARAR 85, Tank Systems (22 CCR Division 4.5, Chapter 14, Article 10). A tank is a device that cannot be moved when full or is hard-plumbed in place or permanently attached to the ground or other structure.

- Hazardous waste tanks must be labeled with “Hazardous Waste.”
- Hazardous waste tank systems must have an integrity assessment that is certified by a California-registered Professional Engineer.
- Hazardous waste tank systems must have secondary containment capable of holding the contents of the largest single tank plus precipitation from a 25-year, 24-hour storm. Accumulated precipitation and spilled liquids must be removed within 24 hours.
- Hazardous waste tank systems must be equipped with controls to prevent overfilling.

Accumulation of nonhazardous waste in tanks must be in accordance with the BMP Plan, provided as Appendix M to this C/RAWP.

4.1.7 Stockpile Management

Stockpiling of soil will be in accordance with the Soil Management Plan, provided as Appendix L to this C/RAWP). Stockpiling of non-hazardous construction debris will be in accordance with BMP Plan (Appendix M).

4.1.8 Waste Accumulation Area Inspections

Areas used for hazardous waste accumulation shall be inspected for malfunctions, deterioration, discharges, and leaks that could result in a release. The following inspection schedule shall be followed:

- Weekly inspection of hazardous waste containers (for leaks, signs of corrosion or general deterioration, labeling, container closure, remaining accumulation time)
- Weekly inspection of overall hazardous waste accumulation area (for general condition, adequate supply of spill control equipment, fire control and communication equipment present and operating properly)
- Daily inspection of hazardous waste tank systems and associated secondary containment to detect corrosion, damage, or evidences of a release

Inspections will be recorded in a logbook or otherwise documented, and the record of inspection will be maintained onsite.

Regular, documented inspections are not required for nonhazardous waste accumulation areas. However, the containers should be inspected periodically for leaks, signs of corrosion or general deterioration, labeling, and container closure. The overall accumulation area should be inspected periodically for general conditions and adequate supply of spill control equipment.

4.2 Management Procedures for Specific Waste Types

4.2.1 Aerosol Cans

Aerosol cans that are empty (contain no residual pressure or liquid) or that contain residual liquid that is not a hazardous material (e.g., air freshener) but no residual pressure, can be disposed of in the trash. Aerosol cans that contain residual pressure or residual liquid that is a hazardous material (e.g., marking paint) cannot be disposed of in the trash and must be managed as a universal waste; see Section 4.2.27.

4.2.2 Batteries

Small batteries including alkaline, nickel-cadmium, and lithium batteries found in many common items, including power tools, radios, electronic equipment, mobile telephones, and portable computers cannot be disposed of in the trash and must be managed as a universal waste; see Section 4.2.27.

Used lead-acid batteries should be returned to the retailer for recycling. If necessary to store onsite prior to return, the battery should be placed in a secure location where it will not become damaged. If a battery becomes damaged or begins to leak, place it in a plastic or other compatible container with a securely fitting cover, label with the accumulation start date and transport to a battery recycler Used lead-acid batteries that are not returned to the retailer or recycler must be managed as hazardous waste.

4.2.3 Calibration Gas Cylinders

Calibration gas for field instruments is usually shipped in nonrefillable DOT-39 specification cylinders. They can be identified by a code stamped into the cylinder that begins with “DOT-39, NRC” followed by a series of other numbers and letters. These cylinders cannot be refilled and are intended to be disposed of by the end user once the contents are consumed. Because of the high cost of shipping partially full cylinders to an, equipment rental company or the manufacturer, most calibration gas cylinders should be disposed of locally using this procedure.

4.2.3.1 Applicability

This procedure applies only to nonrefillable DOT-39 specification cylinders containing calibration gas that is classified by DOT as a Division 2.2 nonflammable gas. The cylinder will display the green nonflammable gas label. Calibration gas usually contains parts per million (ppm)-range concentrations of compounds such as isobutylene, hexane, or methane. This procedure does not apply to Division 2.1 flammable gasses, Division 2.3 poison gasses, corrosive gasses, or oxidizing gasses. It also does not apply to gasses contained in larger refillable DOT-specification cylinders.

4.2.3.2 Disposal Procedure

1. Review the cylinder labeling and SDS to verify that the material in question is calibration gas containing ppm-range concentrations of materials such as isobutylene, hexane, or methane, and that the gas is classified as a Division 2.2 nonflammable gas. If the material is a flammable gas (Division 2.1), poison gas (Division 2.3) corrosive gas, oxidizing gas, or contains toxic air contaminants such as trichloroethylene, do not follow this procedure. Characterize and classify the gas in accordance with Section X.3.
2. Attach the appropriate regulator or valve to the cylinder, open the valve, and allow the gas to vent slowly to the atmosphere in an unconfined, well ventilated area outdoors.
3. If a regulator is not available, depress the valve with a nonsparking tool (e.g., pencil, stick). Be sure that the cylinder is pointed away from you at all times. The valve operates the same way as the valve on a car or bicycle tire.
4. Wear leather work gloves and keep your hands away from the flow of gas.
5. Leave the valve open until all gas is discharged from the cylinder.
6. If the cylinder has a permanently attached valve, leave it open. If a removable regulator or valve was used, remove it from the cylinder.
7. Mark the cylinder as “EMPTY” or “MT.”
8. Recycle the empty cylinder as scrap metal or dispose as solid waste after verifying that the solid waste collection company will accept this material in the trash.
9. If required to puncture the empty cylinder before disposal or recycling, do not attempt to do so using hand tools such as a hammer and nail or punch; obtain a tool that is designed for this purpose.

4.2.4 Concrete and Asphalt Rubble

Concrete and asphalt rubble will be managed as non-hazardous waste, according to the procedures specified in the BMP Plan (Appendix M), and will be disposed at a permitted construction and demolition debris recycling facility.

4.2.5 Concrete Saw-Cutting Slurry

Concrete saw cutting slurry will be managed as hazardous waste unless the pH is verified through testing to be below 12.5, and will be disposed at a permitted hazardous or non-hazardous waste disposal facility, as determined by the waste classification evaluation.

4.2.6 Concrete Washout Water

Water from washing out ready-mix concrete trucks and other concrete-containing equipment will be managed as specified in the BMP Plan (Appendix M) as non-hazardous waste. If the pH is measured at 12.5 or above it will be managed as hazardous waste. Non-hazardous washout water will be used to make new concrete onsite, will be removed by the concrete contractor, or will be disposed at a permitted disposal facility. Hazardous waste washout water will be disposed at a permitted hazardous waste disposal facility.

4.2.7 Construction and Demolition Debris

Construction and Demolition Debris will be managed as non-hazardous waste, according to the procedures specified in the BMP Plan (Appendix M).

4.2.8 Decontamination Solutions

Decontamination solutions will be managed at IM-3 or the TCS ponds, as determined by the waste classification evaluation and available capacity. Otherwise, solutions will be disposed at a permitted offsite disposal facility.

4.2.9 Electronic Devices

Waste electronic devices will be managed as universal waste, as described in Section 4.2.27.

4.2.10 Empty Chemical Containers

Empty chemical containers that formerly held a hazardous material exhibiting hazardous waste characteristics must be managed as a hazardous waste unless handled in accordance with the following procedure.

The container must be “empty.”

- If the material is pourable, no hazardous material can be poured or drained from the container or inner liner when the container or inner liner is held in any orientation (e.g., tilted, inverted, etc.)
- If the material is not pourable, no hazardous material remains in or on the container or inner liner that can feasibly be removed by physical methods (excluding rinsing) which comply with applicable air pollution control laws and which are commonly employed to remove materials from that container or inner liner. Following material removal, the top, bottom and sidewalls of such a container shall not contain remaining adhered or crusted material resulting from buildup of successive layers of material or a mass of solidified material. A thin uniform layer or dried material or powder is considered acceptable
- If the material is an acute hazardous waste or extremely hazardous waste, the container or inner liner has been triple rinsed using a solvent capable of removing the waste and all pourable residues have been removed from the container or inner liner as described above for pourable material. Note that rinsing such containers is considered treatment of hazardous waste and is subject to additional requirements that are not addressed in this plan.

Empty containers five gallons or smaller can be disposed as non-hazardous trash if they are acceptable to the solid waste management company. Rinsing such containers after they are empty is not considered treatment of hazardous waste as long as the rinsate is managed appropriately.

Empty containers larger than five gallons must be marked with “Empty” and the date emptied. Accumulation time is limited to one year. They must be reused onsite in a manner that is considered exempt recycling as described in CHSC Section 25142.3, sent to a reconditioner or to a recycler, or returned to the chemical supplier for refilling. Containers returned to the supplier for refilling are not subject to the marking and accumulation time requirements. Rinsing empty containers larger than five gallons is considered treatment of hazardous waste and is subject to additional requirements that are not addressed in this plan.

4.2.11 Fuel and Oil Filters, Used

Used fuel and oil filters will be drained to remove free-flowing liquid, and accumulated in closed containers that are labeled with “Used (oil or type of fuel) Filters” and the accumulation start date. Used filters will be removed from the site within one year and disposed at a permitted recycler. Free liquid that is drained from the filters or accumulates in the container will be managed as hazardous waste.

4.2.12 Groundwater from Well Installation, Development, and Sampling

Groundwater from well installation, development, and sampling will be accumulated in containers at the point of generation. Groundwater from well installation, development, and sampling will be managed at IM-3 or the TCS ponds, as determined by the waste classification evaluation and available capacity. Otherwise, solutions will be disposed at a permitted offsite disposal facility.

Groundwater from well testing will be injected back into the well as described in Section 4.3.3.

4.2.13 Lamps

Lamps containing mercury (e.g., fluorescent lamps, mercury vapor lamps) will be managed as universal waste as described in Section 4.2.27.

4.2.14 Lumber, Treated

Waste lumber that has been treated with preservatives will be managed according to the alternative management standards for treated wood waste (TWW) specified in 22 CCR Division 4.5 Chapter 34, as follows:

- Store off the ground by placing it on blocks or a paved surface and covered with a tarp, or in containers.
- Onsite storage time is limited to 90 days for blocked and tarped material, 180 days for material stored on a paved surface, and one year for material stored in a container.
- Do not burn or mix with other waste.
- Cover TWW during inclement weather.
- Label all TWW containers, bundles, and shipments with “Treated Wood Waste – Do Not Burn or Scavenge,” the generator’s name and address, and the accumulation start date.
- Dispose at a hazardous waste facility or landfill that has been authorized to accept TWW.

4.2.15 Oil, Used

Used oil will be managed as a hazardous waste and disposed at a permitted recycling facility.

4.2.16 Oily Solids, Used Absorbents Containing Petroleum, Oily Rags

Oily solids (soil, used absorbents) are presumed to be hazardous waste unless tested and verified to be non-hazardous, and will be managed as hazardous waste.

Debris contaminated with petroleum products (e.g., rags) may be managed as non-hazardous waste if all of the following conditions are met:

- The debris consists exclusively of wood, paper, textile materials, concrete rubble, metallic objects, or other solid manufactured objects.
- The debris is not subject to regulation as a hazardous waste or used oil under federal law.
- The debris does not contain any free liquids
- The debris, if not contaminated with petroleum, would not otherwise be regulated as a hazardous waste
- The debris is not a container or tank that is subject to regulation as hazardous waste
- The debris is disposed at a Class I or Class II disposal site.

4.2.17 Paint Waste

Paint waste will be managed as either hazardous or non-hazardous waste, based on the waste classification evaluation, and will be disposed at a permitted offsite disposal facility.

4.2.18 PPE

Used PPE will be managed as non-hazardous waste except if it is visibly contaminated with hazardous waste or hazardous materials.

4.2.19 Sampling Equipment, Plastic Sheeting

Used disposable sampling equipment will be managed as non-hazardous waste unless it is visibly contaminated with hazardous waste or hazardous materials.

4.2.20 Sanitary Waste

Waste from portable sanitary/septic waste systems will be removed from the site by the vendor providing the equipment. Portable toilets will be managed in accordance with the BMP Plan (Appendix M).

4.2.21 Scrap Metal

Scrap metal will be managed in accordance with BMP Plan (Appendix M) and will be disposed at an offsite recycling facility.

4.2.22 Soil

Displaced soil generated by construction activities will be managed in accordance with the Soil Management Plan, provided as Appendix L to this C/RAWP.

4.2.23 Spent Solvents

Spent solvents will be managed as hazardous or non-hazardous waste, as determined by the waste classification evaluation, and will be disposed at a permitted offsite facility.

4.2.24 Stormwater from Secondary Containment Structures

Stormwater that accumulates in secondary containment structures during construction, before the process using the structure becomes operational, will be managed in accordance with the BMP Plan (Appendix M).

4.2.25 Trash

Miscellaneous debris will be managed as non-hazardous waste and will be disposed at a municipal solid waste landfill. Recyclable materials such as cardboard, glass and plastic bottles, etc. may be recycled.

4.2.26 Water from Hydrostatic Testing of Conveyance Piping

Hydrostatic testing of conveyance piping will be conducted in a manner that will allow the test water to be reused onsite. Only clear, untreated potable water will be used for testing. The water will be managed in a

manner that protects it from becoming contaminated. Water from hydrostatic testing of conveyance piping will be managed as non-hazardous waste unless visible evidence of contamination (e.g. discoloration, sheen, suspended solids) is observed. Hydrostatic testing water will be temporarily accumulated at the test site in portable tanks or containers. Hydrostatic testing water not reused onsite will be managed at IM-3, the TCS ponds, or disposed at a permitted offsite disposal facility.

4.2.27 Universal Wastes

Universal waste (e.g., aerosol cans, batteries, lamps, and electronic devices) must be handled as follows:

- Store universal waste in containers or packages that remain closed; are structurally sound; adequate to prevent breakage; compatible with their contents; and lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions.
- Any universal waste that shows evidence of breakage, leakage, or damage that could cause the release of lead, mercury, or other hazardous constituents to the environment must be contained.
- Containers of universal waste should be labeled with the words “Universal Waste,” the type of waste (e.g., batteries, aerosol cans), and the accumulation start date.
- Have universal waste removed from the site by a registered hazardous waste transporter and taken to a permitted universal waste recycling location within 1 year of the accumulation start date.

4.3 Onsite Management of Construction Water

Wastewater will be generated during construction activities from well installation, development, and testing/sampling. In addition, other miscellaneous wastewater streams will be generated from equipment and vehicle decontamination, water from hydrotesting of conveyance piping, and rainfall that collects in secondary containment areas. Consistent with water conservation and sustainability practices, onsite reuse and disposal of wastewater generated during construction will be maximized. Onsite options are described in this section. Water not managed onsite will be transported offsite to a permitted facility.

4.3.1 Management at IM-3 and the TCS Ponds

ARARs for the operation of IM-3 (treatment and injection facilities) authorize the disposal of groundwater generated during well installation, well development, and aquifer testing, and purged groundwater and water generated in rinsing field equipment during sampling events for the area-wide groundwater monitoring program at the IM-3 treatment plant.

The lined evaporation ponds receive cooling tower blowdown water and evaporate the water as part of normal TCS operations. Solids are removed from the ponds periodically. The ponds operate under Waste Discharge Requirements issued by the California Regional Water Quality Control Board. Discharge of construction water to the ponds would require coordinating capacity with the TCS operations and authorization by the Water Board.

4.3.2 Onsite Reuse

Water from hydrostatic testing of conveyance piping may be reused onsite for dust control, backfill moisture control, and other similar uses in accordance with the substantive requirements of State Water Resources Control Board Water Quality Order No. 2003-003-DWQ, Statewide General Waste Discharge Requirements for Discharges To Land With A Low Threat To Water Quality. The water generated from hydrostatic testing will be low volume discharges with minimal pollutant concentrations, and will not be reused in a manner that results in a discharge to waters of the United States or waters of the state. The volume and date of each reuse event will be recorded.

4.3.3 Injection at Individual Wells during Well Testing

Following well installation and development, wells may be tested to evaluate it's maximum injection flow rate. This hydraulic testing involves extracting water from the well, storing the water in portable tanks, then injecting the water back into the aquifer at the same or nearby well through a filter to remove particulate matter. Because chemical additives will not be used during these well testing activities, the water will be injected without additional characterization.

SECTION 5

Waste Transportation and Disposal

After the wastes are containerized and labeled, those wastes ready for offsite disposal will be loaded onto trucks for transport to preapproved disposal facilities. A designated transportation and disposal coordinator will be onsite during transportation and disposal activities. This individual will be responsible for coordinating and overseeing these activities.

As truck loading is completed, the containers and trucks will be inspected and brushed as necessary to remove loose materials if the truck is transporting hazardous waste. Each load on the trucks will be inspected by the driver to ensure that the load is secure. Hazardous waste labels on all non-bulk containers will be verified to be accurate and complete, and non-bulk containers will be labeled with the appropriate USDOT hazard class label. Appropriate documentation to include waste manifests or shipping papers will be completed, checked, and kept onsite. In addition, a truck log with loading and transportation information will be maintained. Transport vehicles will proceed to the designated disposal facilities in accordance with local, state, and federal transportation requirements.

5.1 Transporter Requirements

The selected transporters will be licensed and insured in both the shipping and receiving states, and in any other states through which the waste will be transported. Prior to transporting hazardous waste, the driver's license of each driver will be checked to verify that it is the proper class and has the appropriate endorsements for the vehicle being driven. The transporter must be registered with California Environmental Protection Agency, Department of Toxic Substances Control as a hazardous waste hauler, and have a USEPA Identification number. Transporters operating in Arizona must also be registered with the Arizona Department of Environmental Quality. Transporters operating in Nevada must also hold a permit and certificate of registration issued by the Nevada Department of Environmental Protection.

Each load of hazardous waste shall be accompanied by a properly competed Uniform Hazardous Waste Manifest and, if necessary, a land disposal restriction notification/certification form. Each load of nonhazardous waste shall be accompanied by a properly completed nonhazardous waste manifest form or bill of lading.

The transporter will be responsible for ensuring that loaded trucks comply with all applicable weight limits. For each load of material, weight measurements will be obtained for each full and empty container and dump truck. Official disposal quantities for project records will be based on the difference of weight measurements between the full and empty container or dump truck measured at the disposal facility's scale. Weights will be recorded on the weight ticket by the disposal facility.

The transporter will observe the following practices when hauling and transporting hazardous and nonhazardous waste offsite:

- Minimize impacts to general public traffic.
- Line and cover trucks, trailers, and roll-off bins used for hauling soil before transport to comply with EIR mitigation measure HAZ-2f and to prevent spills or releases.
- Decontaminate exterior of vehicle using dry methods as necessary prior to leaving the site.
- Wastes or materials from other projects may not be combined with wastes generated during this project.
- Personnel involved in offsite disposal activities will follow safety and spill response procedures outlined in project-specific health and safety plans.

Requirements under 22 CCR 66262.30 through 66262.33 (California action-specific ARAR 78) will apply to offsite shipments of hazardous waste. The requirements of 49 CFR 171-178 (USDOT) will apply to shipments of hazardous waste that are also USDOT-regulated hazardous materials. These requirements do not apply to shipments of nonhazardous waste. It is the responsibility of a USDOT-trained individual to ensure that the requirements of 49 CFR 171-178 are met, including proper classification, marking, labeling, and placards.

5.1.1 Spill Reporting

In the event of a spill or release of hazardous or non-hazardous waste, the transporter must immediately notify a PG&E representative**.** The following information about the spill will be reported and recorded:

- Type of material (for example, soil) and contaminant
- Location
- Estimated volume
- Media affected (for example, spilled on concrete pad or soil)
- Time of spill/release
- Final disposition of spilled material

The transporter will also report serious transportation-related incidents, as defined in 49 CFR 171.15, or releases of a reportable quantity of a hazardous substance, to the National Response Center at 800/424-8802 or 202/426-2675. The transporter will also report, in writing, as required by 49 CFR 171.16, to the Director, Office of Hazardous Materials Regulations, Materials Transportation Bureau, Department of Transportation, Washington, DC 20590.

5.1.2 Spill Response

The transporter will clean up spills or releases of hazardous or nonhazardous waste (including soil) that occur during transportation or will take such action as may be required or approved by federal, state, or local officials. Spilled waste will be immediately cleaned up, including soils on the outside of the trucks, the truck and/or container, or road surface. Where appropriate, the spilled material will be returned to the original waste container. Regardless, the spilled material will be properly contained and disposed.

5.2 Disposal Facilities

Disposal facilities that receive Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste (wastes that contain CERCLA hazardous substances, pollutants, or contaminants) will be in compliance with the CERCLA Off-Site Rule (42 U.S.C. 9621 (d) (3) and 40 CFR 300.440). Wastes designated as RCRA or non-RCRA hazardous wastes will be transported to and disposed of at an appropriately permitted facility. In accordance with the requirements of the Remedial Design/Remedial Action Consent Decree (DOI 2013), prior to the first shipment of waste material offsite, and annually thereafter, PG&E will demonstrate to DOI's satisfaction that USEPA has determined that the proposed receiving facility is operating in compliance with 42 U.S.C. 9621(d)(3) and 40 CFR 300.440. If PG&E knows or has reason to know the facility no longer meets the criteria of 40 CFR 300.440(b), PG&E will inform DOI, propose an alternate receiving facility prior to any subsequent shipments, and demonstrate to DOI's satisfaction that USEPA has determined that the alternate receiving facility is operating in compliance with 42 U.S.C. 9621(d)(3) and 40 CFR 300.440. The waste material will be stored onsite in accordance with this waste management plan until approval is received and the waste material is transported offsite. If the waste management facility is out of state, prior to the first shipment of waste material, PG&E will provide written notice for disposal of waste material at the listed facilities to the appropriate state environmental official in each receiving facility's state and the DOI Project Manager.

PG&E proposes use of the following potential disposal facilities for the project as well as others, subject to the communication and approval processes under the Consent Decree outlined above:

PSC Rancho Cordova – TSDF
11855 White Rock Road
Rancho Cordova, CA 95742

Chemical Waste Management – Kettleman Hills Facility – Landfill
35251 Old Skyline Road
Kettleman City, CA 93239

US Ecology Inc. - Landfill
Highway 95 (12 miles South of Beatty, NV)
Beatty, NV 89003

Clean Harbors Button Willow – Landfill
2500 West Lokern Road
Button Willow, CA 93206

SECTION 6

Training and Recordkeeping

6.1 Training

Personnel who handle waste will receive initial and annual training in accordance with California action-specific ARAR 79, Standards Applicable to Generators of Hazardous Waste (22 CCR 66262.34). Training will be documented by records that include:

- The job title for each position related to hazardous waste management and the name of the employee filling each job
- A written job description for each position related to hazardous waste management that includes the requisite skill, education, or other qualifications and duties of facility personnel assigned to each position
- A written description of the type and amount of introductory and continuing training that will be given to each person filling a position related to hazardous waste management
- Records that document that the training or job experience required has been completed

6.2 Recordkeeping

Recordkeeping will be in accordance with California action-specific ARAR 80 (22 CCR 66262.40), Standard Applicable to Generators of Hazardous Waste (22 CCR 66262.40 and 66262.41). Records related to waste management will be maintained for a minimum of three years.

Further, 22 CCR 66262.41 requires large quantity generators of RCRA hazardous waste to submit a biennial report to USEPA by March 1 of each even-numbered year that describes hazardous waste generated in the previous odd-numbered year. In addition, the Consent Decree (DOI 2013) requires that project-related records be retained until 10 years after receipt of the Certificate of Completion. The following records and documents will be maintained for hazardous waste shipment:

- Transportation and offsite disposal records, including:
  - Profiles and associated characterization data
  - Manifests, Land Disposal Restriction notifications/certifications, bills of lading, and weight tickets
  - Offsite facility waste receipts, certificates of disposal/destruction/recycle
  - Trucking logs
- Training records
- Inspection records

In addition, in accordance with the Management Protocol for Handling and Disposition of Displaced Site Material, PG&E will maintain a Displaced Material Inventory for all displaced soil, as described in the Soil Management Plan, provided as Appendix L to this C/RAWP).

SECTION 7

References

California Environmental Protection Agency, Department of Toxic Substances Control. 2011. *Final Environmental Impact Report for the Topock Compressor Station Groundwater Remediation Project*. January 31.

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United States Environmental Protection Agency (USEPA). 2007. *Test Methods for Evaluation Solid Waste, Physical/Chemical Methods. (SW-846).* February.

Appendix S
Bird Impact Avoidance and Minimization Plan
(On CD-ROM Only)

Topock Project Executive Abstract

Document Title: *Final Bird Impact Avoidance and Minimization Plan, Topock Groundwater Remediation Project* Submitting Agency: DTSC, RWQCB Final Document? ☒ Yes ☐ No	Date of Document: April 30, 2014 Who Created this Document?: (i.e. PG&E, DTSC, DOI, Other) – PG&E
Priority Status: ☐ **HIGH** ☐ **MED** ☒ **LOW** Is this time critical? ☐ Yes ☒ No Type of Document: ☐ Draft ☒ Report ☐ Letter ☐ Memo ☐ Other / Explain:	Action Required: ☒ Information Only ☐ Review & Comment Return to: _____ By Date:_____ ☐ Other / Explain:
What does this information pertain to? ☐ Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)/Preliminary Assessment (PA) ☐ RCRA Facility Investigation (RFI)/Remedial Investigation (RI) (including Risk Assessment) ☐ Corrective Measures Study (CMS)/Feasibility Study (FS) ☐ Corrective Measures Implementation (CMI)/Remedial Action ☒ California Environmental Quality Act (CEQA)/Environmental Impact Report (EIR) ☐ Interim Measures ☐ Other / Explain:	Is this a Regulatory Requirement? ☒ Yes ☐ No If no, why is the document needed?
What is the consequence of NOT doing this item? What is the consequence of DOING this item? This plan is required by EIR mitigation measure BIO-2a. If this work was not performed, it would constitute a non-compliance with the EIR mitigation measure.	Other Justification/s: ☐ Permit ☐ Other / Explain:

Brief Summary of attached document:
The Bird Impact Avoidance and Minimization Plan (BIAMP) describes how impacts to special-status bird species, including those protected under the Federal and California Endangered Species Acts and Migratory Bird Treaty Act will be avoided and minimized during implementation of the Topock Groundwater Remediation Project.

Written by: PG&E

Recommendations:
This report is for your information only.

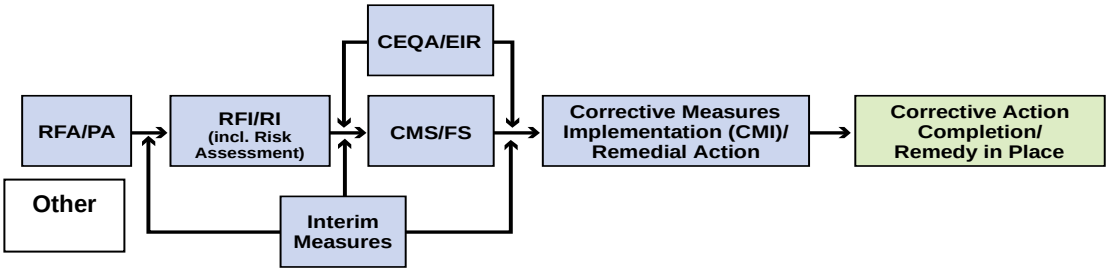
How is this information related to the Final Remedy or Regulatory Requirements:
This plan will be used in remedy design and implementation, in compliance with EIR Mitigation Measure BIO-2a.
.

Other requirements of this information?

None.

Related Reports and Documents:

Click any boxes in the Regulatory Road Map (below) to be linked to the Documents Library on the DTSC Topock Web Site (www.dtsc-topock.com).



Version 9

Legend
RFA/PA – RCRA Facility Assessment/Preliminary Assessment
RFI/RI – RCRA Facility Investigation/CERCLA Remedial Investigation (including Risk Assessment)
CMS/FS – RCRA Corrective Measure Study/CERCLA Feasibility Study
CEQA/EIR – California Environmental Quality Act/Environmental Impact Report

Pacific Gas and Electric Company®

Yvonne J. Meeks
Manager

Environmental Remediation

Mailing Address
4325 South Higuera Street
San Luis Obispo, CA 93401

Location
6588 Ontario Road
San Luis Obispo, CA 93405

805.234.2257
Fax: 805.773.8281
E-Mail: yjm1@pge.com

April 30, 2014

Mr. Aaron Yue
Project Manager
California Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Subject: *Final Bird Impact Avoidance and Minimization Plan, Topock Groundwater Remediation Project*

Dear Mr. Yue:

Enclosed is the *Final Bird Impact Avoidance and Minimization Plan, Topock Compressor Station Groundwater Remediation Project.* This plan describes how impacts to special-status bird species, including those protected under the Federal and California Endangered Species Acts and Migratory Bird Treaty Act will be avoided and minimized during implementation of the Topock Groundwater Remediation Project.

The draft plan was submitted in July 2013 and revised to final after CDFW, DTSC and DOI reviews.

Please contact me at (805) 234-2257 or Virginia Strohl at (559) 263-7417 if you have any questions about this.

Sincerely,

Yvonne Meeks
Topock Project Manager

Enclosure

Final Bird Impact Avoidance and Minimization Plan, Topock Groundwater Remediation Project

cc: Karen Baker/DTSC
Pam Innis/DOI
Carrie Marr/FWS
Linda Miller/ HNWR
Victoria Chau/CDFW
Chris Hayes/CDFW

Final

Bird Impact Avoidance and Minimization Plan Topock Groundwater Remediation Project

Prepared for

Pacific Gas and Electric Company

April 2014

CH2MHILL®

2485 Natomas Park Drive
Suite 600
Sacramento, California 95833

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A Migratory Bird Treaty Act Protected Bird Species Anticipated To Occur Within the Project Area

Acronyms and Abbreviations

ACS	Avian Conservation Strategy (Draft)
AGFC	Arizona Game and Fish Commission
AGFD	Arizona Game and Fish Department
AMM	Avoidance and Minimization Measure
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
ARAR's	Applicable or Relevant and Appropriate Requirements
BLM	United States Bureau of Land Management
BOR	Unites States Bureau of Reclamation
BNSF	Burlington Northern-Santa Fe
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CFGC	California Fish and Game Code
CNDDB	California Natural Diversity Database
Compressor Station	PG&E Topock Compressor Station
Cr(VI)	hexavalent chromium
DOI	United States Department of the Interior
DTSC	Department of Toxic Substances Control
FCR	field contact representative
EIR	Final Environmental Impact Report
ESA	Federal Endangered Species Act
gpm	Gallons per minute
HNWR	Havasu National Wildlife Refuge
IRZ	In-situ Reactive Zone
I-40	Interstate 40
LCR MSCP	Lower Colorado River Multi-Species Conservation Plan
MBTA	Migratory Bird Treaty Act
PBA	Programmatic Biological Assessment
PG&E	Pacific Gas and Electric Company
Plan	Bird Impact Avoidance and Minimization Plan
RCRA	Resource Conservation and Recovery Act

RWQCB	Regional Water Quality Control Board
SSC	California Species of Special Concern
USFWS	United States Fish and Wildlife Service
WSCA	Wildlife of Special Concern in Arizona

SECTION 1

Introduction

Pacific Gas and Electric Company (PG&E) has prepared this Bird Impact Avoidance and Minimization Plan (Plan) to describe how impacts to special-status bird species, including those protected under the Migratory Bird Treaty Act (MBTA), the California Fish and Game Code (CFGC), and Arizona Game and Fish Commission (AGFC), will be avoided and minimized during implementation of the Topock Groundwater Remediation Project.

This plan is required pursuant to the *Final Environmental Impact Report for the Topock Compressor Station Groundwater Remediation Project* (EIR; DTSC 2011)*;* specifically, EIR Mitigation Measure BIO-2a, which addresses Disturbance of Special-Status Birds and Loss of Habitat[1].

BIO-2a: Disturbance of Special-Status Birds and Loss of Habitat. To the extent feasible, the project implementation plans shall be designed to minimize removal of habitat for special-status birds. During the design process and before ground disturbing activities (except within the East Ravine as described in the Revised Addendum and unless otherwise required as noted below), a qualified biologist shall coordinate with PG&E to ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on habitat and nesting habitat for other special-status species, to the extent feasible. DTSC will ensure compliance with all preconstruction and construction phase avoidance measures identified during this process and included in any design plans. Vegetation removal and other activities shall be timed to avoid the nesting season for special-status bird species that may be present. The nesting cycle for most birds in this region spans March 15 through September 30.

Preconstruction Measures: Preconstruction breeding season surveys shall be conducted during the general nesting period, which encompasses the period from March 15 through September 30, if the final design of the project (including East Ravine investigation Sites I, K and L) could result in disturbance or loss of active nests of special-status bird species. If vegetation removal or other disturbance related to project implementation is required during the nesting season, focused surveys for active nests of special-status birds shall be conducted before such activities begin. A qualified biologist shall conduct preconstruction surveys to identify active nests that could be affected. The appropriate area to be surveyed and the timing of the survey may vary depending on the activity and species that could be affected. For the Yuma clapper rail, the preconstruction surveys shall specifically identify habitat within 300 feet of construction areas, in accordance with substantive policies of USFWS including those set out in USFWS protocols.

Construction Measures: Before the initiation of project elements that could result in disturbance of active nests or nesting pairs of other special-status birds, a qualified biologist shall be consulted to identify appropriate measures to minimize adverse impacts during the construction phase of the project. If deemed appropriate for the final project design because of the potential for impacts, minimization measures will include focusing construction activities that must be conducted during the nesting season to less sensitive periods in the nesting cycle, implementing buffers around active nests of special-status birds to the extent practical and feasible to limit visual and noise disturbance, conducting worker awareness training, and conducting biological monitoring (including noise monitoring to determine if construction noise at the edge of suitable nesting habitat is elevated above 60 dBA Leq or ambient levels). An avoidance and minimization plan for special status bird species, as defined in Table 4.3-3 and those species protected under the federal Migratory Bird Treaty Act, including the Yuma clapper rail, shall be developed and implemented in consultation with USFWS, and agreed upon by DTSC. Avoidance and impact minimization measures, such as prohibiting construction near or in sensitive bird habitat, limiting construction during breeding seasons, and requiring an on-site biological monitor, shall be included in the design plan and implemented to the extent necessary to avoid significant impacts on sensitive bird species.

This Plan addresses project activities and their potential impacts to bird species and includes Avoidance and Minimization Measures (AMMs) that will be implemented to ensure that project impacts to special-status bird

[1]Decommissioning will be addressed in a separate plan per EIR Mitigation Measure BIO-2C

species are not significant. The AMM's proposed for southwestern willow flycatcher and Yuma clapper rail, the two federally listed bird species with potential to be affected by the Topock Groundwater Remediation Project, are consistent with measures addressed in the *Programmatic Biological Assessment [PBA] for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions (CH2M HILL 2007)*.

1.1 Background

In December 1951, the PG&E Topock Compressor Station (compressor station) began operations to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California.

From 1951 to 1985 chromium-based products were added to cooling water to inhibit corrosion, minimize scale, and control biological growth. PG&E replaced the chromium-based cooling water treatment products with phosphate-based products in 1985, at which time PG&E discontinued operation of the wastewater treatment system. Currently, four Class II double-lined ponds are in use and operated under the jurisdiction of the Colorado River Basin Regional Water Quality Control Board (RWQCB).

In 1996, PG&E entered into a Corrective Action Consent Agreement with Department of Toxic Substances Control (DTSC) to govern the investigation and remediation of the compressor station site under California state law. DTSC is the California state lead agency charged with directing investigative activities in the action area in accordance with the Resource Conservation and Recovery Act (RCRA). In July 2005, PG&E and the United States Department of the Interior ("DOI") on behalf of the U.S. Fish and Wildlife Service ("USFWS"), the Bureau of Land Management ("BLM"), and the Bureau of Reclamation ("BOR"), entered into a Consent Agreement that outlined the process by which PG&E would comply with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements during the investigation and remediation of the action area, which includes the implementation of a final remedy.

The final remedy will be implemented to address groundwater contamination in the project area, and the EIR includes several mitigation measures that are required to be implemented during the design, construction, and operation phases of the project to protect sensitive biological resources. Project activities have the potential to impact special-status bird species; therefore, the EIR includes Mitigation Measure BIO-2a to ensure the protection of these birds and requires the preparation of this Plan.

1.2 Location

The compressor station is located near the California and Arizona border in eastern San Bernardino County, approximately 12 miles southeast of the city of Needles, California (Figure 1). The town of Topock, Arizona is located approximately one-half mile to the east. Access to the compressor station is from the Park Moabi Road exit off of Interstate 40. At Moabi Regional Park, the roadway connects to National Trails Highway, which extends eastward and then southward for approximately one mile along the Colorado River to the Topock Compressor Station.

1.3 Project Description

Groundwater near the compressor station has been contaminated by chemicals associated with historical releases in areas known as Bat Cave Wash and East Ravine. The main contaminant of concern in groundwater is Cr(VI), which was used in the past as an additive to the cooling water at the compressor station, and is harmful to human health and ecological receptors in the environment. Other chemicals present in the groundwater include Cr(T), molybdenum, selenium, and nitrates. Although currently not being used as a drinking water source, the affected groundwater has the potential to come into contact with drinking water wells and the Colorado River. Cleanup of the contaminated groundwater plume is being designed to protect all identified potential receptors and maintain groundwater as a resource.

The proposed project involves flushing the contaminated groundwater plume through an in-situ reactive zone (IRZ) of extraction and injections wells and installing extraction wells near the Colorado River to hydraulically control the plume, accelerate cleanup of the groundwater within the floodplain, and flush the groundwater with

elevated Cr(VI) through the IRZ. The proposed project consists of five main elements: (1) an IRZ zone along a portion of National Trails Highway, (2) an Inner Recirculation Loop (IRL) that consists of extraction wells near the Colorado River that would pump contaminated groundwater that would be amended with organic carbon before reinjection in the western end of the plume, (3) a TCS Recirculation Loop that includes extraction wells in the eastern end of the East Ravine, eastern side of the TCS, and injection wells northwest of the TCS, and (4) freshwater supply system to convey water from a supply well in Arizona to assist with flushing the chromium plume.

The project description is divided into sequential phases of project implementation: construction, operations and maintenance, long-term monitoring, and decommissioning. It is estimated that the duration of these four project phases is 3 years, 29 years (up to 110 years), 10 years, and 2 years, respectively.

Specific project activities with potential to impact special-status birds are described in Section 4 of this Plan, and potential impacts to special-status birds from these activities are discussed in Section 5.

SECTION 2

Plan Goals

The goals of this Plan are to:

- Identify measures to ensure the avoidance or minimization of impacts to protected bird species during project construction. In general and pursuant to EIR Mitigation Measure BIO-2a, measures will include to the extent necessary (as determined by a qualified biologist and in consultation with the appropriate regulatory agencies):
  - prohibiting construction near or in special-status bird habitat,
  - limiting construction during breeding seasons,
  - requiring an on-site biological monitor during field activities,
  - implementing buffers around active nests to the extent practical and feasible to limit noise and visual disturbances, and
  - conducting worker awareness training and noise monitoring where 60 dBA L_{eq} or ambient levels may be exceeded during construction at the edge of nesting habitats.
- Facilitate project design avoidance of suitable special-status bird habitat, to the extent feasible, via mapping of such habitats.
- Ensure compliance with the regulations described in section 2.1 of this Plan.

2.1 Regulatory Framework

The project is required to comply with the following federal and State (Arizona and California) regulations that protect bird species as identified in the table of Applicable or Relevant and Appropriate Requirements ("ARARs") in the DOI Record of Decision for the groundwater remedy.

2.1.1 Federal Regulations and Standards

2.1.1.1 Federal Endangered Species Act

The Federal Endangered Species Act (ESA) is implemented by the United States Fish and Wildlife Service (USFWS). Section 9 of the ESA prohibits the "take" of federally listed as threatened or endangered species, unless permitted. "Take" is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. The project is subject to consultation pursuant to ESA Section 7 that addresses federally listed species with potential to occur in the project area and their habitat. This document includes measures proposed for federally listed species in the *PBA (CH2M HILL 2007)*.

2.1.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) is implemented by the USFWS and prohibits the "take" of migratory birds, including causing failure of a nest, unless permitted.

2.1.2 State Regulations and Standards

2.1.2.1 California Endangered Species Act

The California Endangered Species Act (CESA) is implemented by the California Department of Fish and Wildlife (CDFW) and prohibits any activities that would jeopardize or take a species listed as threatened or endangered within the State, unless permitted.

2.1.2.2 California Fully Protected Wildlife Species Provisions

This provision is implemented by CDFW and prohibits the take and permitting of take of fully protected species.

2.1.2.3 California Species of Special Concern

This provision is applicable to bird, mammal, amphibian, and reptile species designated by CDFW as California Species of Special Concern (SSC). While this designation does not include additional regulatory protections, SSC species are typically considered by projects that are subject to the California Environmental Quality Act and were addressed in the EIR for the Topock Remediation Project.

2.1.2.4 Protection of Bird Nests and Raptors (California Fish and Game Code §3500 and 3503.5)

Implemented by CDFW, Section 3503 of the California Fish and Game Code (CFGC) states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise proved by the CFGC or any regulation made pursuant to the CFGC. Section 3503.5 specifically states that except as otherwise authorized by the CFGC or related regulations, it is unlawful to take, possess or destroy any raptors (i.e., birds of prey in the orders Falconiformes or Strigiformes that includes eagles, hawks, falcons, owls, and others), including the nests or eggs of such birds.

2.1.2.5 Migratory Bird Provision (California Fish and Game Code §3513)

This provision is implemented by CDFW and prohibits any take or possession of birds that are designated by the MBTA as migratory nongame birds except as allowed by federal rules and regulations promulgated pursuant to the MBTA (see above for MBTA description).

2.1.2.6 Taking Birds; Possession of Raptors (Arizona Game and Fish §17-236)

This provision is implemented by Arizona Game and Fish Department and makes it unlawful to take or injure any bird or harass any bird upon its nest, or remove the nests or eggs of any bird, except as could occur in normal horticultural and agricultural practices and except as authorized by the commission. This regulation is the equivalent, in terms of project applicability, to the CFGC §3503.5.

2.1.2.7 Wildlife of Special Concern in Arizona (Arizona Game and Fish §17)

Under authorities implicit in Arizona Revised Statute 17, the Arizona Game and Fish Department maintains a list of wildlife of greatest concern. The list focuses on the degree to which habitats or populations are threatened and the probability of extirpation of a taxon from Arizona. There are four categories for species on the WSCA list: extinct, endangered, threatened, and candidate.

2.2 Avian Conservation Strategy

In April 2013, PG&E released the *Draft Avian Conservation Strategy: Guideline for Bird Protection and Mitigation* (ICFI, 2013) (ACS) to provide a comprehensive avian conservation strategy thereby avoiding and minimizing adverse effects on nesting migratory birds within PG&E's service area in compliance with applicable federal and state regulations. The ACS recommended buffers were used in this report to avoid and minimize impacts to protected bird species. Any buffer identified in the PBA for a state or federally listed threatened or endangered species was incorporated into this report instead of the ACS buffer.

Protected Bird Species

This section describes the bird species with regulatory protection that are anticipated or known to occur in the project area. Measures to avoid or minimize impacts to these species are provided in Section 6.

Sections 3.1 and 3.2 discuss bird species that are protected by the MBTA and CFGC, respectively. Section 3.3 provides an account of special-status birds with additional regulatory protections that could occur in the project area.

The EIR (*Volume II, Section 4.3*) describes the locations of suitable habitat for special-status bird species in the project area. In order to facilitate project design avoidance of special-status bird habitat, a qualified biologist conducted a literature review that included the EIR, mapping developed for southwestern willow flycatcher presence/absence surveys (GANDA, 2009), mapping developed for Yuma Clapper Rail and California Black Rail Yuma clapper rail surveys (Konecny Biological Services, 2012), and mapping of Vegetation Communities from plant surveys (CH2M HILL 2012). A map that cross references these sources to depict special-status bird species habitat within the project area is included in this Plan as Figure 2.

Many common bird species protected by MBTA may nest in almost any area where nesting structures occur, including widespread upland habitats (e.g., creosote bush scrub) and man-made facilities (e.g., compressor station buildings). Section 6 describes a combined approach to avoid or minimize impacts to sensitive habitats and active nests, to the extent feasible, to ensure that impacts to special-status bird species are less than significant.

3.1 Migratory Bird Treaty Act Protected Bird Species

The number of bird species protected by the MBTA is extensive and listed at 50 CFR §10.13. A list of MBTA protected species that are anticipated to occur within the project area is included in Appendix A. Section 6.1 provides the general avoidance and mitigation measures applicable to MBTA protected birds.

3.2 CFGC §3503 and §3503.5 Protected Bird species

CFGC §3503 protects the nest and eggs of any bird. Raptors and raptor nests protected by CFGC §3503.5 that are anticipated to occur within the project area include American kestrel (*Falco sparverius*), Northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo jamaicensis*), and great horned owl (*Bubo virginianus*). The general avoidance and mitigation measures in Section 6.1 also address mitigation for potential impacts to bird species protected by the CFGC.

3.3 Species Accounts

This section provides the regulatory status, habitat requirements, nesting information, and occurrence potential for eight special-status bird species that could occur in the project area as determined by the EIR. New information from recent protocol surveys, new surveys of the expanded APE, and research conducted in the preparation of this Plan are also provided, as is a species account for the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), previously determined unlikely to occur in the project area but was documented in the area during bird surveys in 2012 (GANDA, 2012).

Mapping of suitable habitat in the project area is included in Figure 2. No critical habitat for listed bird species occurs in the project area. With the exception of western yellow-billed cuckoo, special-status species determined by the EIR as unlikely to occur in the project area, and that have not been detected in the project area, are not discussed in this Plan.

3.3.1 Southwestern willow flycatcher (*Empidonax traillii extimus*)

This species is federally and California State listed as Endangered, and is considered endangered on the list of Wildlife of Special Concern in Arizona. It is associated with dense riparian habitats along streams, rivers, and other wetlands.

Historically the southwestern willow flycatcher nested in native vegetation including willows, seepwillow, boxelder, buttonbush, and cottonwood. Following modern changes to riparian communities, this subspecies still nests in native vegetation, but also uses thickets dominated by non-native tamarisk and Russian olive, or in mixed native non-native stands.

It builds nests and lays eggs in late May and early June with a clutch size of 2 to 5 eggs. The nest is a small open cup, most often 6.5 to 23 feet above ground in a fork or on a horizontal branch of a medium-sized bush or small tree with dense vegetation above and around the nest. Young fledge in early to mid-July, and second clutches only occur if the first clutch failed.

The project area contains suitable nesting (primarily in tamarisk thickets) and foraging habitat for this species along the Colorado River floodplain and Topock Marsh area in Arizona. This species has been documented in riparian areas around the site, primarily at Topock Marsh, and has been detected near Park Moabi Lagoon (GANDA 2009).However, several protocol surveys were conducted since 2004 in the project area and none have detected nests or breeding behaviors. A protocol survey conducted in 2012 identified two transient individuals and no nesting pairs. If an active nest is detected during future surveys, an avoidance zone will be implemented around the nest. The PBA states that all construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests. To the extent feasible, future project activities should be avoided within the sensitive areas such as potential SWFL habitat, wetlands, 100-year floodplain, and a 60-foot buffer from the Colorado River.

Sections 6.1 and 6.2.1 provide the avoidance and minimization measures for southwestern willow flycatcher.

3.3.2 Arizona Bell's vireo (*Vireo bellii arizonae*)

This species is California State listed as Endangered and associated with early to mid-successional riparian habitat that includes a structurally diverse canopy.

It is a summer resident that generally breeds between late March and late September. The nest is usually placed less than 5 feet above the ground. A typical vireo nest is a basket attached to twigs and made of various fibers such as split large grasses, and mixed with strips of soft inner bark, fine grasses, willow fluff, plant down, spider nests, and cattle hair. Three or four eggs usually are laid and incubation lasts about 14 days. Egg laying typically begins in early April, two broods generally are raised each season, and nesting occurs through the summer. Although normally timid, shy, and retiring, both parents are aggressive defenders of eggs and young.

Individuals were detected in Arizona near Needles and the Topock Marsh during project related surveys conducted in 2008 and 2012; therefore, this species is known to forage in the project area (GANDA, 2012). However it is unlikely to nest in the project area due to a general lack of suitable nesting habitat.

Section 6.2.1 provides the avoidance and minimization measures for Arizona Bell's vireo. The ACS recommends a standard activity-free buffer distance of 500 feet from active nests of this species.

3.3.3 Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)

This species is a federal candidate for listing, a California State Endangered species, and is considered threatened on the list of Wildlife of Special Concern in Arizona. It is associated with large blocks of riparian woodland composed of cottonwood and willow.

The onset of breeding is apparently correlated with an abundant local food supply or periods of greatest rainfall. Cuckoos may not breed if local food supply is inadequate on breeding grounds following spring migration. The breeding cycle is extremely rapid and requires only 17 days from egg-laying to fledging of young. Nesting activities take place between late June and late July, but may begin as early as late May and continue into September. Nest building typically takes 2-4 days. One brood of two to three young is raised per season. Cuckoos will occasionally double-brood in western populations if abundant food resources exist. Incubation begins with initiation of the first egg laying, known as asynchronous hatching, resulting in eggs and nestlings at different developmental stages in the same nest. Asynchronous hatching permits survival of the oldest nestlings in the event of a food shortage. The incubation period for yellow-billed cuckoos is 10 to 12 days. The young are fed large food items for the 5-8

day nestling period. Most young cuckoos leave the nest on day 6. After fledging, the young are dependent on the adults for at least 2 weeks.

This species has been documented within Topock Marsh (GANDA 2009) and one individual was detected during a previous survey conducted in 2012 in the project area on the Arizona side of the Colorado River (GANDA 2012). However, this species is not anticipated to nest in the project area due to lack of suitable habitat.

Section 6.2.1 provides the avoidance and minimization measures for western yellow-billed cuckoo. The Fish and Wildlife Service recommends a standard buffer distance of 300 feet for the western yellow-billed cuckoo.

3.3.4 California black rail (*Laterallus jamaicensis coturniculus*)

This marsh bird is California State listed as Threatened, is a California Fully Protected species, and is considered Wildlife of Special Concern in Arizona. California black rail is associated with fresh or brackish water wetlands that include cattail and bulrush stands.

The California black rail form pairs as early as late February. The nest is a well-defined bowl, with a canopy of dead or living vegetation woven over the top and a ramp of dead vegetation leading to an entrance on the side of the nest. Nests are primarily made of southern cattail or spikerush, and are elevated above the mud substrate in clumps of vegetation.

California black rail lays eggs between early March and early July. Average clutch size ranges from 3 to 8 eggs. The incubation period for nests ranges from 17 to 20 days. Chicks hatch one at a time and are born semi-precocial; they require brooding by one parent for the first few days after hatching.

The project area contains suitable foraging and nesting habitat for this species on the Arizona side in the Topock Marsh and marginal habitat in small patches along the Colorado River and mouth of the East Ravine. California black rail was not detected during 2012 protocol surveys (GANDA, 2012). However, during marsh bird surveys performed by HNWR over four years ago a California black rail was detected within the marsh (Linda Miller personal communication, April 30, 2014). The East Ravine and other small patches of cattail and bulrush habitats along the Colorado River are likely subject to too much disturbance from river associated recreation activities and water level fluctuations for this species. This species is not anticipated to nest in the project area due to lack of suitable habitat.

Avoidance and minimization measures for this species are provided in Section 6.2.1. The ACS recommends a standard activity-free buffer distance of 500 feet from active nests of California black rail.

3.3.5 Yuma clapper rail (*Rallus longirostris yumanensis*)

This marsh bird is federally listed as Endangered, California State listed as Threatened, is a California Fully Protected species, and is considered endangered on the list of Wildlife of Special Concern in Arizona.

The Yuma clapper rail is a marsh bird found in dense cattail or cattail-bulrush marshes along the lower Colorado River in Mexico north to the lower Muddy River and Virgin River in Utah above those rivers' confluence with Lake Mead.

Yuma clapper rails are generally found in freshwater and alkali marshes dominated by stands of emergent vegetation interspersed with areas of open water and drier, upland benches. This subspecies prefers mature marsh stands along margins of shallow ponds with stable water levels. Nest sites selected by this subspecies are near upland areas in shallow sites dominated by mature vegetation, often in the base of a shrub. Yuma clapper rails move into different cover types in winter, showing a preference for denser cover than in summer.

This rail usually lays 7 to 11 eggs in a cup nest of grasses or sedges. The first brood appears in March, although pairs may nest again after failure of a previous nest. Chicks begin to forage independently on small prey soon after hatching, and begin to feed farther from adults as fledging age approaches (Meanley 1985). Young can fly in about 9 to 10 weeks.

This species is known to occur in the Topock Marsh, and it was detected during 2012 protocol surveys in the project area in the Topock Marsh on the Arizona side northwest of County Highway 10. These protocol surveys

were also conducted at the East Ravine and in other areas of potentially suitable foraging or nesting habitats in the project area, but no rails were detected in these areas.

Sections 6.1 and 6.2.2 provide the avoidance and minimization measures for Yuma clapper rail, as provided in Section 5.3.1.8 of the PBA. The PBA states that all construction activity within 300 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

3.3.6 Western least bittern (*Ixobrychus exilis hesperis*)

This marsh bird is a California Species of Special Concern and is considered a candidate species on the list of Wildlife of Special Concern in Arizona. It occurs in the same habitats as the aforementioned rail species (cattail and bulrush stands).

In Arizona, resident least bitterns likely begin breeding before migratory populations, with males initiating their cooing calls in March and April. They are a locally common breeder from April through September.

Throughout their entire range, nests are typically built among dense stands of emergent or woody vegetation. Nests are well concealed, and are usually located adjacent to open water. Nests have been found scattered throughout suitable habitat or concentrated in loose groupings. Typical clutches are 4-5 eggs and the time from laying the first egg to the hatching of the first egg ranges from 19 to 21 days. Young can forage on their own within 1-2 weeks. The young normally leave the nest permanently by 13-15 days but linger nearby for 1-2 weeks. Approximate age at first flight is 29 days. The least bittern will re-nest and double brood.

Western least bittern is known to occur at Topock Marsh (Reclamation 2004). The protocol survey for both rail species included a protocol survey for Western least bittern, and the species was not detected in the project area in any areas of suitable or potentially suitable habitat during surveys in 2012. Therefore, it is unlikely that this species occurs and is not expected to nest in the project area.

Section 6.2.1 provides the avoidance and minimization measures for western least bittern. The ACS recommends a standard activity-free buffer distance of 100 feet from active nests of this species.

3.3.7 Crissal thrasher (*Toxostoma crissale*)

This species is a California Species of Special Concern, associated with riparian woodlands, and primarily found in dense stands of honey mesquite.

Crissal thrasher nests are generally well hidden in the interior of dense shrubs, and consist of coarse twigs lined with finer material. Clutch size is usually 2-3 eggs, the incubation period is 14 days, and young fledge 11 to 16 days after hatching (Cody 1999).

This species has been documented along the Colorado River on the Arizona side near Needles and within the Havasu National Wildlife Refuge (GANDA 2008). Marginally suitable habitat occurs in the project area within tamarisk thickets and honey mesquite bosque. Avoidance and minimization measures for this species are provided in Section 6.2.1. The ACS recommends a standard activity-free buffer distance of 75 feet from active thrasher nests.

3.3.8 Sonoran yellow warbler (*Dendroica petechia sonorana*)

This species is a California Species of Special Concern, associated with riparian woodlands composed of cottonwood and willow.

The Sonoran yellow warbler breeds in the willow and cottonwood habitats that line the lower Colorado River. Yellow warblers begin arriving on their breeding grounds in April. Nest building activity has been observed in mid-April, and the egg laying likely begins in late April, with nestlings and fledglings by early May. Nests are typically found in the forks of cottonwoods, willows, or tamarisk from 10 to 20 feet (3-6 m) high. Yellow warblers will attempt several nests throughout the season but typically produce only one brood with a clutch size of 4 eggs. Adults have been observed feeding a fledgling into August.

The species is known to occur in the Topock Marsh, and the project area contains suitable nesting and foraging habitat.

Section 6.2.1 provides avoidance and minimization measures for Sonoran yellow warbler. The ACS recommends a standard activity-free buffer distance of 75 feet from active nests.

3.3.9 Yellow-breasted chat (*Icteria virens*)

This species is a California Species of Special Concern associated with riparian woodlands at the edges of open water. The species is associated with cottonwood, willow, tamarisk, and stands of arrow weed.

The nesting season begins in mid-May and lasts through early August. Nests are usually placed near the ground in dense thickets and shrubs that provide concealment. The nest is a bulky cup composed of grasses, leaves, strips of bark, or stems of weeds and is lined with finer grasses, wiry plant stems, pine needles, and sometimes roots and hair (Oberholser 1974). Three to four eggs are incubated for 10 to 12 days, and the young typically fledge the after 7 to 10 days.

Yellow-breasted chat is known to occur near Needles and at Topock Marsh (CNDDB 2008). The project area contains suitable foraging and nesting habitat for this species along the Colorado River floodplain and Topock Marsh. Avoidance and minimization measures for yellow breasted chat are provided in Section 6.2.1. The ACS recommends a standard activity-free buffer distance of 75 feet from active nests.

TABLE 3-1
Special-Status Species Potentially Occurring in the Project Area

Species	Status[a]	Habitat	Potential for Occurrence[b]	Nesting Season
Southwestern willow flycatcher *Empidonax traillii extimus*	Fed: E CDFW: E AGFC: E LCR MSCP	Dense riparian habitats along streams, rivers, and other wetlands, and breeds in stands of dense cottonwood, willow, and tamarisk thickets.	Known to occur in the project area as transient (non-nesting) based on recent years' protocol surveys. The project area provides some suitable habitat. This species has been documented in riparian areas around the site, primarily at Topock Marsh, and has been detected near Park Moabi Lagoon (GANDA 2009: Figure 5, page 7).	May 1 to September 1
Arizona Bell's vireo *Vireo bellii arizonae*	CDFW: E LCR MSCP	Associated with willow thickets with mulefat.	Known to occur as transient; documented in Arizona near Needles and the Topock Marsh (CNDDB 2008; GANDA 2008:5-1, GANDA 2012), but project area provides little suitable nesting habitat.	May 1 to September 30
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	CDFW: E AGFC: T Fed: C LCR MSCP	Riparian forest nester in flood bottoms of larger river systems. Requires multistory habitat for foraging.	Known to occur as transient; however project area provides no suitable nesting and little foraging habitat. Documented within the Topock Marsh (CNDDB, 2008; GANDA 2009:6).	April 15 to September 30
California black rail *Laterallus jamaicensis coturniculus*	CDFW: FP, T AGFC: E LCR MSCP	Habitat includes shallow freshwater and brackish marshes dominated by bulrush species.	Could occur; potentially suitable habitat within the Topock Marsh, but no CNDDB records near area; documented at delta of Colorado River.	February 1 to August 1
Yuma clapper rail *Rallus longirostris yumanensis*	Fed: E CDFW: T, FP AGFC: T LCR MSCP	Only along the Lower Colorado River (from Topock Marsh southward) and around the Salton Sea. It occupies heavily vegetated freshwater.	Known to occur in the Topock Marsh within the Arizona side of the project area based on 2012 protocol surveys. However, the project area within/adjacent to the river provides little suitable habitat on the California side. This species has been documented in the Topock Marsh and the Topock Gorge (CNDDB 2008; GANDA 2009:6).	March 15 to July 31
Western least bittern *Ixobrychus exilis hesperis*	CDFW: SSC LCR MSCP	Freshwater marshes with dense vegetation.	Could occur; known to occur at Topock Marsh (Reclamation 2004). Along the Lower Colorado River all documented occurrences were in Arizona.	May 1 to August 31
Crissal thrasher *Toxostoma crissale*	CDFW: SSC	Nests within desert riparian and wash habitats.	Could occur; documented along the Colorado River on Arizona side near Needles and within the Havasu National Wildlife Refuge (HNWR) (CNDDB, 2008; GANDA 2008: B-1), but project area provides little suitable nesting habitat.	February 1 to July 31
Sonoran yellow warbler *Dendroica petechia sonorana*	CDFW: SSC LCR MSCP	Historically nesting in riparian forests associated with open water but along the LCR; tamarisk is a habitat component.	Could occur; documented along the Colorado River near Needles (CNDDB 2008), but project area provides little suitable nesting habitat.	May 1 to June 30

TABLE 3-1
Special-Status Species Potentially Occurring in the Project Area

Species	Status[a]	Habitat	Potential for Occurrence[b]	Nesting Season
Yellow-breasted chat *Icteria virens*	CDFW: SSC	Riparian areas with dense woody vegetation bordering open areas.	Could occur; known to occur near Needles and at Topock Marsh (CNDDB 2008).	March 15 to September 30

[a] Legal Status Definitions:

U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories

E = Endangered

C = Candidate proposed for listing

California Department of Fish and Wildlife (CDFW) State Listing Categories

E = Endangered

T = Threatened

FP = Fully Protected (no take permitted)

SSC = California Species of Special Concern

Arizona Game and Fish Commission (AGFC) Listing Categories

E = Endangered

T = Threatened

C = Candidate

Other Status Categories

LCR MHCP = Lower Colorado River Multi-species Habitat Conservation Program covered species (included for informational purposes)

Sources: EIR; CNDDB, 2008; GANDA, 2008 and 2009; Reclamation, 2004, USFWS 1999

[b] Potential for Occurrence Definitions:

Could occur: Suitable habitat is available in the project area; however, there are few or no other indicators that the species might be present.

Known to occur: Species or evidence of its presence was observed in the project area during protocol or reconnaissance-level surveys or was reported by others.

SECTION 4

Project Activities

This section summarizes the activities as described in EIR Section 3.5 that have potential to impact special-status bird species. Biologists participated in a 60 percent design field meeting with the project design team on April 23 and 24, 2012, to assist in ensuring that the project design includes avoidance of sensitive habitats, as feasible, and that the majority of project features have been located away from identified special-status bird habitats.

Construction of the proposed project would occur during an estimated 4 years: 3 years for constructing the remediation facilities at the onset of the proposed project and 1 year for decommissioning of the existing IM-3 Facility after final remedy is considered operating properly and successfully. The length of time required for construction is dependent on a number of factors, including the number of wells, pipelines, and other infrastructure, the geologic conditions encountered during well installation, the time required for regulatory and landowner approvals, and the availability of construction labor and materials at the time of construction.

Construction will be primarily limited to daylight hours to minimize the need for lighting and to conserve energy to the extent practical and/or feasible; however, some nighttime construction efforts may be required. For example, nighttime construction activity could be required for the continuous drilling of large-diameter wells. Lighting associated with construction and decommissioning activities will be limited to active construction equipment in operation during nighttime operations and will consist of downward facing fixtures fitted with cutoff shields to reduce light diffusion. Staging areas will be located to the extent feasible in areas that are already developed or disturbed, such as within the fenced and developed areas at the compressor station. However, staging could also be located elsewhere within the project area.

Construction practices will be designed to limit dust, noise, and nighttime light generation where feasible.

Heavy equipment may include trucks and excavators or backhoes to lay the pipeline network, and cranes to place control sheds and reductant storage tanks. Trucks may be necessary for making deliveries and hauling waste from the site.

The project consists of the following primary features: remediation facilities, freshwater flushing, monitoring wells, water conveyance, utilities, and roadways, each of which has the potential to impact protected birds.

4.1 Remediation Facilities

Remediation facilities will consist of extraction wells, injection wells, IRZ wells, and reductant storage facilities.

4.1.1 Extraction, Injection, and IRZ wells

Remediation and monitoring wells could be installed either using conventional truck-mounted drilling equipment or all-terrain capable equipment. Up to 126 wells will be installed, not including any replacement wells that may be necessary during the operation and maintenance phase. The sonic drilling method could be used for smaller-diameter extraction and injection wells. Wells that are located within the bedrock area may involve diamond coring or air rotary drilling methods in conjunction with sonic or rotary methods for setting surface casing. For wells greater than 4 inches in diameter, mud rotary drilling methods may be used. Sonic drilling methods will be used for construction of 4-inch-diameter or smaller diameter wells to the depths necessary to reach bedrock at much of the project area. Tanks, bins, or tanker trucks may be used to contain excess water and drill cuttings at the drill site and at designated staging areas. Typical well vaults would be 6 feet long by 8 feet long by 8 feet deep, and will house wells between 4 and 12 inches in diameter.

Based on the activities that have occurred to date in the project area during installation of similar wells, the length of time required to construct the injection and extraction wells range from 1 day to 5 weeks per well, depending on the diameter and depth of the well.

To support the drilling rig, a support truck, a forklift, and one or more pickup trucks may be used to transport personnel, equipment, and materials from staging areas to the drill site. The forklift will also be used to transport

cuttings and excess core generated from drilling the soil borings to lined, steel roll-off soil bins that will be temporarily staged. Up to four 20,000 gallon tanks and four to six roll-off bins might be required for large-diameter deep wells. The area surrounding each borehole that may be disturbed, including temporary equipment lay down areas, during drilling is estimated to be up to one-half acre.

4.1.2 Reductant Storage Facilities

The maximum footprint of the reductant storage and associated facilities will be 35,000 square feet, which may consist of facilities at multiple locations.

4.2 Freshwater Flushing

Freshwater flushing involves the use of injection wells, discussed above, to introduce clean water to the aquifer. Freshwater injection would involve piping water in from an off-site source and will be pumped either from new or existing Arizona wells, from new wells in California north of the compressor station, or from a new surface water intake at or near the Colorado River. Freshwater will be transported by pipeline to injection wells located north, west, and/or south of the plume. Any water pipelines that may be needed to deliver water from freshwater wells will be built primarily underground and within existing utility corridors or roadways. The source of freshwater may change during the operation and maintenance period of the remedy; not all freshwater supply structures (wells, intakes, pipelines) will need to be constructed at the outset of the remedy, but could be constructed as needed during the operation and maintenance period. To accommodate the flow volume that is required for remediation, new pipelines will likely need to be constructed connecting the water supply with the injection wells.

If a well is determined the most appropriate method for obtaining freshwater for flushing, wells will be drilled in the typical method for drilling wells as described above. Should a river intake approach be used, the intake will consist typically of belowground perforated or solid pipes (or rectangular channels) extending into the river. The intake pipes lead to pumps that push the water to the desired location. Reinforced concrete is often used to support the pipes. Because the intake pipes are usually installed below the water table, dewatering is necessary to allow for safe construction. Dewatering can be accomplished by pumping or installing sheet piles or cofferdams.

An alternative approach is to install pumps below the river surface with riser pipes extending to a concrete and steel platform. The pump motors, air compressors, monitoring and control equipment, equipment hoists, and an operator’s structure will be installed on the platform. The platform will be supported by pylons or piers drilled into bedrock beneath the river bottom or mounted on the existing pipe bridge structure. The area of the platform will be from 2,000 to 10,000 square feet, and could be accessed by boat or by vehicles.

As described above, pipelines that deliver the freshwater could be installed above or belowground depending on the required service life, security and access needs, ground disturbance considerations, and type of pipeline. The diameter of pipelines is estimated to vary between 1 inch and 2 feet. Air release valves will typically be constructed inside underground concrete vaults surrounded by protective bollards.

4.3 Monitoring Wells

Approximately 100 monitoring wells currently exist near the compressor station, and a maximum of 19 new monitoring wells are anticipated as part of the proposed project. Monitoring wells could be replaced throughout the operation and monitoring phase, as necessary. Monitoring wells are typically between 4 and 8 inches in diameter and are completed at the ground surface with a concrete pad (typically 4 square feet) and include a manhole-type cover to the well. Where a ground surface completion is not feasible, monitoring wells may be installed with aboveground completion with steel protective casing. Monitoring wells will be situated in areas that provide relevant data on groundwater hydraulics and chemistry.

4.4 Water Conveyance, Utilities, and Roadways

The proposed project will require pipelines to transfer freshwater, treated water, and reductant-amended water throughout the treatment area. It will also require other utility connections such as electrical power, signal communications, small solar panels, diesel fuel, and natural gas. Where underground pipelines or utilities are

determined most appropriate, trenches will be excavated to depths of 3 to 4 feet (or more), buried, and covered to match the surrounding area, whether it is soil or pavement.

Depending on required service life, security and access, landowner requirements, agency requirements, type of pipeline, and environmental constraints (such as the subsurface geologic features or cultural resources), pipelines could be installed aboveground or belowground. The diameter of pipelines may vary from 1 to 14 inches, depending on the specific utility and required flow rate. Trenching will vary according to the size of pipeline and electrical conduit needed, as follows: 1.5-foot-wide trench for 1- to 4-inch piping, 3-foot-wide trench for 6- to 12-inch piping, and 5-foot-wide trench for 12- to 14-inch piping. An estimated 120,000 linear feet of pipeline may be required to serve the proposed project. Electric utility transformers and access vaults (which may include the use of protective bollards) will be placed at selected points along the pipeline corridor.

Electric conduit and cable will be installed to supply communication and power to pumps and instrumentation and will typically be installed underground in the same location as piping. Wherever feasible, trenches will be dug to place utility connections underground, which will reduce wear from weather and vandalism. As with pipelines, approximately 70,000 linear feet of electrical and signal communications is expected to be required for project implementation. Small solar panels may be installed to provide supplemental power, or as a primary power source for a lower power demand, such as for instrumentation and communication systems.

A road network for accessing the existing network of monitoring wells runs throughout the project area. This road network will be used where feasible for construction and operation of the proposed project; however, additional roads will be required. Approximately 1,000 linear feet of new roads could be needed throughout the project area, for both construction and long-term operation and maintenance of the proposed project. An access road will be required to provide service to each well. At some wells, a vehicle turnaround will be required. For wells where a turnaround is needed, the final disturbed area at each wellhead could be as large as 3,000 square feet. For wells located along an access road where no turnaround is needed, the area used for the well activities would be approximately 1,000 square feet. Access roads will be graded to create a smooth surface and proper drainage and will be routed with topographical and built structures and will consider sensitive natural resources. The roads will be maintained throughout the operation and maintenance period of the proposed project. Depending on their location, condition, frequency of use, and purpose, roads may be paved with asphalt, covered in gravel, or left unpaved. Following determination that the remedial or monitoring structure is no longer needed, the road will be closed and restored to pre-project conditions.

Depending on the location of extraction, treatment, and injection facilities, additional access routes could be constructed, or existing roads improved to support the level of activities proposed. The length of new or improved roads is estimated to be up to 6,000 linear feet and will be designed to minimize grading and disturbance of sensitive resources and existing structures and to maximize the use of existing roads. Typical road design and construction involves topographic surveying, grading, installing surface drainage systems (culverts, gutters, and riprap for slope protection), and constructing retaining walls.

4.5 Nonspecific Activities

Nonspecific activities support the project but are not considered a primary project feature. For example, habitat restoration activities may include preparing impacted areas for planting of native vegetation and maintaining planted vegetation until success criteria are met, which could be up to 5 years.

Potential Impacts

This section describes the potential impacts of project features and activities described in Section 4. The mechanism of project related impact to birds can be broadly grouped into the following four categories: 1) nesting and foraging habitat degradation or loss, 2) direct nest disturbances, including visual and auditory disturbances, that could result in nest failure, abandonment, or decreased viability of eggs or young, 3) direct injury or mortality resulting from entrapment in equipment and materials, and 4) increased predation of protected birds, especially from feral animals or mesopredators.

5.1 Habitat Loss and Degradation

Habitat loss is one of the most substantial and direct threats to avian species. Permanent loss of habitat is often associated with development such as residential, industrial or agricultural land use conversions. In addition, human uses and development often alter ecosystem function. Losing natural habitat across a landscape further leads to fragmentation and alterations in spatial patterns that influence how avian species utilize the remaining habitat (CalPIF 2009).

Habitat degradation can also affect the foraging and nesting habitats of avian species. For example, the introduction of invasive species to an area can diminish the abundance of native plants, leading to fewer foraging opportunities for seed-dependent species or loss of nesting sites.

5.2 Impacts on Nests or Nesting Territories

The project area supports suitable nesting habitat for birds protected by the MBTA and several special-status birds, and these species could be affected during construction, operation and maintenance, and decommissioning. Nesting can occur in vegetation and/or in burrows on or near the project site. In the project vicinity, the avian nesting season for most bird species is from March 15 through September 30. Active nests may be directly impacted (i.e., destroyed or disturbed) by project construction activities resulting in nest abandonment and failure. Nesting territories, the areas surrounding nests which the parents utilize to support successful nesting (e.g., foraging and hunting for feeding of young, vegetation buffers that provide protection from predators), may be directly impacted by project activities (e.g., vegetation removal and habitat degradation), resulting in nest failure or reduced viability of young.

Visual or auditory disturbances related to construction, operation, maintenance, and decommissioning can affect special-status bird species during the breeding seasons. For example, birds that are startled by the sound or visible presence of project equipment may abandon nests, resulting in the reduced viability of eggs and young. Visual disturbances that may impact birds include those resulting from night-time lighting.

5.3 Entrapment from Equipment and Materials

Equipment and materials on site may entrap special-status birds leading to injury or mortality. Open-top vertical pipes are known to trap birds, especially cavity nesters or birds escaping from predators or seeking shade. Once birds enter pipes, they cannot grip the slick surface or spread their wings to fly out, and suffer death from dehydration, starvation, and exposure. Birds have also become trapped in large water storage tanks with small openings around the top.

To ensure that equipment and materials, especially vertical pipes, do not result in significant impacts to protected birds, the AMMs described in section 6 will be implemented.

5.4 Attracting Predators

Habitat that becomes fragmented from human development often results in an increase in feral animals and mesopredators (carnivores of small or intermediate body size). In addition, an increase in trash often functions as food subsidies for these species, which leads to an increase in predator viability. Land uses can dramatically

influence the sustainability of desert bird populations by increasing the populations of brown-headed cowbirds, domestic cats, jays, skunks, raccoons, ravens, crows, and other predators (CalPIF 2009).

5.5 Effect Categories

Table 5-1 qualifies overall impacts related to the project activities presented in Section 4 and is derived from information presented in *Draft Avian Conservation Strategy: Guidelines for Bird Protection and Mitigation* (ACS; ICFI 2013). Section 6 discusses how these impacts will be avoided or minimized, and Tables 6-1 and 6-2 provide recommended activity buffers based on the identified effect categories.

As discussed in the ACS, effect scores for each impact mechanism were aggregated to assign an overall effect score for each PG&E activity. The overall effect score (Low, Medium, and High) is an aggregation of the effect category scores assigned for each of four impact mechanisms (occupied nest location or nesting substrate, personnel and equipment activity, activity duration, and noise level. Effects categorized as low or short were assigned a value of 1; effects categorized as medium were assigned a value of 2; and effects categorized as high or long were assigned a value of 3. These four effect category values were added to assign the overall effect score. Cumulative values between 4 and 6 were assigned an overall effect category of low; values between 7 and 9 were assigned a category of medium; and values between 10 and 12 were assigned a category of high. It is important to note that the effect categories (low, medium, and high) are relative to each other at any given distance from an activity and that effect category assignments will not change when such activities occur at varying distance from a nest. A detailed discussion of the impact mechanisms is provided in Section 3.3 of the ACS.

Effects of PG&E activities decrease with distance, which is taken into account by the assignment of activity-free buffers in Chapter 6 below. The overall effect categories were used to assign activity free buffer requirements discussed in Chapter 6.

TABLE 5-1
Potential Activity Effects[1]

Activity	**Overall Effect Category** [a]	Occupied nest location or nesting substrate	Personnel and equipment activity	Activity duration	Noise level
Remediation Facilities					
Installation of Extraction, Injection, and IRZ Wells	Medium	Medium	High	Short	High
Construction of Reductant Storage Facilities	High	Medium	High	Long	High
Freshwater Flushing					
Installation of Water Supply Wells	High	Medium	High	Medium	High
Construction of Water Pumping Platform	High	Medium	High	Medium	High
Monitoring Wells					
Installation of Monitoring Wells	Medium	Medium	High	Short	High
Water Conveyance, Utilities, and Roadways					
Pipeline Construction	High	Medium	High	Long	High
Installation of Electrical Conduit and Cable	Medium	Medium	Medium	Short	Medium
Road Construction	High	Medium	High	Long	High
Operation and Maintenance					

TABLE 5-1
Potential Activity Effects[1]

Periodic well maintenance	Medium	Medium	Medium	Short	High
Equipment maintenance and inspections	Medium	Medium	Medium	Short	High
Periodic replacement of wells and other structures	High	Medium	High	Short	High

[1] Based on ICFI 2013, in part

[a] The effect categories (Medium and High) for each activity are relative to each other at any distance that an activity occurs from a nest. Distance is taken into account with the implementation of activity-free buffers as presented in Chapter 6.

SECTION 6

Avoidance and Minimization Measures

As described in Section 4, the majority of project features has been located away from special-status bird habitats and avoids special-status bird habitat areas to the extent feasible. Because complete avoidance of direct impacts to suitable habitat is not feasible, and the project may result in direct (e.g., project related disturbance) and indirect (e.g., increased predation) impacts to protected birds, this section includes measures that have been developed to ensure that direct and indirect impacts to protected birds during the construction, operation, maintenance, and decommissioning phases of the project are not significant. General avoidance and minimization measures that address all bird species are provided in Section 6.1, and additional measures specific to Yuma clapper rail, southwestern willow flycatcher, and the western yellow-billed cuckoo are provided in Section 6.2. The recommended activity buffers in Tables 6-1 and 6-2 are derived from information presented in the ACS, and draw on the effect categories presented in Table 5-1. These tables provide standard buffer distances for each species group or for individual species, followed by minimum buffer distances for medium and high overall effect category activities identified in Table 5-1.

6.1 General Avoidance and Minimization Measures

1. Prior to the initiation of any ground disturbing or noise generating project activities outside of the fenced areas of the Compressor Station between March 15 and September 30, a qualified biologist shall conduct a preconstruction survey in areas of potentially suitable habitat for nests and nesting bird behavior. The appropriate area to be surveyed and the timing of the survey may vary depending on the activity and species that could be affected.
2. The location of any active nest shall be flagged, mapped, and communicated to the project foreperson. For each identified active nest the biologist will record species, nest location, behavior, site conditions, estimated date of nest establishment, and estimated fledge date.
3. To avoid impacts to nesting MBTA protected and California Fish and Game Code §3503 and 3503.5 species, a buffer of up to 400 feet will be established around all identified active nests, as recommended in Table 6-1. Buffer distances will be dependent on feasibility and practicability, and a biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, and the sensitivity and habituation of the birds, and the dissimilarity of the proposed activity with background activity) to minimize impacts to nesting birds. As discussed in Section 7.2, the biologist will assess the activity effect, ambient activities, site conditions, and bird behavior to determine the efficacy of activity-free areas.
4. To avoid impacts to other special-status bird species, a buffer of up to 500 feet will be established around identified active nests as recommended in Table 6-2. In conformance with PBA General Requirement 3.4-25, riparian areas surrounding the proposed action site and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatcher according to the protocol established by the USFWS. Activities within Southwestern willow flycatcher habitat and the floodplain will be avoided during nesting season (March 15 – September 30). Species-specific AMMs in Section 6.2 include additional restrictions for southwestern willow flycatcher, Yuma clapper rail, and the western yellow-billed cuckoo.
5. Activity-free buffers should be designated around active nesting areas in conformance with PBA General Project Management Measure 3.4-25. Project activities within the activity-free area will be prohibited until the nesting pair and young have vacated the nests. The biologist will use maps, flagging, signage, and tailboard meetings as needed to ensure that project crews are aware of the location and intent of the activity-free area.
6. The biologist will monitor bird behavior in relation to project activities. With approval from DTSC and the Federal Agencies, the activity-free area may be reduced if specific factors or additional protection measures (e.g., visual screening) will ensure the protection of the nest.

TABLE 6-1
Recommended Activity-Free Buffers for MBTA and CFGC Protected Species Groups[a]

Species Group	Representative Species	Standard Buffer (feet)[1]	Medium Impact Minimum Buffer (feet)[1]	High Impact Minimum Buffer (feet)[1]
Waterfowl	American wigeon, Bufflehead , Blue-winged teal, Canada goose, Canvasback, Cinnamon teal, Common goldeneye, Common merganser, Gadwall, Greater white-fronted goose, Green-winged teal, Lesser scaup, Mallard, Northern pintail, Northern shoveler, Redhead, Red-breasted merganser, Red-necked duck, Ring-necked duck, Ross' goose, Ruddy duck, Snow goose, American Coot, common moorhen	100	15	30
Rails and Green Heron	Virginia Rail, Sora, Green Heron	100	15	30
Quails and Relatives	Gambel's quail	100	15	30
Colonial Herons, Egrets, and Cormorants	American white pelican, Black-crowned Night-heron, Clark's grebe, Double-crested Cormorant, Eared grebe, Great blue heron, Great Egret, Green heron, Pied-billed grebe, Snowy egret, Western grebe, White faced ibis	400	25	50
Birds of Prey (Cavity-nesting)	American Kestrel, Barn Owl, Great horned owl, Western Screech-owl, Northern Pygmy-owl	200	25	50
Birds of Prey (Platform nesting)	Turkey Vulture, Red-tailed Hawk, Merlin, Prairie Falcon, Osprey, Sharp-shinned hawk, Cooper's Hawk, Northern harrier	300	50	100
Shorebirds 1	Black-necked Stilt, American Avocet, Common snipe, Dunlin, Greater yellowlegs, Least sandpiper, Lesser yellowlegs, Long-billed dowitcher, western sandpiper, Wilson's snipe	150	15	30
Shorebirds 2	Killdeer	75	15	30
Gulls and Terns	Caspian Tern, Forster's Tern, California Gull, Ring-billed gull	300	50	100
Kingfishers	Belted Kingfisher	100	25	50
Doves	Common ground dove, Inca dove, Mourning Dove	50	10	20
Roadrunners and Band-tailed Pigeon	Greater Roadrunner, Band-tailed Pigeon	100	25	50
Caprimulgidae	Lesser Nighthawk	75	20	30
Hummingbirds	Black-chinned Hummingbird, Anna's Hummingbird, Costa's Hummingbird	50	15	20
Woodpeckers	Downy Woodpecker, Gila woodpecker, Hairy Woodpecker, Northern Flicker, Red-breasted Sapsucker, Red-naped sapsucker, White-headed Woodpecker.	50	10	20

TABLE 6-1
Recommended Activity-Free Buffers for MBTA and CFGC Protected Species Groups[a]

Passerines (cavity and crevice nesters)	Ash-throated Flycatcher, Tree Swallow, Mountain Chickadee, Oak Titmouse, Red-breasted Nuthatch, White-breasted Nuthatch, Pygmy Nuthatch, Brown Creeper, Rock Wren, Canyon Wren, Bewick's Wren, House Wren, Western Bluebird	50	10	15
Passerines and other bridge, culvert, and building nesters	Black Phoebe, Say's Phoebe	75	15	30
Colonial Swallows	Cliff Swallow	50	15	30
Passerines (ground nesters, open habitats)	Horned Lark, Lark Sparrow, Western Meadowlark	75	15	30
Passerines (understory and thicket nesters)	Abert's towhee, Gray Flycatcher, Dusky Flycatcher, Pacific-slope Flycatcher, Gray Vireo, Cassin's Vireo, Western Scrub-jay, Bushtit, Bewick's Wren, Blue-gray Gnatcatcher, Swainson's Thrush, Hermit Thrush, Wrentit, California Thrasher, Orange-crowned Warbler, Yellow-rumped Warbler, Black-throated Gray Warbler, MacGillivray's Warbler, Common Yellowthroat, Wilson's Warbler, Yellow-breasted Chat, Green-tailed Towhee, Spotted Towhee, California Towhee, Rufous-crowned Sparrow, Chipping Sparrow, Brewer's Sparrow, Black-chinned Sparrow, Sage Sparrow, Fox Sparrow, Song Sparrow, Dark-eyed Junco, Blue Grosbeak, Lazuli Bunting, Red-winged Blackbird, American Goldfinch	75	15	30
Passerines (scrub and tree nesters)	Gray Flycatcher, Dusky Flycatcher, Pacific-slope Flycatcher, Western Woodpewee, Cassin's Kingbird, Western Kingbird, Cassin's Vireo, Hutton's Vireo, Warbling Vireo, Steller's Jay, American Crow, Common Raven, Verdin, Bushtit, Blue-gray Gnatcatcher, Cactus Wren, American Robin, Northern Mockingbird, Le Conte's Thrasher, Phainopepla, Yellow-rumped Warbler, Black-throated Gray Warbler, Chipping Sparrow, Black-throated Sparrow, Western Tanager, Black-headed Grosbeak, Brewer's Blackbird, Great-tailed Grackle, Hooded Oriole, Bullock's Oriole, Scott's Oriole, Purple Finch, Cassin's Finch, House Finch, Pine Siskin, Lesser Goldfinch, Lawrence's Goldfinch, American Goldfinch	75	15	30
Passerines (tower nesters)	Western Kingbird, Common Raven	75	15	30
Passerines (marsh nesters)	Common Yellowthroat, Red-winged Blackbird, Great-tailed Grackle	75	15	30
Species not covered under MBTA[2]	Rock Pigeon, Ring-necked Pheasant, Chukar, Eurasian Collared-dove, Spotted Dove, European Starling, House Sparrow, and other nonnative/domestic birds	N/A	N/A	N/A

TABLE 6-1
Recommended Activity-Free Buffers for MBTA and CFGC Protected Species Groups[a]

[a] Standard buffer distances are provided for each species group or for individual species, followed by minimum buffer distances for medium and high overall effect category activities (for use in cases where reduced buffers are deemed appropriate).

[1] ICFI 2013

TABLE 6-2
Recommended Activity-Free Buffers for Special-Status Species[a]

	Standard Buffer (feet)[1]	Medium Impact Minimum Buffer (feet)[1]	High Impact Minimum Buffer (feet)[1]
Southwestern willow flycatcher *Empidonax traillii extimus*	CR	CR	CR
Arizona Bell's vireo *Vireo bellii arizonae*	500	CR	CR
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	150	CR	CR
California black rail *Laterallus jamaicensis coturniculus*	300	CR	CR
Yuma clapper rail *Rallus longirostris yumanensis*	300[3]	CR	CR
Western least bittern *Ixobrychus exilis hesperis*	100	15	30
Crissal thrasher *Toxostoma crissale*	75	15	30
Sonoran yellow warbler *Dendroica petechia sonorana*	75	15	30
Yellow-breasted chat *Icteria virens*	75	15	30

[a] Standard buffer distances are provided for each species group or for individual species, followed by minimum buffer distances for medium and high overall effect category activities (for use in cases where reduced buffers are deemed appropriate).

CR – Consultation Required

[1] ICFI 2013
[2] ICFI 2012
[3] USFWS 2008

7. All PG&E employees and the contractors involved with the project shall be required to attend a worker education program prior to working on-site and outside of fenced areas (e.g., the compressor station). This program shall include information about protected bird species (and where they may occur in the project area) and the AMMs described in this Plan to ensure impacts on special-status birds are not significant. New employees shall receive training prior to working onsite.
8. Project activity footprints and access routes shall be confined to pre-determined areas. No vehicle travel off of established roads or approved access routes shall be permitted.
9. Any vertical pipes or small cavities on equipment or materials that may trap birds shall be capped or otherwise covered when work activity is not occurring at site.
10. Trash and food items shall be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as coyotes and feral animals.
11. Night-time project site lights outside of the compressor station shall be angled toward the ground and reduced in intensity to levels compatible with safety concerns, and limited in duration of usage.
12. Upon project completion, all unused material and equipment shall be removed from the site. This condition does not apply to fenced sites.

13. Intentional harassment, killing or collection of any wildlife (including birds) at construction sites and surrounding areas shall be prohibited. Wildlife shall not be handled except in the case of injury or mortality, as described in AMM 15.
14. PG&E shall designate a field contact representative (FCR) who will be responsible for overseeing compliance with the AMMs during major ground disturbing (including vegetation removal) or loud noise generating (above ambient levels) project activities outside of the compressor station or fenced areas. The FCR must be onsite during all construction activities. The FCR shall have authority to halt activities that are in violation of the AMMs and/or pose a danger to protected bird species. The FCR will have a copy of the AMMs when work is being conducted on site. The FCR may be a project manager, PG&E representative, or a biologist.
15. Any dead or injured special status bird species found in the project area shall be reported to the PG&E project biologist, USFWS, CDFW, BLM and, as appropriate, AGFD. Upon locating an individual dead or injured special-status bird species, PG&E shall make initial notification to the BLM and USFWS within three working days of its finding. The notification must be made by telephone and writing to the Lake Havasu BLM Office (2610 Sweetwater Avenue, Lake Havasu City, Arizona 86406, 928-505-1200) and the US Fish and Wildlife Service, Ecological Services Field Office (2321 West Royal Palm Road, Suite 103, Phoenix, AZ 85021, 602-242-0210). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities shall be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the USFWS, CDFW, BLM and, as appropriate, AGFD, shall be contacted for final disposition of the animal.

6.2 Species-Specific Mitigation Measures

The following mitigation measures from the PBA pertain to specific special-status species:

6.2.1 Southwestern Willow Flycatcher

1. The intent of PG&E will be to minimize the net increase of disturbed habitat in the area of potential effect (APE).
2. Riparian areas surrounding the proposed action site and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatcher according to the protocol established by the USFWS. These surveys shall be completed every two years by a biologist permitted by the USFWS to carry out flycatcher surveys until the action has been completed and all facilities have been removed. The monitoring frequency reduced from annual surveys to biennial surveys in agreement with the USFWS and BLM in March 2010. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office on a biennial basis.
3. Construction and development activities that use heavy equipment should occur between October 1 and March 15. The use of any heavy equipment in or near southwestern willow flycatcher habitat after March 15 will be required to be reassessed and additional conservation measures considered.
4. To the extent feasible, future project activities within the sensitive areas identified on Figure 2 (i.e., potential southwestern willow flycatcher habitat, wetlands, 100-year floodplain, and a 60-foot buffer from the Colorado River) should be avoided. Further, if greater than 8.8 acres of floodplain habitat is lost or manipulated, specific project consultation with the USFWS will be required and mitigation may be required. Habitat loss includes the removal of trees and perennial shrubs, but does not include the trimming of vegetation.

6.2.2 Western Yellow-billed Cuckoo

1. The intent of PG&E will be to avoid investigative or response actions in or near riparian habitat, if at all possible.
2. Riparian areas surrounding the designated work areas and subject to influence of operations and maintenance activities shall be surveyed by a USFWS permitted biologist for western yellow-billed cuckoo according to the protocol established by the USFWS. After the initial 2 years of surveys, ongoing surveys shall

be performed according to USFWS's recommendations until the action has been completed and all facilities have been removed. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office and to the USFWS's Phoenix AESO each time they are performed.

3. Construction and development activities that use heavy equipment should be completed prior to May 15. The use of any heavy equipment in or near western yellow-billed cuckoo habitat after May 15 will be required to be reassessed and additional conservation measures may be considered. Preferably such activities would occur from September 30 to May 15.
4. To the extent feasible, future project activities within the sensitive areas identified on Figure 2 (i.e., potential yellow-billed cuckoo habitat, wetlands, 100-year floodplain, and a 60-foot buffer from the Colorado River), should be avoided. Further, if greater than 8.8 acres of floodplain habitat is lost or manipulated, specific project consultation with USFWS will be required and possible mitigation may be required. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.
5. A biologist should be assigned to field teams for remediation activities within western yellow-billed cuckoo habitat during the period of May 15 through September 30.

6.2.3 Yuma Clapper Rail

1. The intent of PG&E will be to avoid investigative or response actions in or near marshes or wetlands, if at all possible.
2. If future actions are proposed to occur within 300 feet of wetlands or marshes (specifically the eastern boundary of the APE on the Arizona floodplain), project specific review will occur to ensure compliance with the PBA and associated USFWS consultation.
3. Specific to the Arizona portion of the APE, all construction and development activities should be completed prior to March 15. Preferably, such activities would occur from October 1 to March 15.
4. Where feasible, actions should not be proposed within the tamarisk habitat under the Interstate 40 and BNSF railway bridges that occur on the HNWR unless otherwise agreed to by the USFWS.
5. No more than 8.8 acres of floodplain habitat can be impacted without triggering additional ESA consultation requirements.

SECTION 7

Monitoring and Reporting

Post-construction monitoring will document any avian fatalities that might occur and will identify factors that might warrant additional avoidance and minimization measures or improvement or elimination of avoidance and minimization measures found to be ineffective. Implementation of the proposed monitoring will help USFWS, BLM, and PG&E to evaluate the effectiveness of the avoidance and minimization measures.

If a dead or injured listed state and federal species is found, PG&E will notify the BLM,USFWS, CDFW, and AGFD, as noted in General AMM 15.

Adaptive Management

8.1 Accounting for Policy Changes

With the possibility of future implementation of new policies it is understood that commitments made in this Plan may require adaptation relative to potential forthcoming guidance. PG&E will work collaboratively with BLM and USFWS to apply necessary policy changes to this Plan.

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Figures

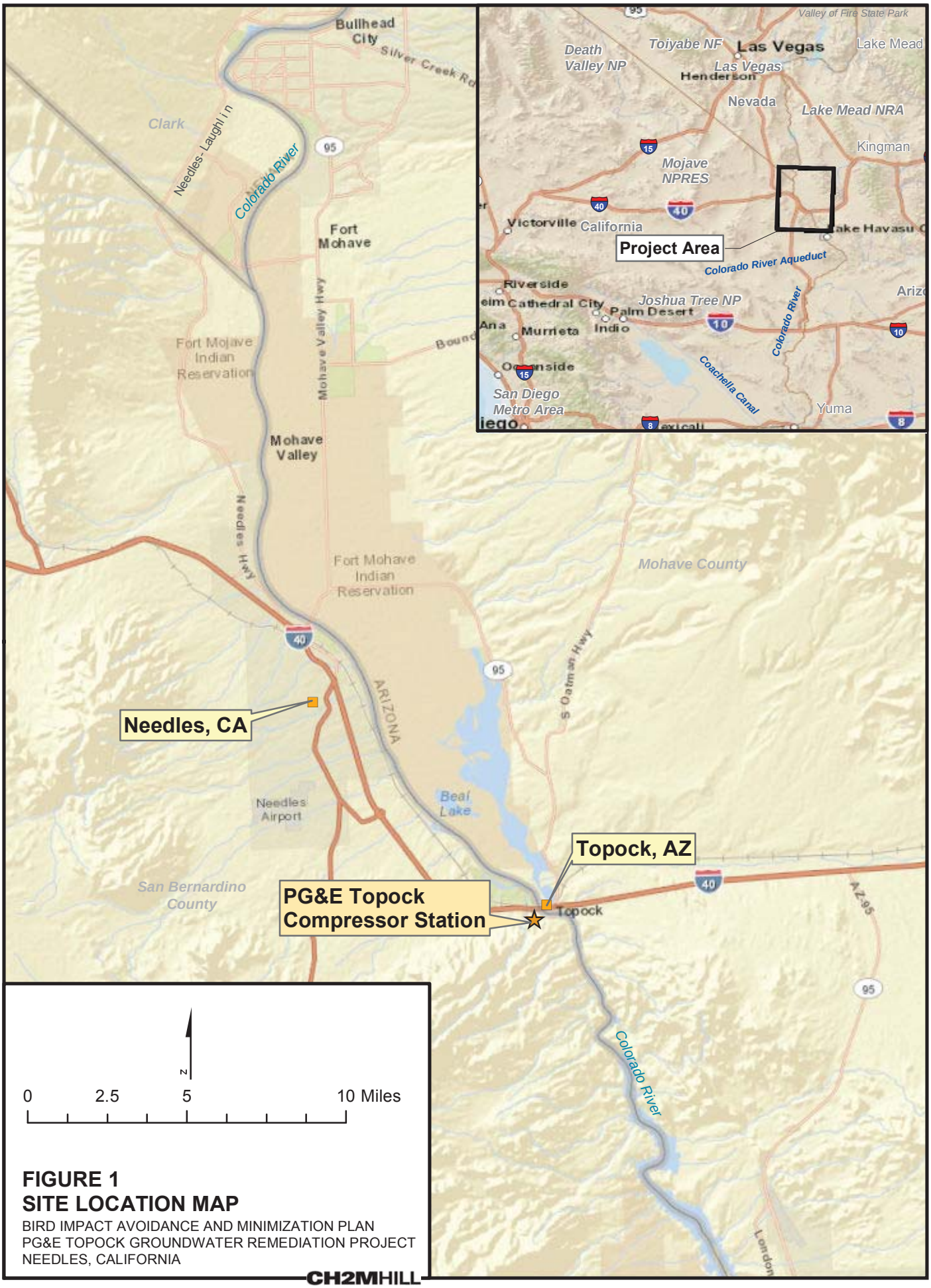

FIGURE 1
SITE LOCATION MAP

BIRD IMPACT AVOIDANCE AND MINIMIZATION PLAN
PG&E TOPOCK GROUNDWATER REMEDIATION PROJECT
NEEDLES, CALIFORNIA

CH2MHILL

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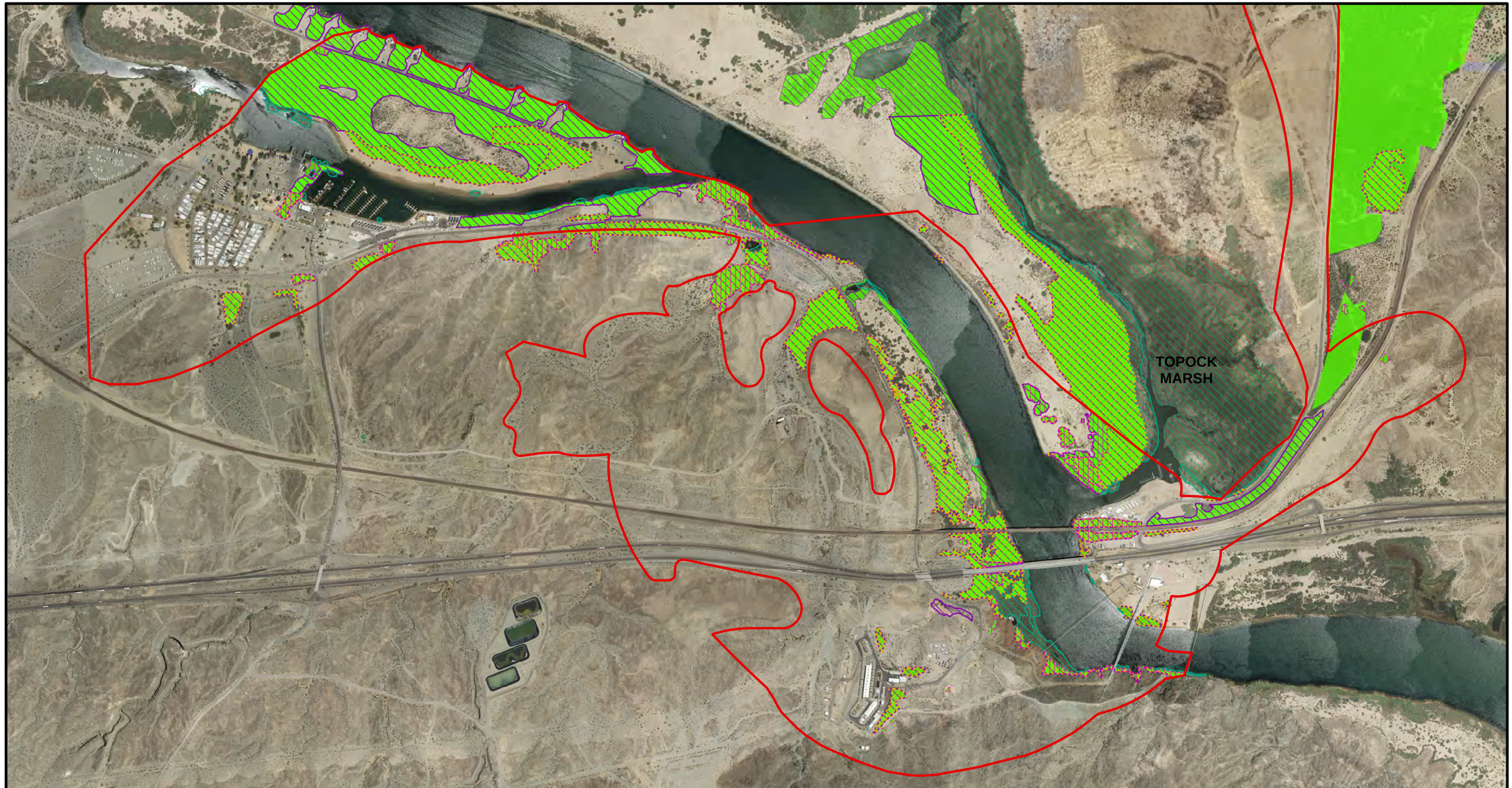

LEGEND

EIR Project Area

Habitat Areas

- Yuma clapper rail, Western least bittern, California black rail
- Western yellow-billed cuckoo (non-nesting), Yellow-breasted chat
- Southwestern willow flycatcher, Arizona Bell's vireo (non-nesting)
- Sonoran yellow warbler
- Crissal thrasher

N

0 500 1,000 2,000 Feet

FIGURE 2
HABITATS OF SPECIAL-STATUS AVIAN SPECIES
APRIL 2014
PG&E Topock Groundwater Remediation Project
Needles, California

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Appendix A
Migratory Bird Treaty Act Protected Bird Species

APPENDIX A

Migratory Bird Treaty Act Protected Species Anticipated To Occur Within The Project Area

Order (Group)	Species	Nesting Season
Anseriformes (waterfowl)	American wigeon	March 15 - September 30
	Bufflehead	
	Blue-winged teal	
	Canada goose	
	Canvasback	
	Cinnamon teal	
	Common goldeneye	
	Common merganser	
	Gadwall	
	Greater white-fronted goose	
	Green-winged teal	
	Lesser scaup	
	Mallard	
	Northern pintail	
	Northern shoveler	
	Redhead	
	Red-breasted merganser	
	Red-necked duck	
	Ring-necked duck	
	Ross' goose	
	Ruddy duck	
	Snow goose	
Apodiformes (swifts and hummingbirds)	Anna's hummingbird	March 15 - September 30
	Black-chinned hummingbird	
	Costa's hummingbird	
Caprimulgiformes (nightjars and allies)	Lesser nighthawk	March 15 - September 30
Charadriiformes (gulls, plovers and allies)	American avocet	March 15 - September 30
	Black-necked stilt	
	California gull	
	Caspian tern	
	Common snipe	
	Dunlin	
	Greater yellowlegs	
	Killdeer	
	Least sandpiper	
	Lesser yellowlegs	
	Long-billed dowitcher	
	Ring-billed gull	
	Western sandpiper	
	Wilson's snipe	
Columbiformes (doves and pigeons)	Common ground dove	March 15 - September 30

APPENDIX A

Migratory Bird Treaty Act Protected Species Anticipated To Occur Within The Project Area

Order (Group)	Species	Nesting Season
	Inca dove	
	Mourning dove	
Coraciiformes (kingfishers)	Belted kingfisher	March 15 - September 30
Cuculiformes (cuckoos and allies)	Greater roadrunner	March 15 - September 30
Falconiformes (falcons)	American kestrel	March 15 - September 30
	Merlin	
	Prairie falcon	
Accipitriformes (hawks, eagles and allies)	Cooper's hawk	March 15 - September 30
	Northern harrier	April 1 - August 15
	Osprey	April 1 - August 31
	Red-tailed hawk	April 1 - August 15
	Sharp-shinned hawk	April 1 - July 15
	Turkey vulture	May 1 - August 15
Galliformes (fowl)	Gambel's quail	March 15 - September 30
Gruiformes (cranes and allies)	American coot	March 15 - September 30
	Common gallinule	
	Common moorhen	
	Green heron	
	Sora	
	Virginia rail	
Passeriformes (perching birds)	Abert's towhee	March 15 - September 30
	American gold finch	
	American pipit	
	American robin	
	Ash-throated flycatcher	
	Bell's vireo	
	Bewick's wren	
	Black pheobe	
	Black-tailed gnatcatcher	
	Black-throated sparrow	
	Blue grosbeak	
	Blue-gray gnatcatcher	
	Brewer's blackbird	
	Brown-headed cowbird	
	Bushtit	
	Canyon wren	
	Chipping sparrow	
	Cliff swallow	
	Common raven	
	Common yellowthroat	
	Dark-eyed junco	

APPENDIX A

Migratory Bird Treaty Act Protected Species Anticipated To Occur Within The Project Area

Order (Group)	Species	Nesting Season
	Great-tailed grackle	
	House finch	
	House wren	
	Lazuli bunting	
	Lesser goldfinch	
	Lincoln's sparrow	
	Loggerhead shrike	
	Lucy's warbler	
	Marsh wren	
	Northern mockingbird	
	Northern rough-winged swallow	
	Orange-crowned warbler	
	Phainopepla	
	Purple finch	
	Red-winged blackbird	
	Rock wren	
	Rose breasted grosbeak	
	Ruby-crowned kinglet	
	Sage sparrow	
	Savannah sparrow	
	Say's pheobe	
	Song sparrow	
	Spotted towhee	
	Tree swallow	
	Verdin	
	Vermilion flycatcher	
	Warbling vireo	
	Western kingbird	
	Western meadowlark	
	White-crowned sparrow	
	Wilson's warbler	
	Yellow-headed blackbird	
	Yellow-rumped warbler	
Pelecaniformes (pelicans and allies)	American white pelican	March 15 - September 30
	Black-crowned night-heron	
	Double-crested cormorant	
	Great blue heron	
	Green heron	
	Great egret	
	Western grebe	
	White faced ibis	

APPENDIX A

Migratory Bird Treaty Act Protected Species Anticipated To Occur Within The Project Area

Order (Group)	Species	Nesting Season
	Snowy egret	
Piciformes (woodpeckers and allies)	Gila woodpecker	March 15 - September 30
	Ladder-backed woodpecker	
	Northern flicker	
	Red-naped sapsucker	
Podicipediformes (grebes)	Clark's grebe	March 15 - September 30
	Eared grebe	
	Pied-billed grebe	
	Western grebe	
Strigiformes (owls)	Great horned owl	March 15 - September 30

Appendix T
Geoarchaeological Assessment for the Topock Remediation Project

This report contains sensitive cultural resources information and is not included in this C/RAWP.

Appendix U
Programmatic Biological Assessment
(On CD-ROM Only)

Final

Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Final Groundwater Remedy

Prepared for

Pacific Gas and Electric Company

April 2014

CH2MHILL

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Acronyms and Abbreviations

2007 PBA	*Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions*
μg/L	micrograms per liter
amsl	mean sea level
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirement
ATV	all-terrain vehicle
BIAMP	Bird Impact Avoidance and Mitigation Plan
BLM	United States Bureau of Land Management
BNSF	Burlington Northern-Santa Fe Railroad
CACA	Corrective Action Consent Agreement
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHHSL	California Human Health Screening Level
CIP	Clean-In-Place
CMP	Compliance Monitoring Program
CNPS	California Native Plant Society
Cr(III)	trivalent chromium
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
CRPR	California Rare Plant Ranks
CSM	conceptual site model
CTUC	California Trail Users Coalition
DOI	United States Department of Interior
DTSC	Department of Toxic Substances Control
ER	East Ravine
ESA	Endangered Species Act
FCR	field contact representative
GMP	Groundwater Monitoring Program
HNWR	Havasu National Wildlife Refuge
IM	Interim Measure

IMPM	Interim Measures Performance Monitoring
IRL	Inner Recirculation Loop
IRZ	In situ Reactive Zone
ISPT	in situ pilot study
NHD	National Hydrologic Dataset
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance
ORV	off-road vehicle
PBA	programmatic biological assessment
PG&E	Pacific Gas and Electric Company
PMP	performance monitoring program
ppm	parts per million
RAO	remedial action objective
RB	River Bank
RCM/ PCMP	Corrective Measure/Remedial Action Monitoring Program
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RI	CERCLA Remedial Investigation
ROD	Record of Decision
ROW	right-of-way
SAP	Sampling and Analysis Plan
SCADA	Supervisory Control and Data Acquisition
SMP	Soil Management Plan
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TCLP	toxicity characteristic leaching procedure
TSC	Topock Compressor Station
TWB	Transwestern Bench
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WET	Waste Extraction Test

SECTION 1.0

Introduction

Pacific Gas and Electric Company (PG&E) is implementing the selected groundwater remedy for chromium in groundwater at the PG&E Topock Compressor Station (TCS, or the Compressor Station) in San Bernardino County, California. The TCS site is located about 15 miles southeast of Needles (Figure 1). The existing chromium contamination in groundwater is largely attributable to historical wastewater discharge from TCS operations to Bat Cave Wash, designated as Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1, and within the East Ravine, designated as AOC 10.

Remedial activities at the TCS site are being performed in conformance with the requirements of the Resource Conservation and Recovery Act (RCRA) Corrective Action pursuant to a Corrective Action Consent Agreement (CACA) entered into by PG&E and the California Department of Toxic Substances Control (DTSC) in 1996, as well as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) pursuant to the Remedial Design/Remedial Action Consent Decree between the United States and PG&E, approved by the United States District Court for the Central District of California in November 2013. Soils investigation work is proceeding under the CACA and pursuant to the Administrative Consent Agreement entered into between PG&E and the federal agencies (U.S. Department of the Interior [DOI], Bureaus of Land Management [BLM] and Reclamation [USBR] and the U.S. Fish and Wildlife Service [USFWS]) (collectively the "Federal Agencies") in 2005.

In December 2010, the DOI issued a Record of Decision (ROD) selecting the groundwater remedy for the site, and in January 2011, DTSC also adopted the Final Remedy for the groundwater contamination. The Consent Decree requires the planning, design, construction, operation and maintenance (O&M), post-remediation monitoring, decommissioning, and restoration of the groundwater remedy selected in the ROD.

This Final Groundwater Remedy Programmatic Biological Assessment (PBA) has been prepared to address potential effects on federal listed species resulting from present or planned investigative and remedial activities related to implementation of the final groundwater remedy to address contamination resulting from historical operations at the TCS.

PG&E is requesting federal Endangered Species Act (ESA) coverage for these activities through the end of the project, which is currently estimated for up to 50 years.

The Action Area for this consultation is shown in Figure 2 and described in Section 3.1, and has been refined based on the final remedy design process. The Action Area term is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 Code of Federal Regulations [CFR] 402.02)." Activities undertaken pursuant to the federally approved investigative and remedial program, including those that require subsequent discretionary federal review and approval, have been and will continue to be evaluated for potential project effects to species that are listed under the federal ESA. There are several species protected by the California Endangered Species Act (CESA) that could potentially occur within the Action Area; however, implementation of the protective measures that are described in this PBA are expected to reduce the risk of take for those species and therefore eliminate the need for incidental take coverage under the California Fish and Game Code Section 2081(b).

BLM is the designated federal representative for this PBA consultation. As of December 2011, BLM has designated PG&E as the non-federal representative for the Topock Remediation Project. This designation pertains to informal consultations pursuant to Section 7 of the ESA (DOI, 2011).

This Final Groundwater Remedy PBA serves as supporting documentation for the BLM Lake Havasu Field Office as the lead federal agency, under the provisions of the ESA of 1973, as amended, and implementing

regulations found at 50 CFR Part 402 for the evaluation of project effects on listed species and resulting determinations. Because the western yellow-billed cuckoo was recently proposed for listing, this document also serves as supporting documentation to conference on that species consistent with 50 CFR 402.10.

1.1 Consultation to Date

In January 2000, PG&E was issued a non-jeopardy biological opinion for ongoing maintenance activities on the PG&E gas pipeline system in the California desert on lands that were managed by BLM and covered the pipeline's effects on the desert tortoise and its critical habitat. However, that biological opinion specifically addressed maintenance of the gas pipeline and did not apply to the past, present, or planned investigative and remedial activities associated with the Action Area.

In September 2004, the BLM Lake Havasu Office initiated an informal consultation with the USFWS Ventura Office on behalf of PG&E regarding potential impacts to the Mojave (now Agassiz's) desert tortoise and southwestern willow flycatcher related to a time-critical removal action/interim measure within the Action Area. The anticipated biological impacts were addressed in the *Final Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California* (CH2M HILL, 2004a). Based on the proposed activities, which included a proposed groundwater treatment system, a "no effect" determination was considered appropriate for that project. To date, Interim Measure (IM) No. 3 has been working under this determination and no effect on (or take of) listed species has occurred.

Based on prior discussions, PG&E received a letter from USFWS Havasu National Wildlife Refuge (HNWR) staff in January 2005 requesting that protocol surveys for the Yuma clapper rail not be performed because HNWR staff were interested in avoiding duplication of existing USFWS survey efforts and were concerned with potential added stress to the Yuma clapper rail (USFWS, 2005a).

In March 2005, a work plan was produced and submitted to BLM, USFWS (HNWR and Phoenix, Arizona, USFWS offices), and California Department of Fish and Game (CDFG) representatives that described the proposed surveys within suitable habitat for the southwestern willow flycatcher, Mojave desert tortoise, and Yuma clapper rail within the Action Area (CH2M HILL, 2005a).

In addition, a biological assessment and Section 7 ESA informal consultation was completed in December 2005 related to construction of the PE-1 groundwater pipeline and implementation of the floodplain in situ pilot study, both located on the floodplain of the Colorado River. The applicable *Biological Assessment for the Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (CH2M HILL, 2005b) was completed in November 2005. The subsequent consultation resulted in a USFWS determination of "may affect, not likely to adversely affect" for southwestern willow flycatcher and a "no effect" finding for all other federal listed species potentially occurring within the Action Area. Concurrence was provided via BLM authorization to proceed on December 9, 2005 (BLM, 2005a).

In 2006, informal consultation was conducted for the *Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Topock Compressor Station, Technical Memorandum, Rev. 3* (CH2M HILL, 2006a). USFWS concurred with a determination of "may affect, but not likely to adversely affect" on April 28, 2006. These access and sampling procedures are currently being implemented and will be carried forward to the project conclusion.

As part of the interim measures on federal lands, Action Memoranda were issued by the Federal Agencies pursuant to Section 104 of the CERCLA. These Action Memoranda include general mitigation measures (outlined in Section 3.4) to manage biological resources. In addition, several measures were subsequently specified or clarified, specifically, access routes and dates, to avoid impacts to nesting migratory birds and southwestern willow flycatcher and their habitats.

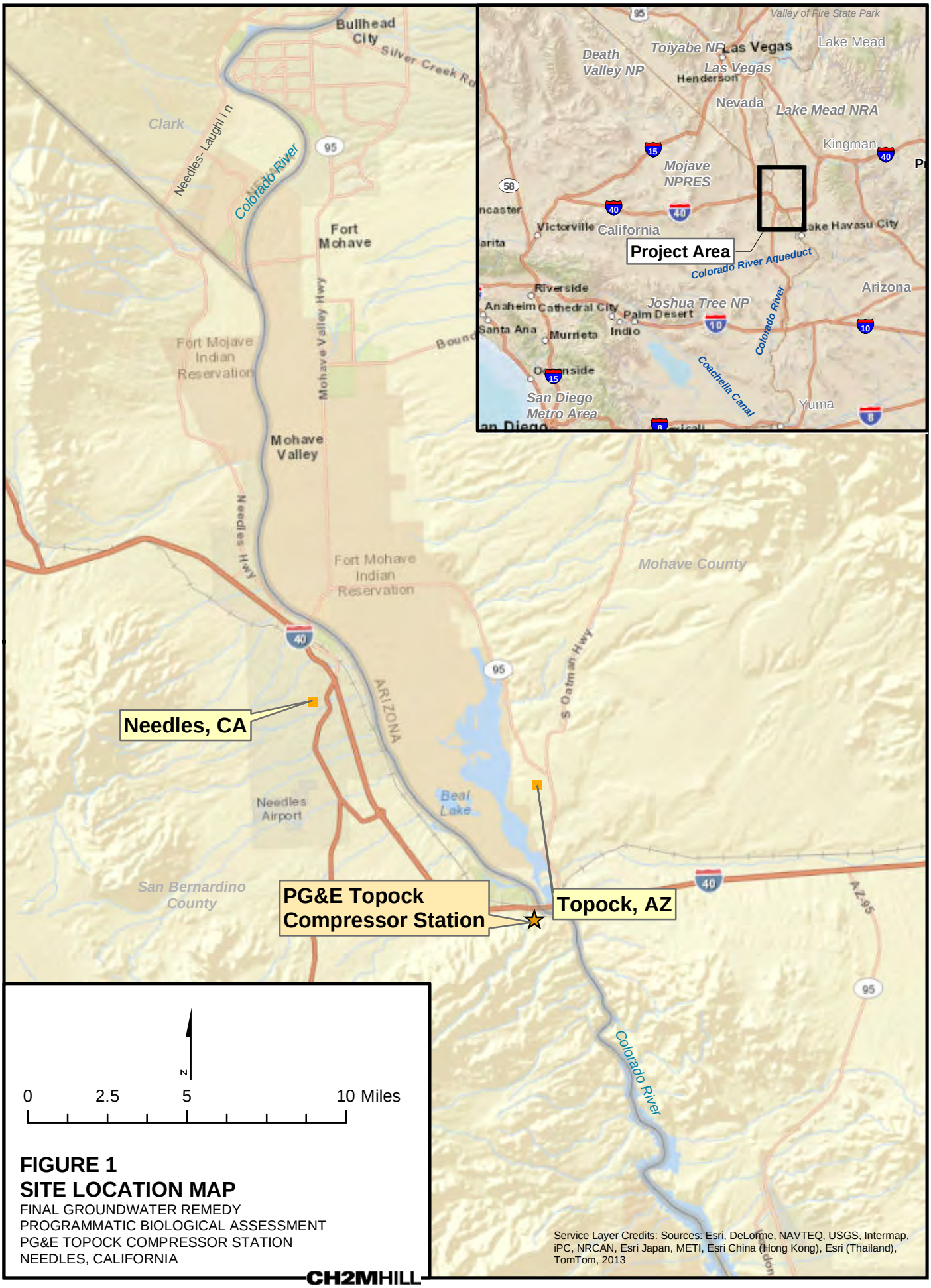

FIGURE 1
SITE LOCATION MAP
FINAL GROUNDWATER REMEDY
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

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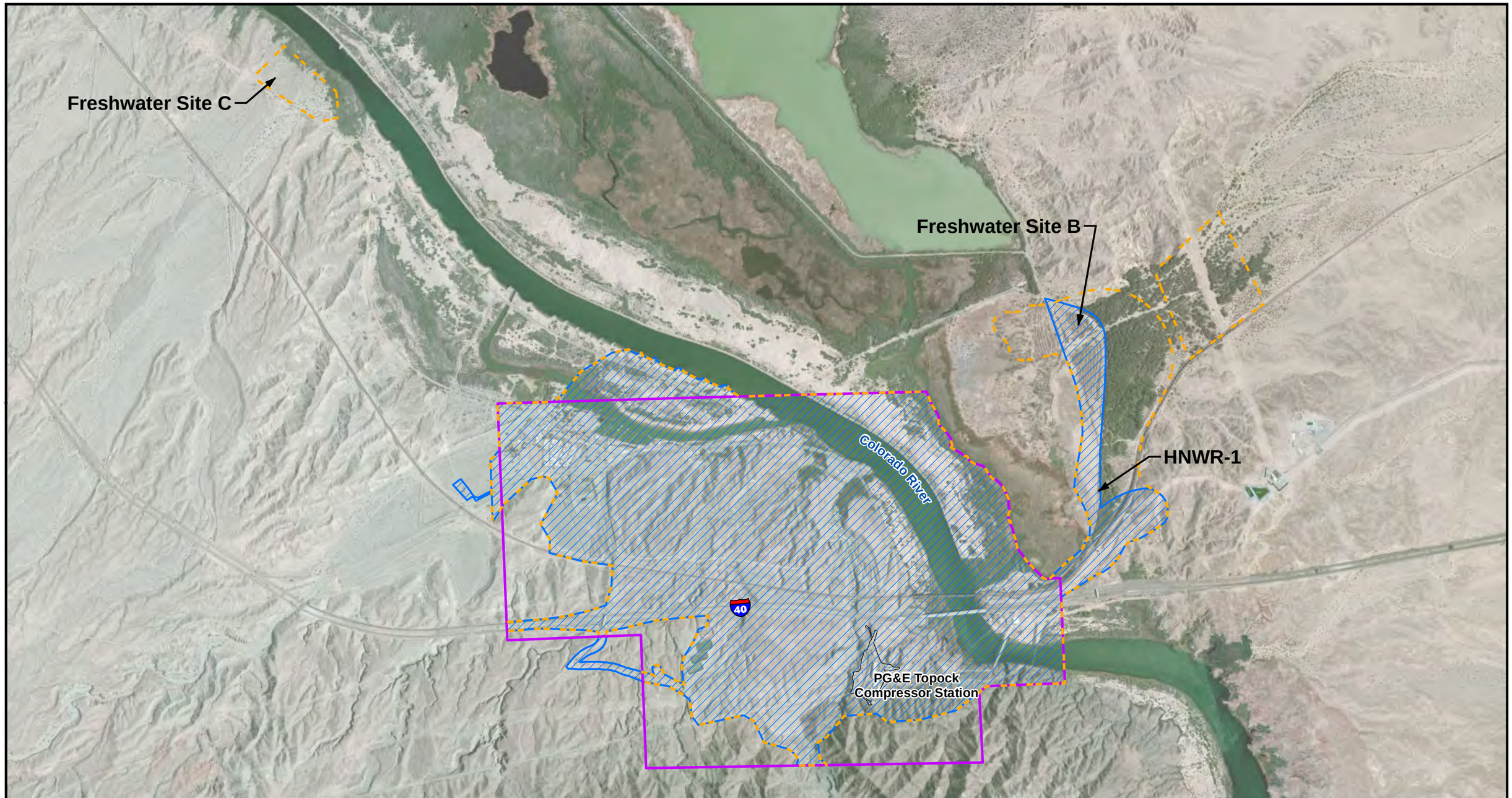

LEGEND

- 2007 PBA Area of Potential Effect (APE)
- 2012 PBA Re-Initiation Action Area
- PBA Update Action Area

N

0 1,000 2,000 4,000 Feet

FIGURE 2
ACTION AREA
FINAL GROUNDWATER REMEDY
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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In 2007, informal consultation with USFWS pursuant to Section 7 of the ESA was conducted in support of the *Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (2007 PBA; CH2M HILL, 2007a). This document addressed the potential effects on species that were protected under the ESA that could result from remedial and investigative activities at the TCS. USFWS concurred with the determinations provided in the 2007 PBA, as documented in a letter dated February 8, 2007 (USFWS, 2007a). In that letter, USFWS concurred with the determinations of "may affect, but not likely to adversely affect" for the southwestern willow flycatcher, Mojave desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub.

In 2010, a Programmatic Agreement was established between PG&E, BLM, and the California State Historic Preservation Officer pertaining to Native American tribes' concerns regarding historic and cultural properties. Based on that agreement, USFWS was notified of the need for additional surveys in three areas located outside of the 2007 PBA Action Area to determine the status of federal listed species in these areas. These additional survey areas were the expanded Action Areas to the north and west in California and the eastern portion of the Action Area in Arizona, as shown in Figure 2. The expanded portions of the Action Area in California were surveyed in 2010 (CH2M HILL, 2010a), while the expanded Action Area in Arizona was surveyed in 2013 (WSA, 2013). These surveys were completed in accordance with approved survey protocols, and a brief summary of the survey results is included in this section.

The project area has been surveyed annually according to approved survey protocols for the presence of southwestern willow flycatcher between 2005 and 2010 (GANDA, 2005a, 2006a, 2007a, 2008a, 2009a, 2010). Similarly, the project area was surveyed according to approved survey protocols for Mojave desert tortoise annually between 2005 and 2009 (GANDA, 2005b, 2006b, 2007b, 2008b, 2009b). As discussed below, the survey for Mojave desert tortoise in 2010 was limited to three areas in California where the Action Area had been expanded (CH2M HILL, 2010a).

In February 2010, PG&E submitted a letter to USFWS proposing modifications to the frequency of performed protocol surveys for the southwestern willow flycatcher and Mojave desert tortoise (PG&E, 2010). Based on the 2005–2009 protocol survey results, PG&E proposed a reduction of southwestern willow flycatcher protocol survey frequency from annual to biennial. The request was based on the negative findings from 5 years of completed surveys in which no nesting pairs and only transient southwestern willow flycatchers have been observed within the Action Area. PG&E also proposed a cessation of Mojave desert tortoise protocol surveys. The request was based on the absence of tortoise sightings in 5 years of annual protocol surveys conducted between 2005 and 2009. In March 2010, PG&E received concurrence from USFWS (USFWS, 2010a) approving the proposed frequency modifications to the southwestern willow flycatcher and Mojave desert tortoise protocol surveys. The revised frequency for protocol surveys for southwestern willow flycatcher were implemented in 2010, so that the next survey was completed in 2012 (GANDA, 2012).

On November 3, 2010, BLM requested a partial re-initiation of consultation regarding the 2007 PBA for an additional 15 monitoring well clusters. The additional wells increased the number of upland well clusters from 15 to 30; however, it did not increase the area of upland habitat disturbance from 3.0 acres, as originally provided for in the 2007 PBA. On November 16, 2010, the USFWS issued a letter to the BLM stating that the revised project did not change its concurrence of "may affect, but not likely to adversely affect" for species covered under the 2007 PBA (USFWS, 2010a).

In 2011, USFWS requested clapper rail surveys in portions of the Action Area that had not been previously surveyed by USFWS as part of its ongoing annual survey and monitoring program. PG&E proposed a modified survey protocol for the Yuma clapper rail to identify suitable habitat of the Action Area along with other project modifications, which the USFWS accepted. The protocol is based on recommendations provided in the *Survey Guidelines to Determine Presence/Absence of the Light-footed Clapper Rail in Southern California; Recommendations of the Clapper Rail Study Team* (Konecny et al., 2009).

In December 2012, BLM requested re-initiation of consultation regarding the 2007 PBA for a proposed 5-year extension of the 2007 PBA, and a revised Action Area (Figure 2) that included an additional well to

the north of HNWR-1 as part of the Final Groundwater Remedy freshwater source (BLM, 2012). It also requested an additional 5.0 acres of allowable upland habitat disturbance to accommodate soil sampling activities. On December 27, 2012, USFWS provided concurrence and approval of the 5-year extension of the 2007 PBA (USFWS, 2012). On January 9, 2013, USFWS issued a correction letter to its December 27, 2012, letter stating additional 5.0 acres of upland habitat disturbance would bring the new total acreage of disturbance to 8.0 acres, rather than 6.4 acres (USFWS, 2013a).

On December 3, 2013, a conference call was held to kick-off the final PBA for the Topock Groundwater Remedy. The call included participants from BLM, USFWS, and DOI, as well as PG&E and its consultant, CH2M HILL. Because the soils investigation is proceeding under the federal Consent Agreement and the groundwater investigation and remediation is proceeding under the federal Consent Decree, topics of discussion included an explanation of how the current PBA would focus on the final groundwater remedy, while ongoing soil investigations would continue until 2017 under the re-initiated 2007 PBA. If remedial/corrective action is determined to be needed for soil, a Final Soils Remedy would be selected, and a new consultation would be initiated. It was noted that the current PBA would follow the organization of the 2007 PBA with completed work summarized and details provided for ongoing or planned activities. An agreement was sought and received to use the term Action Area in the current PBA as long as it was clearly defined. It was also noted that the western yellow-billed cuckoo would be added as a “proposed for listing” species for conferencing consistent with 50 CFR 402.10 and to seek coverage under the Final Groundwater Remedy PBA, should that species’ listing occur before the project’s completion. Lastly, a schedule for submittal and review was discussed.

1.2 Content and Scope

The scope of this Final Groundwater Remedy PBA includes coverage for present and planned activities that are associated with the implementation of the Final Groundwater Remedy. It also addresses past and present activities approved at the site, including those that will be conducted for the soils investigation, consistent with the re-initiated 2007 PBA. The federal ESA coverage of the activities described in this PBA is being requested through the end of the project, currently estimated to be up to 50 years.

The content of a biological assessment is at the discretion of the federal agency and depends on the nature of the action for which consultation is requested. The term “action” refers to discretionary activities or programs that are authorized, funded, or carried out, in whole or in part, by federal agencies. In coordination with PG&E, BLM (as the lead Federal Agency for DOI) has initiated consultation with USFWS to comply with agency responsibilities to consider the effects of activities to federal ESA listed species within the Action Area.

This consultation does not preclude future consultations or additional management restrictions by the BLM or the USFWS beyond the measures that are presented in this document, nor does it authorize final ESA coverage on current or future response or corrective actions. The primary purpose of this Final Groundwater Remedy PBA is to put into context the status and management of federal ESA listed species within or near the Action Area and to better evaluate the effects of current and future proposed groundwater investigation and remediation activities on those species and habitats.

Under the scope of this Final Groundwater Remedy PBA, ESA consultation will be applied to species and habitat located within or near the Action Area. If future activities are proposed to occur outside the Action Area, it will be necessary to reinitiate consultation with USFWS.

“Action Area” refers to all lands that may be directly or indirectly affected by the action and not merely the immediate area involved in the action. Present and planned response activities in the Action Area will take place on BLM- and USFWS-managed lands, as well as non-federal lands.

“Species” and “habitat description” refers to all potentially affected listed species, or species proposed to be listed, and the habitat to be considered. Several federal listed species that are known to occur, or may occur within or near the Action Area have been identified.

“Effects of the action” include direct and indirect effects of an action on the species or associated habitats, together with the effects of other activities that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the Action Area; the anticipated impacts of all proposed federal projects in the Action Area that have already undergone Section 7 consultation; and the impact of state or private actions that are contemporaneous with the consultation in process. For purposes of this Final Groundwater Remedy PBA, these activities are assessed for their potential effect on species listed under the ESA.

“Indirect effects” are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. For example, an action that results in subsequent changes to land use patterns would be considered an indirect effect.

“Cumulative effects” are those effects of future state or private activities that are reasonably certain to occur within the Action Area of the federal action subject to consultation.

“Direct effects” include the direct or immediate effect of the action on the species or its habitat.

“Relevant reports” include any available information on the action, Action Area, affected listed species, or critical habitat. The references section of this document includes a list of works cited—specific references to relevant reports are provided throughout this Final Groundwater Remedy PBA.

SECTION 2.0

Background

In December 1951, the TCS began operations to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California. The compressor station is an actively functioning facility and is anticipated to remain active into the foreseeable future. The operations at the compressor station consist of six major activities: water conditioning, compressing natural gas, cooling compressed natural gas and compressor lubricating oil, wastewater treatment (including cooling water), facility and equipment maintenance, and miscellaneous operations.

From 1951 to 1985, chromium-based products were added to the cooling water to inhibit corrosion, minimize scale, and control biological growth. From 1951 to 1964, untreated waste cooling water (i.e., "blowdown") that contained chromium was discharged to Bat Cave Wash. Beginning in 1964, PG&E began to treat the facility's wastewater. About this time, PG&E also constructed a percolation bed within Bat Cave Wash by creating soil berms to impound the discharged wastewater and allow it to percolate into the ground and/or evaporate. Beginning in May 1970, the majority of treated wastewater was discharged to an injection well located on PG&E property. In 1973, PG&E discontinued use of this injection well, and wastewater was discharged exclusively to a set of four, single-lined evaporation ponds, located about 1,600 feet west of the compressor station.

PG&E replaced the chromium-based cooling water treatment products with phosphate-based products in 1985, at which time PG&E discontinued operation of the wastewater treatment system. Use of the four, single-lined evaporation ponds continued from 1985 to 1989. In 1989, the single-lined ponds were replaced with four new, Class II (double-lined) ponds on BLM-managed lands. The wastewater treatment system and the single-lined ponds were physically removed and "clean-closed" between 1988 and 1993. The four Class II double-lined ponds are still in use and are operated under the jurisdiction of the Colorado River Basin Regional Water Quality Control Board.

In 1996, PG&E entered into the CACA with DTSC to govern the investigation and remediation of the TCS site under California state law. DTSC is the California state lead agency charged with directing investigative activities in the affected area in accordance with the RCRA. In July 2005, PG&E and the Federal Agencies entered into a Consent Agreement that outlined the process by which PG&E would comply with CERCLA requirements during the investigation and remediation of the affected area.

DTSC and DOI meet regularly with stakeholders and have conducted community outreach regarding investigative and cleanup activities at the TCS and within the Action Area. BLM has been delegated the authority to represent the Federal Agencies for purposes of consulting with Native American tribes pursuant to Section 106 of the National Historic Preservation Act, and other federal laws and Executive Orders, concerning potential adverse effects on cultural and historic properties that may result from the Topock Remediation Project.

The activities and consultations that pre-date current interim measures are described in the 2007 PBA and summarized in Section 3.0. In order to expedite the groundwater remedy schedule, after entry of the Consent Agreement, the investigation and remediation effort was split by DOI and DTSC between groundwater and soils; the hydrogeologic characterization and groundwater and surface water investigations were completed in 2009, and soil investigations are ongoing. These include the completed RCRA Facility Investigation / CERCLA Remedial investigation (RFI/RI) reports volume 1 (site background and history; CH2M HILL, 2007b) and volume 2 (groundwater and surface water CH2M HILL, 2009a), the *Human and Ecological Risk Assessment of Groundwater Impacted by Activities at SWMU 1/AOC 1 and SWMU 2* (ARCADIS, 2009), and pending soil RFI/RI and soil risk assessment reports. The Feasibility Study / Corrective

Measure Study for groundwater (CH2M HILL, 2009b) and the Groundwater Risk Assessment (ARCADIS, 2009) followed the Groundwater RFI/RI Report.

In December 2010, the DOI issued a ROD selecting the groundwater remedy for the site to remediate chromium to appropriate cleanup levels, and in January 2011, DTSC also adopted the Final Remedy for the groundwater contamination. A Remedial Design/Remedial Action Consent Decree between the United States and PG&E under CERCLA was approved by the United States District Court for the Central District of California in November 2013. The Consent Decree requires the planning, design, construction, O&M, post-remediation monitoring, decommissioning, and restoration of the groundwater remedy selected in the ROD. A study of alternative freshwater sources for the groundwater remedy is currently ongoing. Currently, the soils investigation is proceeding pursuant to the 2005 federal Consent Agreement and the groundwater investigation and remediation is proceeding pursuant to the 2013 federal Consent Decree.

Consistent with the Consent Decree, the next step in groundwater Remedy Design will be the 90% Basis of Design Report, which is currently in preparation with submittal planned in summer 2014.

As noted previously, this Final Groundwater Remedy PBA has been prepared for consultation with USFWS pursuant to Section 7 of the ESA prior to implementation of the Final Groundwater Remedy. Ongoing soil investigation activities are addressed more specifically under the re-initiated PBA to cover soil-related activities until 2017. If remedial/corrective action is determined to be needed for soil and the Final Soils Remedy has been selected, additional consultation with USFWS will occur.

SECTION 3.0

Description of Activities

The following subsections describe the Action Area and provide a summary of past, present, and planned activities that are part of the Final Groundwater Remedy.

3.1 Action Area

The 2007 PBA Action was originally defined by BLM and DTSC as an approximately 1,528-acre area to facilitate a cultural resources assessment, and an identical boundary was subsequently used to define the area in which annual protocol surveys are conducted for listed species (CH2M HILL, 2005c). The 2007 PBA Action Area (then referred to as the Area of Potential Effects) included portions of land in California and Arizona, as well as the Colorado River separating them (see Figure 2). Since its origin, as the area for the groundwater remedy has become more refined, the 2007 PBA Action Area has undergone several modifications as described below, so that the current Groundwater Remedy Action Area is approximately 1,434.4 acres in size. Within the Action Area, California and Arizona are separated by the Colorado River, such that open water makes up approximately 157.13 acres (about 11 percent of the total Action Area) and includes an excavated channel associated with a day-use/camping area and resort (see Figures 2 and 3).

Additional investigations related to a freshwater source for the groundwater remedy dictated an expansion of the Action Area to the north and west in California and to the east in Arizona. In the December 2012 letter requesting extension and modification of the 2007 PBA (BLM, 2012), these modifications to the existing Action Area were formally requested, as shown in Figure 2. In California, these changes included an expansion of the northern boundary (47.13 acres), the northwestern boundary (5.24 acres), and an isolated area to the north-northwest known as Freshwater Site C (28.73 acres). Other additions to the Action Area included the roadway connection from the Interstate 40 exit and the evaporation ponds (7.69 acres) and a proposed construction laydown area southwest of Moabi Regional Park (2.04 acres). The Action Area changes also included reductions of the original 2007 PBA Action Area along the southern, southwestern, and western boundaries that totaled approximately 257.8 acres. No future work is anticipated within these areas, including the 28.7-acre Freshwater Site C; and therefore, no direct or indirect impacts are expected. The portion of land area in California within the Action Area is approximately 1,012.67 acres (about 71 percent of the total Action Area).

In Arizona, the 2012 Action Area modifications (BLM, 2012) included an approximately 307.13-acre expansion of the original 2007 PBA Action Area (163 acres) for the Freshwater Implementation Plan. Within this area, no future work is anticipated within approximately 205.49 acres after initial evaluations for the Freshwater Implementation Plan were completed. The portion of the Action Area in Arizona where future work is anticipated is approximately 264.63 acres (about 18 percent of the total Action Area). This includes approximately 101.63 acres of expanded area that will include the freshwater supply wells HNWR-1 and the back-up well to the north within Sacramento Wash as well as the supply pipeline that will connect them to the distribution wells in California, as described later in this document. The figures for this PBA identify an area as the “PBA Update Action Area” to facilitate an understanding of the area that may be affected directly or indirectly from work anticipated to occur in the future for purposes of this consultation.

In California, the northern portion of the Action Area is mostly developed and occupied by the Moabi Regional Park on land that is leased by San Bernardino County and managed by BLM. This park has day-use and recreational vehicle camping facilities that are located primarily on the north side of the National Trails Highway to the west of Park Moabi Road. The park also includes the peninsula of land on the north side of the excavated channel.

A portion of this park, mostly east of Park Moabi Road and north of National Trails Highway, is run as a commercial resort, Pirate’s Cove, which has a restaurant and separate lodging facilities. Other resort facilities include a motorized and non-motorized zip-line from the main Pirate Cove resort buildings that

cross the excavated channel, as well as wastewater infiltration ponds south of National Trails Highway and east of Park Moabi Road.

The park facilities also include an extensive network of off-road vehicle (ORV) trails within the peninsula on the north side of the channel. Additional ORV trails extend from the resort on the north side of the National Trails Highway as far east as the outlet from Bat Cave Wash. To the south of the National Trails Highway, in the vicinity of Moabi Regional Park and Pirate's Cove, approximately 400 acres of land has been designated as an open riding area for ORVs according to the California Trail Users Coalition (CTUC, 2011). Numerous ORV trails are present in this area extending as far south as the Burlington Northern Santa Fe (BNSF) railroad in the eastern portion and Interstate 40 in the western portion of the open riding area. It should be noted that BLM (2006) issued an ORV roadway closure for the portion of the open riding areas to the east of Park Moabi Road.

In Arizona, the portion of the Action Area that lies to the east of Topock Marsh and west of the Oatman-Topock Highway was burned in the 2008 Sacramento Wash Fire. An unpaved access road runs through the middle of this area along a north-south alignment. The portion west of this road is part of a restoration area that has been replanted and supplied with irrigation to address the effects of the 2008 Sacramento Wash Fire. The burned area between this unpaved access road and the Oatman-Topock Highway has been mechanically cleared in anticipation of future restoration planting efforts. The area to the east of the Oatman-Topock Highway did not burn and is characterized by dense tamarisk trees and shrubs, and an active wash channel that lacks vegetation.

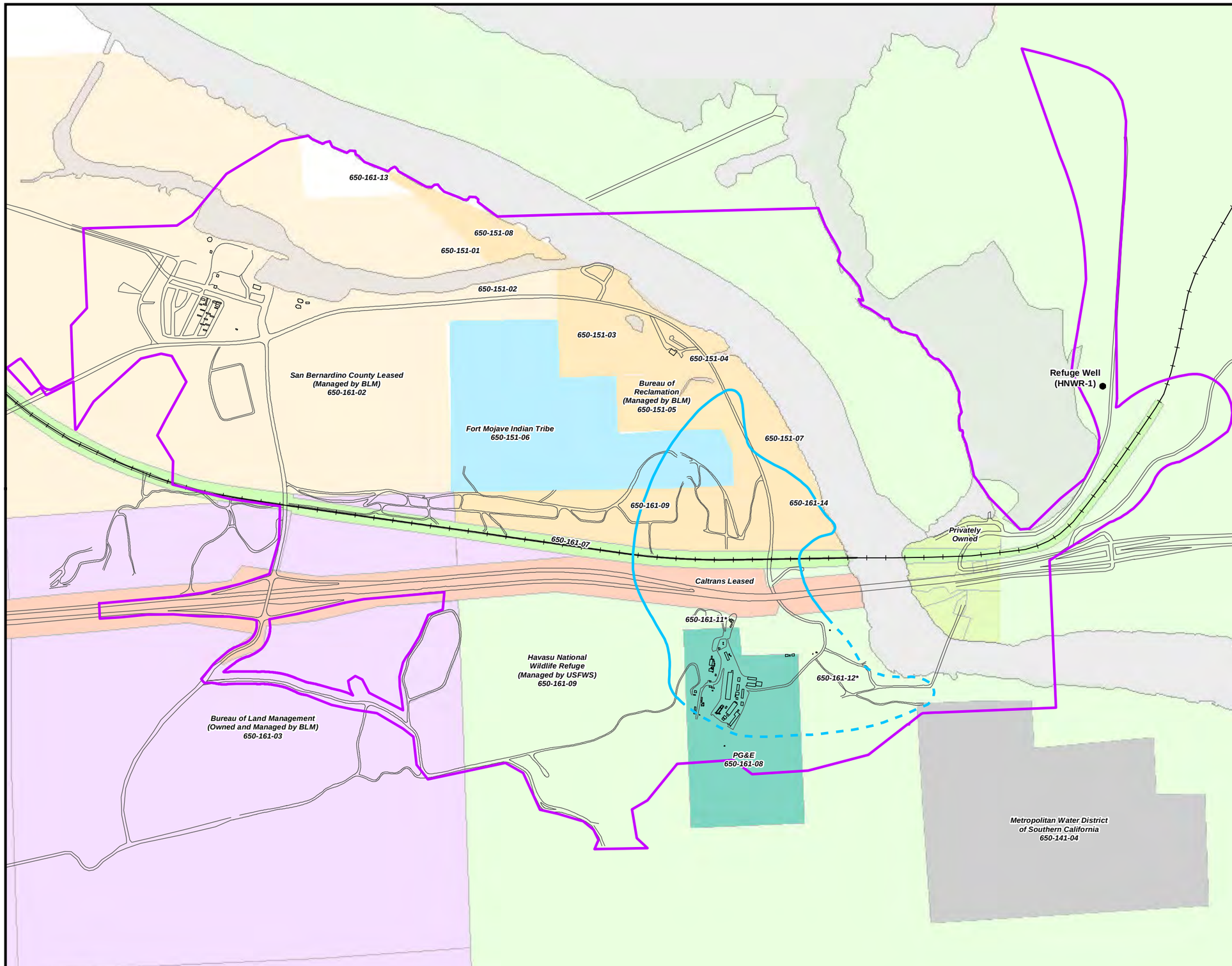
The TCS occupies approximately 65 acres of PG&E-owned land within the Action Area. PG&E also owned a 100-acre parcel located about 0.25 mile north of the compressor station that was purchased to facilitate interim remedial measures, but subsequently transferred the parcel to the Fort Mojave Indian Tribe as shown in Figure 3. The area surrounding these parcels within the Action Area includes land owned and/or managed by a number of government agencies including BLM, USFWS, and USBR.

The Action Area lies within a larger cultural area of significance to federally recognized tribes. In addition, the Colorado River itself is of spiritual and cultural importance to local tribes in the region. The continued contemporary traditional and spiritual use of the area and the management of the land, animals, plants, and water are of great importance to the tribes.

Primary access to the California portion of the Action Area is provided by Park Moabi Road and National Trails Highway, a two-lane paved roadway extending for approximately 2 miles across the Action Area. Park Moabi Road connects with Interstate 40 in the western portion of the Action Area and extends north to Moabi Regional Park in the northwest. At Moabi Regional Park, the roadway connects to the National Trails Highway, which extends eastward and then southward along the Colorado River to the TCS. Various unnamed roadways traverse the Action Area, including abandoned segments of former Historic U.S. Route 66 and National Old Trails Road. The BNSF railway alignment traverses the central portion of the Action Area and crosses the Colorado River to the north of Interstate 40. The Historic U.S. Route 66 connects the National Trails Highway to Park Moabi Road on the north side of the BNSF railroad alignment.

Access to the HNWR in Arizona is provided from the Oatman-Topock Highway. The levee road along the eastern shore of the Colorado River provides access to the northeast portion of the Action Area. The Topock Marina to the south is accessed from the Oatman-Topock Highway, north of Interstate 40. Land use in the Action Area is primarily open space with the following prominent exceptions. Interstate 40 and the BNSF railway run east-west, roughly bisecting the Action Area. The compressor station and associated evaporation ponds are located in the southern portion of the Action Area. Moabi Regional Park and the Pirate's Cove Resort are located in the northwestern portion of the Action Area and include numerous mobile home sites, boat docks, a restaurant, individual lodging, and associated infrastructure. The Topock Marina is located on the Arizona side of the river, north of the railway—the Topock Marina and other nearby parcels encompass approximately 29 acres of private land north and south of Interstate 40 in Arizona (see Figure 3).

Various telecommunication lines and gas transmission pipelines traverse the Action Area. These are primarily subsurface pipelines, with occasional surface expressions (e.g., to bridge ravines or the river).



LEGEND

PBA Update Action Area

Refuge Well

Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.

Property Owner

- BNSF Railroad
- Bureau of Land Management (owned and managed by BLM)
- Bureau of Reclamation (managed by BLM)
- Caltrans Leased From Underlying Federal Owner
- Fort Mojave Indian Tribe Owner in Fee, With PG&E Easement and Access for Remediation
- Havasu National Wildlife Refuge
- Metropolitan Water Dirstrict of Southern California
- PG&E
- Privately Owned
- San Bernadino County Leased (managed by BLM)

Note:
1. * = PG&E has a possessory interest on these parcels (650-161-11,650-161-12) for the operation of a compressor station and associated pipelines.
2. Property ownership for the Caltrans ROW (Parcel Number 650-161-09) is U.S Bureau of Reclamation 'withdrawn land' that is managed by the U.S. Fish and Wildlife Service.

0 362.5 725 1,450 Feet

N

FIGURE 3
SURROUNDING PROPERTY MAP
FINAL GROUNDWATER REMEDY
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2013\PBA\2013Q4\FIG3_SurroundingProp.mxd

Developed facilities associated with previously installed interim measures include numerous groundwater wells and an interim groundwater treatment system (IM No. 3). Between the National Trails Highway and the Colorado River floodplain is an approximately 1-acre area, referred to as the MW-20 Bench (see Figure 4), upon which are located facilities associated with past and present interim measures. These facilities are described further in Section 3.2.

Land ownership and management in the Action Area is depicted in Figure 3. BLM manages the federally owned land north of the BNSF railway and west of the Colorado River. This includes lands managed on behalf of USBR along the Colorado River. USFWS manages the HNWR lands that are located in the southern portion of the Action Area in California and immediately surround the TCS on the south side of Interstate 40/Highway 95. The HNWR is also located in the eastern portions of the Action Area and includes most lands located on the Arizona-side of the Colorado River. Outside of the Action Area, the 37,515-acre HNWR stretches for approximately 26 miles along the Colorado River, extending from Needles, California, to Lake Havasu City, Arizona.

Recreational activities within the HNWR include sightseeing, boating, bird watching, fishing, and hunting. Prior damming and channelization of the Colorado River have significantly altered the aquatic, marsh, and riparian habitats associated with the river. These water-control and diversion actions have also contributed to increased housing development along the river and facilitated an increase in the intensity of river-related recreation, including watercraft, fishing, and hunting (USBR, 1996, 2000, 2002, 2004).

The Colorado River flows southeast between California and Arizona and provides the primary aquatic habitat within the Action Area. The river is approximately 700 to 900 feet wide and 8 to 15 feet deep through the Action Area. The adjacent river floodplain averages about 500 feet in width but narrows at the Topock Gorge, to the south of the Action Area. The topography of the floodplain in California is relatively flat with a gentle slope toward the river. The Arizona floodplain is more mound-like, creating a low divide between the Colorado River and the wetlands of the Topock Marsh.

The Colorado River has been stocked with various game fish that have been linked to predation of native listed fish species (USBR, 2004). Changes to the flow regime on the Colorado River due to damming and water diversion have significantly altered the riparian habitat. The exotic tree salt cedar is able to exploit the hydrological changes and now dominates and displaces native plant communities. USBR is responsible for managing the river and has consulted with USFWS on its actions (USBR, 1996, 2000, 2002, 2004). Several biological opinions have been issued to USBR (USFWS, 1997a, 1997b, 2002a, 2005b). The Lower Colorado River Multi-Species Conservation Plan was developed for the Colorado River (USBR, 2004).

The terrestrial portions of the Action Area are characterized by arid conditions (precipitation averages less than 5 inches per year) and high temperatures (routinely exceeding 110 degrees Fahrenheit in the summer) that are typical in the Mojave Desert. The landscape in the California portion of the Action Area is considerably eroded by natural processes resulting from the effects of wind and water erosion. For these reasons, the land forms are characterized by alluvial terraces and deeply incised drainage channels. One of the largest of these incised channels is the Bat Cave Wash, which runs from the Chemehuevi Mountains in the south of the Action Area, past the west side of the TCS toward the northeast to the Colorado River. Terraces within the Action Area are relatively homogeneous and are composed of rocky soils with sparse vegetation. Of tribal concern and spiritual importance, it is upon these terraces where the physical evidence of the Topock Maze is most observable. Elevations in the Action Area range from about 450 feet mean sea level (amsl) at the river floodplain to approximately 550 feet amsl at the TCS. The area to the north of the Topock Marina within the Arizona portion of the Action Area is part of the HNWR. Historical dredging of the Colorado River for flood control since the 1940s has resulted in the placement of the sandy dredge spoils on the east and west sides of the river within the Action Area and a dune-like, mounded topography in these deposition areas. The river floodplain is otherwise planar with a gentle slope toward the river.

On the California (western) side of the Action Area, the local geology consists of riverine deposits that become older and higher with distance from the river until they transition to the coalesced alluvial fans associated with the local mountains. Sand, gravel, and cobbles dominate these riverine deposits, which

constitute the principal groundwater aquifer within the Action Area. The main surface water drainage channel from the Action Area toward the Colorado River is Bat Cave Wash and another large, unnamed desert wash with several tributaries located farther to the west. These ephemeral desert washes are dry most of the year, but flow during heavy precipitation events.

Structurally diverse vegetation is primarily limited to the Colorado River floodplain and the ephemeral washes near the Colorado River. The uplands consist primarily of sparse creosote bush (*Larrea tridentata*) scrub community with scattered brittlebush (*Encelia farinosa*) and Hillside palo verde (*Parkinsonia microphylla*), whereas the floodplains on the California and Arizona shorelines are composed of sandy soils that are characterized by dense stands of salt cedar (*Tamarix ramosissima*), Phragmites (*P. communis*), or arrow weed (*Pluchea sericea*) with scattered individuals of western honey mesquite (*Prosopis glandulosa* var. *torreyana*) and blue palo verde (*Parkinsonia florida*). Similar to the floodplains, the incised washes also contain a more diverse community of perennial plants that includes creosote bush, blue palo verde, smoketree (*Psorothamnus spinosus)*, brittlebush, and desert-thorn (*Lycium cooperi*). Small, dense patches of cattail (*Typha* sp.), arrow weed, and/or bulrush occur at the wash outlets to the Colorado River and within constructed wash impoundments. A more detailed description of the flora and fauna in the Action Area, including species listed under the federal ESA, are described in Section 4.0.

Based on the information above, the Action Area in California was divided into three primary habitat types as shown in Figure 9 that correspond to habitats that would be used by the PBA-listed species: uplands, historical river floodplain, and current river floodplain. Upland habitats include all undeveloped areas with upland vegetation that could be potentially suitable habitats for desert tortoise. Upland habitats include the ephemeral washes, but specifically exclude the historical and current river floodplains. The historical river floodplain is the zone with riparian vegetation including mesquite, tamarisk, and arrow weed patches. In the Action Area, the historical river floodplain is found between MW-20 Bench and National Trails Highway and the 100-year floodplain (see Figure 9) and has portions of dune-like habitat where dredge sands were deposited. The current floodplain refers to the terrestrial portions within the 100-year floodplain.

3.2 Past Activities

Past activities have occurred on both the California and Arizona portions of the Action Area and within the Colorado River, and are summarized in Table 1. Activities listed in Table 1 are grouped based on whether they were initiated and completed prior to the 2007 PBA, initiated prior to the 2007 PBA but were ongoing through coverage of the 2007 PBA, or were initiated and completed after the 2007 PBA was issued.

The past activities were initially related to environmental investigations of groundwater, surface water, and soils that were associated with historical contamination from the TCS. Some of these activities were part of the RFI/RI, such as the installation and sampling of numerous groundwater monitoring wells and soil sampling. Between 1997 and 2004, RFI activities included the installation of monitoring wells at 32 locations within the Action Area, as well as approximately 300 soil samples that were collected and analyzed at locations within and surrounding the TCS. A soil removal action occurred at the same time the former wastewater treatment structures were removed to the west of the compressor station.

Other past activities were related to IM time-critical removal actions to prevent the migration of hexavalent chromium [Cr(VI)]-contaminated groundwater into the Colorado River. These actions were designated as IM No. 1, IM No. 2, and IM No. 3, and generally involved plume characterization and control, including pumping and treating of affected groundwater. Because the IMs were sequential, each one supplanted its predecessor. Currently, IM No. 3 is the only ongoing IM activity and it will be put in a “lay-up” mode prior to start-up of the Final Groundwater Remedy. A description of the ongoing activities associated with IM No. 3 is provided in Section 3.3, Planned Activities. In addition to the IM removal action, the AOC 4 Removal Action was initiated separately to remove fill material and debris deposited over the northern slope, as well as the debris accumulating in the bottom of the “debris ravine,” AOC 4. As summarized in Table 1, the removal action began in January 2010 and continued through December 2010.

Past and present projects are depicted in Figure 4 and summarized in Table 1, and the existing network of monitoring wells that is part of the ongoing groundwater monitoring program and will be incorporated into the Final Groundwater Remedy is depicted in Figure 5. All of the past activities fall within the General Activity Categories described in the following subsection. In addition to a description of the past activities, Table 1 also documents consultation and approvals, and provides a current tally of the number of wells and acreages of floodplain and upland habitats that have been affected under the 2007 PBA and its re-initiation. A description of O&M activities for infrastructure from past activities (i.e., monitoring wells, extraction wells, pipeline, etc.), that will continue to function and support the Final Groundwater Remedy are included in Section 3.3, Planned Activities.

3.2.1 General Activity Categories

Past and present response and investigative activities have occurred throughout the Action Area and have typically comprised one or more of the following categories of activity. Many of these same activities will occur in the future as part of the Final Groundwater Remedy and are the subject of this consultation.

1. **Well installation, maintenance, operation, and decommissioning**. Includes access to injection, extraction, and monitoring well sites for surveys, drilling, installation of wellheads, pumps and equipment, aquifer testing, monitoring, testing, well maintenance, retro-fitting, decommissioning (e.g., well abandonment), and sampling. Up to 30 new well clusters were allowed to be installed throughout Action Area. Also includes related improvements such as dedicated well pumps to facilitate well sampling activities. Access to well locations would use existing access roads and/or pre-defined travel corridors wherever possible.
2. **Pipeline installation, maintenance, and operation**. Includes above- and belowground piping and appurtenances to and from wells, water treatment, and water and waste management facilities.
3. **Facility maintenance and operation**. Includes water treatment facilities, such as IM No. 2 batch treatment, IM No. 3 treatment facilities, water and waste management facilities, and in situ treatment operations. Periodic maintenance activities include routine repairs, well maintenance, waste removal, and deliveries of supplies and treatment compounds.
4. **Colorado River and soil sampling**. Includes open water sample collection from shore and by boat, as well as pore water sampling using techniques including but not limited to those and similar techniques as described in the Revised Pore Water and Seepage Study Work Plan (CH2M HILL, 2005d). This category also includes soil and sediment sampling activities as described in the Soil Work Plan (CH2M HILL, 2013a) via a number of collection methods including, but not limited to: boring, augers, trenching, and such sampling methods conducted via track- and truck-mounted apparatus. Other sampling activities may include seismic studies and/or bedrock sampling using drilling equipment. Non-intrusive test methods (i.e., geophysical methods) may also be employed if useful data can be collected by such means. Access to soil sampling locations would use existing access roads and/or pre-defined travel corridors wherever possible.
5. **Road maintenance**. Includes maintenance of roads and/or paths to project facilities (wells, pipelines, and treatment facilities) within the Action Area on public and private land. Examples include regrading and/or re-paving of existing access routes, and the installation of stormwater culverts to limit roadway erosion during storm events.
6. **Restoration and mitigation activities**. Includes activities to restore spiritual, cultural, ecological, aesthetic, or other values to areas where project activities/facilities are no longer necessary or have been removed. Also includes revegetation and removal of debris located within the Action Area (e.g., scrap metal, wood, brick, plastic, or similar materials). Some restoration sites will require removal or addition of soil and rocks to recontour the landscape, and drainage ditches that may require barriers and irrigation facilities.

7. **Emergency activities**. Includes any activity that cannot be reasonably foreseen but, due to public health/safety concerns, requires immediate response and/or corrective action. Examples of such activity include, but are not limited to, response of police, fire, ambulance or other personnel to the site, and subsequent work, in the event of explosion, fire, vehicle accident, spill, natural disaster, equipment failure, chemical reaction, heat illness, heart attack, or other medical emergencies.

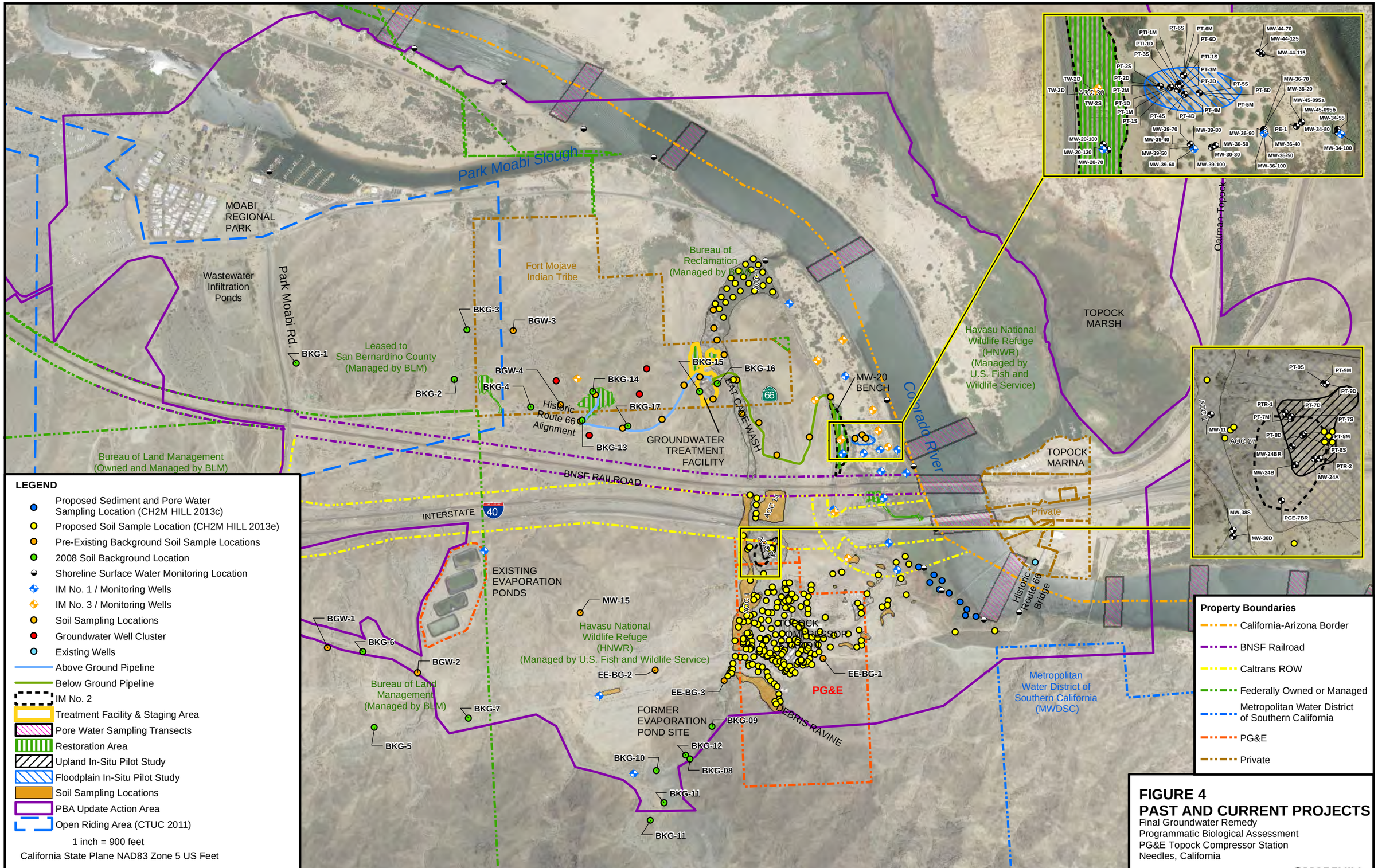


FIGURE 4
PAST AND CURRENT PROJECTS
Final Groundwater Remedy
Programmatic Biological Assessment
PG&E Topock Compressor Station
Needles, California

CH2MHILL

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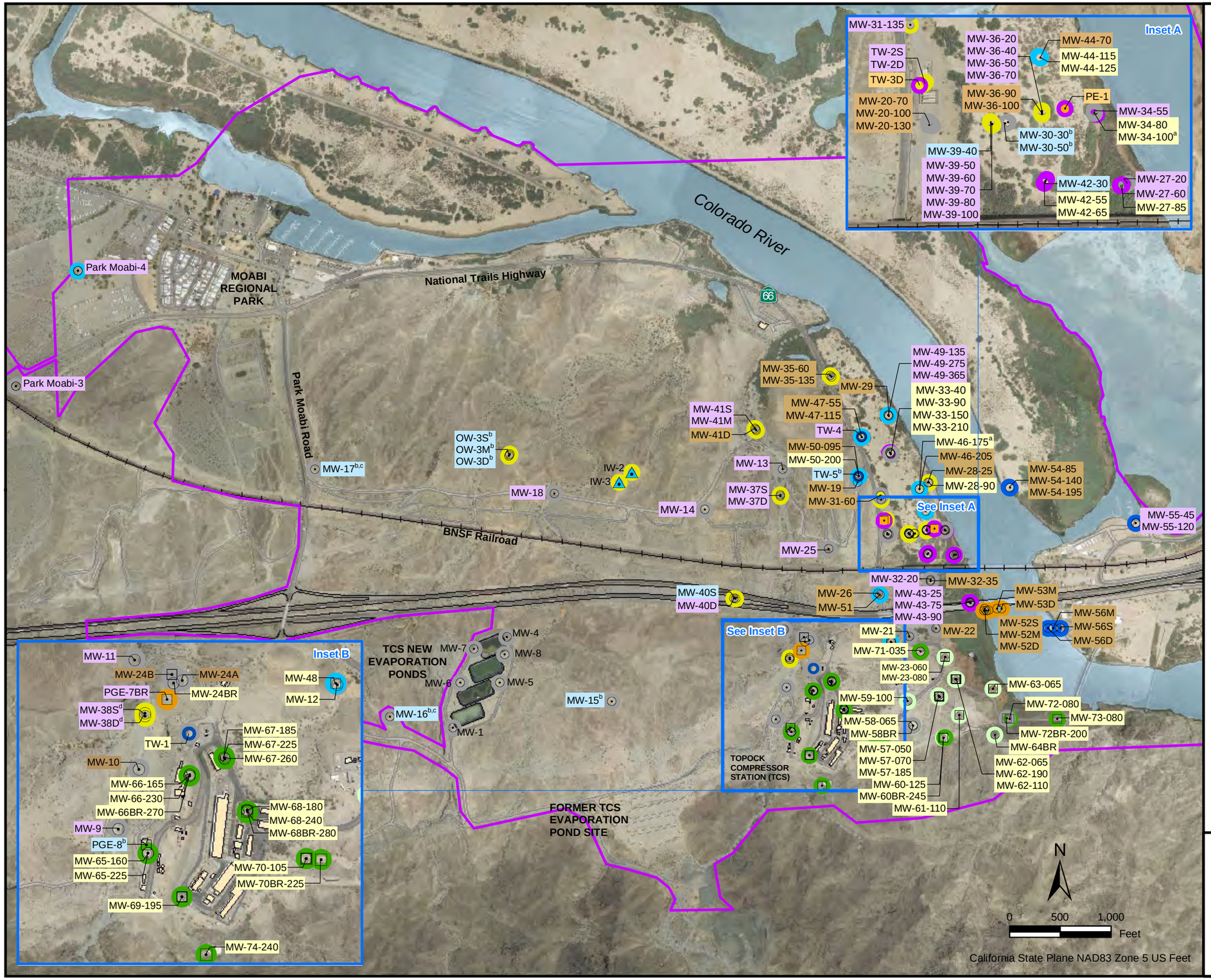

LEGEND

- Groundwater Well Completed in Bedrock
- Injection Well
- Groundwater Monitoring Well
- Test Well or Supply Well (inactive)
- Extraction Well
- PBA Update Action Area

Well Year Install

- Prior to November 2003/TW-1 Installation
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2011

Sampling Frequency for Groundwater Monitoring Program (GMP)

MW-17	Biennial Sampling
MW-9	Annual Sampling
MW-22	Semiannual Sampling
MW-12	Quarterly Sampling
TW-3D	Monthly Sampling

Notes:

[a] Monthly sampling November through February, otherwise quarterly.
[b] These wells required to be sampled biennially, will be sampled annually for the water quality snapshot.
[c] Background metals collected semiannually.
[d] Sampled following repair

FIGURE 5
MONITORING WELL LOCATIONS AND SAMPLING FREQUENCY
FINAL GROUNDWATER REMEDY
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
Projects initiated prior to 2007 PBA					
Topock Compressor Station Wells	Seven groundwater monitoring wells (MW-1 and MW-3 through MW-8) were installed around the new, lined evaporation ponds that replaced the former unlined ponds (see Figure 5). Two additional wells (MW-15 and MW-16) were subsequently installed downgradient and upgradient of the ponds. These wells are not associated with corrective actions but have been and continue to be used to monitor operation of the existing ponds. The Topock Remediation Program has supported some activities associated with the evaporation pond wells from around 2009 to the present including sampling and lysimeter measurements for leak detections and O&M performance for the groundwater sampling pumps. The remediation program also includes water level measurements and periodic sampling of the upgradient/downgradient wells. Because these wells are considered part of the TCS operations, the results are reported separately from the Topock Remediation Program.	Colorado River Regional Board, Order R7-2004-0080, adopted October 13, 2004	Pond wells installed between August 1989 and June 1989; downgradient well installed July 1998; upgradient well installed April 1998. Ongoing sampling in compliance with Water Board order (monitoring program) and Waste Discharge Requirements for the TCS	None, previously disturbed locations of former unlined ponds	Seven (MW-1 and MW-3 through MW-8)
Groundwater and Surface Water Monitoring Program	Routine groundwater and surface water monitoring activities were initiated in 1998 as a continuation of the RCRA Facility Investigation and have been ongoing through the Groundwater Monitoring Program (GMP). The number of groundwater well and surface water sampling locations, as well as the frequency of sampling from each location, have varied since the GMP inception and continue to be refined as data needs are evaluated. Under the original 2007 PBA, monitoring occurred semiannually, quarterly, monthly, biweekly, and biennially, as follows: • -Fourteen (14) groundwater wells that were sampled semiannually (Figure 4); • -Sixty-two (62) groundwater wells that were sampled quarterly; • -Twelve (12) groundwater wells on the floodplain that were sampled monthly; • -Four (4) groundwater wells on the floodplain that were sampled bi-weekly; • -One extraction well, one injection well, and two inactive supply wells are sampled biennially; • -Nine (9) shoreline surface water stations along the Colorado River that were sampled monthly; • -Nine (9) depth-specific sampling stations within the Colorado River channel that were sampled quarterly (except during winter low-river stage conditions, when the stations are sampled monthly). Typically, access to the monitoring wells was accomplished with a pickup truck or an all-terrain utility vehicle with a trailer. On average, two field personnel were engaged in sampling activities for each individual well. Sampling procedures require purging the wells before sampling can be conducted so, depending on the well characteristics, between 15 and 200 gallons of water were typically purged. This purge water was subsequently transported to the IM No. 3 water treatment facility. Purge water pumping often involved the use of a portable generator to power a well pump. After this program began, several wells on the Colorado River floodplain had dedicated pumps installed that were powered from an electrical power source at the PE-1 wellhead. Several monitoring sites included clusters of two to three wells sampled at different groundwater depths so that the time frame involved with completing sampling activities at an individual well ranged from approximately 15 minutes to several hours. The total time frame to complete a sampling event ranged from 1 day for monthly events or 2 days for surface water/river sampling events, to 7 or 8 weeks for a biennial event. Vehicles traveling throughout the Action Area used existing roads and/or predetermined routes to access each of the monitoring wells (CH2M HILL, 2005d).	RCRA Facility Investigation under DTSC Order; 2007 PBA; and 2012 Re-initiated PBA	Installed between July 1997 and March 2004. Sampling ongoing. Future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy,	None, access routes made along unvegetated portions of the floodplain or previously disturbed upland areas	Forty-two (MW-9 through MW-33)

TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
Floodplain Sampling	In June 2005, modified sampling procedures were developed to avoid concerns regarding the potential effects to the southwestern willow flycatcher. Floodplain sampling and access procedures during the 2005 southwestern willow flycatcher nesting season were modified to include limited use of all-terrain vehicles (ATV) and staging of equipment and tanks within specified areas for the purpose of reducing potential impacts to southwestern willow flycatcher (CH2M HILL, 2005e). These procedures to avoid any potential effects to southwestern willow flycatcher constituted a "no effect" avoidance strategy. In April 2006, PG&E proposed modifications to the floodplain sampling procedures implemented during the southwestern willow flycatcher nesting season (May 1 through September 30). The modified procedures include the use of lower-noise ATVs, dedicated well pumps, electrical power supply outlets on the floodplain in lieu of portable generators, reduced sampling frequencies at certain wells, use of 4-inch "lay-flat" hose to purge water outside of potentially sensitive areas, and additional staging areas to limit equipment movement. These procedures are detailed in the *Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Rev. 3* (CH2M HILL, 2006b) that was provided to the BLM on April 20, 2006. Based on the above-referenced technical memorandum and the biological analysis provided therein, BLM and HNWR initiated informal consultation with USFWS. The approved ATV access routes and staging areas to be used during the southwestern willow flycatcher nesting season along the Colorado River floodplain are shown in Figure 7. It is PG&E's intent to carry these or similar access and sampling procedures forward and to consider them as general management measures throughout the duration of the project.	In a letter dated April 28, 2006, USFWS provided its concurrence with the BLM determination of "may affect, but not likely to adversely affect" for the proposed sampling procedure modification with respect to the southwestern willow flycatcher. USFWS also concurred with the BLM determination that implementation of these sampling procedures would have "no effect" to the Yuma clapper rail. The sampling procedures described in the April 20, 2006, technical memorandum were subsequently approved by BLM in a letter dated May 1, 2006, and by HNWR in a letter dated May 11, 2006.	Wells installed between April 23, 1998 and March 21, 2006; Sampling procedures changed in June 2005. Sampling ongoing. Future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy,	None, existing access routes within unvegetated portions of the floodplain	Seventeen (MW-22, MW-27 through-36, MW-42 through-44; MW-46, and MW-49)
Surface Water Sampling	Surface water sampling procedures were described in the *Monitoring Plan for Groundwater and Surface Water Monitoring Program* (CH2M HILL, 2005d), The revised sampling procedures for depth-specific surface water sampling on the Colorado River involve the use of a motorized boat and a global positioning system device. At each sample location, river samples are taken from 1 foot off the river bottom, at the mid-point of the water column, and 1 foot below the river surface. Shoreline surface water samples are taken at a depth of approximately 6 inches below the water surface from the shoreline or from a boat. Twenty-five shoreline surface stations along the Colorado River and in-channel depth-specific sampling stations within the Colorado River channel are sampled quarterly with one additional low-river stage sampling event in winter. To date, these activities have occurred with no known take of listed species.	USFWS also concurred with the BLM determination that implementation of these sampling procedures would have "no effect" to the razorback sucker, bonytail chub, and Colorado pikeminnow. The sampling procedures described in the April 20, 2006, technical memorandum were subsequently approved by BLM in a letter dated May 1, 2006, and by HNWR in a letter dated May 11, 2006.	Sampling began in May 2006. Sampling ongoing. Future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy,	None	None

TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
Interim Measure No. 1	The IM No. 1 project was initiated as a time-critical removal action in response to a January 22, 2004, direction from DTSC to prepare a work plan to mitigate potential impacts to the Colorado River. This project was described in a technical memorandum work plan: Field Activities for Groundwater Well Installation, PG&E Topock Project (CH2M HILL, 2004b) and included additional groundwater monitoring wells at eight locations to complement the existing network of monitoring wells within the Action Area (CH2M HILL, 2004b). An additional well, MW-37, was proposed on BLM land within Bat Cave Wash (Figure 5). In early 2005, a second phase of IM No. 1 was implemented that involved the installation of groundwater wells at five additional locations on the Colorado River floodplain (CH2M HILL, 2005f). IM No. 1 also included several potential extraction wells (PE-1 and PE-3). However, the groundwater extraction portion of IM No. 1 was not implemented, but rather was supplanted by IM No. 2, which provided a more comprehensive program to extract, treat, and haul groundwater containing chromium. An assessment of the land used during the second phase of IM No. 1 construction activities was prepared for BLM and USFWS, in accordance with the stipulations that were provided in their approval. Monitoring wells installed under IM No. 1 include wells that are used for both the Groundwater Monitoring Program and Performance Monitoring Program.	The first phase of IM No. 1 was authorized by BLM in March in the IM No. 1/2 Action Memorandum (BLM, 2004a) and by two letters dated March 15, 2004 from BLM Lake Havasu Field Office (BLM, 2004b). Well MW-37 in Bat Cave Wash was authorized by April 8, 2004 letter (BLM, 2004c) Second phase of IM No. 2 was authorized with stipulations by letter dated December 29, 2004 (BLM, 2004d) and by Action Memorandum with special conditions dated February 15, 2005 from the USFWS (2005c).	Well installation began on March 22, 2004 and was completed by March 5, 2005. Ongoing sampling of selected wells. Future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy.	None in Phase 1, new well locations and existing access routes within previous disturbed areas or unvegetated portions of the floodplain. In Phase 2, floodplain vegetation removed for PE-1, MW-27 and MW-43 wells or access totaled 0.372 acre (tamarisk and arrow weed) (CH2M HILL, 2005g)	Eight Phase 1 wells (TW-2S/D and MW-31D on the MW-20 Bench; MW-28D, MW-35 through -37, and MW-39 on the floodplain; and MW-40 within the I-40 corridor) Six Phase 2 wells (MW-27M/D, MW-33D, MW-34D; MW-42S/M/D; and MW-43S/M/D and PE-1). Two other floodplain boreholes PE-1A and PE-1B were sampled but not completed as wells.
Interim Measure No. 2	IM No. 2 involved the extraction, treatment, and hauling of treated water to an offsite disposal facility (CH2M HILL, 2004c). As shown in Figure 4, the IM No. 2 facilities and operations were limited to an approximately 1-acre area on BLM land, referred to as the MW-20 Bench, where two extraction wells (TW-2S and TW-2D) were installed. Groundwater was extracted at rates of up to approximately 90 gallons per minute and pumped into a series of Baker tanks. A batch treatment process to remove chromium occurred within the Baker tanks, resulting in a 99 percent reduction in the volume of hazardous waste (CH2M HILL, 2004d). The treated water was pumped into tanker trucks for disposal at a permitted treatment facility in Los Angeles. Groundwater treatment operations at IM No. 2 were phased out in July 2005 following commencement of groundwater treatment at the IM No. 3 plant at the MW-20 Bench.	IM No. 2 was authorized by BLM in March in the IM No. 1/2 Action Memorandum (BLM, 2004a) and by Action Memorandum from the Lake Havasu Field office on May 20, 2004 (BLM, 2004d).	Extraction wells (TW-2S and TW-2D) were installed between April 3 and 6, 2004. These two wells became backup extraction wells once the new well (TW-3D) was installed on October 27, 2005.	None, aboveground pipelines located on the developed MW-20 Bench where temporary holding tanks were located.	Two extraction wells on the MW-20 Bench (TW-2S and TW-2D)

TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
Interim Measure No. 3	IM No. 3 facilities include extraction, treatment, conveyance, injection, and monitoring facilities, shown in Figure 4. As described in the IM No. 3 Work Plan (CH2M HILL, 2004e, 2004f, 2004g, 2004h, 2004i, 2005c, 2005f, 2005h) these measures were designed to provide greater groundwater extraction and management capacity to maintain hydraulic control of groundwater near the Colorado River. Under IM No. 3, former MW-20 Bench groundwater extraction wells (TW-2S/D) were replaced by a new extraction well (TW-3D) and a new floodplain extraction well (PE-1). Extracted groundwater was then conveyed by underground pipeline to a reverse osmosis treatment facility located in an upland treatment facility to the west. The treated water was then managed by re-injection into the groundwater aquifer at an upgradient location, while reverse osmosis wastewater (brine) was conveyed back to temporary holding tanks at MW-20 Bench prior to trucking to an approved offsite disposal facility. IM No. 3 operations provided a significantly higher rate of extraction and treatment than IM No. 2. Access to IM No. 3 is provided by roads extending from the east and west off Park Moabi Road and National Trails Highway, which have been improved to facilitate effective transportation to the treatment plant and to protect key cultural resources. The roads are maintained several times each year to repair storm damage and control dust using graders, backhoes, and water trucks. The IM No. 3 treatment plant occupies an approximately 1-acre site. Double-walled influent conveyance piping is subsurface and generally follows the eastern access road. Effluent piping from the treatment system to the injection wells is mostly located aboveground, along the shoulder of the western IM No. 3 access road. The subsurface and aboveground piping extend for approximately 3,000 and 1,900 feet, respectively. Periodic maintenance activities include routine repairs, waste removal, and deliveries of supplies and treatment compounds. Maintenance activities may also involve enhancement of existing facilities to optimize operations (e.g., upgrading or replacing equipment). Delivery of supplies and materials occurs several times per week. Repair activity includes repairs to the IM No. 3 access road that include the installation of sufficiently sized culverts to convey stormwater below the roadway and the addition of fill material to eroded sections. As part of the BLM mitigation for Historic Route 66, which is the primary access route to IM No. 3, approximately 5 inches of road base is maintained over the original Historic Route 66 surface to protect the historic road from potential vehicular impacts (BLM, 2004f). During IM No. 3 operations, brine wastewater from the water treatment process is pumped back to the MW-20 Bench and trucked to an offsite disposal facility. Currently, the offsite disposal facility receiving the brine wastewater is located in Phoenix, Arizona. The required trucking activity varies throughout the year as the flow rate requirements change.	Prior federal ESA consultation between BLM and USFWS regarding IM No. 3 construction and operation (CH2M HILL, 2004a, 2004e, 2004f, 2004g, 2004h, 2004i) resulted in a determination of "no effect" to the desert tortoise, a listed threatened species. Authorization of the activities and stipulations are provided in the Action Memorandum (BLM, 2004e). The protective gravel blanket over Historic Route 66 was approved in a letter from the Lake Havasu Field Office on October 14, 2004 (BLM, 2004f). Approval of floodplain borings (PE-1, PE-1A, and PE-1B) was provided in a letter dated February 25, 2005 (BLM, 2005b).	Construction of IM No. 3 facilities commenced in September 2004 and was completed in July 2005. IM No. 3 operations are ongoing pending start-up of the Final Groundwater Remedy, at which time the IM No. 3 facilities will be put into "lay up" mode until approved for decommissioning and removal.	The construction completion report documents that total land used by the IM No. 3 facilities was 8.0 acres (of which, 3.9 acres was previously disturbed); for a net ground disturbance of 4.1 acres (CH2M, 2005g)	One floodplain extraction well (PE-1); Two other floodplain borings (PE-1A and PE-1B) were abandoned without installing wells; One extraction well (TW-3D) on the MW-20 Bench; and Two upland injection wells (IW-2 and IW-3)

TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
Performance Monitoring Program	The performance monitoring program (PMP) involves monitoring, data evaluation, reporting, and response actions associated with the IM No. 3 pumping, treatment, transport, and disposal of extracted groundwater near the floodplain area (CH2M HILL, 2005d). The network of groundwater wells used for performance monitoring included previously installed extraction well (PE-1) and twelve monitoring well clusters in the floodplain (MWs-22, MW-27 through -30, MW-32 through -34, MW-36, MW-39, MW-42 and MW-43); seven intermediate upland wells (MW-12, MW-19 through -21, MW-26, MW-31, and MW-35) and extraction wells (TW-2S and -2D); and two monitoring wells (MW-10 and MW-25) in the upland interior portion of the Cr(VI) plume, as shown in Figure 5. Based on the performance monitoring results, three new floodplain monitoring well installations were proposed (MW-44 through-46). As part of the PMP, a network of pressure transducers are maintained and operated to continuously monitor water levels and assess hydraulic gradients (horizontal and vertical) in the floodplain area. The transducer data are downloaded biweekly to the PMP database. Manual water levels are measured periodically at the monitoring wells, river locations, and extraction wells to calibrate and supplement the pressure transducer data. The majority of the PMP wells used for hydraulic data and groundwater sampling are clusters consisting of two or three individual wells installed at one monitoring location.	BLM and HNWR approval of the Interim Measures Performance Monitoring (IMPM) well clusters was provided in a letter dated February 21, 2006, pursuant to prior authorization provided by the September 2004 Action Memorandum related to IM No. 3 activities. Construction of the IMPM well clusters commenced in February 2006 and concluded in May 2006.	Well installation between February 13, 2006 and March 11, 2006. Sampling is ongoing and future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy,	None, new well locations within unvegetated portion of the floodplain and access gain using existing routes	Three floodplain wells (MW-44 through-46)
Compliance Monitoring Program	The compliance monitoring program (CMP) monitors the aquifer in the IM No. 3 injection well area to ensure that injection of treated groundwater is not causing an adverse effect on the aquifer water quality (CH2M HILL, 2005d, 2005j). Groundwater levels are measured in the vicinity of the IM No. 3 injection wells (IW-2 and IW-3), and groundwater samples are collected and analyzed. Groundwater analyses are performed to ensure that the distribution and concentrations of constituents of concern remain consistent with the baseline sampling results. The CMP monitoring well network consists of both observation wells and compliance monitoring wells.	A December 2004 BLM letter of approval (BLM, 2004e) for the CMP facilities makes reference to prior authorization provided under the March 2004 IM No. 1/2 Action Memorandum and applies all stipulations included in the September 2004 IM No. 3 Action Memorandum.	New CMP wells installed between January 13 and February 7, 2005. Sampling is ongoing and future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy.	0.596 acre of upland or wash habitat removed for CW-2 through-3 wells or access (5 beavertail cactuses transplanted; 5 coyote brush removed or crushed) (CH2M HILL, 2005g)	Four compliance wells (CW-1 through-4). All on the upland mesa or within dry washes to west of groundwater treatment facility in Figure 5.
Floodplain In Situ Pilot Study	The floodplain in situ pilot study (ISPT) activities involve injection of food-grade compounds into the groundwater aquifer and measurement of the reduction of chromium levels in nearby monitoring wells (MWH, 2005a). The pilot study was located on the floodplain within an approximately 0.25-acre area 300 feet east of the MW-20 Bench. Facilities at the site include one injection well cluster (PTI-1S/M/D) and six monitoring well nests (PT-1 through PT-6, all with S/M/D intervals). The floodplain pilot study project area is shown in Figure 4; however, the individual wells are not shown. The pilot study wells were installed in early 2006, prior to the southwestern willow flycatcher nesting season. Construction of the injection and monitoring wells occurred over approximately 2 months. Beyond the project wells, no other permanent equipment or facilities are required for in situ pilot study operations; temporary hoses connect the injection well to temporary containers during injection activities. Operations commenced in April 2006, and involved injection of reagents at up to four separate times over the 8-month operation period as well as groundwater monitoring. Groundwater monitoring occurred as frequently as daily over the first week of operations, and then weekly to monthly until the end of the study in late 2006. Potential biological impacts associated with these activities were covered under the *Biological Assessment for the Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (CH2M HILL, 2005b) prepared in November 2005.	An ESA Section 7 consultation process was completed in December 2005. The result of that consultation was a finding of "may affect, not likely to adversely affect" for the southwestern willow flycatcher, and a "no effect" finding for all other listed species. As documented in the completion report for these facilities (CH2M HILL, 2006b), the construction activities were completed with no take of any listed species; Master CDFG Streambed Alteration Agreement Notification 1600-2005-0140-R6, signed December 25, 2005, and valid until December 31, 2007. Subsequently, a CERCLA exemption was recognized by CDFW and the project was required to comply with a set of Avoidance and Minimization Measures (CDFW, 2013a).	Pilot test wells installed between January 26, and February 14, 2006; pilot test was concluded in October 2006. While the ISPT is complete, sampling of selected wells is ongoing. Future sampling will be incorporated into the Sampling and Monitoring Program of Section 3.3 (Planned Activities).	The permanent nested well structures have a surface expression of less than 500 square feet (0.01 acre) on the floodplain; total floodplain land use is about 0.85 acres (CH2M HILL, 2006b)	Seven (Injection well PTI-1S/M/D and monitoring wells (PT-1 through -6, all with S/M/D sample intervals). All on historical floodplain

TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
PE-1 Pipeline	A work plan was prepared for the conveyance piping and power supply for floodplain extraction well PE-1 (CH2M HILL, 2005i). Construction of a double-walled conveyance pipeline to connect the PE-1 extraction well with existing conveyance pipeline at the MW-20 Bench was completed in January 2006. The pipeline and associated power conduit alignment extend for approximately 500 feet between PE-1 and the MW-20 Bench (Figure 4). As documented in the completion report for PE-1 Pipeline (CH2M HILL, 2006b) and included in Appendix A, the construction activities were completed with no take of any listed species.	Potential biological impacts associated with this facility were covered under the *Biological Assessment* (CH2M HILL, 2005b) and an ESA Section 7 consultation process was completed in December 2005. The result of that consultation was a finding of "may affect, not likely to adversely affect" for the southwestern willow flycatcher, and a "no effect" finding for all other listed species.	The PE-1 extraction well was installed in March 2005 and the pipeline was installed between December 12, 2005 and January 27, 2006. Use and maintenance are ongoing. PE-1 extraction well is planned for decommissioning as part of IM No. 3 facilities.	Total floodplain land use was 0.88 acre, most of which (0.85 acre) overlapped with floodplain ISPT area for an added area of 0.03 acre; removed 0.19 acre of arrow weed and 0.22 acre of tamarisk (CH2M HILL, 2006g)	None, conveyance pipeline only
TW-3D Extraction Well	A work plan was prepared for the new MW-20 Bench extraction well (TW-3D) (CH2M HILL, 2005h). This extraction well began extracting groundwater in December 2005, while the other two extraction wells (TW-2S and TW-2D) were taken off-line and kept for backup. Approximately 50 feet of underground piping was constructed to connect TW-3D to the existing IM No. 3 groundwater conveyance system, and all these construction activities occurred entirely within the MW-20 Bench. Details on the well construction are provided in the installation report (CH2M HILL, 2005k)	No biological consultation was conducted for this well because of the developed nature of the site and the timing of installation outside of the southwestern willow flycatcher season.	Well TW-3D was installed October 27, 2005, but brought on-line in December 2005. TW-3D extraction well is planned for decommissioning as part of IM No. 3 facilities.	None, all activities occurred within the previously developed MW-20 Bench	One (TW-3D) On MW-20 Bench
IM No. 3 Soil Sampling	As described in the Work Plan (CH2M HILL, 2006c) soil samples were collected at 21 locations associated with the IM No. 3 facilities: PE-1 pipeline, MW-20 Bench to treatment facility pipeline, treatment facility, effluent pipeline, and area of potential impact (Bat Cave Wash). These samples were collected prior to IM No. 3 startup to document pre-existing (baseline) soil conditions to support eventual closure of those facilities. The sample locations are shown to the north of the BNSF railroad in Figure 4.	No biological consultation was conducted for this well because of the developed nature of the site and/or the timing of sampling outside of the southwestern willow flycatcher season.	Early 2006	None, all activities occurred within the previously developed or disturbed areas or within unvegetated portions of Bat Cave Wash	None, soil samples only
Pore Water Study and Seismic Survey	The pore water study focused on water within pore spaces in sediments immediately beneath the Colorado River. Samples from the river were taken along approximately 16 transects—eight downstream of the groundwater plume and eight upstream of the groundwater plume (CH2M HILL, 2005d). Pore water transects within the Action Area are shown in Figure 4. Approximately four samples were taken at each transect. In addition, approximately 10 core samples of river sediment were taken. Sampling depths ranged from 2 to 6 feet below the riverbed. Prior to implementation of the pore water study, the United States Geological Survey (USGS) conducted a seismic survey within the Colorado River to better understand bedrock characteristics below the riverbed. This survey involved the use of a small watercraft utilizing equipment similar to a fish finder to conduct the seismic bedrock survey.	Prior review and approval by the USFWS HNWR concluded that no effect to sensitive fish species would result from implementation of the pore water study (USFWS, 2005d). Authorization and approval for the pore water study provided by the USFWS HNWR on November 15 included a prohibition on take of any wildlife, particularly threatened and/or endangered species.	Sampling began in December 2005/early January 2006, and is now complete. It should be noted that other pore water samples will be conducted as part of the East Ravine Investigation as described in the RFI Soil Investigation Work Plan (CH2M HILL, 2013a).	None, all activities were completed within the Colorado River	None, surface water and sediment samples only.
Restoration	Restoration activities completed to date involved the revegetation of the area affected by installation of monitoring well MW-43 and decommissioning of the IM-2 batch treatment system at the MW-20 Bench. Restoration at MW-43 involved the planting of approximately 100 mesquite trees along the approximately 250-foot access corridor to MW-43. Decommissioning of the IM No. 2 batch treatment system to date has involved cleaning and removing tanks and associated containment structures, removal of support facilities (including the field trailer, field laboratory, generator, ice machine and potable water tanks, etc.), securing batch treatment pumps, piping and appurtenances, and modifying the security fencing to reduce the footprint of the secured area.	Decommissioning of the MW-20 Bench was performed in phases, as described in the *MW-20 Bench Decommissioning Work Plan,* submitted to BLM on August 8, 2005 (CH2M HILL, 2005l).	The MW-20 Bench batch treatment system was decommissioned in February and March 2009 (CH2M HILL, 2009c).	None, activities related to restoration of areas disturbed by MW-43 well installation	None

TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
Past and Present Activities Within the Project Action Area Post 2007 PBA					
California Slant Drilling Project	The California Slant Drilling Project involved groundwater characterization beneath the Colorado River using a slant drilling method. This method was used to install two multi-level groundwater monitoring wells (MW-52 and MW-53), extending below the Colorado River. As documented in the completion report for the California Slant Well Project facilities, (CH2M HILL, 2007c), the construction of these wells did not result in take of any of the listed species. However, this activity required the removal of 0.082 acres of vegetation on the Colorado River floodplain.	The project was conducted under a "may affect, not likely to adversely affect" determination for the southwestern willow flycatcher, and a 'no effect' determination for the remaining species listed in the 2007 PBA.	Installed between February 24 and March 30, 2007/ ongoing sampling. Future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy,	**Floodplain:** 0.082 acres **Uplands:** None	Two (MW-52 and MW-53) On floodplain beneath Interstate 40 Bridge
Upland In-Situ Pilot Study	Similar to the Floodplain ISPT, the Upland ISPT activities involved circulating different reducing reagents through the groundwater aquifer between two recirculation wells (PTR1 & PTR2) at the MW-24 Bench. The test performance was determined by measuring the reduction of chromium levels in three monitoring wells (PT7, PT8, and PT9) located between the two recirculation wells as described in the Work Plan (MWH, 2005b). The Upland ISPT equipment and operation are similar to those described for the Floodplain ISPT and involve injection of reagents at up to four separate times over the 7-month operation period and groundwater monitoring. Groundwater monitoring occurs as frequently as daily over the first week of operations, and then weekly to monthly until the end of the study on February 23, 2008. The ISPT wells are all located within the previously disturbed areas at the MW-24 bench and the Topock Compressor Station. Because the project area, staging areas, and access routes have been used extensively for past activities, these areas were already devoid of vegetation prior to the initiation of this project. As documented in the completion report for these facilities (CH2M HILL, 2008a), the construction and testing activities were completed with no take of any listed species.	The Upland ISPT activities were approved in an email from the HNWR Refuge Manager John Earle, dated March 23, 2007 (BLM, 2007b) that provided clarification of the USFWS authorization letter dated March 14, 2007 (USFWS, 2007b).	Installed between April 23 and July 18, 2007; Pilot test ran between July 2007 and February 23, 2008. While the ISPT is complete, sampling of selected wells is ongoing. Future sampling will be incorporated into the Sampling and Monitoring Program in Section 3.3 (Planned Activities	**Floodplain:** None **Uplands:** None All activities within previously disturbed, unvegetated areas at MW-24 Bench.	Five (PT7, PT8, PT9, PTR1, and PTR2) All on MW-24 Bench
Arizona Drilling Program	As described in the work plan (CH2M HILL, 2007d), the Arizona Drilling Project involved the installation of three groundwater monitoring wells, designated as MW-54, MW-55, and MW-56, at separate locations on the east shore of the Colorado River. Monitoring wells MW-55 and MW-56 were installed on private land, while monitoring well MW-54 was installed on federal (HNWR) land. As documented in the completion report for the Arizona Drilling Project, (CH2M HILL, 2008b), the construction of these facilities did not result in take of any of the listed species.	These activities were discussed in the 2007 PBA and so fell under a determinations of "may affect, but not likely to adversely affect" for southwestern willow flycatcher, desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub; and a "no effect" determination for the Colorado pikeminnow (CH2M HILL, 2007a). The Arizona Drilling Program activities were authorized in a letter from BLM Lake Havasu Field Office dated February 11. (BLM, 2007a).	The wells were installed between March 11 and April 23, 2008. Sampling is ongoing. Future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy.	**Floodplain:** None **Uplands:** None All three of these wells were installed in locations that had been previously disturbed and, so did not require any removal of vegetation.	Three (MW-54, MW-55, and MW-56). Two on floodplain and one on southern margin of Topock Marsh
Soil Investigation	Based on the RCRA Facility Investigation, Soil Investigation Work Plan Soil investigations were conducted in 2008 to characterize environmental conditions at six different Areas of Concern (AOC) including AOC 4, AOC 9 through AOC 12, and AOC 14. It also included soil samples within Bat Cave Wash (AOC 1 and SWMU 1); at the former 300B Liquids Tank east of the TCS, and the potential pipe disposal area on a previously disturbed portion of the HNWR. This soil investigation also included background soil sampling at seventeen locations, as shown in Figure 4, as well as any soil sampling that will occur under the 2012 re-initiation of original 2007 PBA, which is now valid until 2017.	Authorization letter for soil sampling activities received from USFWS on August 22, 2008 CDFG Streambed Alteration Agreement; These activities were discussed in the 2007 PBA and so fell under a determinations of "may affect, but not likely to adversely affect" for southwestern willow flycatcher, desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub; and a "no effect" determination for the Colorado pikeminnow (CH2M HILL, 2007a). As documented in the biological resources completion report for these activities (CH2M HILL, 2008c), the soil sampling was completed with no take of any listed species.	Soil sampling completed between August 22 and October 24, 2008. This also includes all future soil sampling activities to be completed under the 2012 re-initiation of original 2007 PBA, which is now valid until 2017.	**Floodplain:** None **Uplands:** None As documented in the Biological Completion Report (CH2M HILL, 2008c), approximately 0.162 acres of temporary disturbance to the unvegetated Bat Cave Wash active channel for equipment access during sampling. All upland soil sampling was conducted on unvegetated, previously disturbed areas. No vegetation removal of any kind was required, so no habitat loss occurred as a result of this activity.	None, soil samples only

TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
East Ravine Groundwater Investigation (Part 1)	As described in the work plan (CH2M HILL, 2008d), the East Ravine Groundwater Investigation involved the installation and development of eight groundwater monitoring wells (MW-57 through MW-64) within the unvegetated dry wash and in upland locations that were used to characterize groundwater conditions associated with TCS activities. All wells were installed within unvegetated wash or previously disturbed areas such as existing dirt roads and road shoulders so that no habitat loss occurred as a result of these activities.	These activities were part of the 2007 PBA and so fell under a determinations of "may affect, but not likely to adversely affect" for southwestern willow flycatcher, desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub; and a "no effect" determination for the Colorado pikeminnow (CH2M HILL, 2007a). On November 3, 2010, BLM requested a partial re-initiation of consultation regarding the 2007 PBA for an additional 15 monitoring well clusters increasing the number of upland well clusters from 15 to 30 without increasing the area of upland habitat disturbance from 3.0 acres. East Ravine Investigation activities were authorized by letter dated November 7, 2008 (DOI, 2008). On November 16, 2010, USFWS issued a letter to BLM stating that the revised project did not change its concurrence of "may affect, but not likely to adversely affect" for species covered under the 2007 PBA (USFWS, 2010b).	Wells installed between January 21, 2009 and May 2, 2009. Sampling ongoing. Future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy.	**Floodplain:** None **Upland:** 0.00207 ac 0.000745 ac of permanent disturbance in unvegetated wash for MW-58. No vegetated habitat was removed for these wells. As documented in the biological resources completion report for these activities (CH2M HILL, 2009d), the well installations were completed with no take of any listed species	Eight (MW-57 through MW-64)
East Ravine Groundwater Investigation (Part 2)	The East Ravine Groundwater Investigation was continued based on a revised work plan (CH2M HILL, 2010b) and involved the installation and development of groundwater monitoring wells at eleven new locations (MW-65 through MW-74) in the East Ravine and TCS area (plus one deep well at existing Location MW-60) to provide additional groundwater characterization data for the RFI/RI. Twenty new monitoring wells installed within 16 boreholes were established in the 11 locations during the investigation. However, because wells were constructed in unvegetated and previously disturbed areas such as within the existing TCS or within dirt roads and road shoulders, no habitat loss occurred as a result of these activities.	Additional investigations were conducted under the original consultation and authorization letter (DOI, 2008). These activities were part of the 2007 PBA (as re-initiated in 2012) and so fell under a determinations of "may affect, but not likely to adversely affect" for southwestern willow flycatcher, desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub; and a "no effect" determination for the Colorado pikeminnow (CH2M HILL, 2007a).	Wells installed between March 15 and late September 2011. Sampling ongoing. Future sampling will be incorporated into the Sampling and Monitoring Program of the Final Groundwater Remedy.	**Floodplain:** None **Upland:** None As documented in the biological resource completion reports for this investigation (CH2M HILL, 2012a), the well installations were completed with no take of any listed species.	Eleven (MW-65 through MW-74); note one additional deep well interval was added to previous well location MW-60
AOC 4 Removal Action	As described on the work plan (CH2M HILL, 2009e), the AOC 4 Removal Action was performed to remove fill material and debris deposited over the northern slope, and debris accumulating in the bottom of the "debris ravine" designated as AOC 4. The removal action began in January 2010 and continued to December 16, 2010. Three primary methods were employed to remove fill and debris material from AOC 4: manual collection, vacuum excavation, and mechanical excavation. Two small check dams were constructed within the AOC 4 debris ravine and a rock gabion with geotextile filter fabric was installed at the confluence of the AOC 4 ravine with Bat Cave Wash to prevent subsequent migration of debris or contaminants into the wash.	AOC 4 Removal Action activities were authorized by letters dated December 15, 2009 (DOI, 2009) and January 7, 2010 (USFWS, 2010c). These activities were part of the 2007 PBA and so fell under a determinations of "may affect, but not likely to adversely affect" for southwestern willow flycatcher, desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub; and a "no effect" determination for the Colorado pikeminnow (CH2M HILL, 2007a). Master CDFG Streambed Alteration Agreement Notification 1600-2005-0140-R6, as amended on January 10, 2007. As documented in the biological resource completion reports (CH2M HILL, 2011), the AOC 4 Removal Action activities were completed with no take of any listed species.	Project was initiated on January 26, 2010 and finished on December 16, 2010	**Floodplain:** None **Upland:** None Approximately 1.6 acres of disturbance of upland habitat occurred from the AOC 4 Removal Action. Other disturbance occurred within washes includes 0.043 acre within the AOC 4 Debris Ravine for two small check dams and 0.072 acre within Bat Cave Wash for a rock gabion for a total of 0.115 acre. Several creosote bushes were removed from the north wall and one honey mesquite was trimmed (CH2M HILL, 2011)	None, debris removal only
Geophysical Survey	The Geophysical Survey (surface resistivity logging) was conducted in support of the Freshwater Implementation Plan to locate the most favorable portion of the subsurface channel for water yields at locations within California and Arizona. The soil resistivity logging was completed before drilling exploratory borings to support the evaluation of alternative freshwater sources for the Final Groundwater Remedy. The geophysical survey areas were located in pre-existing disturbed areas. No additional areas were disturbed and no habitat loss occurred as a result of this activity.	These activities were part of the 2007 PBA (as re-initiated in 2012) and so fell under a determinations of "may affect, but not likely to adversely affect" for southwestern willow flycatcher, desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub; and a "no effect" determination for the Colorado pikeminnow (CH2M HILL, 2007a). No other consultation for these activities that occurred outside of the bird nesting season in the Action Area. As documented in the biological resource completion report for these activities (CH2M HILL, 2013b), the geophysical survey activities were completed with no take of any listed species.	October 22 to 26, 2012	**Floodplain:** None **Upland:** None The geophysical survey areas were in previously disturbed areas, which required only minimal trimming of creosote bush and tamarisk. No habitat loss occurred as a result of this activity (CH2M HILL, 2013b).	None, soil resistivity measurements only

TABLE 1
Past and Present[a] Activities Within the Project Action Area

Project Title	Project Summary (including location, project description, conclusion)	Approval/Consultation	Start/End Dates	Habitat Disturbance	Well/Well Clusters[b] (see Figures 4 and 5 for locations)
Utility Potholing	This project was undertaken to help plan future pipeline alignments by accurately locating existing utilities features in the Action Area at 39 locations. The utilities investigated included telecommunication lines, fuel and natural gas lines, and remediation water lines owned by Frontier Communications; Kinder Morgan; Mojave Electric; SoCal Gas, Southwest Gas, Transwestern Gas, and PG&E. All holes were refilled upon completion.	These activities were part of the 2007 PBA (as re-initiated in 2012) and so fell under a determinations of "may affect, but not likely to adversely affect" for southwestern willow flycatcher, desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub; and a "no effect" determination for the Colorado pikeminnow (CH2M HILL, 2007a). No other consultation for these activities was required because they occurred outside of the bird nesting season in the Action Area. As documented in the biological resource completion report for these activities (WSA, 2014), the geophysical survey activities were completed with no take of any listed species.	October 15 to October 24, 2013	**Floodplain:** None **Upland:** None The potholing activities occurred solely within previously disturbed areas (roadway shoulders or developed industrial areas) that were devoid of vegetation. There was no habitat loss or vegetation removal (WSA, 2014).	None, shallow potholes only that were re-filled upon completion.
Alternative Freshwater Sources Evaluation Implementation Plan	This project includes the construction of up to two water supply wells in Arizona along the west side of the Oatman-Topock Highway. The first well, HNWR-1, was already constructed by the HNWR. A second (Site B) well to the north within Sacramento Wash, was recently constructed under the 2007 PBA (as re-initiated in 2012).	This work was included in and is occurring under the 2012 re-initiation of original 2007 PBA, which is now valid until 2017.	Fall 2010 to end of February 2014 (estimated)	**Floodplain:** To Be Provided **Upland: None** Located within the 100-year floodplain of the Colorado River floodplain.	Two (HNWR-1 and additional Site B well to north)
			Total	**Floodplain: 0.08407 acre** **Washes: 0.115 acre** **Upland: 1.6 acres**	**Wells/Well Clusters: 32**

Notes:

[a] Many of these same activities will occur in the future as part of the Final Groundwater Remedy and are the subject of this consultation as presented in Table 2.

[b] Tally of wells or areas of disturbance that pre-date the January 2007 PBA, do not count against the total in that document.

3.3 Planned Activities

Remedial actions for the Final Groundwater Remedy are identified in this section. Implementation of the groundwater remedy consists of several phases, including construction, O&M, post-remediation monitoring, decommissioning, and restoration. The Final Groundwater Remedy description has been summarized from the Basis of Design Report / Intermediate (60%) Design Submittal for the Final Groundwater Remedy that was submitted on April 5, 2013 (CH2M HILL, 2013c) but also incorporates the latest information related to the Freshwater Implementation Program and freshwater pre-injection treatment discussions with regulatory stakeholders. The Final Groundwater Remedy activities are listed below and described later in this section and represent the latest available information at this time. Table 2 includes a list of planned activities and an estimate of potential habitat loss resulting from those activities. It should be noted that the 90% design is expected in August 2014. It is possible that in response to comments, further refinements to the alignments and impacts may result. Table 3 provides a summary of the Final Groundwater Remedy impacts from Tables 1 and 2.

The Final Groundwater Remedy will be constructed and operated until the following remedial action objectives (RAO) are achieved:

1. Prevent ingestion of groundwater as a potable water source having hexavalent chromium (Cr[VI]) in excess of the regional background concentration of 32 micrograms per liter (μg/L).
2. Prevent or minimize migration of total chromium (Cr[T]) and Cr(VI) in groundwater to ensure concentrations in surface water do not exceed the designated “beneficial use” water quality standard of 11 μg/L Cr(VI) s for the Colorado River.
3. Reduce the mass of Cr[T] and Cr(VI) in groundwater at the site to achieve compliance with the applicable or relevant and appropriate requirements (ARAR) in groundwater. This RAO will be achieved through the cleanup goal of the regional background concentration of 32 μg/L of Cr(VI).
4. Ensure that the geographic location of the target remediation area does not permanently expand following completion of the remedial action.

Figure 6 shows the planned Final Groundwater Remedy system layout in California and Arizona. The Final Groundwater Remedy is expected to operate for several decades (up to 50 years).

Generally, the Final Groundwater Remedy will include the following key features:

- An **In situ Reactive Zone (IRZ)** along the National Trails Highway that will use a line of wells that may be used as both injection and extraction wells to circulate groundwater and distribute an organic carbon source that will promote reduction of the Cr(VI) to trivalent chromium (Cr[III]).
- An **Inner Recirculation Loop (IRL)** that comprises:
  - Extraction wells near the Colorado River (referred to as the River Bank [RB] extraction wells) to provide hydraulic capture of the deep Cr(VI) groundwater concentrations, accelerate cleanup of the floodplain, enhance the flow of contaminated groundwater through the IRZ line, and control migration of IRZ-generated byproducts toward the Colorado River.
  - Injection wells to re-inject groundwater extracted from the River Bank extraction wells, which may be amended with an organic carbon source, in the upgradient portion of the Cr(VI) plume to flush the plume through the IRZ.
- A **TCS Recirculation Loop**, which includes:
  - East Ravine (ER) extraction wells in the eastern end of the East Ravine to capture contaminated groundwater in the shallow bedrock.

  - Transwestern Bench (TWB) extraction wells along the eastern side of the TCS to capture contaminated groundwater downgradient of TCS.
  - TCS injection wells located northwest of the TCS for the re-injection of groundwater extracted from the East Ravine and Transwestern Bench extraction wells. The extracted water will be amended with an organic carbon source to promote reduction of the Cr(VI) to Cr(III) and reduce elevated Cr(VI) groundwater concentrations from the alluvial aquifer in the vicinity of the TCS.
- **Freshwater Supply System** will convey water from a supply well in Arizona to assist with flushing the chromium plume through the National Trails Highway IRZ and to constrain the westward spread of carbon-amended water and in situ byproducts from the IRL.

The Final Groundwater Remedy will also include utility and support facilities necessary to make the remedy effective and safe over the anticipated decades-long operation. Utilities will include electrical power supply, communications systems, and instrumentation and control systems. Support facilities will include carbon amendment facilities, access routes, facilities to manage wastewater, operator's facilities (office space, bathrooms, etc.), long-term storage of excess soil, equipment and materials storage, equipment maintenance and testing areas, waste or refuse containers, and an onsite laboratory.

In addition, temporary facilities will be required for the construction of the remedy. Potential locations within the project area have been identified in the project area for temporary staging locations for construction activities including a construction yard. These temporary staging areas and the construction yard are located in areas that are already developed or disturbed. It is anticipated that the construction yard will include at a minimum: multiple trailers serving as a work place for personnel, a central check-in/out location for site visitors, a place for daily briefings/project meetings, and staging area for equipment and materials as well as other construction-related functions.

In compliance with the mitigation measures and agreements that govern the project, the remedy infrastructure has been designed in a manner that gives: (1) priority to previously disturbed areas for the placement of new physical improvements, and (2) priority to re-use of existing physical improvements, such as, but not limited to, wells and pipelines, but not including the IM No. 3 Treatment Plant.

The description of the planned activities for the Final Groundwater Remedy follow the format of Table 2 and are described in the following subsections as they relate to the construction of the facilities; the operation and maintenance of those facilities; the sampling and monitoring of those facilities; soil storage; and decommissioning, restoration, and post-remediation monitoring.

3.3.1 Construction of the Final Groundwater Remedy

Additional details on these key features of the Final Groundwater Remedy, as well as supporting systems are provided in the following subsections. During the design, PG&E has located all remedy infrastructure to avoid or minimize impacts to biological resources to the maximum extent practicable. Biologists performed field reviews together with the design team prior to selection of locations for the design. In addition, a pre-construction survey will also be conducted by biologists to minimize the impacts to biological resources. The potential impacts to biological resources from these activities are described within Section 5.0 of this PBA.

3.3.1.1 Remediation Wells

At the 60% design stage, the Final Groundwater Remedy will require 48 new wells, with the flexibility to add approximately 37 provisional wells in the future, as needed to optimize the remedy system. The total estimated number of new remediation wells (including future provisional wells) is 95. The 90% remedy design submittal is planned for the summer of 2014 and will be incorporated into the current consultation.

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Construction[a]		
Remediation Wells: a total of 48 new wells plus 37 provisional wells[b]	**National Trails Highway In Situ Reactive Zone (IRZ):** -Twenty-four (24) IRZ Injection wells (plus 30 future provisional wells) -Four (4) IRZ Extraction wells (plus one future provisional well) **Inner Recirculation Loop (IRL):** -Four (4) Injection wells (plus 3 future provisional wells) -Five (5) Riverbank Extraction wells **Topock Compressor Station (TCS) Recirculation Loop:** -Two (2) TCS Injection wells -Five (5) East Ravine Extraction wells (plus 1 future provisional) -Two (2) Transwestern (TW) Bench Extraction wells (plus two future provisional wells) **Freshwater Injection:** -Two (2) Freshwater Injection wells	**Required Additional Current Floodplain[d] Acreage:** 0.1 acres **Required Additional Historical Floodplain[d] Acreage:** 1.6 acres **Required Additional Upland Acreage**: 0.2 acres **Required Additional Wells**: 85 planned and provisional Primary floodplain habitat impacts will be for the Riverbank Extraction wells, pipelines, and access routes which will be placed to the extent possible outside of dense vegetation areas. Primary upland habitat impacts will be for new wells, pipelines and access routes in previously undeveloped or undisturbed areas. The locations will avoid perennial vegetation and shrubs to the extent possible. Note that approximately 95 percent of the current and historical floodplain acreage impacts are associated with tamarisk and arrow weed vegetation units.
Monitoring Wells	Nineteen (19) new monitoring well locations (plus 6 future provisional wells) Re-use existing monitoring wells where possible	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** 0.9 acres **Required Additional Upland Acreage:** 0.1 acre **Required Additional Wells:** 19 planned and 6 provisional clusters. Primary historical floodplain habitat impacts will be for the monitoring wells (A, B, C, D, H, and O) and access routes which will be placed to the extent possible outside of dense vegetation areas. The floodplain impacts are limited to the historical river floodplain and there are no expected impacts within current river floodplain. Primary upland habitat impacts will be for new wells, pipelines and access routes in previously undeveloped or undisturbed areas. The locations will avoid perennial vegetation and shrubs to the extent possible.
Carbon Amendment and Carbon Storage Facilities	One 3,000-gallon aboveground carbon storage tank and carbon amendment facility at the TW Bench One 15,000-gallon aboveground carbon storage tank and carbon amendment facility at the MW-20 Bench	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None No additional habitat impacts are expected because these facilities will be placed within previously developed upland areas. Any unavoidable impacts to individual native trees will be addressed through established salvage or replacement approaches.

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Freshwater Source/Supply wells/Pre-injection Treatment/Storage Facilities	At this time, field work is being conducted to determine the best location for a primary freshwater supply well in Arizona. It is anticipated that DTSC and DOI will provide direction to PG&E on freshwater supply by April 2014. In the meantime, there are two candidate locations for freshwater supply for the remedy, as follows: The first location for freshwater supply being considered is the existing well HNWR-1 located on the Refuge in Arizona or a new well at a nearby location. A second well located north of HNWR-1 (provisional designation, Site B Well) is also being evaluated. If needed, freshwater can be supplemented from the existing supply wells to TCS, namely, Topock-2/3 wells. One Fresh Water Pre-Injection Treatment System (FWPTS) and associated chemical storage tank and two small process tanks will be located at the Compressor Station, if required. [Note: Initial details are preliminary and these items will be included as a contingency in the 90% Design] Two freshwater storage tanks at the Topock Compressor Station. Note that these freshwater storage tanks will be operated separately from the Topock Compressor Station water supply tanks.	**Required Additional Current Floodplain Acreage:** 1.1 acres **Required Additional Historical Floodplain Acreage:** 0.1 acres **Required Additional Upland Acreage:** 0.2 acre **Required Additional Well:** One potential future well near HNWR-1. Well HNWR-1 was already constructed by the USFWS and lies within the 100-year floodplain of the Colorado River. Similarly, the Site B Well is also already constructed and lies within the floodplain. A future supply well near HNWR-1 would also be within the floodplain. The contingency pre-injection treatment facilities would be located within previously developed upland areas, if required. Estimate above is based on pipelines only.
Piping Corridors	-Belowground water pipes are made of plastic (high density polyethylene [HDPE]). Aboveground water pipes are made of steel (Schedule 40 steel with AWWA C205 cement mortar lining). [Note: Final details on belowground and aboveground segments still under consideration] **Conveyance Piping Associated with Remediation Wells** -The groundwater remedy includes approximately 26,000 feet of trenches and more than 100,000 linear feet of pipeline, with most being installed below ground either direct burial or in pre-cast concrete trenches. **Conveyance Piping Associated with Freshwater Supply** -Approximately 105,000 feet (ft) of water/liquid/utility pipes, and approximately 70,000 ft of electrical conduits and cables. Most of conveyance pipes/conduits will be below ground. -Approximately 2,200 feet of double-walled pipe.	**Required Additional Current Floodplain Acreage:** 1.7 acres **Required Additional Historical Floodplain Acreage:** 4.7 acres **Required Additional Upland Acreage:** 0.5 acre **Required Additional Wells:** None Portions of the freshwater pipeline along Oatman-Topock Highway in AZ will be within the 100-year floodplain of the Colorado River. There is another segment of freshwater conveyance line that crosses along the edge of the floodplain beneath the Interstate 40 bridge. No additional floodplain impacts because the pipeline will cross the Colorado River on an existing pipe bridge that spans the floodplain. These acreages are included in remediation and freshwater impacts above.
Supporting Facilities	The primary power supply source for remedy facilities in California will be power generated by the TCS. Secondary power supply will be power generated from small photovoltaic solar panels at various locations such as at the Central Maintenance Facility at the TW Bench and at select remote well locations. Power will be transmitted at 480 VAC to 12K VAC along pipeline corridor, six load centers are planned with a transformer/distribution equipment at each one (plus one future provisional load center to serve the future provisional well IRL-7 if this well is needed to be installed/operated). For the freshwater supply well (HNWR-1) in Arizona, the power supply source will be power provided by Mohave Electric Cooperative. Remedy-produced Water Conditioning System and associated tanks located at the Compressor Station One central maintenance building (approx. 10,000 sq. ft.) and one storage building (approx. 900 sq. ft.) at the TW Bench. A Supervisory Control and Data Acquisition (SCADA) and Human Machine Interface (HMI) system located at the central maintenance building at the TW Bench.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** None expected **Required Additional Wells:** None One power transformer location north of Bat Cave Wash outlet is in the historical floodplain. Additional upland habitat needs are limited to the area needed for power facilities at or near HNWR-1 or at Site B well as well as other power transformer locations. Other facilities will be constructed in previously developed upland areas.
Access Pathways and Roadways	Reuse all existing access pathways and roadways (see Figure 7). Two new graded access roads will be needed in the upland area to allow for installation and maintenance of wells IRL-2 and IRL-4. To allow for shared use of the TW Bench by the Topock remediation project and Transwestern, one new access road east of the TW bench will be needed for access to Transwestern's gas transmission equipment.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** 0.6 acre **Required Additional Wells:** None New roadway impacts estimated for new roadways to IRL-2 (estimated at 150 feet) and IRL-4 (estimated at 350 feet long). Assumes a 50-foot-wide disturbance corridor.

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Other Ancillary Facilities	Upgrades to the evaporation ponds to address comments on the 60% Remedy Design Two aboveground pipe bridges for aerial crossing of Bat Cave Wash Small photovoltaic solar panels at various locations such as at the Central Maintenance Facility at the TW Bench and at select remote well locations. Small communication radios at select remote monitoring well locations to allow for remote data collection. Security equipment (e.g., fencing, gate, security cameras) for Transwestern bench and remote staging areas or other facilities. Concrete pads with sunshades for water supply wells to hold wellhead, pump, and electrical/control equipment.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** 0.1 acre **Required Additional Wells:** None There will be no additional historical floodplain or upland acreage due to the remote communication installations because they will be located immediately adjacent to the wells within existing disturbed areas. The upland disturbance for the two aerial bridge crossings over Bat Cave Wash will consist of concrete anchor points at either end of the bridges estimated at 25 by 30 feet each.
Construction Yard/Temporary Material Staging and Soil Storage	Within the Action Area, twenty-five staging areas (totaling up to 35.40 acres) have been proposed in California and four staging areas (totaling up to 3.18 acres) have been proposed in Arizona (see Figure 7). Twenty areas (totaling up to 22.95 acres) in California will be for staging only while five areas (totaling up to 11.5 acres) near the northwest corner of the Action Area are proposed for combined staging and soil storage areas. Two of the twenty areas (total 0.95 acre) are under negotiation as potential combined staging and soil storage areas to the north of the west access route. A construction yard (to be located in Park Moabi) will also be required which will include at a minimum: multiple trailers serving as a work place for personnel, a central check-in/out location for site visitors, a place for daily briefings/project meetings, etc.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None None of the proposed construction staging and soil storage areas are located within the historical floodplain or in undisturbed areas within the uplands.
Operation and Maintenance		
Operation of Final Remedy Facilities	Normal operation of the previously described Final Remedy facilities which includes the groundwater extraction and recirculation wells and pipelines carbon substrate storage and deliveries; carbon substrate injections, and regularly scheduled maintenance and repairs of the remedy system. Normal operation and maintenance of the freshwater supply, conveyance, and storage system. Normal operation and maintenance of the Remedy Produced Water Treatment system. Normal operation and maintenance of the Pre-Injection Arsenic Treatment system (if required). Normal operation and maintenance of the power supply and distribution system.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** None expected **Required Additional Wells:** None The operation of the IRZ facilities will not expand the project footprint beyond what has already been used during construction.
Well Maintenance and Decommissioning	Routine maintenance that can be conducted without intrusive modifications to the wellhead or well including regular surging and pumping techniques. A more aggressive routine maintenance technique uses AquaGard™ that injects cryogenic liquid carbon dioxide (CO_2) into existing well access tubes and requires all or some of the following: a CO_2 injection trailer, CO_2 storage vessel, support truck, pump rig and/or crane (if a pump or pipe needs to be installed/removed), and a support truck. Non-routine maintenance are intrusive methods requiring removal of existing equipment from well and include drop-pipe replacement; submersible pump repair/replacement; and well repair and well rehabilitation methods. Depending on the specific plan for well rehabilitation, some or all of the following equipment may be required: a pump rig and/or crane, support or pipe truck, generator(s), air compressor, chemical trailer (mixing tanks and pumps), neutralization trailer (mixing tanks and pumps), support truck, video van, vacuum or tanker truck, forklift, and 20,000-gallon frac tanks. The general approach for well decommissioning is currently being developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes and will be provided in the 90% Design O&M manual.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** None expected **Required Additional Wells:** None The operation of the IRZ facilities will not expand the project footprint beyond what will have already been used during construction.

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Pipeline Maintenance and Repair	A Clean-In-Place (CIP) system will operate as a closed loop system to use approved chemicals to remove biological films and mineral scale deposits within remedy pipelines. Spent CIP solutions will be collected and managed as liquid wastes. Sections of direct burial HDPE pipe requiring repairs will need to be exposed by excavation; whereas, belowground pipe section inside precast concrete trench can be accessed via maintenance manhole(s). Aboveground pipeline repairs will be done according to manufacturer's recommendations. Aboveground pipeline will need to be periodically repainted for upkeep and aesthetic reasons.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** None expected **Required Additional Wells:** None No additional habitat impacts are expected because repairs will occur along corridors and work zones that have already been already been used during the pipeline installation.
Waste Management Practices	Different waste streams include remedy produced water and CIP; displaced soil; solids and filters from remedy-produced water treatment system; dewatered sludge from contingency arsenic removal system; used PPE; miscellaneous waste; universal waste; recoverable materials; and sanitary waste. Liquid and solid wastes will be analyzed to determine if they are hazardous or not, and how the waste will be managed. Waste materials will be managed onsite in demarcated waste management areas that will be selected from the proposed staging areas shown in Figure 7. Wastes will be segregated, containerized and labeled before they are shipped off site in accordance with local, state, and federal transportation requirements. Recoverable materials will be recycled or re-used as feasible.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Upland areas that will be used for waste management and temporary storage will be limited to previously disturbed and unvegetated locations.
Storm Water Pollution Prevention	Storm water pollution prevention has two major objectives: Identifying and evaluating sources of pollutants associated with industrial activities that may affect the quality of storm water discharges and authorized non-storm water discharges from the facility; and Identifying and implementing site-specific best management practices (BMP) to reduce or prevent pollutants from being released in storm water discharges and/or authorized non-storm water discharges that may affect receiving water quality. The O&M SWPPP identifies BMPs as required by law, and establish a monitoring and sampling plan (including visual inspections and an annual comprehensive review). The annual comprehensive review is required to evaluate the effectiveness of the BMPs and to determine whether modifying BMPs or implementing additional BMPs is required. A Draft O&M SWPPP will be included in the 90% Design submittal that will reflect the latest requirements of the Industrial General Permit.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** None expected **Required Additional Wells:** None BMPs established by the O&M SWPPP are expected to be contained within existing project work areas or designated soil storage areas. SWPPP actions are not expected to expand the project footprint, except in the case of a possible response to a BMP failure during a storm event.
Fuel Storage and Fueling Practices	Two types of fuels are currently expected for use during the final Groundwater Remedy, diesel and gasoline, which shall meet the applicable California standards. There are existing diesel and gasoline bulk storage tank at the Topock Compressor Station that will be used by Final Remedy personnel. Alternate fuels, if used in the future, will comply will all local, state, or federal regulations related to their bulk storage and management. The Hazardous Materials Business Plan and SOPs will include procedures for properly storing and handling fuels on site; equipment and procedures for spill containment; required PPE; and measures to reduce the likelihood of spills during fueling or maintenance activities.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Fueling practices are not expected to expand the project footprint, except in the case of an unlikely spill.
Access Road and Pathway Maintenance	Access roadway and footpath are expected to deteriorate over time, so maintenance activities will need to be tailored to the specific cause and repair need. For footpaths, pruning of overgrowth will be done using hand tools or mechanical-powered tools. Soil stabilization for disturbed areas may be accomplished by applying approved soil stabilizing agents (e.g., SoilTac), erosion control matting, silt fencing, etc. Access roadways can be loose or compact dirt; gravel; or paved surfaces. Manual or mechanical grading may be required; as well as filling and soil stabilization. Ditches and culverts will be inspected and cleaned but may require replacement or ditch reshaping to increase capacity. Erosion control measures; addition of base fill or gravel; or re-paving of the roadways are all activities that may be required depending on the need.	**Required Additional Current Floodplain Acreage:** To Be Determined **Required Additional Historical Floodplain Acreage:** To Be Determined **Required Additional Upland Acreage:** To Be Determined **Required Additional Wells:** None The project footprint may be expanded in cases where roadway repairs require modifications of ditches or placement of fill to address erosion or deterioration issues. The added habitat acreage for this activity cannot be reasonably estimated; however, it is expected to be negligible because the likely repair areas will be alongside roadways, which have already been disturbed,

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Contingency Plans	Contingency Plans have been provided as part of the 60% Design Submittal in the form of the Draft Operation and Maintenance Manual – Volume 3 (CH2M HILL, 2012c) and consider the following unacceptable conditions: unacceptable remedy performance where the RAOs are not met; schedule failures where the time to cleanup is extended more than 5 to 15 years; cost failures; significant change to impact; and significant H&S or compliance incident. Contingency planning has been prepared for five key elements of the groundwater remedy: In-Situ Remediation System; Remedy-produced Water Management System; Freshwater Supply; Power Supply; and SCADA System. Various failures and corrective actions are considered.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None ESA consultation will be required for any unacceptable condition that leads to a longer time frame for achievement of the RAOs and continued activities for a longer period of time than contemplated in this consultation or results in potential impacts on any of the PBA-listed species not addressed here. However, should additional operational time be required, it will not expand the footprint of the Final Remedy beyond what was used during construction.
IM No. 3 Lay-up	Prior to startup of the Final Groundwater Remedy, the IM No. 3 system will be shut down and prepared for lay-up. When the IM No. 3 is in a lay-up condition, the system will be left in a safe, secure, and preserved state and will not operate again until agency approval is received for decommissioning and removal of the system. Procedures for shutting down IM No. 3 are included in the existing IM No. 3 Treatment and Extraction System Operations and Maintenance Plan (O&M) (CH2M HILL, 2006d). The IM No. 3 system will remain in a lay-up condition until PG&E receives approval for closure and decommissioning of IM No. 3, as appropriate. During the lay-up period, equipment maintenance is required to keep the equipment in good condition and under active equipment warranties, because most major equipment will likely be recovered for reuse. Electricity will be required for equipment maintenance. In addition, weekly inspections of the following equipment will be conducted: • Storage tanks that formerly contained hazardous materials. • Pressurized (compressed air) tank. • Onsite chemical storage areas. (Excess chemicals will be removed from site during lay-up preparation.) • Emergency shower and eye wash station and potable water cooling system. • Fire water tank. • Aboveground injection well pipeline and instrumentation conduit. Maintenance will also be conducted on the access road to the IM No. 3 Treatment Plant and injection wells as well as watering the road for dust control pursuant to EIR mitigation measures. Periodic filling of the potable water tank, and possibly the fire water tank at the IM No. 3 Treatment Plant, as well as regular pest control will also be required. Telecommunications and plant communications will continue to be maintained for safety, security, and maintenance requirements. Because personnel will be onsite during work days, the potable water system at the IM No. 3 Treatment Plant will stay in service to provide water to the sinks and toilet in the IM No. 3 Treatment Plant trailer. The sewage holding tank for the IM No. 3 Treatment Plant trailer will stay in service. The sewage holding tank will need to be serviced; the service frequency will be on an as needed basis.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None These actions are not expected to have impacts outside of the existing project footprint; however, ESA coverage would be additional inspection/maintenance site visits to the IM No. 3 facilities during the lay-up phase.

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Sampling and Monitoring Plan		
Monitoring well sampling locations and frequency	Remedy Compliance Monitoring and Process Control Monitoring Plan (RCM/PCMP) will include the planned 19 monitoring wells (Designated as Wells A through S in Figure 6) as well as any existing monitoring wells and surface water samples from the current GMP that are deemed necessary during the Final Remedy operations. It also includes the additional future 25 contingency wells. The RCM/PCMP sample locations, analytes, and frequencies will be adapted in an ongoing manner to meet the needs of the Final Remedy. Current GMP samples include: • Thirteen (13) groundwater wells are sampled biennially; • Thirty-nine (39) groundwater wells are sampled annually; • Two (2) active supply wells are sampled annually; • Thirty-five (35) groundwater wells are sampled semi-annually; • Fifty-four (54) groundwater wells are sampled quarterly; • Two (2) groundwater wells on the floodplain are sampled monthly between November and February • Two (2) active extraction wells are sampled monthly; • Four (4) shoreline surface water stations along the Colorado River and two (2) other surface water monitoring locations were sampled quarterly (except during the winter low-river stage conditions, when the stations are sampled one additional time); and • Ten (10) depth-specific sampling stations within the Colorado River that were sampled quarterly (except during the winter low-river stage conditions, when the stations are sampled one additional time). An initial RCM/PCMP for groundwater and surface water sampling are provided in the 60% Design Draft O&M Manual (Volume 2).	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Well sampling activities will make use of existing routes established during the well installations so no additional habitat impacts are anticipated. Associated impacts to wildlife resources are related to the periodic visits for well sampling during operation of the Final Remedy, which will be a function of the well sampling frequency and well characteristics (e.g., required purge volumes). Additional wells may also be required but the additional impact for this is accounted for in the provisional monitoring wells in the Construction section of this table.
Sampling Methods	SOPs for groundwater and surface water sampling are provided in Appendix A of the 60% Design Draft O&M Manual (Volume 2) (CH2M HILL, 2012d). The SOPs provide detailed method descriptions for purging and sampling of groundwater monitoring wells by well-volume and modified well-volume methods; purging and sampling of active and inactive water supply wells; depth-specific surface water sampling; groundwater sampling from sonic drilling boreholes; sample field filtration and preservation for metals analyses; decontamination of water sampling equipment; spill prevention, containment, and control measures for monitoring well sampling; pore water sampling; access routes; process water sampling; and safe fueling and fuel handling procedures.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Well sampling activities will make use of existing routes established during the well installations so no additional habitat impacts are anticipated. Associated impacts to wildlife resources are related to the periodic visits for well sampling during operation of the Final Remedy, which will be a function of the well sampling frequency and well characteristics (e.g., required purge volumes). The SOPs minimize potential impacts to sensitive biological resources.
Baseline Soil Sampling	A Baseline Soil Sampling and Analysis Plan is provided in Appendix A of the Draft O&M Manual (Volume 4) (CH2M HILL, 2012e). In areas where groundwater remedy infrastructure overlaps with any of the eighteen different Soil Investigation Areas, the approach presented in the SAP will be fully coordinated with the ongoing RFI/RI planning activities to minimize the total number of soil samples to be collected and associated ground disturbances, as well as to ensure consistency between the groundwater and soil programs associated with the Topock Remediation Project. The purpose of the baseline soil sampling will be to provide comparable data to evaluate potential impacts of the final remedy features at the time that they are being decommissioned. Baseline soil samples will be collected along the remedy pipelines/conduits alignments, which include direct burial pipelines/conduits, pipeline trenches, and the new remediation wells (i.e., injection and extraction wells) that are connected to those pipelines, as well as at the new remedy monitoring well locations. Baseline soil sampling will not occur along the alignment of the freshwater pipeline in Arizona, and on the California side, leading to the Compressor Station because the freshwater from HNWR-1 has very low concentrations of inorganic compounds so that potential risks to underlying soil from incidental releases, spills or leaks from the pipeline are negligible.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None The Baseline soil samples would be collected just prior to installation of Final Remedy facilities so the acreage for disturbance is already accounted for in the construction phase.

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Soil Storage		
Locations and Storage Methods	The Baseline Soil Sampling and Analysis Plan (SAP) presented in Appendix A of the Soil Management Plan 60% Design Draft O&M Manual - Volume 4 (CH2M HILL, 2012e) describes the collection of data to assist with the management of materials displaced during construction activities. Screening of analytical test results will determine handling requirements for displaced soils project in accordance with the Soil Management Plan. Figure 7 shows five different proposed staging/soil storage areas that have been identified in California (totaling 11.50 acres). Two other areas to the north of the west access route (Historic Route 66) totaling 0.95 acre, are currently being negotiated for dual staging/soil storage use. Displaced soil that is non-hazardous but is unsuitable for final disposition onsite because contaminants are present above the interim screening level cannot be reused until project-specific soil cleanup goals are finalized and must be stored onsite. Storage area(s) will depend on the volume of soil, which will not be known until after the implementation of the Baseline SAP. Soil will be stored in 55-gallon drums/small containers, roll-off bins, and/or stockpiles that are managed in accordance with the O&M SWPPP. All containers will be properly labeled according to state and federal requirements. Only non-hazardous soil will be stored in stockpiles.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Soil storage areas will be located within selected upland areas that have been previously disturbed. Application and maintenance of BMPs in accordance with the O&M SWPPP are expected to limit expansions of the storage area footprints.
Handling and Short-term Storage of Non-Hazardous Clean Soil	Non-hazardous clean displaced soil will be stockpiled at the work site. If feasible, clean soil that was removed from trenches or excavations will be reused as backfill into the same trench or excavation area. Clean soil that cannot be immediately used as backfill may be reused in other areas within the Action Area, or stockpiled for future reuse within the Action Area. Displaced soil that is stockpiled for future use will be managed following the BMPs Plan that will be part of the O&M SWPPP and included in Appendix E of the 90% design Draft Operation and Maintenance Manual – Volume 1 (CH2M HILL, 2012b). Storage area(s) for clean soil will depend on the volume of soil, which will not be known until after the implementation of the Baseline SAP (Appendix A). Once the volume of clean soil needing storage is determined, PG&E will coordinate with agencies, tribe(s), and affected land owners regarding the acceptable mode and location of storage. An addendum to the Soil Management Plan (SMP) will be prepared after the implementation of the Baseline SAP, to document sampling results and discuss implications on soil management. The volume of clean displaced soil from the decommissioning and removal of the IM No. 3 system requiring storage will not be known until after the system has been decommissioned and removed, which will not occur until after the start of implementation of the groundwater remedy. Since the amount of displaced soil from the decommissioning and removal of the IM No. 3 system is expected to be minimal and characterization of this displaced soil will not occur until after the SMP has been revised to include the Baseline SAP results, this displaced soil will be stored and managed following the same process as the soil displaced during the groundwater remedy installation and O&M as provided for in the revised SMP.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Short-term soil storage areas will be located and operated within selected upland areas that have been previously disturbed. Application and maintenance of BMPs in accordance with the O&M SWPPP are expected to limit expansions of the storage area footprints.
Long-term Storage of Non-Hazardous Soil	Displaced soil that is non-hazardous but unsuitable for final disposition onsite because contaminants are present above the interim screening level cannot be reused must be stored onsite until project-specific soil cleanup goals are finalized. Once final project specific cleanup goals are established, the contamination will be re-assessed based on existing data, or additional data as determined necessary, to determine final disposition (i.e., transportation to offsite disposal facility or reuse within the Action Area). The long-term storage area(s) will depend on the volume of soil, which will not be known until after the implementation of the Baseline SAP. Once the volume of soil needing long-term storage is determined, PG&E will coordinate with agencies, Tribe(s), and affected land owners regarding the acceptable mode and location of long-term storage. An addendum to the SMP will be prepared after the implementation of the Baseline SAP to document sampling results and discuss implications on soil management, especially long-term storage of soil. The volume of displaced soil in and near Soil RFI/RI Areas from the decommissioning and removal of the IM No. 3 system requiring long-term storage will not be known until after the system has been decommissioned and removed, which will be after the start of implementation of the groundwater remedy. The amount of displaced soil within and near Soil RFI/RI Areas from the decommissioning and removal of the IM No. 3 system is expected to be minimal and characterization of this displaced soil will not occur until after the SMP has been revised to include the Baseline SAP results. For these reasons, this displaced soil will be stored and managed following the same process as the soil displaced during the groundwater remedy installation and O&M provided in the revised SMP.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Long-term soil storage areas will be located and operated within selected upland areas that have been previously disturbed. Application and maintenance of BMPs in accordance with the O&M SWPPP are expected to limit expansions of the storage area footprints to these previously disturbed areas.

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Handling, Short-term Storage, and Offsite Transport of Hazardous Waste Soil	Non-RCRA and RCRA hazardous wastes will be removed from the site within 90 days from date of generation.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Hazardous waste soils will be contained in drums or roll-off bins and managed at waste storage areas will be located within selected upland areas that have been previously disturbed. Regular inspection of waste storage areas are expected to prevent releases of hazardous waste soil. There will be no hazardous soil storage or handling within the historical or current river floodplains.
Emergency Response	A barrier, such as temporary fencing, will be provided for hazardous waste accumulation areas that are otherwise accessible to the general public. Hazardous waste soil accumulation areas will also have signs that provide 24-hour emergency contacts and telephone numbers and will contain emergency response equipment appropriate to applicable waste hazards. The project-specific Health and Safety Plan will identify the project emergency response procedures and equipment, including emergency response contacts and phone numbers. In addition to the project-specific Health and Safety Plan procedures, hazardous waste accumulation areas will be provided with fire extinguishers, decontamination equipment including an eye wash station, and an alarm system (if radio equipment is not available to all staff working in accumulation area).	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None Established procedures for management of hazardous soil storage areas located in upland areas will include properly trained personnel and equipment to handle emergency response situations. There will be no hazardous soil storage or handling within the historical or current river floodplains.
Post-Remediation Monitoring		
Post-Remediation Monitoring	After active remediation is completed, monitored natural attenuation will be implemented as a long-term component of the groundwater remedy to address residual chromium that may remain in recalcitrant portions of the aquifer following efforts to enhance and optimize in-situ treatment and flushing systems during the O&M phase. In addition, in compliance with the State Board directive dated November 20, 2013, monitoring of groundwater quality in the freshwater injection areas will be conducted to verify that the arsenic water quality objective in the receiving groundwater are met within the earlier of (i) 20 years after achieving the RAO for chromium or (ii) 20 years after ceasing injection of freshwater containing naturally occurring arsenic at concentrations above the water quality objective. It is currently assumed that there will be no need for additional monitoring wells (or replacements) as a part of the post-remediation monitoring program.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** None expected **Required Additional Wells:** To Be Determined Well sampling activities will make use of existing routes established during the well installations so no additional habitat impacts are anticipated. Additional impact comes from the periodic visits for well sampling during operation of the Final Remedy, which will be a function of the well sampling frequency and well characteristics (e.g., required purge volumes). This assumes that no new wells will be needed other than those provisional wells already accounted for in the Construction section of this table.

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Decommissioning		
IM No. 3	Once the Final Groundwater Remedy is brought on line and is determined by the agencies to be operating properly and successfully, PG&E will decommission and remove the IM No. 3 system after receipt of approval by DTSC, with concurrence from DOI. A draft work plan describing the IM No. 3 Decommissioning activities will be submitted for review with the 90% design. Once approved, the work plan will be implemented for the decommissioning and removal of IM No. 3 facilities. The scope of work will include the decommissioning and removal or abandonment in place of the following IM No. 3 system components: • Three extraction wells in the MW-20 Bench area of the site (TW-2S, TW-2D, and TW-3D) and one extraction well in the floodplain (PE-1), as well as ancillary well equipment and vaults. Two injection wells in the East Mesa area of the site (IW-2 and IW-3) and power supply structure located at this site. Prior to decommissioning the wells, submersible pumps in the extraction wells, air-lift tubing in the injection wells, and pipes, valves, and instruments in both the extraction and injection well vaults will be removed. Conduit, electrical panels, and other features within a well vault will also be removed. • Underground piping and vaults between the extraction wells and the treatment plant. After successful decontamination or cleaning, underground pipelines and conduits exiting PE-1, IW-2, and IW-3 well vaults will be cut and capped outside of the well vault and abandoned in place. The subsurface well vault will then be removed. • Entire treatment plant, including equipment, pipelines, valves, instrumentation, utilities, and infrastructure underneath the sunshade, the sunshade, mobile warehouse units, trailer, treatment plant foundation and secondary containment areas, underground pipelines and utilities within the footprint of the treatment plant fence line, and security fence and gate. • Underground and aboveground pipelines, and instrumentation conduit between treatment plant and injection well field. • Support facilities on the MW-20 Bench, including Valve Vault #1, pumps, valves, pipelines, electrical, and instrumentation associated with the extraction wells, parking areas, security fence and gates, security system, lighting, and other ancillary equipment. • Existing MWs and their instrumentation that are currently used to monitor IM No. 3 performance will be reused as part of the monitoring network associated with the Final Remedy, and therefore will not be decommissioned. Decommissioning of these existing MWs and their instrumentation will be addressed as part of the decommissioning of the groundwater remedy. The general approach for decommissioning wells is being developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes, and will be incorporated into the Groundwater Remedy O&M Manual, Volume 1, Section 4 (Well Maintenance and Decommissioning), as available. • No aboveground component of the existing IM No. 3 system located within the footprint of the existing IM No. 3 Treatment Plant building, or within the IM No. 3 Treatment Plant fence line will be reused in its current location as part of the Final Remedy. The brine storage and loading facility (three tanks, the truck lane, and associated pumps and piping) will be reused by the Final Groundwater Remedy in its existing location at the MW-20 Bench.	**Required Additional Current Floodplain Acreage:** None expected **Required Additional Historical Floodplain Acreage:** None expected **Required Additional Upland Acreage:** None expected **Required Additional Wells:** None The decommissioning process is not expected to expand beyond the footprint that was already created during construction and maintenance activities. It is recognized however; that there may be "re-disturbance" for limited areas where habitat has re-established on previously disturbed areas.
Final Remedy	In compliance with the 2013 Consent Decree (Appendix C, Item 9), PG&E will submit a decommissioning plan within 120 days of DOI's certification of completion of the remedial action and a determination by DOI that removal of such facilities is protective of human health and the environment. The decommissioning plan will describe procedures for the removal of the remedy facilities and associated infrastructure. The plan will also describe the post-remedy restoration of the site to the conditions existing prior to the implementation of the remedy construction, to the extent practicable. In addition, in accordance with mitigation measure, biological surveys will be conducted prior to decommissioning, and during the breeding season, to inform the decommissioning planning process. The Final Remedy Decommissioning activities will be completed in accordance with the Bird Impact Avoidance and Mitigation Plan (BIAMP; CH2M HILL, 2013f) and other relevant documents (including this PBA). After decommissioning and removal of the remediation facilities, the areas will be restored using decompaction and grading techniques designed to decrease erosion and accelerate revegetation of native species. The decommissioning of monitoring wells will be after an appropriate time span following the decommissioning of the remediation facilities.	**Required Additional Current Floodplain Acreage:** To Be Determined **Required Additional Historical Floodplain Acreage:** To Be Determined **Required Additional Upland Acreage:** To Be Determined **Required Additional Wells:** None The decommissioning process is not expected to expand beyond the footprint that was already created during construction and maintenance activities. It is recognized; however, that there may be "re-disturbance" for limited areas where habitat has re-established on previously disturbed areas that have regrown during the Final Remedy operation (up to 50 years).

TABLE 2
Summary of Planned Activities for the Final Groundwater Remedy

Final Remedy Item	Planned Activity Description (refer to Figure 6 for locations of these features, unless otherwise noted)	Estimated Future Habitat Loss[c]
Restoration		
IM No. 3	The IM No. 3 restoration will provide a template after which, subsequent restoration efforts may be modeled or improved. Prior to conducting restoration activities, PG&E will prepare a Restoration Plan for review by regulatory agencies, stakeholders, landowners, and Tribal Nations. The focus of the Restoration Plan would be to outline the scope of restoration; the goals and objectives of the restoration; to promote native plant and habitat regeneration; and to prevent invasive plant establishment. Success criteria will be proposed along with a monitoring and reporting plan. Adaptive management will be used to evaluate the effectiveness of the restoration through monitoring, and adjust management of the site in the event of unforeseen circumstances. It should be recognized that the majority of the IM No. 3 decommissioned facilities are adjacent to ongoing Final Groundwater Remedy facilities. Similarly, previously used staging or soil storage may also be required for use in the Final Groundwater Remedy, or have ongoing activities (e.g., the Compressor Station, the Transwestern Metering Bench, the MW-24 Bench, the evaporation ponds area, the trailer park area in Moabi Regional Park, the parking areas off I-40, etc.). Even after the decommissioning of the IM No. 3 facilities, it is expected that restoration will not be feasible for many areas that are required for ongoing Final Remedy operations (e.g., MW-20 Bench). Rather, these areas will not be restored until after the Final Groundwater Remedy facilities have been closed and decommissioned. Instead, these locations will be maintained along with remaining facilities over the duration of the final remedy operation. Established roads and access pathways will be maintained during decommissioning and restoration activities. After demobilization, the condition of established roads and access pathways will be returned to pre-mobilization condition. The IM No. 3 treatment plant site may represent one area where restoration could proceed in advance of the closure of the Final Groundwater Remedy facilities, assuming it was not required as part of the Final Groundwater or Soil Remedies. Whether it is the former IM No. 3 Treatment Plant site or any other location, as previously mentioned, the IM No. 3 Restoration Plan will provide an excellent opportunity to develop the best methods and approaches that will help the Final Groundwater Remedy restoration efforts.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None No additional disturbance areas outside of those already used for prior construction or maintenance activities are expected during the restoration process.
Final Remedy	With the decommissioning and removal of the Final Groundwater Remedy facilities, it will be possible to restore many of the areas used by the Remediation Project. Prior to final decommissioning, a second Restoration Plan will be prepared for review by regulatory agencies, stakeholders and Tribal Nations. This Restoration Plan will encompass the remaining project areas used by groundwater remedy, including staging/storage areas. Similar to IM No. 3 Restoration, staging areas that have ongoing activities (e.g., the Compressor Station, the Transwestern Metering Bench, the MW-24 Bench, the evaporation ponds area, the trailer park area in Moabi Regional Park, the parking areas off I-40, etc.) will not be restored. Also, established roads and access pathways will be returned to pre-mobilization condition. The Restoration Plan for the remedy facilities will incorporate the approaches and feedback gathered from the previously prepared IM No. 3 Restoration Plan.	**Required Additional Current Floodplain Acreage:** None **Required Additional Historical Floodplain Acreage:** None **Required Additional Upland Acreage:** None **Required Additional Wells:** None No additional disturbance areas outside of those already used for prior construction or maintenance activities are expected during the restoration process.

Notes:

[a] The listed Final Groundwater Remedy features described in this table are based upon the 60% Design Submittal along with some modifications based on comments received. The 90% Design submittal is anticipated to be available in August 2014.

[b] The numbers of well locations and wells differs because of the need for dual well completions at certain individual locations (IRZ-11, -13, -15, -16, -17, -19, -20 and -21).

[c] The estimated habitat losses provided in this table may be modified based on discussions with Agencies. Habitat losses were estimated for planned well and pipeline locations as shown in the 60% Design and modified based on subsequent agency comments and a constructability review between April 7 and April 10, 2014. The habitat losses from the planned wells were used to estimate the additional habitat losses from future provisional wells, for which data is not currently available. Estimated impacts for the upland pipeline corridors used current design trench dimensions and assumed that a 25-foot construction corridor would be needed, recognizing that actual project impacts may be less as adaptations in the field are used to minimize impacts to potential sensitive resources or to avoid terrain constraints. In historical floodplain areas assumed pipeline construction corridors ranged between 50 and 75 feet based on anticipated design and construction conditions. In upland areas, the estimated new impact area was estimated by intersecting the GIS footprint with previous undisturbed areas. In the historical and current floodplains, the estimated new impact area was estimated by intersecting the GIS footprint with mapped vegetation polygons. It should be recognized that the vegetation unit intersections in the floodplain habitats overestimate impacts when the vegetation polygons contain significant bare ground (such as the native shrub and some arrow weed map units). In such units, it is expected that access routes will be able to avoid most (if not all) of the vegetation impacts.

[d] The current floodplain of the Colorado River includes those areas within the 100-year floodplain while the historical floodplain is comprised of the land in California that is outside of the 100-year floodplain and extends to the MW-20 Bench and National Trails Highway or adjacent upland area as shown on Figure 7.

LEGEND

- Existing Monitoring Well
- Existing Freshwater Supply Well
- Proposed Access Routes
- Property Boundaries
- PBA Update Action Area
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.

Remedy Wells

- Contingent Freshwater Source
- Freshwater Source
- Remedy Monitoring Well
- Extraction Well (East Ravine)
- Extraction Well (NTH IRZ)
- Extraction Well (Riverbank)
- Extraction Well (Transwestern Bench)
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Injection Well (NTH IRZ)
- Injection Well (Topock Compressor Station)
- Future Provisional Extraction Well
- Future Provisional Injection Well

Pipeline Corridor for Remedy

- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional

Remedy Facilities

- Proposed New Remedy Structure
- Transformers

Notes:

1. Note that in compliance with EIR mitigation measure CUL-1a-9, as well as PA and CHPMP mitigation measures, the pipeline along the dirt road west of National Trails Hwy is located in an existing, previously disturbed, access road. In addition, the location of the road and pipeline was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10, PA, and CHPMP mitigation measures .
2. Remedy features, as shown are based on 60% Design Submittal (CH2M HILL 2013a) as amended based on initial regulatory comments.

N

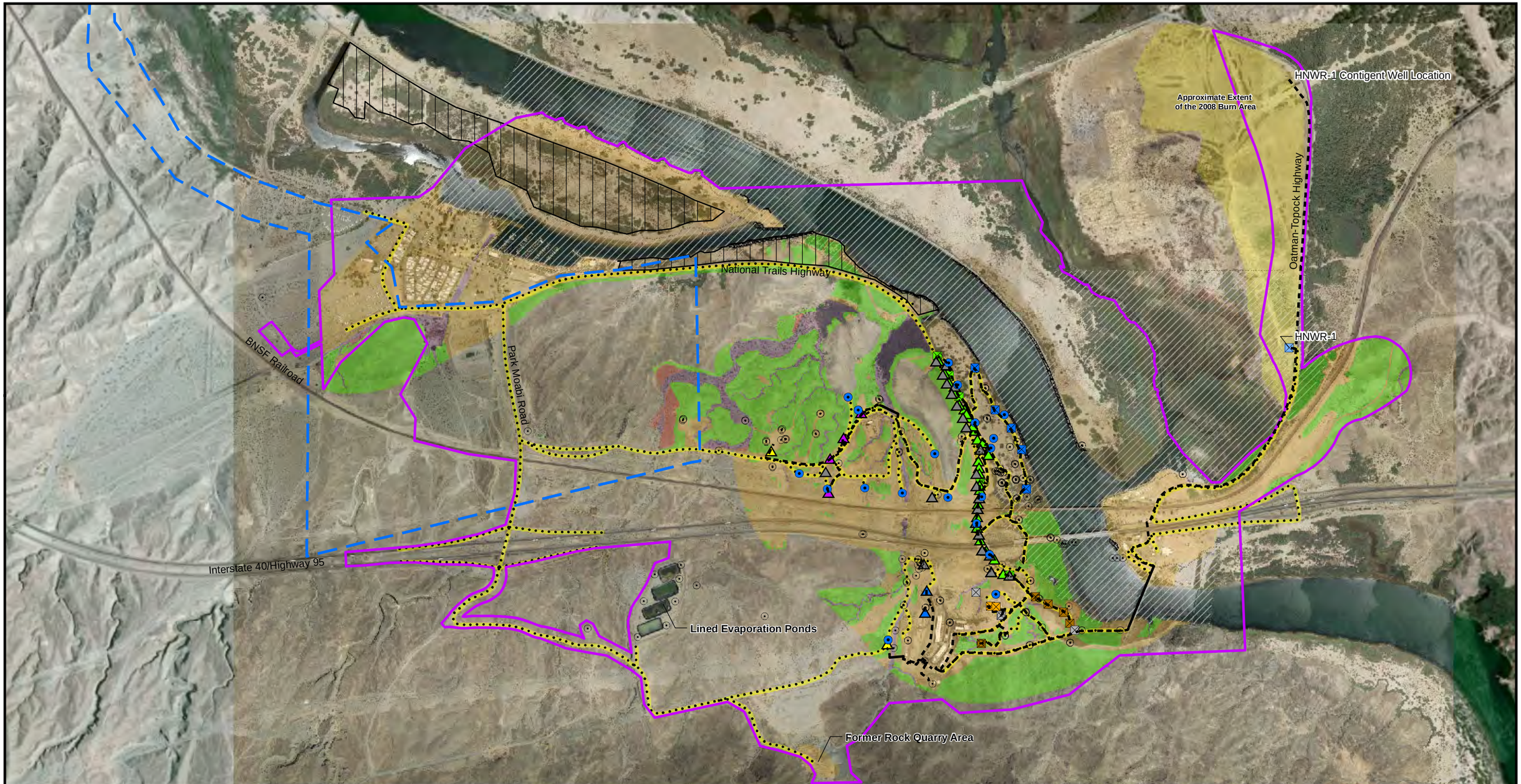
0 300 600 1,200 Feet

FIGURE 6
GENERAL REMEDY LAYOUT

FINAL GROUNDWATER REMEDY
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2013\PBA\2013Q4\FIG6_GeneralRemedyLayout.mxd



LEGEND

- Existing Monitoring Well
- Aboveground Pipe Route
- Underground Pipe Route
- Proposed Access Routes
- PBA Update Action Area

Remedy Features

- Future Provisional Extraction Well
- Future Provisional Injection Well
- Remedy Monitoring Well
- Freshwater Source

Surface Condition

- Mechanical Soil Surface Damage
- Dredged Sand
- Active Wash Channel
- Inactive Wash Channel
- Rip Rap
- Undisturbed and Archaeological/Historical Sites
- Mechanical Soil Surface Damage and 2008 Burn Area
- Open Riding Area (CTUC 2011)
- Vegetated Areas with ORV Trails
- Soil Storage and/or Staging Areas under Negotiation
- Combined Staging/ Soil Storage Area
- Staging Areas
- 100yr. Floodplain

Source Map:
Aerial Map of Disturbed Areas, November 2011
Note:
Access Routes and Surface Conditions are limited to the Project Area from the EIR.

FIGURE 7
PROPOSED CONSTRUCTION STAGING, SOIL STORAGE, AND ACCESS ROUTES
FINAL GROUNDWATER REMEDY
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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TABLE 3
Summary of 2007 PBA and Final Groundwater Remedy Impacts in the Project Action Area[a]

Final Remedy Item	Additional Current Floodplain Acreage[b]	Additional Historical Floodplain Acreage[b]	Additional Upland Acreage
Activities Covered Under 2007 PBA (including the 2012 Re-initiation)			
CA Slant Wells	0.082	None	None
Upland ISPT	None	None	None
AZ Drill Program	None	None	None
East Ravine GW Investigations (1)	None	None	None
East Ravine GW Investigations (2)	None	None	None
AOC 4 removal Action	None	None	1.6
FWIP	None	None[d]	None
Subtotal Activities Covered under 2012 Reinitiation	**0.082**	**None**	**1.6**
Final Groundwater Remedy Construction			
Remediation Wells	0.1	1.6	0.2
Monitoring Wells	None	0.9	0.1
Freshwater Source	1.1	0.1	0.2
Piping Corridors	1.7	4.7	0.5
Access Roadways	None expected	None expected	0.6
Ancillary Facilities	None expected	None expected	0.1
Subtotal	2.9[c]	7.3[c]	1.7
Including 20% Design Change Contingency	3.5	8.8	2.0
Total Final Groundwater Remedy	3.5	8.8	3.6
Allowable Acreage Disturbance Carry-Over from 2012 Reinitiation	2.5		8.0
Current Cumulative Disturbance	0.082		1.6
Amount Requested for Soil Investigation to Remain in 2012 Reinitiation PBA	0.14		2.2
Balance Remaining from 2012 Reinitiation PBA	2.278		4.2
Total Requested for Final Groundwater Remedy Minus 2012 Carryover[e] and Soil Investigation Amount	**1.222**	**8.8**	**4.2**

Notes:

[a] This table includes only those features in Table 2 where acreage impacts or wells for the Final Groundwater Remedy were noted.

[b] The current floodplain of the Colorado River includes those areas within the 100-year floodplain while the historical floodplain is composed of the land in California that is outside of the 100-year floodplain and extends to the MW-20 Bench and National Trails Highway or adjacent upland area as shown on Figure 7.

[c.] The areal estimates of impacts within the current and historical floodplain are based on intersections of the project footprint with mapped vegetation units. However, the mapped vegetation units contain a significant proportion of bare ground that would not actually represent habitat loss. Additionally, final design, layout, and construction approaches may be able to further reduce habitat losses. As such, the impact acreages presented here are very conservative, especially with respect to the floodplain impacts. Project footprint includes all access routes, well and pipeline work areas, as well as IM-3 areas that will decommissioned.

[d] This is only an estimate as the final completion reports have yet to be completed.

[e] Difference between 2012 Reinitiation Carryover and Final Groundwater Remedy.

3.3.1.1.1 In situ Reactive Zone (IRZ) along the National Trails Highway

This line of wells will be installed primarily along the eastern margins of the National Trails Highway, extending from the outlet of Bat Cave Wash in the north to a few hundred feet south of the Interstate-40 alignment. Almost all the wells are located adjacent to the National Trails Highway with the southern-most three wells located within a graded area between the roadway and the Transwestern Bench.

The current (60%) design will include 24 new injection wells and four new extraction wells. As shown in Figure 6, the new injection well locations have the following designations: IRL-11, 13, 15, 16, 17, 19, 20, 21, 25, 27 ,29, 30, 31, 33, 35, 36, 37, and 39, while the four extraction wells are designated: IRZ-1, 5, 9, and 23. As determined by the remedy need, the additional six wells would be installed within a selection of these same locations (either as dual or multiple-well installations).

The 60% design also includes a contingency for an additional future 30 injection wells. Eighteen contingency well locations are shown in Figure 6 with the following designations: IRZ-02, 03, 04, 06, 07, 08, 10, 12, 14, 18, 22, 24, 26, 28, 32, 34, 38, and 40. As determined by the remedy need, the additional twelve wells would be installed within a selection of wells at these same locations (either as dual or multiple-well installations).

3.3.1.1.2 Inner Recirculation Loop (IRL)

As shown in Figure 6, the current (60%) design has planned for five new extraction wells near the western bank of the Colorado River. These wells are located at least 20 feet outside of the mapped ordinary high water mark. The five wells (RB-1 through RB-5) have been located outside of dense floodplain vegetation area and, especially, avoid any mapped adjacent emergent wetlands (CH2M HILL, 2013c). The wells extend from approximately 780 feet southeast of the Bat Cave Wash outlet to about 500 feet east of the southern portion of the MW-20 Bench.

Under the current (60%) design, the IRL will add four new injection wells (IRL-1 through IRL-4) in an arc to the west of the IM No. 3 Treatment facility (Figure 6). The 60% design also includes a contingency for an additional future three injection wells (IRL-5 through IRL-7). Depending on the quality of the extracted water, the riverbank extracted groundwater may or may not be amended with a carbon source to promote reduction of Cr(VI) to Cr(III).

Based on the 60% design shown in Figure 6, six of seven IRL injection wells (IRL-1 through IRL-5 and IRL-7) will be located to the west of the National Trails Highway north of the BNSF railroad. These injection wells and pipeline routes are located mostly on the upland sparsely vegetated plateau to the west of Bat Cave Wash, with the exception of IRL-4, which is located at the bottom of a ravine just north of the BNSF railroad. If needed, the future provisional well (IRL-6) would be located adjacent to east side of Bat Cave Wash just south of Interstate 40.

Existing access routes will be used to install, maintain, monitor, and decommission these wells, with the exception of IRL-2 and IRL-4. The details concerning those new access routes are provided in subsection 3.3.10.

3.3.1.1.3 Topock Compressor Station (TCS) Recirculation Loop

As shown in Figure 5, the East Ravine (ER) extraction wells will be located in a line across the eastern end of the East Ravine. The current (60%) design anticipates five new extraction wells with a future provisional extraction well. The extraction wells are designated as ER-1 through ER-4, with one of these wells constructed as a dual well completion based on the remedy need. The future provisional well location is at ER-5.

These wells and piping will be installed along the existing access roadway that crosses the highly disturbed East Ravine and provides access from the National Trails Highway to the three pipe bridges that are located downstream from the Interstate-40 bridge. The unpaved access roadway runs along the eastern edge of the terrace that slopes steeply down to the Colorado River floodplain.

The Transwestern Bench (TWB) extraction wells are located near the eastern edge of the TCS to provide hydraulic capture of contaminated groundwater. The current (60%) design anticipates two new extraction wells (TWB-1 and TWB-2) located within the developed Transwestern Bench parking area. The two future provisional extraction wells (TWB-3 and TWB-4) will be located outside of the Transwestern yard but within adjacent, previously graded areas to the northwest and southeast margin of the yard.

The TCS injection wells will be located in the northern half of the station for the re-injection of groundwater that has been extracted from the East Ravine and Transwestern Bench extraction wells and amended with an organic carbon source to promote reduction of Cr(VI) to Cr(III). As shown in Figure 6, the current (60%) design anticipates two new injection wells (TCS-1 and TCS-2) that will be installed within previously developed areas.

3.3.1.1.4 Freshwater Injection System

The Final Groundwater Remedy will include two freshwater injection wells that are located upgradient of both the IRL and the TCS injection wells, as shown in Figure 6. These wells will inject freshwater that has been conveyed from the Arizona supply well(s) into the groundwater aquifer upgradient of the recirculation loops and will assist with flushing the chromium plume through the National Trails Highway IRZ and to constrain the westward spread of carbon-amended water and in situ byproducts from the IRLs. The 90% design will have a contingency for potential pre-treatment of the freshwater supply to reduce naturally occurring arsenic concentrations before injection. Those contingency pre-injection treatment facilities are described in subsection 3.3.1.4.2.

The first freshwater injection well (FW-1) is located just north of the Historic Route 66 alignment and near the property line of the Fort Mojave Indian Tribe property. The freshwater supply pipeline route to this well is described in subsection 3.3.1.5.2.

The second freshwater injection well (FW-2) is located to the west of the TCS on HNWR land. The freshwater supply pipeline route to this well is described in subsection 3.3.1.5.2.

3.3.1.2 Monitoring Wells

The Final Groundwater Remedy will make use of all existing monitoring wells; however, the current (60%) design has planned for an additional 19 monitoring wells as shown in Figure 6. Six of these new monitoring wells (Wells A through D, H, and O) are located within unvegetated areas of the Colorado River floodplain north-northeast of the MW-20 Bench. Four new individual monitoring wells are located within developed or previously disturbed areas along the National Trails Highway south of the MW-20 Bench (Wells E and G), north of the Transwestern Bench (Well K), and in an undeveloped area within Bat Cave Wash (Well S).

The remaining nine new monitoring wells (Wells I, J, L through N, P through R) are located within the dry wash or upland habitats north and south of the western access route along the Historic Route 66. The type of monitoring well installed at any particular location will be based on an evaluation of the key uncertainties and constraints. Well installation will be conducted in a manner to minimize the well's footprint while considering factors such as hydrogeologic conditions at the well site, borehole quantity constraints, data collection needs, constructability, and longevity constraints.

3.3.1.3 Carbon Amendment and Carbon Storage Facilities

These facilities will include a carbon storage tank and a carbon amendment building at each of the MW-20 Bench and the Transwestern Bench, as shown in Figure 6. These facilities will be used to deliver the planned dose of carbon substrate to the IRZ and TCS injection wells to promote reduction of Cr(VI). The system will be designed to provide flexibility according to the requirements for system optimization.

The MW-20 Bench was chosen for placement of carbon amendment facilities because of its relatively proximity to the National Trails Highway IRZ wells. The proposed carbon amendment facilities will include a new 15,000-gallon, aboveground carbon storage tank located just south of the three existing temporary

storage ("frac") tanks. The carbon storage tank will be placed within a 50-foot by 35-foot concrete containment structure and will have an access walk-way. Also a new 55-foot by 25-foot carbon amendment building will be located just south of the carbon amendment tank containment structure to contain dosing, metering, and control equipment.

The Transwestern Bench was chosen for placement of carbon amendment facilities because of its proximity to the TCS and to the pipeline corridor that services the TCS injection wells. The proposed carbon amendment facilities will include a 3,000-gallon aboveground carbon storage tank in the southern portion of the Transwestern Bench. This horizontal saddle tank has double-walled construction and an interstitial zone outfitted with ports for leak detection monitoring devices and overfill protection. It will be placed on a 50-foot by 35-foot concrete pad. Also, a new 40-foot by 12-foot carbon amendment building will be constructed to contain dosing, metering, and control equipment and will be located immediately to the southeast of the carbon storage tank.

3.3.1.4 Freshwater Source

The Final Groundwater Remedy includes freshwater supplied from Arizona well(s) to be conveyed to a freshwater storage tank in California, as shown in Figure 6. The freshwater supply system has been designed to provide a separate, reliable water source for the Final Groundwater Remedy that uses previously disturbed areas wherever possible.

3.3.1.4.1 Supply Wells

At this time, field work is being conducted to determine the best location for a primary freshwater supply well in Arizona. It is anticipated that DTSC and DOI will provide direction to PG&E on freshwater supply by April 2014. In the meantime, two candidate locations are proposed for freshwater supply for the remedy: (1) at or near the existing HNWR-1 well site, and (2) at Site B (see Figure 6).

The first freshwater supply well being considered for Final Groundwater Remedy use is HNWR-1 (see Figure 6). This well was installed by the refuge itself in the fall of 2010 for the purpose of providing irrigation water for the vegetation restoration project associated with the 2008 Sacramento Wash Fire to the west of the Oatman-Topock Highway. With the conclusion of the restoration irrigation, HNWR-1 is now being considered as a potential freshwater supply well for the Final Groundwater Remedy, pending verification of the physical condition of the well and aquifer testing. The ability to use an existing well avoids the need for additional disturbance and uncertainties about water quantity and quality. In the event the HNWR-1 well is determined not to be suitable for remedy use over the anticipated decades-long operation or information from the Site B well below suggest that it is also not a suitable well site, a new supply well could be drilled in the vicinity of the HNWR-1 site, and would be located within a previously disturbed area.

The second location being considered for a supply well (Site B Well) is located approximately 3,200 feet to the north of HNWR-1, just north of the Sacramento Wash channel levee on the west side of the Oatman-Topock Highway (see Figure 6). Installation of the Site B Well was completed in January 2014 with the well testing completed in early March 2014. ESA consultation for the installation and testing of that freshwater supply well was evaluated in the 2012 Reinitiated PBA. However, evaluation of any impacts to listed species for future maintenance of that well, if chosen as the supply well, is considered in the current Final Groundwater Remedy PBA.

If additional freshwater is needed, the existing supply wells that supply water to the TCS (Topock-2/3) may be employed. This well was installed prior to and independent of the Topock Compressor Station RFI/RI.

3.3.1.4.2 Contingency Pre-Injection Treatment Facilities

Per DTSC's direction, a contingency pre-injection treatment facility to remove arsenic in the freshwater water supply from Arizona will be included in the 90% Design.

As shown in Figure 6, the contingency pre-injection treatment facilities would consist of a chemical storage tank, two smaller process tanks, and a building to house the treatment process controls. All of these facilities would be located within the TCS in an already disturbed area. Because the pre-injection treatment facilities are discussed here as a contingency, the final design parameters have not been established. These details will be made available in the 90% Design.

3.3.1.4.3 Freshwater Storage Tank

A storage tank is required to ensure that adequate supplies are available for freshwater injection. The water stored in this tank may be conditioned, if it is determined that pre-treatment to reduce arsenic is required. As shown in Figure 6, the 10,000-gallon freshwater storage tank is located inside the existing TCS.

3.3.1.5 Piping Corridors

Remediation wells (extraction and injection wells) will be connected to pumps, carbon amendment facilities, and to freshwater supply facilities through a system of aboveground and belowground pipelines as described in the following subsections. The pipeline alignments will be placed in previously disturbed areas to avoid known utilities and cultural, archaeological, and historical resources. The mapped limits of previously disturbed areas are only used as a guide for planning activities, especially given that consultation with the Tribes is ongoing, regardless of whether the land is categorized as previously disturbed or not. In addition, the pipelines will be placed along existing or new access routes to minimize the need for additional vegetation removal.

3.3.1.5.1 Conveyance Piping Associated with Remediation Wells

Above- and below-grade piping networks will be installed to convey extracted groundwater, carbon-amended water, freshwater, and/or water produced from routine O&M activities such as backwashing of the injection wells, as shown in Figure 6. At the 60% design stage, the groundwater remedy includes approximately 26,000 feet of trenches and more than 100,000 linear feet of pipeline, with most being installed below ground either direct burial or in pre-cast concrete trenches. As previously noted, the changes that result in the 90% design submittal due in August 2014 may slightly alter alignments and impacts.

In general, pipe materials will be selected to resist corrosion, climatic effects, soil loads, and/or other physical impacts. Groundwater in the floodplain, in particular, contains high levels of total dissolved solids, chlorides (greater than 2,000 mg/L), sulfate, and other minerals that cause significant corrosion to iron-based piping material from mild carbon steel to Type 316 stainless steel. Below-grade piping will be constructed with HDPE pipe in a standard construction trench. Short sections of piping will be constructed within pre-cast concrete trench systems to facilitate ease of operation and maintenance in select locations (e.g., road crossings, around the Bench facilities, etc.).

Piping will be designed and installed in accordance with best practices for O&M, including flanged or union joints for serviceability and isolation valves for systems requiring routine maintenance. Expansion loops or joints will be located in all necessary areas in accordance with good engineering practices. All valves, instruments, control devices, pumps, and other equipment will be installed in a manner such that they are easily accessible for O&M; and equipment and instruments with readout displays will be oriented to allow for ease of data collection. Cleanouts will be provided at nominal 400-foot intervals, minimum, unless this would be in conflict with biological constraints or mitigation measures.

3.3.1.5.2 Conveyance Piping Associated with Freshwater Supply Wells

Figure 6 shows the alignment of the freshwater piping network. The total length of freshwater pipe is approximately 18,400 feet with most below ground. For the most part, the pipeline alignment follows existing roadways and existing PG&E pipeline rights-of-way (ROW) (see Figures 6 and 7). The pipeline alignment will be placed in previously disturbed areas to avoid known utilities and cultural, archaeological, and historical resources. The mapped limits of previously disturbed areas are only used as a guide for

planning activities, especially given that and consultation with the Tribes is ongoing, regardless of whether the land is categorized as previously disturbed or not.

A 12-inch-diameter freshwater pipeline that connects to a supply well in Arizona (HNWR-1 or Site B well), will follow the western shoulder of the Topock-Oatman Highway (Mohave County Road 10) toward the south and southwest. As the pipeline nears the Topock Marsh in the south, it will cross from the west side to the southeast side of the roadway to avoid the marsh and wetland habitats. The pipeline will cross beneath the BNSF railroad track within the existing road and then cross beneath Interstate 40. The water pipeline will then cross privately owned parcels south of Interstate 40 and continue onto the existing arched pipeline bridge (co-owned by Kinder Morgan and PG&E) to cross the Colorado River.

After crossing the Colorado River into California, the water pipeline will follow PG&E's natural gas pipeline ROW to deliver freshwater to the injection wells. In the event that pre-injection treatment of freshwater supply (to remove arsenic) is needed, all freshwater would first be pumped to the freshwater storage tank and the treatment system inside the TCS.

After exiting the pre-injection treatment system, freshwater will be conveyed eastward along the TCS access road to the north. Freshwater will run along National Trails Highway and split down to the floodplain with a short leg crossing under Interstate 40 and the BNSF railroad bridges. The northern branch will connect to and serve the MW-20 Bench; and from the MW-20 Bench, fresh water piping will go north and south to connect to the remaining floodplain and National Trails Highway IRZ wells. A branch of the freshwater piping will cross underneath the National Trails Highway to the access road west of the National Trails Highway. This pipe will continue westward along the west access road and serve the westernmost freshwater injection well (FW-1) and the four IRL injection wells (IRL-1 through -4), as needed. The Bat Cave Wash crossing near the IM No. 3 treatment plant will be an aerial crossing with a steel support structure complete with access ladders for piping inspection.

The freshwater injection well, FW-2, located within Bat Cave Wash to the west of the TCS, will be directly served by a water line that connects to conditioned water storage tanks and traverses Bat Cave Wash on an aerial pipe support bridge (see Figure 6). Once it crosses the wash, the pipe will go underground until it reaches the injection well.

3.3.1.6 Supporting Facilities

A number of supporting systems and features are needed to allow the remedy to function properly and safely over its projected operational span of several decades. These supporting items include systems to supply power to pumps and control systems, treat remedy-produced water, and access routes to allow for installation, maintenance, monitoring, and eventual decommissioning of the final remedy facilities.

There are a number of other aspects related to the Final Groundwater Remedy that are discussed in the 60% Design Submittal (CH2M HILL, 2013c). While these items are associated with or located within remedy facilities, because they do not have any potential to directly or indirectly affect biological resources, they are not discussed in detail in this PBA. These items include institutional land controls to ensure protection of the remedy features; communications and data networks; remote control and monitoring equipment; an onsite laboratory; a document repository center; a training/conference room; fire water; and site safety and security (e.g., alarms, gates/fences, security cameras, etc.). Because these facilities occur primarily within existing developed areas, their effect on biological resources is expected to be negligible. The security fences, which may have the potential to interrupt wildlife movement, surround areas containing marginal habitat value and are small enough so that they do not constitute a significant wildlife concern.

3.3.1.6.1 Power Supply

The primary power supply source for remedy facilities in California will be generated by two dedicated, stand-alone generators (2 x 450 kW) located inside the TCS, by the TCS power system, and/or by small solar

panels. Underground power line conduits will follow existing pipeline alignments and be limited to previously disturbed areas.

Power will be transmitted at 480 VAC to 12K VAC along pipeline corridors. Six load centers are planned with transformer/distribution equipment at each location. One future provisional load center could be constructed to serve the future provisional well IRL-7, provided this well is required to be installed/operated.

For the freshwater supply well in Arizona, the power supply source will be power provided by Mohave Electric Cooperative.

Similar to other construction activities, the installation of transformer pads and electrical equipment and connections will follow the same procedures as employed for other parts of the remediation program in order to minimize impacts to perennial vegetation. The facilities will be located, to the extent possible, within previously disturbed or developed areas that are without perennial, native vegetation.

3.3.1.6.2 Management of Remedy-produced Water

Because the Final Groundwater Remedy relies on several dozen wells used for the IRZ, freshwater and carbon-amended injection, and groundwater extraction, regular maintenance such as backwashing and rehabilitation is vital to maintain efficient and effective operations during the 30-year projected life of the remedy. Well maintenance will also prevent or reduce the need for drilling new replacement wells. These maintenance activities will produce an ongoing water stream that must be managed as part of the remedial action. Other types of produced water with smaller volumes will also need to be managed, such as monitoring well sampling purge water, equipment decontamination wastewater, and rainfall that collects in remedy facility secondary containment. Collectively, these types of water are called remedy-produced water. The current estimated total volume of remedy-produced water is 7.6 million gallons per year. Of the 7.6 million gallons, it is estimated that 800,000 gallons will be consumptive use (i.e., will not be returned to the groundwater aquifer).

Providing a reliable means of managing this wastewater is a critical component of the overall remedy. It is desirable that the remedy include more than one wastewater management option in order to not constrain remedy operation. Different waste streams may also require different management options. The 60% design presents a management plan that includes the following management options:

- Well backwash and cleaner water (2nd flush) from well rehabilitation will be conditioned in a central facility located at the TCS. The remedy-produced water conditioning system will be located within a new building in a previously developed area, at the southern end of the TCS and near the contingency freshwater pre-injection treatment facilities (see Figure 6). The conditioning system removes (filters) solids and adjusts pH of the water prior to reuse as compressor station cooling tower make-up waters or for re-injection into the IRZ wells. At the 90% design, in response to Tribes' comment, contingency systems to remove high iron and manganese will also be evaluated. It is anticipated that the contingency system will fit in the existing proposed footprint of the conditioning building.
- Remedy-produced water (e.g., water at the beginning of the well rehabilitation process or 1st flush water) that has significantly higher concentrations of solids or dissolved constituents (e.g., byproducts) than what exists in the aquifer water will be sent to the TCS evaporation ponds, or transported offsite for disposal.
- In some cases during well rehabilitation, mobile equipment may be used to condition the produced water at the well location. In the event that the produced water is hazardous, permitted transportable treatment units could be used.

3.3.1.6.3 Support Buildings

The following criteria were used to identify candidate locations for building/structures to house major equipment and key supporting functions:

- Previously disturbed areas;
- Avoiding or minimizing adverse effects on cultural, archaeological, and historical resources to the maximum extent practicable;
- Avoiding or minimizing adverse effects on sensitive biological resources to the maximum extent practicable;
- Areas of adequate space;
- Proximity to existing asphalt access roads, the Compressor Station, electrical and other utility services, remedy components (for service), and reuse/disposal options for remedy-produced water;
- Limited interference with existing infrastructure (especially with major gas pipelines in the area);
- Limited interference with Compressor Station operations during construction and O&M of the remedy (health and safety concerns);
- Shared use of existing improvements to the extent practicable (except for buildings with potential historical significance); and
- Minimized footprint outside of PG&E property.

The Transwestern Bench area is currently used to support various field/IM activities, the ongoing groundwater and surface water sampling activities, well drilling activities, equipment decontamination activities, soil sampling activities, temporary waste management activities, and various field surveys to collect baseline data to support design. The Transwestern Bench houses a field trailer, a decontamination pad, and several conex boxes for temporary storage. These facilities are regularly used by the groundwater and surface water sampling crew, PG&E staff, and field personnel/staff onsite for ad-hoc field tasks. In addition to PG&E's use of the bench area, Transwestern has been operating its gas metering station on the easternmost portion of the bench since 1991.

One central maintenance building and one storage building will be constructed at the Transwestern Bench, as shown in Figure 6. The central maintenance building (approximately 100 by 50 feet) will be located within the developed Transwestern yard to the west of the existing trailer, which will be removed. The central maintenance building will require a new septic disposal system (approximately 35 by 20 feet) to the north of the building. The central maintenance facility will house the SCADA system and HMI screen that will be used to control the Final Groundwater Remedy facilities. The building will also include laboratories, offices, an employee break room, work areas, and equipment and document storage areas.

A 40-foot by 22.5-foot storage building will be constructed to the southeast of the central maintenance building and will contain spare parts and tools for repair of the Final Remedy System. The Transwestern Bench yard between the central maintenance building and the paved access roadway will also be paved after subsurface utility trenches and stormwater drainage have been installed.

3.3.1.7 Access Pathways and Roadways

In compliance with the directive to give priority to existing facilities, the Final Groundwater Remedy will reuse all existing routes that have been previously used or constructed during the investigation and remediation activities to date. In addition, two new graded access roads will be required within the upland area to allow for installation and maintenance of wells IRL-2 and IRL-4, as shown in Figure 6.

The IRL-2 roadway will connect directly to the Historic Route 66 and is estimated at 150 feet in length along the top of a plateau. The IRL-4 freshwater injection well is located at the bottom of a ravine, and a new

permanent, engineered road (estimated at 350 feet in length) has been designed to access and service this well, the nearby monitoring well, and associated piping. In addition to the roadway, a portion of the ravine bottom will be filled to create a sturdy, flat area with adequate work space install the wells, maintain and sample them during remedy operations, and perform future decommissioning activities.

To allow for shared use of the Transwestern Bench together with activities for the PG&E Topock Remediation Project, one new access road to the northeast of the bench will be needed for access to Transwestern's gas transmission equipment (see Figure 7).

3.3.1.8 Other Ancillary Facilities

As shown in Figure 6, the conveyance pipeline system will require two aboveground pipe bridges to allow for aerial crossings of Bat Cave Wash. The first of these bridges will be located just north of the west access routes (Historic Route 66) to the northeast of the IM No. 3 Treatment facility. This 200-foot-wide aerial pipe bridge will be part of the freshwater conveyance system delivering water to the injection well, FW-1. The second of these bridges is approximately 180 feet wide will be west-southwest of the TCS and will be part of the freshwater conveyance system delivering water to the injection well, FW-2.

Small photovoltaic solar panel installations will be installed at various locations to offset electric demands for the Final Groundwater Remedy and to power radio data communication equipment at remote well locations. The largest of the solar panel installations will be located on the roof of the central maintenance facility that will be constructed at the Transwestern Bench.

Individual solar panels will also be used at select remote well locations to power wireless data communication devices that are part of the monitoring and control system of the Final Groundwater Remedy. These devices will be attached to poles that are installed within the existing disturbed area around the well. It will be necessary to periodically trim vegetation to maintain direct line-of-sight to data receivers. The sites where such devices are located will be inspected on a periodic basis and overgrowth will be pruned or managed (e.g., tie back, bundle, etc.) to maintain clear lines of sight. Care will be taken to ensure that vegetation control measures are consistent with the project mitigation directives such as the protection of mature plants and the avoidance/protection of ethnobotanically sensitive plants

Currently, a portion of the MW-20 Bench is used to house IM equipment and to support IM operations (e.g., extraction wells, an electrical room, three portable tanks, and a truck loading/unloading facility). There is fencing around the equipment area and nighttime lighting for health and safety and security purposes. The remaining portion of the MW-20 Bench is used for vehicle parking and equipment staging, and provides an alternative access route around the fenced facility. Similarly, the new facilities at the Transwestern Bench and the proposed material storage areas will require fencing and gates and other security equipment such as remote cameras to provide for protection and surveillance of these facilities.

The freshwater supply system will also include two concrete pads at the freshwater supply well site (HNWR-1 or Site B Well). These small concrete pads, equipped with sunshades, will be used to support the wellhead, pump, and electrical/control equipment.

3.3.1.9 Construction Yard / Temporary Material Staging and Soil Storage

During the Final Groundwater Remedy construction phase, staging areas will be established for location of temporary facilities, laydown of equipment (including heavy equipment), refueling of vehicles or equipment, materials, supplies, and demolition tools. These areas will also be used for the staging of empty containers; staging of recoverable materials for recycle or reuse; and for management of construction wastes, as further described in subsection 3.3.2.4. All of the proposed equipment and material staging areas will be located on previously disturbed areas.

In addition, staging areas will be used for temporary storage of nonhazardous, clean soil collected during construction or decommissioning activities. These soils, which have been determined to meet the criteria for onsite re-use, would be used to restore and stabilize construction sites, as needed, within the Action Area.

Any activities conducted on the proposed staging areas, would be done in accordance with established plans to protect against potential adverse impacts to surface waters or air quality. Smaller, temporary equipment and materials staging areas will be set up within the authorized work zones at each primary work area, as necessary.

It is anticipated that a construction yard (to be located within Park Moabi) will also be required, which will include at a minimum: multiple trailers serving as a work place for personnel, a central check-in/out location for site visitors, a place for daily briefings/project meetings, etc.

As shown in Figure 7, 25 different proposed staging/soil storage areas have been identified in California (totaling up to 35.40 acres, note that the actual area available for use by PG&E will need to be verified) and four staging areas have been identified in Arizona (totaling 3.18 acres). Of the total 35.40 acres of the California staging areas, about 23.90 acres is proposed only for staging use (with 0.95 acre under negotiation for dual staging/soil storage use). To allow for efficient staging during construction, the staging areas in California are scattered throughout the Action Area and are found near Moabi Regional Park; along Park Moabi Road to north and south of Interstate 40; around the eastern side of the evaporation ponds; along the western access route (Historic Route 66); along the National Trails Highway near the Bat Cave Wash and MW-20 Bench; and along the turnoff to the Transwestern Bench and around the TCS. The largest single area (11.57) acres is around the TCS. The staging areas in Arizona are located in close proximity to the Oatman-Topock Highway exit off Interstate 40.

3.3.2 Operation and Maintenance

The Final Groundwater Remedy PBA will cover actions that will be required to operate the constructed facilities described above over the anticipated duration of the remedy that could extend up to 50 years. The planned activities associated with the operation of the remedy systems are described in the following subsections.

3.3.2.1 Operation of the Final Groundwater Remedy Features

Planned activities that will be associated with the operation of the Final Groundwater Remedy have been summarized here from the Draft Operation and Maintenance Manual – Volume 1 (CH2M HILL, 2012b). Normal operations of the final remedy will include groundwater extraction and recirculation, carbon substrate storage and deliveries; carbon substrate injections, and monitoring and control of the system. There will also be activities associated with freshwater supply, conveyance, and storage; remedy-produced water management; pre-injection water treatment (if required); power supply and distribution; and the SCADA and HMI screen. All of these systems will require regularly scheduled maintenance to keep the systems functioning in an efficient and optimal manner.

In general, normal operation of the Final Groundwater Remedy associated with optimization of the groundwater extraction and recirculation systems will be accomplished through use of the SCADA system housed at the Transwestern Bench. Carbon substrate will be delivered by tanker truck to the previously described carbon storage tanks at the MW-20 Bench and Transwestern Bench. Operation personnel will be present during all chemical transfer activities and will verify the liquid level in each tank prior to beginning the filling operation to prevent overfilling. The tanks themselves will have secondary containment and be outfitted with level detectors and alarms to prevent overfilling.

Carbon substrate dosing and injection into the National Trails Highway IRZ, IRL, and TCS injection wells will also be primarily controlled by the SCADA system. Carbon substrate will be delivered to individual injection wells by a system of distribution lines and manifolds. The design incorporates the flexibility that will also allow for the injection of carbon substrate directly to selected wells through connections in the well vaults. Those individual well injections will be accomplished by pulling a portable tank to the well on a trailer or in a smaller vehicle carried by an operator during work hours. The anticipated footprint of these operations will be similar to that for sampling or maintenance of a well. All carbon substrate delivery valves and controls will be tested before startup. There are system controls that are linked to the SCADA system including well

packer pressure sensors and process control features that would allow operators to detect leaks or flow problems in the carbon substrate delivery system.

Regularly scheduled equipment O&M activities will include regular record keeping on important information from the SCADA/HMI system, such as tank levels and flow data. It will also include regular visual inspections of aboveground storage tanks for signs of damage, leaks, or excessive deformation of tank walls. Vent pipes and screens will be inspected and cleaned as needed. Carbon substrate pumps, well maintenance reagent pumps, and submersible well pumps will be regularly maintained according to manufacturer's recommendations and as established in the O&M manual and standard operating procedures (SOP). Monitoring flow rates through the SCADA system will help identify potentially faulty well pumps that may require removal from the individual wells for servicing. Planned actions, therefore, include maintenance of all equipment or replacement of faulty devices to keep the final groundwater remedy systems operating.

The freshwater supply, conveyance, and storage system begins at the freshwater supply well, includes the freshwater storage tank at the Compressor Station, and ends at the freshwater injection wells, FW-1 and FW-2, IRL wells, and the two benches, MW-20 and Transwestern (see Figure 6). Regular planned activities will follow SOPs to guide the testing of the system startup and shutdown procedures; well maintenance (see subsection 3.3.2.2); and cleaning and maintenance of the instrumentation and control equipment. Anticipated equipment O&M manuals will include the instrumentation and control equipment; extraction well pump; and control systems operations manual.

The Remedy Produced Water Management system begins at the wells, includes the conveyance system to the Remedy Produced Water Treatment System, and ends at the disposal/reuse including re-injection locations (see Figure 6). Regular planned activities will follow SOPs to guide the testing of the system startup and shutdown procedures; automatic backwashing; batch and continuous conditioning processes; reuse of conditioned water in TCS Cooling Towers, re-injection of conditioned water into the IRZ injection wells; disposal of remedy produced water into the existing evaporation ponds; and if required, offsite trucking of remedy produced water.

Maintenance activities for the Remedy Produced Water Management system will follow SOPs for cartridge filter change-out; produced water storage tank cleaning and inspection; produced water conditioning system secondary containment inspection and operation; phase separator loading and removal; cleaning and maintenance of instrumentation and control equipment; and conveyance system and secondary containment inspection and maintenance. Anticipated equipment O&M manuals will include the following items: extraction well, centrifugal, metering, sump, air-operated diaphragm pumps; cartridge filters; flow control valves; and instrumentation and control equipment; and control systems operations manual.

Details on the contingency pre-injection freshwater treatment system will be developed between the 60% and 90% Final Remedy design submittals. Those details will be provided as they become available.

The normal operation of the power supply systems for the Final Groundwater Remedy will include planned activities that will be guided by SOPs related to transformer inspection and repair and transformer secondary containment inspections. Anticipated equipment O&M manuals will include the following items: transformers and motor control centers.

3.3.2.2 Well Maintenance and Decommissioning

The final groundwater remedy is reliant on several dozen wells used for the IRZ, freshwater and carbon-amended injection, and groundwater extraction. For each of these types of wells, especially for the injection and IRZ wells, regular maintenance such as backwashing and rehabilitation is vital to maintain efficient and effective operations during the decades-long projected life of the remedy. Well maintenance will also prevent or reduce the need for drilling new replacement wells. The frequency and methods for well maintenance will be identified through initial and long-term well performance tracking (e.g., specific capacity or specific injectivity, flow logging, aquifer testing). This information will be supplemented by well video surveys and water quality (biological and geochemical) sampling. Routine and non-routine well

maintenance activities will focus on individual wells and their elements (screen, casing, gravel pack, and the aquifer formation near the borehole wall, plus down-hole equipment and pumps).

Routine maintenance methods are conducted without intrusive modifications to the wellhead or well and do not require removing existing equipment from the well for access. Simple operational procedures are implemented in order to prevent clogging and maintain well capacity over the service life of the well. One non-invasive procedure for extraction wells involves surging and pumping to remove siltation or mineral encrustation, while tightening the filter pack. Backwashing of the injection wells involves a similar non-invasive procedure. Backwashing is conducted by stopping injection and pumping the well for a short period. Backwashing removes the solids which have accumulated in the well screen and gravel pack during injection.

Aqua Gard™ is another, somewhat more aggressive non-intrusive routine method that can be done on both extraction and injection wells. The method involves injecting cryogenic liquid CO_2 into existing well access tubes. During the injection, plugging and fouling deposits are dislodged and detached from the filter pack and formation through rapid gas expansion during the liquid/gas phase change. Once the injection is complete, pumping and surging (or backwashing for injection wells) is employed to agitate and remove the material that was loosened during the injection. Some of the necessary equipment needed to conduct Aqua Gard™ may include all or some of the following: a CO_2 injection trailer, CO_2 storage vessel, support truck, pump rig and/or crane (if a pump or pipe needs to be installed/removed), and a support truck.

Non-routine maintenance methods are more intrusive, requiring removal of existing equipment from the well prior to conducting maintenance. Non-routine maintenance methods include drop-pipe replacement; submersible pump repair/replacement; and well repair and well rehabilitation methods. Over time, the column pipe in extraction wells and drop-pipes in injection wells can corrode so they will be thoroughly inspected for corrosion and damage when equipment is removed from the well. If threads, rings, or seals are damaged, they will be replaced. In addition, the total depth of the well should be sounded to determine if sand or silt debris is accumulating in the well and those solids will be removed.

Over time, submersible pump components wear out. Based on site experience, submersible pumps have lasted for 5 to 7 years under normal operating conditions. Conditions that can reduce the life of a submersible pump include: wear to the pump from excessive sand related to the well, a well that is not plumb and straight, blocked or plugged pump intake, improper motor cooling, corrosion, extended cavitation, and poor electricity supply. Submersible pumps may provide some advanced warnings, such as decreased production due to impeller wear and electrical changes (amp draw), but may provide no advance warning of problems, other than failure to operate. As needed, submersible pumps will be replaced with spares kept onsite, if they cannot be repaired.

If well performance declines, and routine maintenance proves ineffective, then more extensive well rehabilitation measures will be required. The focus of well rehabilitation is to effectively remove the material that is plugging the well and restore capacity. Specific plans for well rehabilitation activities will be prepared at the time rehabilitation is required, as rehabilitation methods must be custom tailored for each well and rehabilitation method. Some of the necessary equipment needed to conduct well rehabilitation work may include all or some of the following: a pump rig and/or crane, support or pipe truck, generator(s), air compressor, chemical trailer (mixing tanks and pumps), neutralization trailer (mixing tanks and pumps), support truck, video van, vacuum or tanker truck, forklift, and 20,000-gallon frac tanks. The three existing IM No. 3 frac tanks at the MW-20 Bench will be kept on site to meet some of this need, as required.

The general approach for well decommissioning is currently being developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes. Detailed SOPs for conducting well decommissioning will be based on this general approach and be presented in the O&M Plan at the 90% design stage.

3.3.2.3 Pipeline Maintenance and Repair

The groundwater remedy includes approximately 26,000 feet of trenches and more than 100,000 linear feet of pipeline, with most being installed below ground either direct burial or in pre-cast concrete trenches.

Belowground water pipes are made of plastic (HDPE). Aboveground water pipes are made of steel (Schedule 40 steel with AWWA C205 cement mortar lining).

It is possible, during the operation of groundwater extraction wells for biological films and mineral scale depositions to accumulate within the pipelines. A CIP system has been included in the in-situ remediation design to be operated as a closed-loop system to facilitate the maintenance of the groundwater pipelines associated with the IRZ. The CIP systems located at the MW-20 bench and Transwestern Bench carbon amendment facilities allow for short duration addition of maintenance chemicals (approved for use in drinking water systems) to prevent the collection of materials in the pipelines that may impact remedy performance. After the CIP maintenance procedures have been completed, the spent CIP solution will be flushed from the groundwater force mains with freshwater and the spent solution will be transferred from the receiving tank to either the Remedy-produced water conditioning plant or shipped offsite by tanker truck for treatment. The total volume of spent CIP solution is expected to be between 10,000 and 40,000 gallons per maintenance event.

In general, properly handled and installed heat fused HDPE pipeline provides a maintenance free system with leak free joints at 40-foot intervals, except for infrequent unforeseen third party damage. If HDPE pipe is damaged or leaks, repair methods will be required to bring the piping system back into service as soon as practicable. Sections of direct burial pipe requiring repairs will need to be exposed by excavation; whereas, belowground pipe section inside precast concrete trench can be accessed via maintenance manhole(s).

For aboveground repairs, when the pipe can be moved, the damage can be cut out and replacement pipe can be butt-fused or electro-fused into the system. In case that the pipe cannot be moved, alternative repair techniques and fittings that do not require longitudinal movement can be used. For field repairs of small puncture damage, techniques involving saddle fusion, electro-fusion patch, mechanical fittings, etc. can be used depending on the location, nature, and extent of the damage.

Although most of the remedy piping system is belowground, there are three aboveground water pipe segments: **Segment 1** – Over 800 feet of 12-inch pipe conveying freshwater from the irrigation well HNWR-1 (or the well at Site B), across the Arched Bridge to the California side of the Colorado River; **Segment 2** – Approximately 200 feet of 3-inch pipe conveying freshwater and 4-inch pipe conveying remedy-produced water aerially across Bat Cave Wash to/from the Freshwater Injection Well FW-2. **Segment 3** – Approximately 180 feet of 6-inch pipe conveying freshwater, 8-inch pipe conveying remedy-produced water, and 6-inch pipe conveying carbon amended water aerially across Bat Cave Wash, north of the IM No. 3 treatment plant. In addition to the water pipes, the aerial crossing for Segment 2 and 3 will also have conduits for distribution of electricity and instrumentation circuits.

Overall, cement mortar lined pipe conveying treated or conditioned water has proven to have a long and maintenance free service life in the water services industry. Cement mortar lined pipe conveying raw or freshwater will require periodic inspection of the lining to see if thickness has reduced or if the cement mortar is corroding. Repair of the lining usually requires curing time that could take up to 24 hours. All inspection and repair work will be in accordance with manufacturer's recommendation. All aboveground pipe segments will be painted to be harmonious with the surrounding earth-tone color palette, except for the arch bridge crossing, which will painted to match the existing pipelines. The pipelines will need to be periodically repainted for maintenance reasons.

3.3.2.4 Waste Management Practices

The expected waste streams from O&M activities include: remedy produced water; spent CIP solutions; displaced soil from well drilling/replacement/decommissioning and O&M activities; precipitated solids/sludge and spent filters generated from the Remedy-produced Water Conditioning Process; used personal protective equipment; miscellaneous waste including trash, paper bags, cardboard boxes, empty drums/cans, unused chemicals/paints, used oil, used solvents, etc.; universal waste including batteries,

electronic devices, lamps, aerosol cans, and mercury-containing equipment; recoverable materials; and sanitary waste.

Characterization of displaced soils will be discussed below in subsection 3.3.4. Liquids will be classified as hazardous waste based on having conditions of corrosivity (pH of ≤2.0 or ≥12.5); dissolved Cr concentration equals or greater than 5 parts per million (ppm), and/or dissolved As concentration equals or greater than 5 ppm. Liquids will also be evaluated for the presence of metals having hazardous waste toxicity characteristic levels. Similarly, solid wastes will be analyzed for total and leachable metals to determine if the waste will be classified as non-RCRA hazardous waste; RCRA hazardous waste; or as nonhazardous waste.

Miscellaneous waste such as trash, paper bags, and cardboard boxes will be disposed of as nonhazardous solid waste, unless affected by potentially contaminated material or water. Potentially contaminated miscellaneous waste will be combined with other hazardous waste. Empty, used 55-gallon drums that formerly contained hazardous materials will be labeled with the word “empty” and the date emptied, and will be returned to the original chemical supplier or turned over to a drum re-conditioner. Drums being reconditioned will be removed from the site within one year.

Different types of remedy-produced water require different management approaches. Multiple options are maintained to provide operational flexibility and reliability. A major portion of the produced water will be conditioned at the remedy-produced water conditioning system located at the Compressor Station as well as the spent solutions from CIP system.

Waste materials will be managed onsite in demarcated waste management areas that will be selected from the proposed staging areas shown in Figure 7. Within the waste management areas, hazardous wastes will be segregated from nonhazardous wastes. Additionally, incompatible hazardous wastes (e.g., flammable and corrosives wastes) will be segregated. Wastes of the same matrix, contamination, and source may be aggregated to facilitate accumulation and disposal. Lined roll-off boxes will be used to contain solid wastes. Liquid wastes will be contained in drums, totes, or portable tanks. Cleaning and decontamination wastewater will be contained in portable tanks within secondary containment near the point of origin while the water is characterized for offsite disposal. Incidental trash, such as wooden pallets and food and beverage containers, will be contained in dumpsters located in staging areas near temporary facilities. Universal waste will be stored in containers or packages that will remain closed; are structurally sound; are adequate to prevent breakage; are compatible with contents of batteries, lamps, or thermostats; and lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions. When possible, containerized wastes will be direct-loaded onto a truck and removed from the site from the point of generation (e.g., potentially during a rehabilitation event at the well site).

Once the wastes are containerized and labeled, those wastes ready for offsite disposal will be loaded onto trucks for transport to preapproved disposal facilities. A designated transportation and disposal coordinator will be onsite during transportation and disposal activities. This individual will be responsible for coordinating and overseeing these activities. As truck loading is completed, the containers and trucks will be inspected and brushed as necessary to remove loose materials. Each load will be inspected to ensure that it is secure and that the truck has been properly cleaned and/or decontaminated as required. Appropriate documentation to include waste manifests will be completed and checked. In addition, a truck log will be maintained of loading and transportation information. Transport vehicle will proceed to the designated disposal facility in accordance with local, state, and federal transportation requirements.

Some waste streams generated from various maintenance activities such as piping and/or process equipment removal/replacement, electrical equipment refurbishment, secondary containment structure repair, etc. are potentially recoverable or salvageable for reuse or recycle. Efforts will be made to limit the amount of components and materials leaving the site by recovering nonhazardous equipment and materials. All recoverable materials must be nonhazardous. An evaluation of reuse and recycling options will be

conducted to determine the most appropriate and sustainable way to manage nonhazardous recoverable materials.

3.3.2.5 Stormwater Pollution Prevention

A Stormwater Pollution Prevention Plan (SWPPP) for O&M activities will be prepared to comply with the requirements of the California State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS00001, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Industrial Activity (General Permit). The TCS project site is under the regional jurisdiction of the Colorado River Basin Water Quality Control Board (Regional Water Board). In accordance with the General Permit, storm water pollution prevention has two major objectives:

- Identifying and evaluating sources of pollutants associated with industrial activities that may affect the quality of storm water discharges and authorized non-storm water discharges from the facility.
- Identifying and implementing site-specific BMPs to reduce or prevent pollutants from being released in storm water discharges and/or authorized non-storm water discharges that may affect receiving water quality.

The O&M SWPPP will cover all remedy facilities located inside and outside of the Compressor Station. The O&M SWPPP identify BMPs as required by law, and establish a monitoring and sampling plan (including visual inspections and an annual comprehensive review). The annual comprehensive review is required to evaluate the effectiveness of the BMPs and to determine whether modifying BMPs or implementing additional BMPs is required. Please note that the remedy design has and will continue to incorporate engineering elements to reduce or prevent pollutants from being released in storm water discharges.

An outline of the O&M SWPPP, is presented in Appendix E of the Draft Operation and Maintenance Manual – Volume 1 (CH2M HILL, 2012b). A draft O&M SWPPP will be included in the 90% design submittal that will reflect the latest requirements of the Industrial General Permit.

3.3.2.6 Fuel Storage and Fueling Practices

Types of fuel anticipated to be used onsite include diesel Fuel Number 2 and gasoline. The diesel fuel will meet California low-sulfur standards and regulations. There is a bulk diesel fuel tank in place at the TCS that will be used by PG&E and its contractors conducting remedy activities for re-fueling vehicles and equipment. Gasoline will meet California's reformulated gasoline (CaRFG) program standards and regulations. There is a bulk gasoline fuel tank in place at the TCS that will be used by PG&E and its contractors conducting remedy activities for re-fueling vehicles and equipment. It is anticipated that remote fueling activities (transporting small amounts of fuel to equipment in the field) will also be conducted to re-fuel equipment located at remote portions of the site.

Over the decades-long O&M period, it is anticipated that alternative fuels may be considered for onsite use including, but not limited to, bio fuels, ethanol, etc. In addition, bulk fuel storage methods may change to support future remedy needs, and fueling practices may change to capture best practices that may become available in the future. Regardless of the type of fuel used, the project will comply with local, state, and federal regulations related to their bulk storage and management. Specifically, the Hazardous Materials Business Plan presented in Appendix F of the Draft Operation and Maintenance Manual – Volume 1 (CH2M HILL, 2012b) and SOPs will include procedures for properly storing and handling fuel onsite, the required equipment and procedures for spill containment, required personal protective equipment, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities.

3.3.2.7 Access Road and Pathway Maintenance

Over time, access roads and pathways are likely to exhibit deterioration and/or overgrowth, and will require maintenance for safety, and for ensuring access to as well as protection of remedy infrastructure and

facilities. Depending on the road or pathway surface and condition, the proper maintenance method(s) will be different. Typically, road maintenance consists of stabilizing disturbed areas, filling/re-grading, and pruning overgrowth.

Once it is determined that a road or pathway must be maintained, an assessment including a review of potential causes for deterioration will be completed. Based on the assessment, an appropriate method for maintenance will be conducted.

For footpaths, pruning of overgrowth will be done using hand tools or mechanical-powered tools. Soil stabilization for disturbed areas may be accomplished by applying approved soil stabilizing agents (e.g., SoilTac), erosion control matting, silt fencing, etc.

For loose or compact dirt access roads with erosion, subsidence, soft spots, or potholes, road surfaces may be re-established using manual shovel and rake. In more severe cases, a backhoe or grader may be required. Soil stabilization for disturbed areas may be accomplished by applying approved soil stabilizing agents (e.g., SoilTac), erosion control matting, silt fencing, or water bars. Ditches and culverts will be inspected and cleaned or rebuilt, as needed. If additional capacity is needed, the ditch may be reshaped or turnout/diversion berms may need to be installed. For gravel access roads, it may be necessary to add gravel and re-grade the road surface.

Paved asphalt or concrete access roads may require patching, additional base fill, or re-paving, in addition to erosion control and restoration measures. All of the techniques listed above may be appropriate.

3.3.2.8 Contingency Plans

Contingency Plans have been provided as part of the 60% Design Submittal in the form of the Draft Operation and Maintenance Manual – Volume 3 (CH2M HILL, 2012c). Contingency planning is being conducted as a part of the final groundwater remedy design process to anticipate potential risks and organize plans to mitigate these risks. The contingency plan is intended for use during the design phase as a tool to anticipate potential risks and to develop methods to mitigate these risks, either within the design, or as part of the future system operations.

The contingency planning process identifies possible failures that could cause unacceptable conditions in the groundwater remedy such as unacceptable remedy performance where the RAOs are not met; schedule failures where the time to cleanup is extended more than 5 to 15 years; cost failures; significant change to design parameters associated with the remedy; and significant H&S or compliance incident such as a health and safety incident that results in lost work time for remedy or Compressor Station staff or the public; an environmental compliance Notice of Violation (other than related to remedy performance); or violation of the requirements in the ARARs.

Contingency planning has been prepared for five key elements of the groundwater remedy: In-Situ Remediation System; Remedy-produced Water Management System; Freshwater Supply; Power Supply; and Supervisory Control and Data Acquisition (SCADA) System. In the 90% Design, per DTSC's direction, the freshwater pre-injection treatment system will be added as a contingency.

This section has been included in the PBA in order to seek ESA coverage in the event of the occurrence of any unacceptable condition that leads to a longer time frame for achievement of the RAOs or results in potential impacts on any of the PBA-listed species requiring reinitiation of consultation under 50 CFR 402.16.

3.3.2.9 IM No. 3 Lay-Up

Prior to startup of the Final Groundwater Remedy, the IM No. 3 system will be shut down and prepared for lay-up. When the IM No. 3 system is in a lay-up condition, the system will be left in a safe, secure, and preserved state and will not operate again until agency approval is received for decommissioning and removal of the system. Procedures for shutting down IM No. 3 are included in the existing IM No. 3 Treatment and Extraction System Operations and Maintenance Plan (CH2M HILL, 2006d). Procedures for

Lockout/Tagout of pipelines and mechanical and electrical equipment will be in accordance with existing IM No. 3 Treatment and Extraction System SOPs. Wastes generated during IM No. 3 lay-up will be handled in accordance with the Waste Management Plan under the IM No. 3 Treatment and Extraction System O&M Plan (CH2M HILL, 2006d). After the IM No. 3 system is in a lay-up condition, it is not currently expected to operate again because it will have met the goals of the IM and associated design parameters. The IM No. 3 system will remain in a lay-up condition until PG&E receives approval for closure and decommissioning of IM No. 3.

During the lay-up period, equipment maintenance is required to keep the equipment in good condition and under active equipment warranties, because most major equipment will likely be recovered for reuse. Electricity will be required for equipment maintenance. In addition, weekly inspections of the following equipment will be conducted:

- Storage tanks that formerly contained hazardous materials.
- Pressurized (compressed air) tank.
- Onsite chemical storage areas. (Excess chemicals will be removed from site during lay-up preparation.)
- Emergency shower and eye wash station and potable water cooling system.
- Fire water tank.
- Aboveground injection well pipeline and instrumentation conduit.

Maintenance will also be conducted on the access road to the IM No. 3 Treatment Plant and injection wells as well as watering the road for dust control pursuant to EIR mitigation measures. Periodic filling of the potable water tank, and possibly the fire water tank at the IM No. 3 Treatment Plant, as well as regular pest control will also be required.

During the lay-up period, PG&E's security system will continue to provide security monitoring of the IM No. 3 system facilities. During nighttime hours, existing lighting will continue to be used at the IM No. 3 Treatment Plant and at the MW-20 Bench Facility for security and safety. Even though the facility will not be routinely staffed at night, minimum lighting during nighttime hours is still required for safety in case PG&E personnel need to enter the facilities during these hours. Minimum lighting or minimum illumination intensities are defined by OSHA. For activities and areas not included under the OSHA standard, the American National Standards Institute has established recommended illumination levels under Recommended Practice RP-07-01.

Telecommunications and plant communications will continue to be maintained for safety, security, and maintenance requirements. Because personnel will be onsite during work days, the potable water system at the IM No. 3 Treatment Plant will stay in service to provide water to the sinks and toilet in the IM No. 3 Treatment Plant trailer. The sewage holding tank for the IM No. 3 Treatment Plant trailer will stay in service. The sewage holding tank will need to be serviced; the service frequency will be on an as needed basis.

3.3.3 Sampling and Monitoring Plan

When the Final Groundwater Remedy is implemented, the current groundwater monitoring programs will be replaced by a new Corrective Measure/ Remedial Action Monitoring Program with the focus of evaluating the performance of the remedy to attain the RAOs and to comply with ARARs. As described in the Draft Operation and Maintenance Manual – Volume 2 (CH2M HILL, 2012d), the monitoring program will have several components: compliance monitoring, process control monitoring, and constituents of potential concern monitoring.

In the field, variations in Cr(VI) concentration distributions, lithology, and hydrogeology will be encountered. To deal with the uncertainty in these parameters in implementation, the remedial system was designed to be flexible and the remedy will be implemented with an adaptive operational strategy. During system installation and baseline sampling, additional data will be collected that will refine the current conceptual

model. Where appropriate, the data may be used to refine the design, such as remedial well screen depths or well locations.

3.3.3.1 Monitoring Well Sampling Locations and Frequency.

As previously noted, the Corrective Measure/Remedial Action Monitoring Program (RCM/ PCMP) will make use of the existing monitoring well network wherever possible. That existing monitoring well network will be augmented by the planned 19 new monitoring wells (Designated as Wells A through S in Figure 6) that were previously described in subsection 3.3.1.2. The RCM/PCMP sample locations, analytes, and frequencies will be adapted in an ongoing manner to meet the monitoring needs of the Final Groundwater Remedy. Additional monitoring wells may be required in the future.

The current GMP network of monitoring wells in the Action Area (shown in Figure 5) consists of 146 groundwater monitoring wells, with an additional 17 wells that are associated with the CMP for the IM No. 3 injection area. The current GMP also includes surface water sampling in the Colorado River, so these samples are presented in the event that sampling will continue during operation of the Final Remedy and, are included in this evaluation. As of December 2013, monitoring occurs as follows:

- 13 groundwater wells are sampled biennially;
- 39 groundwater wells are sampled annually;
- 2 active supply wells are sampled annually;
- 35 groundwater wells are sampled semi-annually;
- 54 groundwater wells are sampled quarterly;
- 2 groundwater wells on the floodplain are sampled monthly between November and February
- 2 active extraction wells are sampled monthly;
- 4 shoreline surface water stations along the Colorado River and two (2) other surface water monitoring locations were sampled quarterly (except during the winter low-river stage conditions, when the stations are sampled one additional time); and
- 10 depth-specific sampling stations within the Colorado River that were sampled quarterly (except during the winter low-river stage conditions, when the stations are sampled one additional time).

The locations of the existing GMP/CMP wells are included in Figure 5.

3.3.3.2 Sampling Methods

As previously mentioned, analytes and monitoring frequencies for particular wells will be dictated by the location and well category and will be regularly evaluated by the PG&E, DOI, and DTSC to provide a flexible, adaptive program to meet the needs of the RCM/PCM program during remedy operations. An initial sampling program is presented in the Draft Operation and Maintenance Manual – Volume 2 (CH2M HILL, 2012d) for different well types (remediation, process control, monitoring, and freshwater supply wells). As data are collected during remedy installation and initial operations, the conceptual site model (CSM) will be updated. The monitoring program may be refined based on baseline data prior to remedy operation, and the sampling program will be revisited and refined after the first two years of operation.

All sampling events, regardless of the analytes being sampled, will also include collection of field parameters (pH, dissolved oxygen, oxidation-reduction potential, temperature, and specific conductance) and water level data to evaluate hydraulic control of the remedy system. Field sampling will follow the SOPs outlined in Section 7 and presented in Appendix A of the O&M manual (CH2M HILL, 2012d). The SOPs provide detailed method descriptions for purging and sampling of groundwater monitoring wells by well-volume and modified well-volume methods; purging and sampling of active and inactive water supply wells; depth-specific surface water sampling; groundwater sampling from sonic drilling boreholes; sample field filtration

and preservation for metals analyses; decontamination of water sampling equipment; spill prevention, containment, and control measures for monitoring well sampling; pore water sampling; access routes; process water sampling; and safe fueling and fuel handling procedures.

Access to monitoring wells will typically occur using via a pickup truck or all-terrain utility vehicle with a trailer. On average, two field personnel will be involved in sampling activities for each individual well. Sampling procedures require purging the wells before sampling can be conducted. Depending on the well characteristics, approximately 15 to 200 gallons of water are typically purged. This water will be either re-injected into the IRZ or transported to the Remedy-produced Water Treatment Facility. Pumping of purge water will typically involve the use of a portable generator unless the well pump has a dedicated (direct line) power source. For example, several wells on the Colorado River floodplain have dedicated pumps installed that are powered from an electrical power source taken from the PE-1 extraction well.

The time frame to complete field sampling activities at an individual well ranges from approximately 15 minutes to several hours. Several of the monitoring sites include clusters of two to three wells sampled at different groundwater depths. The total time frame to complete a sampling event ranges from one day for monthly events or two days for surface water/river sampling events, to seven or eight weeks for a biennial event. Existing and new access routes as shown in Figure 7 will be used to access any of these wells that are kept as part of the new Corrective Measure/Remedial Action Monitoring Program.

There will be ongoing RFI Soil Investigations as described in the work plan (CH2M HILL, 2013a) that will include sampling activities as shown in Figure 4. This work plan includes soil samples that will be distributed in locations around the Action Area but predominantly within Bat Cave Wash and East Ravine. It also includes sediment and pore water sampling that will be used as part of the East Ravine Investigation. All proposed sampling will follow existing SOPs.

3.3.3.3 Baseline Soil Sampling

In general, ongoing soil sampling through 2017 was evaluated in the 2012 Reinitiated PBA and included in the environmental baseline for this project. A brief description of baseline soil sampling is provided here since it will be accomplished in conjunction with the construction of the Final Groundwater Remedy facilities. To document baseline soil conditions prior to groundwater remedy implementation, a Baseline Soil SAP has been presented in Appendix A of the Soil Management Plan 60% Design Draft O&M Manual (Volume 4) (CH2M HILL, 2012e) to provide the approach and methods to collect and analyze soil samples in the areas used by the groundwater remedy.

In areas where groundwater remedy infrastructure overlaps with any of the eighteen different Soil Investigation Areas, the approach presented in the SAP will be fully coordinated with the ongoing RFI/RI planning activities to minimize the total number of soil samples to be collected and associated ground disturbances.

The purpose of the baseline soil sampling will be to provide comparable data to evaluate potential impacts of the final remedy at the time that they are being decommissioned. Baseline soil samples will be collected along the remedy pipelines/conduits alignments, which include direct burial pipelines/conduits, pipeline trenches, and the new remediation wells (i.e., injection and extraction wells) that are connected to those pipelines, as well as at the new remedy monitoring well locations. The exception is that baseline soil sampling will not occur along the alignment of the freshwater pipeline in Arizona, and on the California side, leading to the Compressor Station because the freshwater from HNWR-1 has inorganic compounds at such low concentrations, that soil underlying the pipeline would not be adversely impacted by inorganic compounds from incidental releases, spills or leaks from the pipeline.

3.3.4 Soil Storage

It is anticipated that excess soil will be generated from the construction of the Final Groundwater Remedy. The Soil Management Plan (60% Design Draft O&M Manual - Volume 4 [CH2M HILL, 2012e]) describes the

collection of data to assist with the management of displaced soils during construction activities. Analytical results from the Baseline SAP or other characterization of soil samples (i.e., drum or roll-off bins, or areas not pre-characterized) will be used to determine whether displaced soil is suitable for retention onsite for eventual return, reuse, or replacement, or if the soil must be removed from the site for disposal in accordance with applicable state and federal laws and regulations.

Analytes detected in the Baseline SAP or other characterization of soil samples above laboratory detection limits will be screened first against conservative values such as the background screening values (if available), or against the DTSC residential California Human Health Screening Level (CHHSL) or the ecological comparison value. If a CHHSL is not available, then the lesser of the U.S. Environmental Protection Agency residential regional screening level or the ecological comparison value will be used. It is assumed that the project-specific soil cleanup goals will be equal to or greater than these levels, so that soils below these levels will not be managed as wastes and would be suitable for re-use.

Soils not falling below these conservative screening levels will be further screened to determine if the soil should be classified as a nonhazardous waste, a state (non-RCRA California) hazardous waste, or a federal (RCRA) hazardous waste. The specific procedures are described in Section 2.3 of the Soil Management Plan, but are summarized here. Analytical results for total constituent concentrations (mg/kg), toxicity characteristic leaching procedure (TCLP) values, and California Waste Extraction Test (WET) values will be screened to determine how the soils should be classified. Based on the screening results, the displaced soil will be classified into 3 categories and will be managed as follows:

- RCRA and non-RCRA hazardous waste—the waste will be removed from the site within 90 days of generation and disposed of offsite in accordance with applicable laws and regulations. It will be imperative to coordinate with the waste hauler and disposal facility to ensure proper completion of the waste profile and to avoid unnecessary delays in acceptance of a waste to a specific facility.
- Non-hazardous clean soil—soil that is not classified as a hazardous waste, and is equal to or below the interim screening level, is suitable for immediate return, reuse, or replacement onsite. Based on initial estimates, roughly over 10,000 cubic yard of excess clean soil could be generated during remedy construction.
- Non-hazardous soil for long-term storage—soil that is not classified as a hazardous waste, and is greater than the interim screening level, will be stored onsite until the project-specific cleanup goals are established. Until these goals are established, soil that falls into this intermediate category will be retained onsite for long-term storage. For planning purposes, approximately 2,000 cubic yards of nonhazardous soil requiring long-term storage could be generated during remedy construction. Storage duration could be 3 to 5 years, or more, depending on establishment of site-specific cleanup goals and/or reuse scenario. Storage will be consistent with applicable requirements.

3.3.4.1 Locations and Storage Methods

As shown in Figure 7, five different proposed staging/soil storage areas have been identified in California (totaling 11.50 acres). Two other areas to the north of the west access route (Historic Route 66) totaling 0.95 acre, are currently being negotiated for dual staging/soil storage use.

Soil and material originating in or near Soil RFI/RI Investigation Areas (areas of known or suspected soil contamination) that is displaced as part of the groundwater remediation project will be handled and managed in accordance with the Soil Management Plan (CH2M HILL, 2012e). Uncontaminated soil that cannot be immediately used as backfill may be reused in other areas within the Action Area, or stockpiled for future reuse within the Action Area. The stockpiled uncontaminated soil will be managed following the BMPs Plan that will be part of the O&M SWPPP will be included in Appendix E of the 90% design Draft Operation and Maintenance Manual – Volume 1, which will reflect the latest requirements of the Industrial General Permit. It should be noted that the impacts for the Final Soil Remedy, if required by the agencies, will be evaluated prior to the conclusion of the re-Initiated 2007 PBA, which will expire in 2017.

Displaced soil that is nonhazardous but is unsuitable for final disposition onsite because contaminants are present above the interim screening level cannot be reused until project-specific soil cleanup goals are finalized and must be stored onsite. Once final project specific cleanup goals are established, the contamination will be re-assessed based on existing data, or additional data as determined necessary, to determine final disposition (i.e., transportation to offsite disposal facility or reuse within the Action Area).

Storage area(s) will depend on the volume of soil, which will not be known until after the implementation of the Baseline SAP. Soil will be stored in 55-gallon drums/small containers, roll-off bins, and/or stockpiles that are managed in accordance with the O&M SWPPP. All containers will be properly labeled according to state and federal requirements. Only nonhazardous soil will be stored in stockpiles.

3.3.4.2 Emergency Response

In compliance with 22 CCR 66264.14, a barrier, such as temporary fencing, will be provided for hazardous waste accumulation areas that are otherwise accessible to the general public. Hazardous waste soil accumulation areas will also have signs that provide 24-hour emergency contacts and telephone numbers. Hazardous waste accumulation areas will contain emergency response equipment appropriate to applicable waste hazards. The project-specific Health and Safety Plan will identify the project emergency response procedures and equipment, including emergency response contacts and phone numbers.

In addition to the project-specific Health and Safety Plan procedures, hazardous waste accumulation areas will be provided with fire extinguishers, decontamination equipment including an eye wash station, and an alarm system (if radio equipment is not available to all staff working in accumulation area).

3.3.5 Post-Remediation Monitoring

After active remediation ceases, monitored natural attenuation will be implemented as a long-term component of the groundwater remedy to address residual chromium that may remain in recalcitrant portions of the aquifer following efforts to enhance and optimize in-situ treatment and flushing systems during the O&M phase. In addition, in compliance with the State Board directive dated November 20, 2013, monitoring of groundwater quality in the freshwater injection areas will be conducted to verify that the arsenic water quality objective in the receiving groundwater are met within the earlier of (i) 20 years after achieving the RAO for chromium or (ii) 20 years after ceasing injection of freshwater containing naturally occurring arsenic at concentrations above the water quality objective. In other words, this long-term monitoring program could last up to 20 years after active remediation has ceased.

3.3.6 Decommissioning

Decommissioning of the project will occur in separate phases as described in the following subsections. Details on these items along with a consideration of their biological impacts are discussed in the following subsections.

3.3.6.1 IM No. 3 Facilities

Once the Final Groundwater Remedy is brought on line and is determined by the agencies to be operating properly and successfully, PG&E will decommission and remove the IM No. 3 system after receipt of approval for IM No. 3 decommissioning by DTSC, with concurrence from DOI. As required, a draft work plan describing the IM No. 3 Decommissioning activities will be submitted for review with the 90% design. Once approved, the work plan will be implemented for the decommissioning and removal of IM No. 3 facilities. The scope of work will include the decommissioning and removal or abandonment in place of the following IM No. 3 system components:

- Three extraction wells in the MW-20 Bench area of the site (TW-2S, TW-2D, and TW-3D) and one extraction well in the floodplain (PE-1), as well as ancillary well equipment and vaults. Two injection wells in the East Mesa area of the site (IW-2 and IW-3) and power supply structure located at this site. Prior to decommissioning the wells, submersible pumps in the extraction wells, air-lift tubing in the

injection wells, and pipes, valves, and instruments in both the extraction and injection well vaults will be removed. Conduit, electrical panels, and other features within a well vault will also be removed.

- Underground piping and vaults between the extraction wells and the treatment plant. After successful decontamination or cleaning, underground pipelines and conduits exiting PE-1, IW-2, and IW-3 well vaults will be cut and capped outside of the well vault and abandoned in place. The subsurface well vault will then be removed.
- The entire treatment plant, including equipment, pipelines, valves, instrumentation, utilities, and infrastructure underneath the sunshade, the sunshade, mobile warehouse units, trailer, treatment plant foundation and secondary containment areas, underground pipelines and utilities within the footprint of the treatment plant fence line, and security fence and gate.
- Underground and aboveground pipelines, and instrumentation conduit between treatment plant and injection well field.
- Support facilities on the MW-20 Bench, including Valve Vault #1, pumps, valves, pipelines, electrical, and instrumentation associated with the extraction wells, parking areas, security fence and gates, security system, lighting, and other ancillary equipment.

Existing monitoring wells and their instrumentation that are currently used to monitor IM No. 3 performance will be reused as part of the monitoring network associated with the Final Groundwater Remedy, and therefore will not be decommissioned. Decommissioning of these existing monitoring wells and their instrumentation will be addressed as part of the decommissioning of the groundwater remedy. The general approach for decommissioning wells is being developed by a subgroup that includes PG&E, DTSC, DOI, and Interested Tribes, and will be incorporated into the Groundwater Remedy O&M Manual, Volume 1, Section 4 (Well Maintenance and Decommissioning), as it becomes available.

The brine storage and loading facility (three tanks, the truck lane, and associated pumps and piping) also will be reused by the Final Groundwater Remedy in its existing location at the MW-20 Bench. No aboveground component of the existing IM No. 3 system located within the footprint of the existing IM No. 3 Treatment Plant building, or within the IM No. 3 Treatment Plant fence line will be reused in its current location as part of the Final Remedy.

3.3.6.2 Final Remedy Facilities

In compliance with the 2013 Consent Decree (Appendix C, Item 9), PG&E will submit a decommissioning plan within 120 days of DOI's certification of completion of the remedial action and a determination by DOI that removal of such facilities is protective of human health and the environment. The decommissioning plan will describe procedures for the removal of the remedy facilities and associated infrastructure. The plan will also describe the post-remedy restoration of the site to the conditions existing prior to the implementation of the remedy construction, to the extent practicable.

In addition, in accordance with mitigation measures, biological surveys will be conducted prior to decommissioning, and during the breeding season, to inform the decommissioning planning process. The Final Remedy Decommissioning activities will be completed in accordance with the BIAMP (CH2M HILL, 2013f) and other relevant documents (including this PBA).

3.3.7 Restoration

Upon completion of the decommissioning activities, the next step for the TCS Remediation Project will be to restore areas that were used in the course of the project, to conditions existing prior to construction to the maximum extent practicable.

After decommissioning and removal of the IM No. 3 treatment plant and final remediation facilities, the areas will be restored using decompaction and grading techniques designed to decrease erosion and

accelerate revegetation of native species. The decommissioning of monitoring wells will occur after an appropriate time span following the decommissioning of the remediation facilities.

3.3.7.1 IM No. 3 Facilities

The IM No. 3 restoration will provide a template after which, subsequent restoration efforts may be modeled or improved. Prior to conducting restoration activities, PG&E will prepare a Restoration Plan for review by regulatory agencies, stakeholders and Tribal Nations. The focus of the Restoration Plan would be to outline the scope of restoration; the goals and objectives of the restoration; to promote native plant and habitat regeneration; and to prevent invasive plant establishment. Success criteria will be proposed along with a monitoring and reporting plan. Adaptive management will be used to evaluate the effectiveness of the restoration through monitoring, and adjust management of the site in the event of unforeseen circumstances.

It should be recognized that the majority of the IM No. 3 decommissioned facilities are adjacent to ongoing Final Groundwater Remedy facilities. Similarly, previously used staging or soil storage may also be required for use in the Final Groundwater Remedy, or have ongoing activities (e.g. the Compressor Station, the Transwestern Metering Bench, the MW-24 Bench, the evaporation ponds area, the trailer park area in Moabi Regional Park, the parking areas off Interstate 40, etc.). Even after the decommissioning of the IM No. 3 facilities, it is expected that restoration will not be feasible for many areas that are required for ongoing Final Remedy operations (e.g., MW-20 Bench). Rather, these areas will not be restored until after the Final Groundwater Remedy facilities have been closed and decommissioned. Instead, these locations will be maintained along with remaining facilities over the duration of the final groundwater remedy operation. Established roads and access pathways will be maintained during decommissioning and restoration activities. After demobilization, the condition of established roads and access pathways will be returned to pre-mobilization condition.

The IM No. 3 treatment plant site may represent one area where restoration could proceed in advance of the closure of the Final Groundwater Remedy facilities, assuming it was not required as part of the Final Groundwater or Soil Remedies. Whether it is the former IM No. 3 Treatment Plant site or any other location, as previously mentioned, the IM No. 3 Restoration Plan will provide an excellent opportunity to develop the best methods and approaches that will help the Final Groundwater Remedy restoration efforts.

3.3.7.2 IM No. 3 Restoration Guidelines

After the aboveground IM No. 3 infrastructure and components have been decommissioned, the land within the work zone will be returned to a safe condition prior to commencing restoration activities. To return the land to a safe condition, excavated infrastructure, such as buried well and pipeline vaults, partially buried buildings, the IM No. 3 Treatment Plant foundation, and trenches excavated to remove utility lines, will be backfilled with displaced material or foreign fill and compacted. Excess displaced material from the Final Groundwater Remedy and displaced material from IM No. 3 Decommissioning activities may be used for backfill after the materials are tested and proven to be suitable for this use. Imported fill may be used if there is not enough displaced site material to backfill the excavated area or if the displaced material is not suitable for backfilling a particular area.

Backfilling and grading the decommissioned IM No. 3 infrastructure areas will be coordinated with the Soil cleanup process at the IM No. 3 site (AOC 29) and MW-20 Bench (AOC 30). If final remedial action at these areas is not known at the time of subsurface infrastructure decommissioning, temporary controls, such as barricades or gravel, may be placed at excavated areas to render the locations safe until the final remedial action for AOC 29 and AOC 30 is selected and implemented, and the final backfilling and grading is established.

Following backfill and compaction, light grading may be required to provide proper drainage and to control erosion. Grading, contouring, drainage, and erosion control plans for the identified areas to be restored will

be designed and included in the IM No. 3 Restoration Plan. Final grading and contouring will occur prior to revegetating the identified disturbed areas.

The following general steps will be conducted during restoration:

1. Verify that the above- and below-grade components, with the exception of any facilities associated with the final remedy, have been decommissioned.
2. Verify soil confirmation sampling is complete, and that remedial actions selected for AOC 29 and AOC 30 are implemented.
3. In coordination with the selected remedial action for AOC 29 and AOC 30, backfill holes or trenches created during the removal of IM No. 3 infrastructure or components with either displaced materials or with foreign fill.
4. Grade, contour, and compact the soil in accordance with the grading, drainage, and erosion control plans included in the IM No. 3 Restoration Plan.
5. Revegetate the area in accordance with the IM No. 3 Restoration Plan.

3.3.7.3 Final Remedy Facilities

With the decommissioning and removal of the Final Groundwater Remedy facilities, it will be possible to restore many of the areas used by the Remediation Project. Prior to final decommissioning, a second Restoration Plan will be prepared for review by regulatory agencies, stakeholders and Tribes. This Restoration Plan will encompass the remaining project areas used by groundwater remedy, including staging/storage areas. Similar to IM No. 3 Restoration, staging areas that have ongoing activities (e.g. the Compressor Station, the Transwestern Metering Bench, the MW-24 Bench, the evaporation ponds area, the trailer park area in Moabi Regional Park, the parking areas off Interstate 40, etc.) will not be restored. Also, established roads and access pathways will be returned to pre-mobilization condition.

The Restoration Plan for the remedy facilities will incorporate the approaches and feedback gathered from the previously prepared IM No. 3 Restoration Plan.

3.4 General Project Management Measures

Approval of ongoing and planned future activities are expected to be consistent with the substantive intent of current mitigation measures applied by BLM, USFWS, and DTSC to investigative and interim measures/removal actions that were required in the 2007 PBA. In addition to the measures noted below, project activities could also be subject to other regulatory requirements including, but not necessarily limited to, substantive requirements of the California Fish and Game Code Section 1600 et seq. and the California Endangered Species Act. Further, prior to the approval of implementation of the groundwater remedy, the BLM and/or USFWS will consult with the Native American community, which typically includes nine local tribes.

To clarify existing BLM mitigation measures, March 15 through September 30 was established as the date for the migratory bird nesting season and May 1 through September 30 was established to encompass the nesting period for the southwestern willow flycatcher and western yellow-billed cuckoo. During these periods, a qualified biological monitor would be required in the field to conduct pre-construction surveys for nesting birds, in addition to the USFWS-approved surveys that were being conducted annually, and then biennially, for the presence of southwestern willow flycatchers. In addition, February 1 through May 31 has been established as conservation dates to identify the up/down river migration and spawning period for razorback suckers and bonytail chubs. More recent agreements with the USFWS (2014a) have modified the southwestern willow flycatcher surveys to once every three years. Initially, two consecutive years of surveys for western yellow-billed cuckoo will be conducted in 2014 and 2015, and, thereafter, may also follow a triennial frequency depending on the results. Based on input from the USFWS (2005a, 2014b), it was

decided that there would be no project-specific surveys for Yuma clapper rail but that the status of this species in the Action Area would be assessed using the annual survey data from the USFWS. Should those data or onsite monitoring results indicate a need, future clapper surveys may become warranted.

Since 2005, there have been a number of focused protocol-level surveys for desert tortoise and southwestern willow flycatcher that have increased the knowledge of local biology. In addition, there have been many project-specific surveys, incidental wildlife observations, and habitat and plant surveys to help characterize the overall biological baseline within the Action Area. The BIAMP (CH2M HILL, 2013f) was drafted to identify and avoid project-related risks to avian wildlife that could result from the construction and operation of the Final Remedy, including decommissioning and restoration. Specific mitigation measures reflecting the latest agreements with the USFWS are included with the individual species descriptions in Section 5.0 of this PBA.

General management measures will apply to future field activities are listed below:

1. All project activities will be conducted in a manner that avoids take of a federally listed species. Take is defined to include any harm or harassment, including significant habitat modification or degradation that actually kills or injures listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project site or become harmed or killed by project activities, the project shall be shut down and the USFWS, BLM, and CDFW shall be consulted. Impacts to habitat will also be minimized to the maximum possible extent.
2. PG&E shall designate a field contact representative (FCR) who will be responsible for overseeing compliance with the mitigation measures. The FCR must be onsite during all construction activities. The FCR shall have authority to halt activities that are in violation of the mitigation measures and/or pose a danger to listed species. The FCR will have a copy of the mitigation measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.
3. PG&E shall have a qualified biologist responsible for assisting crews in compliance with the mitigation measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist shall be implemented for special-status wildlife species in work areas immediately prior to initiation of ground-disturbing activities. The survey shall provide 100 percent coverage of the designated work area, to the extent practicable. Any desert tortoise burrows and pallets outside of, but near, the work area footprint shall be flagged at that time so that they may be avoided during work activities. At conclusion of work activities, all flagging shall be removed.
4. Listed species, including the desert tortoise, shall not be handled or harassed. Encounters with a listed species shall be reported to the project biologist and BLM Lake Havasu biologists. These biologists will maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.
5. All PG&E employees and the contractors involved with the proposed project shall be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees and contractors shall receive training prior to working onsite.
6. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) shall be sited within existing designated access routes and previously disturbed or barren areas to limit new surface disturbance.
7. Existing routes of travel to and from the proposed project site shall be used. Cross-country vehicle and equipment use shall be prohibited.

8. Trash and food items shall be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.
9. To minimize effects, lights shall be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting shall be that which is most compatible with and least disturbing to wildlife.
10. Employees shall not bring pets to the project site.
11. Firearms shall be prohibited from the project site, except as required for security employees.
12. Employees shall be required to check under their equipment or vehicle before it is moved. If a desert tortoise or other wildlife is encountered under vehicles or equipment, the vehicle shall not be moved until the animal has voluntarily moved to another location, or to a safe distance from the parked vehicle.
13. Upon completion, all unused material and equipment shall be removed from the site. This condition does not apply to fenced areas.
14. Palo verde, ocotillo, mesquite, catclaw acacia, smoketree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species shall be avoided. If complete avoidance is not possible, these species shall be transplanted when practical. Should any of the aforementioned plants be destroyed, they shall be replaced.
15. The area of disturbance shall be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. Designated work areas will be determined based on Remedy Design documents, as approved by the BLM, USFWS, and CDFW.
16. Activities shall be restricted to the designated work areas that are determined by the latest Remedy Design documents as approved by BLM, USFWS, and CDFW. If unforeseen circumstances require project expansion outside of the designated work area, the potential expanded work areas shall be surveyed for listed species prior to use of the area. All appropriate mitigation measures shall be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original designated work area shall proceed only after receiving written approval from the BLM, USFWS and CDFW describing the exact location of the expansion
17. All open holes and trenches shall be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps shall be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist shall be notified immediately. The desert tortoise shall be allowed to escape before work continues in that location. A final inspection of the open trench segment shall also be made immediately before back filling.
18. All open, vertical pipe segments (such as those used for fence support or other purposes) shall be capped or otherwise covered when work activity is not occurring at the site. The capping/covering of the pipes is needed to prevent birds from entering the pipes. Uncapped pipes represent a threat to birds who may enter them and then be unable to exit. Capping the vertical pipes will avoid unintended impacts to birds.
19. Handling of hazardous materials for the Final Remedy program will be managed under the Topock Compressor Station Hazardous Materials Business Plan and under specific standard operating procedures (SOP) that are included in the O&M Manual (Volume 1), which will include procedures for properly storing and handling fuel onsite, the required equipment and procedures for spill containment, required personal protective equipment, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. The BLM shall be informed of any hazardous spills within 48 hours.

20. Workers shall exercise caution when traveling to and from the Action Area. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on designated access roads shall not exceed 20 miles per hour.
21. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas shall be prohibited. The BLM shall be notified of any such occurrences.
22. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E shall notify the BLM within 48 hours. As a part of this emergency response, the BLM may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.
23. Once remedy facilities are no longer needed, PG&E shall restore disturbed areas in a manner that will assist in the reestablishment of biological values within the disturbed areas. Methods of such restoration shall be consistent with the Topock Remediation Restoration Plans and include erosion control, planting with appropriate native shrubs, and restoration to pre-project conditions, to the extent practicable.
24. Within 60 days of completion of construction activities, the FCR and biologist shall prepare a brief report for the BLM documenting the effectiveness and practicality of the mitigation measure and making recommendations for modifying the measures to enhance species protection, as appropriate. The report will also provide information on survey and monitoring activities, observed listed species if encountered, and the actual acreage disturbed by the activities, if any.
25. Construction during the potential nesting season for most birds will require preconstruction surveys for nesting pairs, nests and eggs. These preconstruction surveys shall occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season. All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests, unless otherwise approved by the USFWS.
26. All areas within the proposed Action Area, subject to operations and maintenance activities, and within the potential impact of the action, shall be monitored during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys shall be completed throughout the duration of the activity to verify the presence or absence of desert tortoise and reports shall be provided to the biologists in the BLM Lake Havasu Field Office. Due to the lack of tortoise sightings in the Project area, the BLM has ended the program requirement for annual surveys.
27. Riparian areas surrounding the proposed Action Area and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatcher according to the protocol established by the USFWS. These surveys shall be completed every three years by a biologist permitted by the USFWS to carry out flycatcher surveys until the project has been completed and all facilities have been removed. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office and the USFWS's Phoenix, Arizona Ecological Services Field (AESO) Office (2321 West Royal Palm Road, Suite 103, Phoenix, AZ 85021, 602-242-0210) at the end of the each survey period.
28. Upon locating an individual of a dead or injured listed species, PG&E shall make initial notification to the BLM and USFWS within three working days of its finding. The notification must be made by telephone and writing to the Lake Havasu BLM Office (2610 Sweetwater Avenue, Lake Havasu City, Arizona 86406, 928-505-1200) and the USFWS's Phoenix AESO Office. The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities shall be transported by a permitted biologist to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFW and the BLM shall be contacted for final disposition of the animal.

29. PG&E will immediately notify the BLM Lake Havasu Field Manager (or his designated representative) of any cultural resources (prehistoric/historic sites or objects) and/or paleontological resources (fossils) encountered during permitted operations and will maintain the integrity of such resources pending subsequent investigation. All operations in the immediate area of the discovery must be suspended until written authorization from BLM to proceed is issued. An evaluation of the discovery shall be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically important paleontological values.
30. No permanent improvements that affect the integrity of the bridge/culvert over Bat Cave Wash on historic Route 66 shall be implemented.
31. Actions that result in impacts to archaeological or historical resources are subject to the provisions of the Archaeological Resources Protection Act of 1979, as amended, and the Federal Land Policy and Management Act of 1976.
32. To document existing conditions prior to construction, a photo documentation plan will be written for the project and reviewed by BLM and USFWS. The plan will include photo points and a methodology. The plan will be implemented prior to any disturbance on site.

Additional species-specific measures are provided in Section 5.0 of this document.

SECTION 4.0

Biological Setting and Environmental Baseline

This section describes the general biological setting and environmental baseline in the Action Area along with species-specific information. Interpretations and conclusions regarding biological resources within the Action Area were derived primarily from the results of various studies conducted between 2004 and the present including:

- *Final Environmental Impact Report for the PG&E Topock Compressor Station Groundwater Remediation Project, Volume 2* (AECOM, 2011)
- *Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (CH2M HILL, 2007a)
- Desert Tortoise Presence/Absence Surveys for the Topock Compressor Station (CH2M HILL 2004f, 2004g; Garcia and Associates (GANDA) 2005b, 2006b, 2007b, 2008b, and 2009b; and William Self Associates, Inc. [WSA] 2013)
- Southwestern Willow Flycatcher Presence/Absence Surveys for the PG&E Topock Compressor Station (GANDA 2005a, 2006a, 2007a, 2008a, 2009a, 2010, and 2012)
- Yuma Clapper Rail and Black Rail Surveys at the PG&E Topock Compressor Station Site (Konecny Biological Services (KBS), 2012)
- Instream Habitat Typing Survey, Topock Compressor Station, Colorado River (CH2M HILL, 2012f)
- *Revised Final Floristic Survey for the Topock Compressor Station Groundwater Remediation Project* (GANDA and CH2M HILL, 2013a)
- *Revised Final Ethnobotany Survey Report for the Topock Groundwater Remediation Project* (GANDA and CH2M HILL, 2013b)
- *Supplemental Ethnobotanical Plant Surveys for the Pacific Gas and Electric Company's Topock Compressor Station, San Bernardino County, California* (E2 Consulting Engineers, Inc., 2014)
- *Wetlands and Waters of the United States, Delineation for the Topock Compressor Station Groundwater Remediation Project* (CH2M HILL, 2013d)

4.1 Biological Setting

The Action Area is located approximately 12 miles southeast of Needles, California, and 2.5 miles south-southwest of Topock, Arizona, and is located in the easternmost portion of San Bernardino County, California, and the westernmost portion of Mohave County, Arizona. The Colorado River represents the boundary between California and Arizona (Figure 1).

Land use in the Action Area and vicinity consists of developed areas and open space (undeveloped) federal lands that are managed for multiple uses. Developed areas, described later in subsections 4.2.1 and 4.2.2, include the TCS, the BNSF railroad and Interstate 40 transportation corridor, existing paved roadways, Moabi Regional Park, Pirate's Cove Resort, and Topock Marina. The nearest significant concentration of irrigated agricultural lands can be found within the Colorado River floodplain approximately 9.4 miles or more to the north of the Action Area.

The channel banks along the Arizona side of the river north of the Topock Marina are characterized by steep slopes that have been armored with large boulders. The elevation at the top of the bank is approximately 466 feet amsl. The banks along the inlet to the Topock Marina are characterized by narrow sandy beaches and eroded sandy banks at elevations ranging from around 460 to 463 feet amsl. Low sandy beaches are

also present along the Arizona side of the river south of the Topock Marina and the BNSF railroad bridge (CH2M HILL, 2013d). The 100-year floodplain of the Colorado River is shown in Figure 7. The low terrace between MW-20 Bench and the floodplain is a former (historical) floodplain that has been colonized by riparian vegetation habitat.

The California side of the river channel is characterized by steep, sandy banks with dense vegetation with narrow sandy beaches occurring in scattered locations. Along the California side of the channel, north of the Park Moabi Slough, the banks have been modified to create elevated campgrounds and low sandy beaches (CH2M HILL, 2013d).

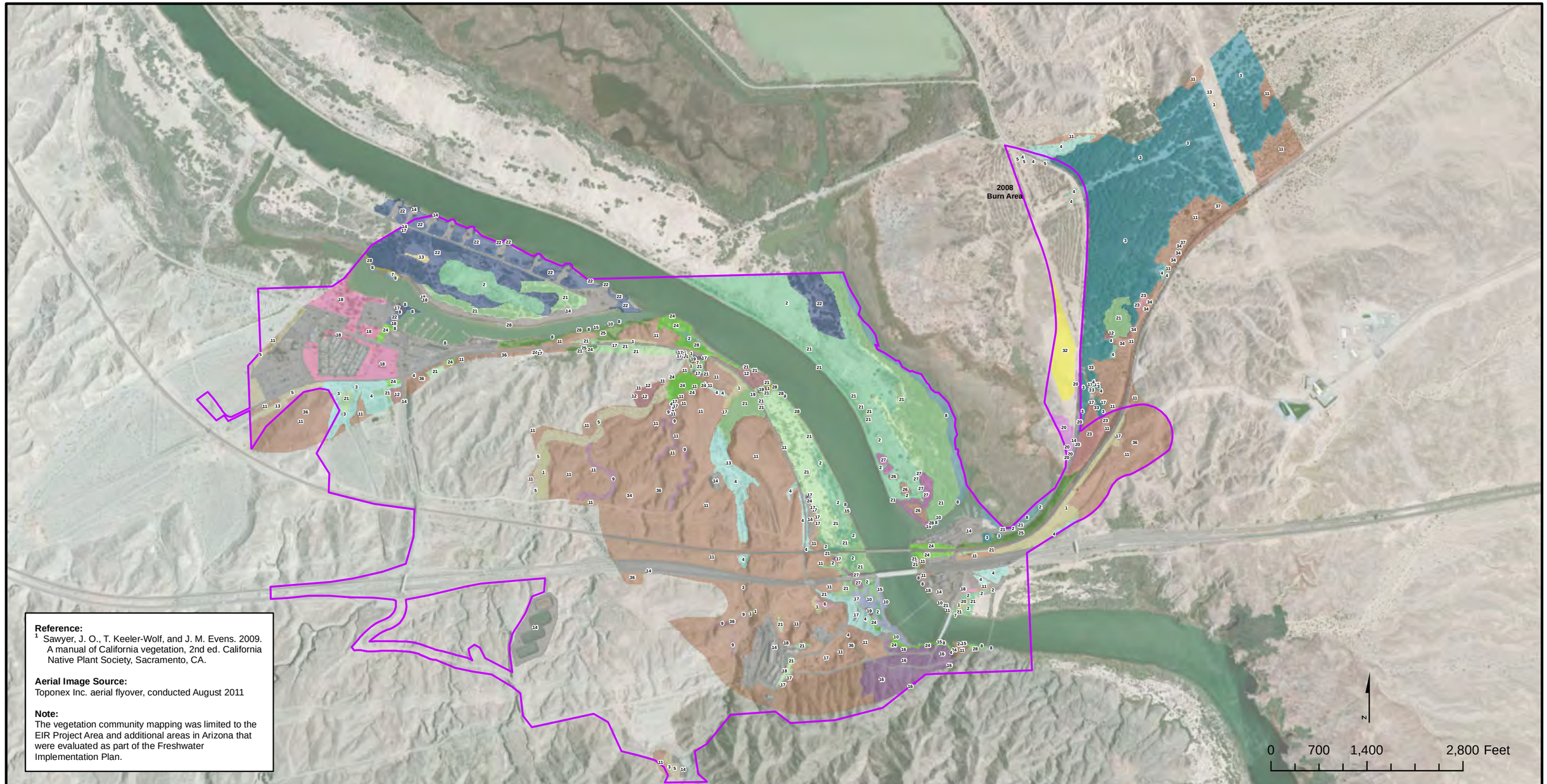
Within the Action Area, most of the northern banks of the Park Moabi Slough are characterized by open sandy beaches that are routinely maintained as part of the park operations. Vegetated areas along the north shoreline are limited to the low terrace at the western edge of the survey area. The south banks of Park Moabi Slough are characterized by developed beaches, vacation cabins, boat docks, and boat ramps associated with the Pirate's Cove Resort and Park Moabi. East of the developed areas, the south shore of the slough is characterized by relatively steep sandy and rocky banks with dense vegetation. As with the main channel of the Colorado River, patches of emergent vegetation occur in some locations along the edges of the slough. Park Moabi Slough is a direct tributary to the Colorado River and is also used for interstate commerce including recreational boating and fishing (CH2M HILL, 2013d). Open water associated with the Colorado River and Park Moabi Slough account for approximately 11 percent of Action Area.

4.1.1 Vegetation Communities and Land Cover Types

Most of the Action Area is located in the Piute Valley-Sacramento Mountains ecological subsection of Mojave Desert Ecological Section (Miles and Goudey, 1998). Approximately half of this subsection is characterized by steep mountains, moderately sloping piedmonts, and alluvial fans, with the remaining half of the subsection characterized by alluvial plains and a nearly level basin floor (Miles and Goudey, 1998).

An area approximately 50 acres in size within the HNWR was burned during the 2008 Sacramento Wash wildfire. In 2011, USFWS mechanically cleared this area of dead trees and much of the woody debris was chipped and spread over the site (Digital-Desert, 2013). This area was essentially devoid of vegetation at the time of the 2012 floristic survey (GANDA and CH2M HILL, 2013a). However, when this area was observed in December 2013, vegetative restoration with native plants (Digital-Desert, 2013) had been initiated to the west of the unpaved roadway. The restoration plantings of the area between the unpaved roadway and the Oatman-Topock Highway had not yet begun and this area was dominated by an invasive plant, Russian thistle (*Salsola tragus*).

Ten primary terrestrial plant community types and three major wetland communities occur within the Action Area. The primary terrestrial plant community types are creosote bush scrub, tamarisk thickets, arrow weed thickets, blue palo verde woodlands, catclaw acacia thorn scrub, hillside palo verde scrub, allscale scrub, quailbush scrub, western honey mesquite bosque, and screwbean mesquite bosque. The primary wetland communities include California bulrush marshes, cattail marshes, and common reed marshes. Descriptions of these primary plant communities are provided in the following subsections. A detailed vegetation map with additional community types found in the Action Area is provided in Figure 8.



Reference:
[1] Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. A manual of California vegetation, 2nd ed. California Native Plant Society, Sacramento, CA.

Aerial Image Source:
Toponex Inc. aerial flyover, conducted August 2011

Note:
The vegetation community mapping was limited to the EIR Project Area and additional areas in Arizona that were evaluated as part of the Freshwater Implementation Plan.

LEGEND

PBA Update Action Area

Vegetation Types

- Desert Lilly
- Allscale Scrub (MCV2[1]: Allscale scrub) [1]
- Arrow Weed (MCV2: Arrow weed thickets)[2]
- Athel Tamarisk (MCV2: Tamarisk thickets)[3]
- Blue Paloverde (MCV2: Blue palo verde-Ironwood woodland)[4]
- Blue Paloverde/Catclaw Acacia (MCV2: Blue palo verde-Ironwood woodland)[5]
- Blue Paloverde/Honey Mesquite (MCV2: Blue palo verde woodland)[6]
- Broad-leaved Cattail (MCV2: Cattail marshes)[7]
- California Bullrush (MCV2: California bulrush marsh)[8]
- Catclaw Acacia (MCV2: Catclaw acacia thorn scrub)[9]
- Common Reed (MCV2: Common reed marshes)[10]
- Creosote bush scrub (MCV2:Creosote bush scrub)[11]
- Creosote Bush/Cattle Saltbush (MCV2: Allscale scrub)[12]
- Desert Smoke Tree (MCV2: Blue palo verde-Ironwood woodland)[13]
- Developed/Disturbed[14]
- Giant Reed (MCV2:Giant reed breaks)[15]
- Hillside Paloverde (MCV2: Foothill palo verde desert scrub)[16]
- Honey Mesquite (MCV2: Mesquite bosque)[17]
- Landscaped[18]
- Open Water [19]
- Quailbush Scrub (MCV2: Quailbush scrub)[20]
- Salt Cedar (MCV2: Tamarisk thickets)[21]
- Salt Cedar/Arrow Weed (MCV2: Tamarisk/Arrow weed thickets)[22]
- Salt Cedar/Athel Tamarisk (MCV2: Tamarisk thickets)[23]
- Salt Cedar/Honey Mesquite (MCV2: Tamarisk thickets/Mesquite bosque)[24]
- Salt Cedar/Honey Mesquite/Blue Paloverde (MCV2: Tamarisk thickets/Mesquite bosque/Blue palo verde-Ironwood woodland)[25]
- Salt Cedar/Screwbean Mesquite (MCV2: Tamarisk thickets/ Screwbean mesquite bosque)[26]
- Screwbean Mesquite (MCV2: Screwbean mesquite bosque)[27]
- Wetland [28]

FIGURE 8
VEGETATION COMMUNITIES

FINAL GROUNDWATER REMEDY
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2013\PBA\2013Q4\FIG8_VegCommunities.mxd Date Saved: 1/7/2014 10:45:13 AM

4.1.2 Terrestrial Communities

The following descriptions were summarized from the *Revised Final Floristic Survey Report* (GANDA and CH2M HILL, 2013a). It should be noted that the area surveyed for that report was limited to the portions of the Action Area in California and Arizona that were associated with proposed or existing investigative or remedial activities. The floristic survey area included additional areas outside of the Action Area that were associated with the Freshwater Implementation Plan.

4.1.2.1 Creosote Bush Scrub

The most common and widespread plant community in the Action Area is creosote bush scrub. This vegetation type is characterized by widely spaced creosote bush (*Larrea tridentata*) with associated species such as white bursage (*Ambrosia dumosa*), white rhatany (*Krameria bicolor*), brittlebush (*Encelia farinosa*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and silver cholla (*Cylindropuntia echinocarpa*). Creosote bush scrub occurs throughout the dissected alluvial terraces within the Action Area.

4.1.2.2 Tamarisk Thicket

Tamarisk thicket is found primarily on the east side of the Oatman-Topock Highway in the Sacramento Wash and along the low sandy terraces adjacent to the Colorado River and the inlet to Park Moabi Slough. This vegetation type is also found near the terminus of the larger ephemeral washes along the Colorado River and south of the National Trails Highway. Vegetation is characterized by open to dense stands of the non-native and invasive tamarisk (*Tamarix ramosissima*) and/or athel tamarisk (*Tamarix aphylla*). In many locations tamarisk or athel tamarisk occur as monospecific stands; in other areas associated trees and shrubs include western honey mesquite (*Prosopis glandulosa* var. *torreyana*), screwbean mesquite (*Prosopis pubescens*), blue palo verde (*Parkinsonia florida*), and arrow weed (*Pluchea sericea*). Herbaceous vegetation is absent within dense thickets of tamarisk and athel tamarisk, but scattered herbaceous species such as fanleaf crinklemat (*Tiquilia plicata*), Spanish needle (*Palafoxia arida*), and *Cryptantha* spp. are often present in the openings between the trees in some areas.

4.1.2.3 Arrow Weed Thicket

Arrow weed thicket is found on the low sandy terraces along the Colorado River and Park Moabi Slough. Arrow weed is the sole dominant shrub species with individuals widely scattered or aggregated into dense, nearly impenetrable stands. It is most common along the Colorado River in California north of Interstate 40 and in Arizona north of the Topock Marsh Inlet and often intermixes with tamarisk thickets and mesquite bosque. Associated species include tamarisk, smoke tree (*Psorothamnus spinosus*), western honey mesquite, brittlebush, and desert broom (*Baccharis sarothroides*). Scattered herbaceous vegetation in the more open areas includes fanleaf crinklemat, Spanish needle, *Cryptantha* spp., and Mediterranean grass (*Schismus barbatus*).

4.1.2.4 Blue Palo Verde Woodland

Blue palo verde woodland occurs along the edges and throughout the channel bottoms of the larger ephemeral washes in the dissected alluvial terraces south of the Colorado River. This vegetation type is also present in Arizona in the northern and eastern parts of the Action Area on the HNWR. Total vegetation cover is generally low, but species diversity is relatively high, especially in the larger washes, as compared to the other vegetation types in the project area. Blue palo verde is the dominant tree with scattered individuals of tamarisk, athel tamarisk, and smoke tree also present in some areas. Associated shrubs include catclaw acacia (*Senegalia greggii*), Anderson's desert thorn (*Lycium andersonii*), brittlebush, sweetbush (*Bebbia juncea* var. *aspera*), cheesebush (*Hymenoclea salsola*), climbing milkweed (*Funastrum hirtellum*), desert lavender (*Hyptis emoryi*), white bursage, white rhatany, and creosote bush. Common herbaceous species include small-seeded spurge (*Chamaesyce polycarpa*), small-flowered California poppy (*Eschscholzia minutiflora*), Emory rock daisy (*Perityle emoryi*), Spanish needle, and Arizona lupine (*Lupinus arizonicus*).

4.1.2.5 Catclaw Acacia Thorn Scrub

In the Action Area, catclaw acacia thorn scrub is limited to the bottoms of moderate-sized ephemeral washes in the dissected terraces south of the National Trails Highway. This vegetation type is characterized by widely scattered shrubs dominated by catclaw acacia. Common associated species include Anderson's desert thorn, brittlebush, sweetbush, cheesebush, desert lavender, white bursage, white rhatany, and creosote bush. Herbaceous species include small-seeded spurge, Arizona lupine, and Spanish needle.

4.1.2.6 Hillside Palo Verde Scrub

Hillside palo verde scrub is restricted to a small area east of the compressor station along the slopes of the Chemehuevi Mountains. Vegetation in this area is characterized by scattered hillside palo verde (*Parkinsonia microphylla*). Associated species in this area include creosote bush, pygmy-cedar (*Peucephyllum schottii*), brittlebush, white rhatany, beavertail cactus, buckhorn cholla (*Cylindropuntia acanthocarpa*), California barrel cactus (*Ferocactus cylindraceus* var*. cylindraceus*), and inflated desert trumpet (*Eriogonum inflatum* var*. inflatum*).

4.1.2.7 Quailbush Scrub

Quailbush scrub is dominated by big saltbush (*Atriplex lentiformis*) and occurs on low-lying alkaline or saline soils. This community is most common in Arizona, where it occurs in the HNWR west of the Oatman-Topock Highway. The only common associate at this site is bush seepweed (*Suaeda moquinii).* A small area of Quailbush scrub also occurs in Arizona near the Colorado River at the foot of the southernmost natural gas pipeline bridge.

4.1.2.8 Allscale Scrub

Allscale scrub is dominated by cattle saltbush (*Atriplex polycarpa*) and is the most common alkaline-tolerant shrubland alliance in the project area. In the Action Area, allscale scrub is most common along the National Trails Highway south of the Park Moabi Slough and Colorado River confluence. In Arizona, a small area of allscale shrub is also present south of the pipeline bridge and cattle saltbush is the characteristic shrub in a large open area on the east side of the BNSF railroad tracks.

4.1.2.9 Western Honey Mesquite Bosque

Western honey mesquite bosque is mostly found on the low sandy terraces along the Colorado River in California north of Interstate 40 and in Arizona north of the Topock Marsh Inlet, where it occurs intermixed with tamarisk thickets, but also occurs in a few scattered locations in the HNWR on the east side of the Oatman-Topock Highway in Arizona.

4.1.2.10 Screwbean Mesquite Bosque

Screwbean Mesquite bosque is almost entirely restricted to the low terraces along the California side of the Colorado River where it is concentrated in three relatively small areas from Moabi Regional Park to the Interstate-40 bridge. It is most abundant along the southwestern shoreline of Park Moabi Slough across from the marina. It is also a principal component of the screwbean/tamarisk thicket vegetation that covers the southern portion of the island to north of the slough. It is common on the California side of the Colorado River near the BNSF railroad bridge. Along the narrow inlet of Park Moabi Slough, it is locally common and near the cattail marshes. Screwbean mesquite was also planted as part of vegetation restoration between the Topock Marsh and the unpaved roadway on the HNWR following a 2008 Sacramento Wash wildfire.

4.1.3 Wetland Plant Communities

The following descriptions were summarized from the *Wetlands and Waters of the United States Delineation for the Topock Compressor Station Groundwater Remediation Project, San Bernardino County, California* (CH2M HILL, 2013d). Similar to the previously discussed Floristic Report, the area surveyed for the wetland delineation report included only the portions of the Action Area in California and Arizona that were associated with proposed or existing investigative or remedial activities.

The delineation mapped and characterized riverine (i.e., flowing water) and palustrine (i.e., ponded water) features with their own vegetation communities, as summarized in the following subsections.

4.1.3.1 Riverine Features

Under the classification system developed by Cowardin et al. (1979), riverine features include "all wetlands that are contained within a channel, with the exception of channelized wetlands dominated by over 30 percent cover of trees, shrubs, or persistent emergent vegetation and channels containing ocean-derived salts…" Under this classification system, a channel is defined as "an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water".

Riverine features identified in the Action Area include Lower Perennial features and Intermittent classes. The Lower Perennial Riverine features are non-tidal, low gradient rivers and streams with slow water velocity, sandy or muddy substrates, and at least some water flow throughout the year and are represented by the Colorado River and Park Moabi Slough. The Intermittent features are channels that contain flowing water for only part of the year and include the Sacramento Wash, Bat Cave Wash, and other ephemeral washes and drainages that occur throughout the dissected terraces within the Action Area (primarily west of the Colorado River).

Both the Colorado River and Park Moabi Slough were considered to be traditional navigable waters based on their use for recreational boating including the Pirate's Cove Resort Marina and the Topock Marina (USACE, 2007). Because the state line between California and Arizona is located near the center of the Colorado River, the river is also an interstate water body. Interstate commerce associated with the river includes recreational boating, camping, and fishing. Ephemeral washes that are direct tributaries to the Colorado River or the Topock Marsh are considered to be non-wetland waters of the United States.

The alluvial terraces located along the south side of the Colorado River and north of the Chemehuevi Mountains are characterized by numerous incised drainage channels and ephemeral washes. One of the largest ephemeral drainages within the Action Area is Bat Cave Wash, a primarily north-south-trending channel immediately west of the PG&E TCS. Bat Cave Wash is shown as an intermittent blue line stream on the USGS Topock topographic quadrangle map and is also shown as an intermittent stream in the National Hydrologic Dataset (NHD). Vegetation in the upper reaches is sparse consisting of scattered shrubs such as Cooper's box-thorn (*Lycium cooperii*), catclaw acacia, and desert lavender. As the wash continues down slope, the channel broadens to over 190 feet wide in some areas and multiple low-flow channels are present throughout the active floodplain. Vegetation cover also increases down slope with blue palo verde and tamarisk trees scattered throughout the active floodplain. Other common shrubs on or immediately adjacent to the active floodplain include brittlebush, creosote bush, white bur-sage, sweetbush, and white rhatany.

A second large ephemeral wash, located to the northwest of Bat Cave Wash, is not shown as a blue line stream on the USGS Topock quadrangle map or as a mapped feature in the NHD. The active floodplain of this channel ranges from approximately 100 feet to 240 feet wide and is characterized by a sandy-pebble-cobble substrate with multiple low-flow channels. Scattered perennial vegetation throughout the channel includes blue palo verde, catclaw acacia, Cooper's box-thorn, sweetbush, creosote bush, white rhatany, and cheesebush. Similar to Bat Cave Wash, there is a dense thicket of tamarisk and honey mesquite at the northern (down slope) end of the wash feature. Evidence of flow observed in this area included a defined

bed and bank, scouring, drift/debris deposits, benches and sand/silt deposits. A large earthen dam has been constructed near the downstream terminus of this feature and there is no longer a direct hydrologic connection to the Colorado River. A perennial pond is located immediately north of the dam that is connected to a small wetland adjacent to the Colorado River via a large culvert that passes under the National Trails Highway. This pond and the adjacent wetland are described in more detail in the following subsection under Palustrine wetlands.

Several additional smaller, incised tributary drainages flow directly into either Bat Cave Wash or into the unnamed western wash system within the Action Area. These channels are characterized by a single low-flow channel and generally have sandy-gravel, cobble, or rocky substrates. Most of the low-flow channels are devoid of vegetation or have only sparse scattered herbaceous species such as spurge, Spanish needle, ovate plantain (*Plantago ovata*), and needle gramma (*Bouteloua aristidoides* var. *aristidoides*). Common trees and shrubs along the lower slopes and channel edges in these areas include blue palo verde, catclaw acacia, Anderson's box-thorn, creosote bush, white bur-sage, white rhatany, and sweetbush.

The Sacramento Wash is located near the northern end of the Action Area east of the Topock Marsh. Within the Action Area, the Oatman-Topock Highway bisects the wash with an at-grade ("Arizona-type") crossing. The Sacramento Wash is shown as a blue line stream on the Topock USGS 7.5-minute quadrangle and as an NHD intermittent stream. Within the Action Area, the Sacramento Wash is a broad, open sandy channel that is largely confined within constructed levees. The channel ranges from approximately 50 to 70 feet wide and has a flat, generally uniform bed that lacks well-defined low-flow channels. There are minor benches and terraces along the channel in a few locations, but there is no active floodplain outside of the channel due to the constructed levees along this section of the wash. On the east side of the Oatman-Topock Highway, the main wash channel is devoid of vegetation with extensive athel tamarisk thickets along both sides of the wash channel. On the west side of the road, the wash continues to flow through a main channel that is confined by levees for approximately 950 feet to where it then broadens out along the floodplain adjacent to the Topock Marsh just west of the Action Area. Some blue palo verde trees are present along the levees on the west side of the road and a few small trees and shrubs including tamarisk, smoke tree, bush seepweed (*Suaeda nigra*), and creosote bush occur within the wash channel.

4.1.3.2 Palustrine Features

Palustrine (ponded) wetlands are nontidal, freshwater wetlands that are vegetated with over 30 percent cover of trees, shrubs, herbaceous vegetation or mosses, and lichens. Also included are wetlands lacking such vegetation but with all of the following four characteristics: 1) the total area is less than 20 acres; 2) there are no active wave-formed or bedrock shoreline features; 3) water depth in the deepest part of basin is less than 6 feet at low water; and 4) salinity due to ocean-derived salts is less than 0.5 parts per thousand (Cowardin et al., 1979). Palustrine wetlands identified in the Action Area included emergent, scrub-shrub, and unconsolidated bottom wetland classes. The Emergent class includes those wetlands that are characterized by erect, rooted, herbaceous plants adapted to grow under flooded and/or saturated conditions. The Scrub-Shrub class includes wetlands that are characterized by trees and shrubs less than 20 feet tall. Unconsolidated Bottom wetlands have sand, silt or mud substrates and less than 30 percent vegetative cover.

Shore zone emergent wetlands include scattered patches of southern cattail (*Typha domingensis*), California bulrush, common reed (*Phragmites australis*), and giant reed (*Arundo donax*) growing along the edges of the Colorado River and Park Moabi Slough, below the ordinary high water line. These shore zone wetlands are most common along the southern banks of the Park Moabi Slough, but are also found along the north banks of the slough in the westernmost part of the Action Area. Shore zone wetlands are less common along the Colorado River and occur in scattered locations along the south/west bank as well as in the vicinity of the Topock Marina. Also included are areas with California bulrush along the outlet of Bat Cave Wash and areas with broad-leaved cattail (*Typha latifolia*) in the outlet of the East Ravine near the southern boundary of the Action Area (CH2M HILL, 2013d).

Adjacent emergent wetlands include wetland features that are immediately adjacent to the Colorado River or Park Moabi Slough, but occur above the ordinary high water and inland of the shore zone wetlands. Four adjacent wetland areas were identified in the Action Area. The first and largest adjacent wetland is located on the south side of the Interstate 40 Bridge on the west side of the Colorado River. This wetland is characterized by a dense monoculture of common reed. Based on the location and elevation of this wetland surface water is likely present in the summer months (May–July) during higher flow levels and so was considered to be seasonally flooded (CH2M HILL, 2013d).

The second adjacent wetland is on the east side of the Colorado River, north of the Topock Marina. This wetland is characterized by a strip of emergent wetland immediately above the shore line and also includes a narrow band of low trees and shrubs further inland. Emergent vegetation is characterized by iris-leaved rush (*Juncus xiphioides*), dallis grass (*Paspalum dilatatum*), and marsh pennywort (*Hydrocotyle verticillata*) with scattered common reed and California bulrush. Given the low topographic position, this area is likely subject to some flooding during higher flows and appears to have saturated conditions in the upper part of the soil for most of the year (i.e., seasonally flooded). Immediately inland, the vegetation is characterized by small tamarisk trees and shrubs, arrow weed, broom baccharis and scattered narrow-leaved willow (*Salix exigua*), and sparse common reed. For these reasons, this area was classified as a scrub-shrub saturated wetlands (CH2M HILL, 2013d).

The third adjacent wetland is on the south bank of the Colorado River, approximately 600 feet downstream of the confluences of the Park Moabi Slough and the Colorado River. This low depressional area is filled with dense growth of southern cattail. A culvert connects this area to a pond on the south side of the National Trails Highway. Given the low topographic position, hydrologic connection to the pond south of the road, and shallow ground water noted at the time of the survey, it is likely that this area is subject to shallow seasonal flooding for part of the year (CH2M HILL, 2013d).

The fourth adjacent wetland occurs on the north side of Park Moabi Slough to the northwest of the Moabi Regional Park parking area and marina. This wetland is located on the landward side of shore zone and is characterized by iris leaved rush, marsh pennywort, and dallis grass with scattered southern cattail. This wetland area appears to be located just above the ordinary high water level, but it is at a low enough elevation that some flooding likely occurs during periods of higher flows and so was considered to be seasonally flooded (CH2M HILL, 2013d).

The Action Area includes a small piece of the southern Topock Marsh located to the north of Interstate 40 in Arizona. In this location the marsh is characterized by dense growth of California bulrush. Surface water to a depth of 7 inches was present at the sample location at the time of the February 2012 survey and the area was considered to be permanently flooded.

As previously mentioned, there is a pond on the south side of the National Trails Highway approximately 800 feet southeast of the confluence of Park Moabi Slough and the Colorado River. An earthen dam separates the pond from the ephemeral wash system that extends to the south. The pond is connected to an adjacent emergent wetland on the north side of the National Trails Highway via a large culvert. The southern half of the pond is characterized by dense growth of southern cattail, while the northern part is open water. Several feet of water was observed in the pond during both the February and July 2012 surveys and so this area was considered to be permanently flooded. A beaver lodge is present near the center of the pond at the edge of the cattails.

There is another small, square pond in the northeast corner of Moabi Regional Park between the boat ramp and the Pirate's Cove Marina, which was created as part of a water-supply project and is immediately adjacent to Park Moabi Slough. With the exception of sparse California bulrush the pond is characterized by open water with tamarisk, honey mesquite, and arrow weed surrounding the pond. Because of the lack of vegetation this feature was considered to be a non-wetland waters of the U.S. (CH2M HILL, 2013d).

Dense thickets of tamarisk are present at the northern ends of larger ephemeral washes south of the National Trails Highway. As previously noted, there is a dense thicket of tamarisk at the northern end of Bat Cave Wash and a dense thicket of tamarisk intermixed with honey mesquite is present at the terminus of the ephemeral wash system west of Bat Cave Wash. These areas are considered to be temporarily flooded wetlands because vegetative cover exceeds 30 percent.

The stormwater impoundment area in the western part of the Action Area, south of Moabi Regional Park, also supports relatively dense tamarisk and blue palo verde with scattered creosote bush and brittlebush. This feature collects water from three ephemeral drainages south of Moabi Regional Park. Evidence of flooding observed in this area during the survey included drainage patterns, drift deposits, large mud cracks and extensive debris at the 48-inch-diameter culverts in the northeast corner. This area was also considered to be temporarily flooded wetland (CH2M HILL, 2013d).

Based on the information above, the Action Area in California was divided into three primary habitat types as shown in Figure 9 that correspond to habitats that would be used by the PBA-listed species: uplands; historical river floodplain; and current river floodplain. Upland habitats include all undeveloped areas with upland vegetation that could be potentially suitable habitats for desert tortoise. Upland habitats include the ephemeral washes, but specifically exclude the historical and current river floodplains. The historical river floodplain is the zone with riparian vegetation including mesquite, tamarisk, and arrow weed patches. In the Action Area, the historical river floodplain is found between MW-20 Bench and National Trails Highway and the 100-year floodplain (see Figure 9) and has portions of dune-like habitat where dredge sands were deposited. This habitat may potentially suitable for use by southwestern willow flycatcher and western yellow-billed cuckoo. The current river floodplain includes all the area inside of the 100-year floodplain of the Colorado River. In general, these include adjacent (emergent marsh) wetlands such as that at the outlet of East Ravine and in smaller patches along the river's edge. The emergent marsh habitats are potentially suitable for Yuma clapper rail and the aquatic habitats are potentially suitable for the razorback sucker, and bonytail chub.

4.1.4 Special-Status Plants in the Action Area

Potential special-status plants in the Action Area were considered as part of the Environmental Impact Report (AECOM, 2011). Special-status plants that were identified within the Action Area are documented in the *Revised Final Floristic Survey Report* (GANDA and CH2M HILL, 2013a) and shown in Figure 9. It should be noted that the area surveyed for this report included only the portions of the Action Area in California and Arizona that were associated with proposed or existing investigative or remedial activities. The floristic survey area also included additional areas outside of the Action Area that were associated with the Freshwater Implementation Plan.

No federal or state listed endangered, threatened, or rare plants and no BLM sensitive species were found in the project area. Five species, including four plants with California Rare Plant Ranks (CRPR) of 2B and one plant with a rank of 4, were identified in the project area (Table 4). Two of these (mousetail suncup and hillside palo verde) were found in California and three (spiny-haired blazing star, small flowered androstephian, and gravel milkvetch) were found only in Arizona. A total of 14 plants that are protected under the California Desert Native Plants Act were identified in the project area (Table 4). No plants identified in the Arizona Rare Plant Field Guide were found in the Action Area.

TABLE 4
Summary of Special-Status Plants Identified in the Project Area

Common Name	Scientific Name	Status	Estimated Number in the Project Area
Trees			
Blue palo verde	*Parkinsonia florida*	CDNPA	700 +
Catclaw acacia	*Senegalia greggii*	CDNPA	250 +
Desert smoke tree	*Psorothamnus spinosus*	CDNPA	50
Hillside palo verde	*Parkinsonia microphylla*	CRPR 4.3 / CDNPA	100 -150
Screwbean mesquite	*Prosopis pubescens*	CDNPA	150 +
Western honey mesquite	*Prosopis glandulosa* var. *torreyana*	CDNPA	200
Shrubs			
Desert holly saltbush	*Atriplex hymenelytra*	CDNPA	3
Cacti			
Beavertail prickly pear	*Opuntia basilaris* ssp. *basilaris*	CDNPA	>500
Buckhorn cholla	*Cylindropuntia acanthocarpa* var. *coloradensis*	CDNPA	30
California Barrel Cactus	*Ferocactus cylindraceus* var. *cylindraceus*	CDNPA	65
Corkseed mammillaria	*Mammillaria tetrancistra*	CDNPA	50
Ocotillo	*Fouquieria splendens*	CDNPA	8
Teddy bear cholla	*Cylindropuntia bigelovii*	CDNPA	2
Silver cholla	*Cylindropuntia echinocarpa*	CDNPA	200
Herbs			
Mousetail suncup	*Chylismia arenaria*	CRPR 2.2	12
Small-flowered androstephium*	*Androstephium breviflorum*	CRPR 2.2	70 +
Spiny-hair blazing star*	*Mentzelia tricuspis*	CRPR 2.1	5
Gravel milkvetch*	*Astragalus sabulonum*	CRPR 2.2	1

*Species found only in Arizona within the limits of the project area.
CNDPA = California Desert Native Plants Act

4.1.5 Federal or State Listed Plants

No federal or state listed endangered, threatened, or rare plants or candidates for listing were found in the project area.

4.1.5.1 Bureau of Land Management Sensitive Plants

BLM has designated a category of special-status plants termed “sensitive.” Such plants are not federally endangered, threatened, or proposed, but are designated by the BLM State Director for special management consideration. In California this category includes all plants that are Federal Candidates for listing, all plants that are listed as Endangered, Threatened, or Rare by the State of California, and all plants that are ranked as 1B in the Inventory of Rare and Endangered Plants of California (CNPS, 2010), unless the State Director has determined that a particular taxon should be excluded from sensitive status. Based on the literature and database reviews, only four BLM sensitive species were considered to have the potential to occur in the project area: Harwood’s woolly star (*Eriastrum harwoodii*), Kofa Mountain barberry (*Berberis harrisoniana*), white-margined penstemmon (*Penstemmon albomarginatus*) and Howe's hedgehog cactus (*Eichenocereus engelmannii* var. *howei*). None of these species was found during the surveys within the Action Area.

4.1.5.2 California Rare Plant Ranked Species

CRPRs are used to define and categorizes degrees of concern regarding rarity in the California Flora. Plants that have been ranked as 2B are considered to be rare, threatened or endangered in California, but more common elsewhere (outside of the state). Plants assigned this ranking meet the definitions of a threatened or endangered species under sections 2062 and 2067 of the California Endangered Species Act and are eligible for listing.

Plants that have been ranked as 4 included species that have a limited distribution or have infrequent occurrences over a broad region in California. Plants assigned this rank are generally not eligible for listing under the California Endangered Species Act, but are uncommon enough that their status warrants monitoring. In general, however, many are locally important or represent populations that are at the periphery of the species range.

In addition to Rare Plant Ranks, plants are also assigned a Threat Rank to designate the degree in which the species is threatened. A threat rank of .1 indicates the species is seriously threatened, whereas a rank of .2 indicates a moderate threat level, and a rank of .3 indicates that a species is not very threatened in California.

Five CRPR plants were identified in the Action Area (Table 4). Two species, mousetail suncup (CPRP 2.2) and hillside palo verde (CRPR 4.3), were discovered in California and the other three species, spiny-haired blazing star (CRPR 2.1), small-flowered androstephium (CRPR 2.2), and gravel milkvetch (CRPR2.2) were found only in Arizona.

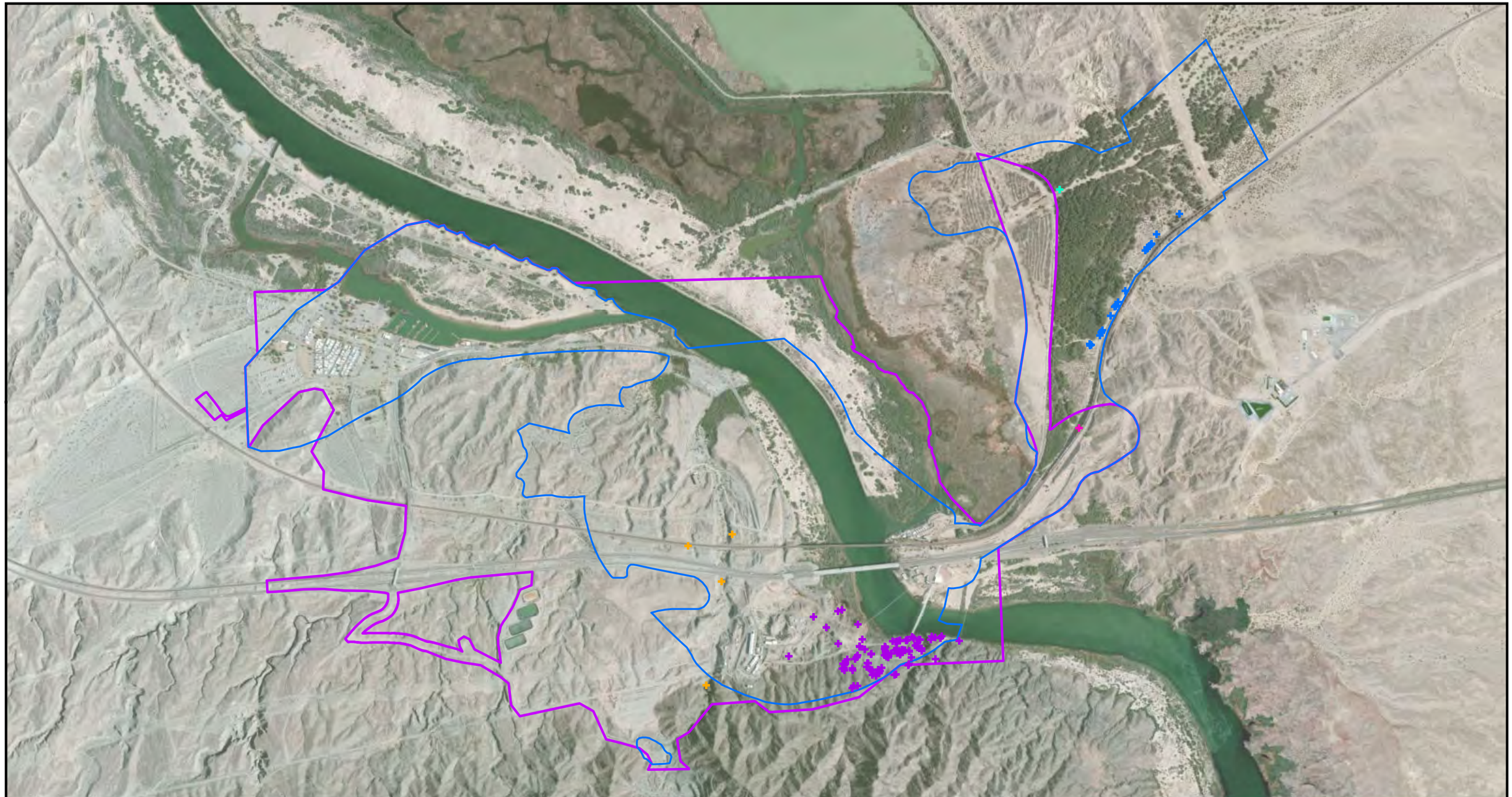
Mousetail suncup was found in Survey Segments C, D, and H. The largest population (with approximately nine individuals) is located on a vertical conglomerate rock wall above Bat Cave Wash (Figure 9). Single individuals also occur on a conglomerate rocks above the wash south of Interstate 40 and on a granitic rock face at the southern end of the wash. It also occurs on a steep rocky slope next to the BNSF railroad tracks (Figure 9). These populations represent a significant range extension for the species as they are over 90 miles northeast of previously recorded populations in California (Jepson Online Interchange, n.d.).

Hillside palo verde was found in areas to the south of Interstate 40 on the rocky north-facing slopes of the Chemehuevi Mountains (Figure 9). The number of individuals in this population is approximately 150 trees.

The other three species were all found in the Arizona portion of the Action Area to the south and east of the Topock Marsh. A few individuals of spiny-haired blazing star were identified on the rocky slopes just west of the BNSF railroad tracks. Approximately 70 individuals of small-flowered androstephium were observed in sandy soils on the west side of the BNSF railroad tracks and a single gravel milkvetch plant was found adjacent to the Sacramento Wash on the east side of the Oatman-Topock Highway (Figure 9). While listed as rare species in California these plants have no special-status ranking in Arizona. However, these plants may be locally important as they are likely near the western extent of their natural range.

4.1.5.3 Plants with Special Status in Arizona

The Arizona Rare Plant Field Guide includes over 125 species of plants that are considered rare in Arizona, including 26 species that occur in Mohave County (Arizona Rare Plant Committee, 2001). All but one of the rare plants listed for Mohave County are found in the northern and eastern parts of the county and were not considered likely to occur. The only Arizona rare plant that was considered to possibly occur in the project area is white-margined beardtongue, which was not found during multiple site surveys within the Action Area.



LEGEND

- PBA Update Action Area
- Vegetation Survey Area

Plant Species

Common Name:	Scientific Name:
Hillside Palo Verde	*Parkinsonia microphylla*
Small-flowered androstephium	*Androstephium breviflorum*
Mousetail suncup	*Chylismia arenaria*
Spiny-haired blazing-star	*Mentzelia tricuspis*
Gravel milkvetch	*Astragalus sabulonum*

Note: The rare/ranked plant mapping was limited to the EIR Project Area and additional areas in Arizona that were evaluated as part of the Freshwater Implementation Plan

N

0 1,000 2,000 4,000 Feet

FIGURE 9
CALIFORNIA RARE PLANTS/ RANKED PLANTS
Final Groundwater Remedy
Programmatic Biological Assessment
PG&E Topock Compressor Station
Needles, California

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2013\PBA\2013Q4\FIG9_RarePlants.mxd Date Saved: 3/10/2014 10:56:21 AM

4.1.6 Wildlife in the Action Area

The aquatic habitat of the Colorado River supports several game fish species including striped bass (*Morone saxatillis*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), white crappie (*Pomoxis annularis*), flathead catfish (*Pylodictis olivaris*), and channel catfish (*Ictalurus punctatus*) (AECOM, 2011).

The diversity and abundance of wildlife species encountered are influenced by the proximity of the Action Area to the creosote-dominated desert and the Topock Marsh, a large wetland with abundant wildlife (GANDA, 2012). Avian species commonly associated with the river include American coot (*Fulica americana*), mallard (*Anas platyrhynchos*), pied-billed grebe (*Podilymbus podiceps*), great egret (*Casmerodius albus*), great blue heron (*Ardea herodias*), northern rough-winged swallow (*Stegidopteryx serripennis*), and belted kingfisher (*Ceryle alcyon*). Other avian species found in the upland areas include red-tailed hawk (*Buteo jamencensis*), Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), common raven (*Corvus corax*), song sparrow (*Melospiza melodia*), Canyon wren (*Catherpes mexicanus*), brewer's blackbird (*Euphagus cyanocephalus*), great-tailed grackle (*Quiscalus mexicanus*), turkey vulture (*Cathartes aura*), greater roadrunner (*Geococcyx californianus*), lesser nighthawk (*Chordeiles acutipennis*), rock dove (*Columba livia*), verdin (*Auriparus flaviceps*), and black-tailed gnatcatcher (*Polioptila melanura*) (AECOM, 2011; GANDA, 2012).

Observations during the 2012 avian surveys also included detections of Yuma clapper rail (*Rallus longirostris yumanensis*), Arizona Bell's vireo (*Vireo bellii arizonae*), brownheaded cowbird (*Molothrus ater*), and the discovery of a great blue heron nest (GANDA, 2012).

Mammals that may occur in the Action Area include deer mouse (*Peromyscus maniculatus*), Merriam kangaroo rat (*Dipodomys merriami*), whitetail antelope squirrel (*Ammospermophilus leucurus*), desert woodrat (*Neotoma lepida*), California ground squirrel (*Spermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*), Audubon's cottontail (*Sylvilagus audubonii)*, black-tailed hare (*Lepus californicus*), coyote (*Canis latrans*), desert kit fox (*Vulpes macrotis*), American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), beaver (*Castor canadensis*), raccoon (*Procyon lotor*), burro (*Equus asinus*); and bighorn sheep (*Ovis canadensis nelsoni*) (AECOM, 2011; GANDA, 2012; CH2M HILL, 2013e).

Reptiles that may occur in the area include chuckwalla (*Sauromalus obesus*), side-blotched lizard (*Uta stansburiana*), western whiptail lizard (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), desert iguana (*Dipsosaurus dorsalis*), coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), and western diamondback rattlesnake (*Crotalus atrox*) (AECOM, 2011; GANDA, 2012).

4.2 Environmental Baseline

The environmental baseline for the Action Area includes the past and present impacts of all federal, state, or private actions and other human activities, the anticipated impacts of all proposed federal projects that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation process (50 CFR 402.02). The Action Area for the environmental baseline evaluated here includes the entire geographic area encompassed by both the 2007 PBA and the 2012 Reinitiated PBA (see Figure 2). For the purpose of this Final Groundwater Remedy PBA, the potential impacts to listed species that are related to planned activities that were discussed in Section 3.0, as well as current and ongoing activities, are included in this ESA consultation.

Over time, the Colorado River corridor within the Action Area has undergone many changes influenced by past and present federal, state, or private actions that constitute the environmental baseline.

Within California, the Action Area is irregularly shaped and includes land to the north and south of Interstate 40 for approximately 1.7 miles west of the Colorado River. To the south of the highway, it encompasses the PG&E TCS, a pipeline metering station (Transwestern), a rock quarry, and four lined evaporation ponds (see Figure 4).

On the Arizona side, the Action Area includes the area between the Colorado River and western margin of Topock Marsh (north of its inlet). To the south of Topock Marsh, it extends approximately 1,500 feet east of the Colorado River and includes land along the north and south side of the BNSF railroad for approximate 0.75 mile east of the river. It also includes land on the east side of the Oatman-Topock Highway for approximately 1 mile north of the point where it diverges east of the Topock Marsh (Figure 2). An unpaved roadway extends through this area in a north-northwest direction from the Oatman-Topock Highway. The Topock Marina operates a resort here and there are several private residences also located on the Arizona side of the river, near the BNSF railroad and Interstate 40 bridges.

As shown in Figure 3, land ownership in the Action Area includes parcels owned by PG&E, as well as lands owned and/or managed by federal and local government agencies such as BLM, USFWS (HNWR), USBR, and the Metropolitan Water District of Southern California. The Interstate 40 right-of-way in California is leased by the California Department of Transportation from USBR land that is managed by USFWS. The Moabi Regional Park and Pirate's Cove Resort is located on BLM land that is leased by San Bernardino County. The Action Area also includes the TCS site owned by PG&E and land owned by the Fort Mojave Indian Tribe, as well as privately owned parcels in Arizona.

BLM manages the federally owned land north of the BNSF railroad and west of the Colorado River. This includes lands managed on behalf of USBR. USFWS manages the HNWR located in California immediately north, south, west, and east of the TCS. The HNWR is also located in the southern and eastern portions of the Action Area and includes most lands located on the Arizona side of the Colorado River. Outside of the Action Area, the 37,515-acre HNWR extends for approximately 30 miles along the Colorado River, from Needles, California, to Lake Havasu City, Arizona.

The Action Area includes land within the HNWR. Recreational activities within the HNWR include sightseeing, boating, bird watching, fishing, and hunting. Prior damming and channelization of the Colorado River have significantly altered the aquatic, marsh, and riparian habitats associated with the river. These water control and diversion actions have also contributed to increased housing development along the river and facilitated an increase in the intensity of river-related recreation (including recreational boating, fishing, and hunting) (USBR, 2004).

The Colorado River has been stocked with various game fish that have been linked to predation of native, listed fish species (USBR, 2004). The invasion of tamarisk along the Colorado River has significantly altered riparian habitat. This exotic tree dominates and displaces native plant communities. USBR is responsible for managing the river and has consulted with USFWS on its actions. Several biological opinions have been issued to USBR (USFWS, 1997a; 1997b; 2002a; 2005a). The Lower Colorado River Multi-Species Conservation Plan was developed for the Colorado River (USBR, 2004).

4.2.1 Historical Setting and Activities within the Action Area

By 1852, the first steamboat traveled up the Colorado River to resupply Fort Yuma. This marked the beginning of the steamboat trade that would have profound effects on the mature riparian areas along the river. The Colorado River Gold Rush began in 1862 (Lingenfelter, 1978). The gold rush fueled steamboat trade along the lower Colorado River. Initially, downed, dried cottonwood, willow, and mesquite trees were used as fuel for the steamboats (Ives, 1861). Increased river traffic soon used all of the available wood debris, and crews began cutting down large quantities of cottonwoods, willows, and mesquites. By 1890, most of the large cottonwood-willow stands and mesquite bosques had been cut down (Ohmart et al., 1988; Grinnell, 1914). The railroad crossing at Needles by the Atlantic and Pacific Railroad in 1883 resulted in the end of steamboat trade along the lower Colorado River (LaRue, 1916).

Tamarisk was introduced as an ornamental tree into the United States in the late 1800s and soon escaped cultivation. Expansion of its range was rapid and by 1920 tamarisk had appeared along the mainstem of the Colorado River (DeLoach, 1989; Ohmart et al., 1988). This species adapted to the altered riverine ecosystem and displaced native riparian species throughout the lower Colorado River. Important wildlife habitats,

including the cottonwood-willow gallery forests, have all but disappeared from the mainstem of the Colorado River and have been replaced by the tamarisk (Anderson and Ohmart, 1984).

In 1910, Joseph Grinnell led a 3-month expedition from Needles to Yuma to collect data on mammals, birds, and associated habitats. The expedition provided one of first detailed accounts of the flora and fauna of the lower Colorado River. Grinnell documented the loss of riparian habitat to agriculture during his expedition (Grinnell, 1914).

Starting in the 1930s, federal actions included the channelization of the Colorado River and the construction of several dams, including the Hoover Dam, Parker Dam, and Davis Dam. The changes to the natural river flows significantly altered available fish habitats and reduced the river's ability to meander and create or destroy backwaters and marshes. Alleviating the threat of floods also allowed for conversion of riparian areas to agricultural uses. In addition, USBR implemented intermittent riverbank stabilization and dredging programs from 1951 to present. As part of the mitigation for the various river control projects, USBR has undertaken projects to improve and enhance backwater and marsh areas, including the Topock Marsh within and adjacent to the Action Area (USBR, 1996, 2000, 2002, 2004).

Significant changes to the Colorado River hydraulic regime have occurred in the vicinity of the Action Area. With the completion of Hoover Dam in 1936, annual spring floods and associated scouring events ended. With the closure of Parker Dam in 1938 and subsequent filling of Lake Havasu, the Colorado River channel between Needles and Topock rapidly aggraded (Metzger and Loeltz, 1973) and by 1944, this had caused elevated groundwater levels and flooding in low-lying areas. These issues required USBR to conduct an extensive program of dredging to maintain river channel geometry and to reduce flooding of adjacent areas.

USBR began emergency levee modifications around Needles in the mid- to late 1940s. Between 1949 and 1953, USBR implemented a formal program to dredge the Colorado River from Needles to the Topock area to open the channel. Between 1953 and 1960, USBR moved dredging operations upstream to remove additional sediments in the Big Bend to Needles river reach in order to prevent those sediments from moving downstream. Additional maintenance dredging of the river channel in the Topock area was continued until 1961 (CH2M HILL, 2013d).

Another major dredging program was completed by USBR in the Action Area between 1965 and 1968. Historical photographs from this period indicate that much of the present shoreline and bank stabilization features on both sides of the Colorado River were created at this time. The USBR program began with the construction of an active water management system that included a diversion structure and excavated inlet channel to divert water from the river into Topock Marsh. Jetties were then constructed upstream of the inlet (at a roughly right angles to the Arizona shoreline) to form a narrower channel and cause the river to flow faster past the inlet in order to scour the sand bar at the Topock Marsh inlet and keep it open.

Dredged river sands were placed on the east and west sides of the river that created the existing sand dune-like features. On the California side of the Colorado River, this area is outside of the 100-year floodplain and is referred to as the historical river floodplain. Boulder rip-rap, some of which was mined from the rock quarry in the south central portion of the Action Area (Figure 7), was also placed along the sides of the river to prevent erosion of the banks. The Park Moabi Slough was also excavated by USBR at this time. However, additional subsequent dredging by San Bernardino County is what rendered the Park Moabi Slough in its current configuration (CH2M HILL, 2013d).

Large-scale historical transportation projects have also been part of the Action Area. For example, Historic Route 66 originally traversed the Action Area in the 1920s and portions of its former alignment are evident just south of Interstate 40 alignment on both the Arizona and California sides of the Colorado River. Historic Route 66 formerly crossed the river on the white steel-arch bridge that is currently used as a pipe bridge. Within California, the Historic Route 66 ran along a terrace above the Colorado River from the bridge to the west and north to where it joined the current National Trails Highway alignment and followed a northward alignment beneath the current Interstate 40 and BNSF bridges. Approximately 0.25 mile north, the Historic

Route 66 alignment turns west, as it mounts the terrace hillside by way of a pair of broad switchbacks before taking a predominantly western track to where it intercepts Park Moabi Road. The historic highway's visible trace within the Action Area also ends at this point. By the 1970s, Historic Route 66's longest intact stretch was largely replaced by five different interstate highways. The last stretch in Arizona was decommissioned when Interstate 40 was completed in 1984, and the remnants of the route are protected under the 1999 Route 66 Preservation Bill (Crapanzo, 2010).

The current BNSF railroad alignment was originally part of a transcontinental railway system that first linked Chicago to Southern California. It was originally built by the Atchinson Topeka and Santa Fe Railroad (later to become BNSF) and dates back to the late 1880s. Both the Interstate 40 and the BNSF alignments traverse the Action Area on the east and west sides of the Colorado River. These transportation features roughly bisect the northern and southern halves of the Action Area (see Figures 3 and 4).

Two exits provide connections off Interstate 40 within the Action Area. In Arizona, just east of the Colorado River, the exit connects to the Oatman-Topock highway that runs north and northeast around Topock Marsh along the eastern edge of the Action Area. Short private roadway segments in this area also connect the exit to the Topock Marina on the north side and to private residences on the south side of the interstate. In California, the Park Moabi Road exit off of Interstate 40 provides access to the Moabi Regional Park/Pirate's Cove Resort, as well as the PG&E TCS, which is reached by heading east from Park Moabi Road along the National Trails Highway. An extensive system of unpaved roadways extending south from the Park Moabi Road exit provide access to the former rock quarry, lined evaporation ponds, and to the gas supply pipelines that extend west from the PG&E TCS (Figure 7).

4.2.2 More Recent Activities within the Action Area

Activities within the Action Area that are not related to the PG&E TCS environmental cleanup program include the development and ongoing operations associated within recreational facilities at the Moabi Regional Park and the Topock Marina. They also include restoration efforts on the HNWR that are associated with the 2008 Sacramento Wash Fire.

Moabi Regional Park occupies the northwestern portion of the Action Area (Figure 4). As previously mentioned, Park Moabi Slough was originally created by USBR between 1965 and 1968. However, the Moabi Regional Park was developed into its current configuration by San Bernardino County, which leases the land from BLM. Moabi Regional Park has recreational vehicle trailer, as well as day-use and recreational vehicle camping and parking facilities that are located primarily on the north side of the National Trails Highway to the west of Park Moabi Road. Moabi Regional Park also includes the island of land on the north side of the excavated Park Moabi Slough. The island is accessed via an unpaved roadway and bridge along the Colorado River from northwest of the Action Area. The island contains elevated, constructed camping sites along the Colorado River shoreline. The park also maintains wastewater infiltration ponds within an ephemeral wash to the south of the National Trails Highway and east of Park Moabi Road (Figure 4).

A private, commercial resort, Pirate's Cove, has also been developed within the Moabi Regional Park, mostly to the east of Park Moabi Road and north of the National Trails Highway. The resort has a developed marina, a restaurant, and separate lodging facilities along the southern bank of the excavated slough. Other recent constructed facilities include a motorized and non-motorized zip-line from the main Pirate's Cove resort buildings that cross over the slough north and northwest to the island.

On the Arizona side of the Colorado River, there is another commercial marina, the Topock Marina, and a resort located in the southern portion of the Topock Marsh, where several mobile home lodging facilities are rented out by the week.

The Moabi Regional Park facilities also include an extensive network of ORV trails on the island on the north side of Park Moabi Slough and along the north side of the National Trails Highway from the resort as far east as the outlet from Bat Cave Wash (Figures 4 and 6). It should be noted that the ORV trail portion along the north side of the National Trails Highway from the Pirate's Cove resort east to the outlet from Bat Cave

Wash is currently closed as part of a federal road closure (CFR 2006; BLM, 2011), although recent (2013) aerial photographs indicate continued ORV use of this area. The estimated total length of the ORV trails through vegetated areas is about 12,600 feet or 2.4 miles. Assuming that the ORV trails are, on average, 15 feet wide, the estimated total area represents about 4.34 acres that are associated with the park.

Directly south and west of Moabi Regional Park, there is another area of approximately 400 acres that has been designated as an "open riding area" for ORVs according to the California Trail Users Coalition (CTUC, 2011). Numerous ORV trails are present within this area, which extends nearly as far south as the BNSF railroad on the eastern edge and to Interstate 40 on the western edge of the open riding area. Within the Action Area, the portion of this ORV open riding area to the east of Park Moabi Road is currently closed as part of a federal road closure (CFR 2006; BLM, 2011), which has likely limited most of the ORV use in this area. However, the ORV trails are clearly visible to west of Park Moabi Road and the open riding status and relatively open nature of this area means that vehicular impacts can potentially occur over a relatively high proportion this part of the designated ORV area. It is also possible that ORV effects may extend even beyond the designated areas through uncontrolled access or trespass.

The Sacramento Wash Fire occurred in October 2008 as a result of arson and burned approximately 306 acres between the Oatman-Topock Highway and Topock Marsh. The burned area included about 240 acres of dense tamarisk and about 41 acres of emergent marsh vegetation consisting of southern cattails and California bulrush. The remaining land cover classes affected by the fire were characterized as either developed or mixed shrub-scrub habitat (Digital-Desert, 2013).

A revegetation plan by the HNWR focused on those areas previously dominated by the dense tamarisk, which were divided into management zones based on the results of soil analyses, public visibility, and proximity to available water. Due to high levels of salinity, it was necessary to leach the soils with fresh water prior to replanting with native vegetation. In the winter of 2010–2011, the restoration efforts began with a mechanical clearing of the downed woody debris. This permitted the planting of native vegetation seedlings in the spring of 2011 that included: honey mesquite; screwbean mesquite; blue palo verde; and desert broom. Seeding of native plants included big saltbush, four-wing saltbush (*Atriplex canescens*), needle gramma (*Bouteloua aristidoides*), alkali sacaton (*Sporobolus airoides*), James galleta (*Pleuraphis jamesii*), and desert globemallow (*Sphaeralcea ambigua*) (Digital-Desert, 2013).

The Sacramento Wash burn area restoration is being conducted in two phases. When the area was visited in December 2013, the restoration plantings and associated irrigation piping were observed in the area between the Topock Marsh and the unpaved access roadway that runs roughly north-northwest through the center of the burn area. The area between the roadway and the Oatman-Topock Highway to the south of the main wash channel had been cleared and graded, but not yet planted or irrigated.

4.2.3 Activities within the Action Area Related to the PG&E Remediation Program

As previously described, the PG&E TCS and associated gas transmission lines were constructed in the late 1940s and have been operating since 1951 in the southern portion of the Action Area. Just downhill from the PG&E TCS, is the Transwestern Bench that contains pipeline metering facilities. A biological opinion was obtained to cover the operations and maintenance of this facility and associated pipelines (USFWS, 2000).

The PG&E TCS RCRA site investigations began in 1996, when PG&E entered into a Corrective Action Consent Agreement with DTSC. Involvement of the federal agencies began in July 2005, when PG&E entered into a Consent Agreement that outlined the process by which PG&E would comply with CERCLA requirements. Subsequently, in December 2010, the DOI issued a Record of Decision (ROD) selecting the groundwater remedy for the site, and in January 2011, DTSC also adopted the Final Remedy for the groundwater contamination. PG&E and the United States then entered into a Consent Decree governing implementation of the groundwater remedy, which was approved by the United States District Court for the Central District of California in November 2013. Since those dates, the investigation and remediation activities within the

Action Area have proceeded with under the direction of DTSC and DOI as well as inputs from stakeholders and interested tribes, which have been facilitated through the Topock Consultative Work Group and the Technical Work Group.

Past and present investigation and remediation activities at the Topock site are included in the environmental baseline for this consultation. These include those activities evaluated in prior consultations and summarized in Section 3.2 and Table 1 and shown in Figures 4 and 5, including but not limited to soil investigation activities and Freshwater Implementation Plan activities evaluated in the reinitiated 2007 PBA (through 2017).

4.2.3.1 Planned Remediation Activities

Of concern to this Final Groundwater Remedy PBA are those activities that are related to the ongoing operation and maintenance of the remedy, and to the future shut-down/lay-up of IM No. 3 facilities, decommissioning of IM No. 3 and remedial facilities, and restoration activities that are related to the IM No. 3 groundwater pumping and treatment facilities and remedial facilities described in Section 3.3. They will also include ongoing periodic system performance and compliance monitoring activities for groundwater and surface water.

The planned activities related to the Final Groundwater Remedy are described in Section 3.3 and summarized in Table 2. In addition, General Project Management Measures were described in Section 3.4. Many of the planned activities that are the subject of this consultation are similar in type, and (in some cases) location, to those that have already been conducted for activities previously completed prior to and under the 2007 PBA. These planned Final Groundwater Remedy activities will occur throughout the Action Area. Where necessary, staging of equipment and materials, nonhazardous soil storage, and waste management activities will all occur at previously developed areas such as the PG&E TCS, the Transwestern Bench, the MW-20 Bench, the main construction headquarter at Moabi Regional Park, or other previously disturbed areas identified in Figure 7. The planned activities will include construction of the Final Groundwater Remedy facilities, operation and maintenance of the remedy over a decades-long remediation period, sampling and monitoring for compliance and process performance, soil storage, long-term monitoring (post active remediation), decommissioning, and restoration. The planned activities also include future decommissioning and restoration of the IM No. 3 facilities. Again these activities are described in Section 3.3 and summarized in Table 2.

4.2.3.2 Potential Effects of the Planned Final Groundwater Remedy Activities

The potential effects of planned Final Groundwater Remedy activities are summarized here but described in more detail in Section 5.0. The construction of additional wells for extraction, injection, or monitoring will require access to new sites. Similarly, although the pipelines to connect the wells to planned remedial facilities are located primarily on previously disturbed areas, their construction may expand the existing project footprint. The general remedy layout, shown in Figure 6, shows the anticipated locations of planned facilities while Figure 7 shows proposed staging and soil storage areas and access routes. Ongoing operation and maintenance of the Final Groundwater Remedy facilities, as well as system monitoring will also expand the timeframe in which potential impacts to sensitive receptors may occur.

As described in Section 3.4, these Final Groundwater Remedy construction activities will continue to follow existing program procedures to minimize disturbances in previously undisturbed areas and vegetation clearing will be kept to a minimum. The planning and timing of the construction, as well as operation and compliance/performance monitoring activities, will also be done in accordance with the Draft BIAMP (CH2M HILL, 2013f). Based on proximity to potential sensitive habitats, the BIAMP establishes limitations on the timing of these activities to avoid disturbances to receptors, such as nesting and resident listed bird species.

A draft Decommissioning, Removal, and Restoration Work Plan has been prepared and submitted for review for the IM No. 3 facilities. The draft plan provides details about the process for decommissioning and

removal of the physical IM No. 3 Treatment Plant facilities. It also describes the areas that will be restored, as well as the process (guidelines) by which, restoration will occur. Elements of habitat restoration are also described, including revegetation methods (transplantation, planting, seed mix), performance criteria, maintenance monitoring, reporting, and adaptive management. It also lists demobilization activities and describes the process for the development of the future Detailed IM No. 3 Restoration Plan.

SECTION 5.0

Species and Habitat Description, Effects of the Action, and Relevant Reports

5.1 Introduction

This section describes the status, natural history, distribution, and abundance of federally listed and proposed species that may occur or are known to occur within or near the Action Area. This section also analyzes the potential effects to each species and its critical habitat resulting from on-going and planned activities described in Section 3.3 and Table 2.

A background search of available documents and databases was performed in preparation for this Final Groundwater Remedy PBA and the information in this section was obtained from several sources that are listed below. In addition, there were prior biological assessments and consultations, as documented in Section 1.1, which informed the baseline analysis presented in this section.

- Arizona Game and Fish Natural Heritage Program (AGFD, 2013)
- California Natural Diversity Data Base (2013)
- California Wildlife Habitat Relationships System (CDFW, n.d.)
- *Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (CH2M HILL, 2007a)
- Desert Tortoise Presence/Absence Surveys for the Topock Compressor Station (GANDA, 2005b, 2006b, 2007b, 2008b, and 2009b; CH2M HILL, 2004a, 2004f, 2004g, 2004h, 2004i, 2010a; and WSA, 2013)
- Southwestern Willow Flycatcher Presence/Absence Surveys for the PG&E Topock Compressor Station (GANDA, 2005a; 2006a; 2007a; 2008a; 2009a; 2010; and 2012)
- *Wetlands and Waters of the United States, Delineation for the Topock Compressor Station Groundwater Remediation Project* (CH2M HILL, 2013d)
- *Revised Final Floristic Survey Report for the Topock Compressor Station Groundwater Remediation Project* (GANDA and CH2M HILL, 2013a)
- *Revised Final Ethnobotany Survey for the Topock Compressor Station Groundwater Remediation Project* (GANDA and CH2M HILL, 2013b)
- Yuma Clapper Rail and Black Rail Surveys for the Topock Compressor Station Groundwater Remediation Project (KBS, 2012)
- *Instream Habitat Typing Survey Technical Memorandum, Topock Compressor Station, Colorado River.* May 21. CH2M HILL. 2012f.

Overall, the general management measures identified in Section 3.4 are intended to avoid, reduce, or mitigate potential direct, indirect, and cumulative effects to these species and habitats.

5.2 Terrestrial

5.2.1 Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

5.2.1.1 Status

The southwestern willow flycatcher (*Empidonax traillii extimus*) was listed as federally endangered on February 27, 1995 (USFWS, 1995). Critical habitat was first designated on October 19, 2005 and revised January 3, 2013 (USFWS, 2013b). The Southwestern Willow Flycatcher Recovery Plan was released on August 30, 2002 (USFWS, 2002b). The southwestern willow flycatcher was listed as endangered by the state of California in 1991.

Several factors have caused the decline in southwestern willow flycatcher populations. Extensive areas of suitable riparian habitat have been lost due to river regulation and channelization, agricultural and urban development, mining, road construction, and overgrazing (Tibbitts et al., 1994). As a result of habitat fragmentation, cowbird (*Molothrus ater*) nest parasitism has increased. Historical alterations of the river corridor in the Southwest by water management actions (i.e., damming, water diversions, and groundwater pumping) and by land management actions (e.g., grazing, recreation, levee construction, and agriculture) have facilitated the establishment, spread, and persistence of tamarisk along rivers. These human-caused changes have favored the invasion of the exotic tamarisk in the riparian ecosystems. Willow flycatcher nesting and foraging has been widely documented in tamarisk stands along the Colorado River so that tamarisk represents about 50% of the known breeding sites. Tamarisk is considered as a primary constituent element and is also a component within existing designated critical habitat for willow flycatchers. Many of the observations of southwestern willow flycatcher since 1993 have occurred in habitat dominated by tamarisk (Koronkiewicz et al., 2013). Successful breeding is known to occur in tamarisk on the Lower Colorado River. Because of low population numbers rangewide, identifying and conserving southwestern willow flycatcher breeding sites is thought to be crucial to the recovery of the species (USFWS, 2010d; Koronkiewicz et al., 2013).

5.2.1.2 Natural History, Distribution, Abundance and Habitat

Southwestern willow flycatcher is one of four subspecies of willow flycatcher. *Empidonax* flycatchers are noted for their physical similarities and the difficulty in identifying individuals in the field. This species is a small bird, approximately 14.6 centimeters (5.75 inches) long, with a grayish-green back and wings, whitish throat, light grey-olive breast, and pale yellowish body. Two white wing bars are visible. The upper mandible is dark, the lower is light. The most distinguishable taxonomic characteristic of the southwestern willow flycatcher is the absent or faintly visible eye ring. This willow flycatcher can be differentiated from other species by its distinctive “fitz-bew” song. As an insectivore, it forages within and above dense riparian vegetation taking insects on the wing and gleaning them from the foliage. It also forages along water edges, backwaters, and sandbars adjacent to nest sites (Tibbitts et al., 1994). From 2008 to 2012, breeding populations of southwestern willow flycatcher were studied at 113 study areas along the Virgin and Lower Colorado rivers and tributaries, and residents were detected at 33 sites in 9 study areas (Koronkiewicz et al., 2013).

The southwestern willow flycatcher breeds in dense riparian habitats in all or part of six southwestern states, from sea level in California to over 2,600 meters (8,550 feet) in Arizona and southwestern Colorado (Sogge et al., 1997). This particular species nests only in dense riparian vegetation near surface water or saturated soil; however, the surrounding portions of the territories are often comprised of a mosaic of vegetation that is not uniformly dense. Along the Colorado River they may typically nest in riparian habitat characterized by a dense stand of intermediate-sized shrubs or trees, such as willows (especially *Salix gooddingii*), *Baccharis*, or arrow weed, usually with an overstory of scattered larger trees, such as cottonwoods. Along the Lower Colorado River (downstream of the Hoover Dam), willow flycatcher nests have only been detected in tamarisk. Occupied habitat always has dense vegetation in the patch interior regardless of the plant composition and height. These dense patches are often interspersed with small

openings, open water, or sparser vegetation, creating a mosaic that is not uniformly dense (Sogge et al., 1997).

Riparian patches used by breeding flycatchers vary in size and may be a relatively dense, linear, contiguous stand or an irregularly shaped mosaic of dense vegetation with open areas. Southwestern willow flycatchers are known to nest in patches as small as 0.8 hectare (2 acres) to as large as several hundred hectares (Sogge et al, 1997). The mean size of flycatcher breeding habitat patches is 8.5 hectares (21.2 acres) (Sogge et al, 1997). Habitat patches as small as 0.5 hectare (1.23 acres) may support one or two nesting pairs (USFWS, 1995). Sogge et al. (1993) found territorial flycatchers in habitat patches ranging from 0.5 to 1.2 hectares (1.23 to 2.96 acres). However, this species has not been observed nesting in narrow, linear riparian habitats that are less than 10 meters (30 feet) wide, although they may use such linear habitats during migration (Sogge et al., 1997; USFWS, 2003). In the Southwest, most willow flycatcher breeding territories are found within small breeding sites containing five or fewer territories; only four sites are known to have 50 or more territories (Gila, Rio Grande, San Pedro River, and San Luis Rey River). The Hoover to Parker Management Unit that includes the Topock Marsh contains approximately 14 territories (Durst et al., 2008). The overall recovery objective for the flycatcher is to attain a population level and an amount and distribution of habitat sufficient to provide for the long-term persistence of metapopulations, even in the face of local losses (e.g., extirpation) so that the species may be downlisted. Management unit recovery criteria (goals) for the management unit are to increase viable territories and to hold at least 50% to 80% of the minimum population target for that unit (USFWS, 2002b).

Nesting habitat almost always contains or is adjacent to water or saturated soil. With the loss of habitats that are more dominated by native species throughout the Southwest, southwestern willow flycatchers have been observed using tamarisk thickets for nesting. Nearly 50 percent of willow flycatcher territories occur in mixed native/exotic habitat, and 25 percent are at sites where tamarisk is dominant (Durst et al., 2008). Flycatchers nest in tamarisk at many river sites and, in many cases, use tamarisk even if native willows are present. Tamarisk eradication can be detrimental to willow flycatchers in mixed and exotic habitats, especially in or near occupied habitat or where restoration is unlikely to be successful. Risks to the flycatcher increase if the tamarisk control projects are implemented in the absence of a plan to restore suitable native riparian plant species or if site conditions preclude the reestablishment of native plant species of equal or higher functional value. Threats also increase if the eradication projects are large-scale, possibly setting the stage for large-scale habitat loss (USFWS, 2005b).

Migrant southwestern willow flycatchers may occur in nonriparian habitats and riparian habitats unsuitable for breeding. These migration stopover areas, even though not used for breeding, may be critically important sites affecting local and regional flycatcher productivity and survival (Sogge et al., 1997). One of the last long-distance, neo-tropical migrants to arrive in North America during spring migration, willow flycatchers have a short (approximately 100-day) breeding season, with individuals typically arriving in May or June and departing in late August. All four subspecies of willow flycatchers spend the non-breeding season in portions of southern Mexico, Central America, and northwestern South America. Willow flycatchers have been recorded on the wintering grounds from central Mexico to southern Central America as early as mid-August, and wintering resident individuals have been recorded in southern Central America as late as the end of May.

5.2.1.3 Status of the Species in the Action Area

The Action Area is located in the vicinity of two southwestern willow flycatcher study areas—the Topock Marsh (a portion of which is within the Action Area) and Topock Gorge (south of the Action Area). GANDA (2005a, 2006a, 2007a, 2008a, 2009a, 2010, and 2012) has conducted protocol-level surveys of the suitable southwestern willow flycatcher habitats within and adjacent to the Action Area annually from 2005 to 2010 and again in 2012.

In 2005, 2007, 2008, 2009, and 2012, biologists detected the bird, primarily by song, in varying locations but primarily in Arizona. No detections were made during the 2006 and 2010 surveys. All detections have been

determined to be migratory or transient birds and no nests, or nesting activity, have been observed (GANDA, 2009a).

During the 2012 surveys, auditory and visual observations of single birds only on June 5 and June 7 were detected. The June 5 detection was at a newly added call point, CA4-V, along the Colorado River near the confluence with Bat Cave Wash. The June 7 detection was at call point AZ5-8 to the east of Topock Bay. These single sightings were not replicated in other survey events and so, were also considered to be indicative of transient, rather than breeding, individuals (GANDA, 2012).

Nesting territories do occur within the general area as documented nesting activities have been reported along the northeastern portion of Topock Marsh. This area supported 34 territories and 29 nesting pairs in 2004 and all nest locations are documented within tamarisk thickets. These areas are approximately 2,900 feet west-southwest from the northeast portion of the Action Area where planned actions associated with the Site B well may occur and are approximately 1,900 feet north of the Action Area along the Arizona shoreline. The nesting habitat occurred on the eastern side of the peninsula within the mixed tamarisk/willow thickets before they transition to the Topock Marsh. In nearby areas of the Topock Marsh that are outside of the Action Area, more recent survey data (McLeod and Pellegrini, 2013) have demonstrated a decline in nesting pairs between 2004 and 2008. Only one nesting pair was detected in 2011 and, for the first time since surveys began in 1996, no nesting pairs were detected in 2012. The decline was attributed to low water levels in the Topock Marsh (corresponding in time to repairs of the inlet structures) which led to a decline in the amount of inundated vegetation that correlated with the decline in flycatcher populations.

Nesting and migratory habitat for the southwestern willow flycatcher exists within and adjacent to the Action Area. The nesting and migratory period for southwestern willow flycatchers begins with arrival around mid-May and ends with departure around late September (Sogge et al., 2010). Tamarisk and arrow weed are the dominant vegetation types within the portion of the Action Area that are associated with the Colorado River floodplain. The dense tamarisk thickets are considered potentially suitable nesting, roosting, and foraging habitat for willow flycatchers. They may also serve as suitable perching and foraging habitats during migration periods (arrival/departure).

East of the river, potentially suitable nesting habitat exists along the western margin of the Topock Marsh within dense tamarisk stands where nesting pairs of southwestern willow flycatchers have been documented within the Action Area. Additionally, other less desirable, but potentially suitable nesting habitat exists within dense tamarisk stands associated with Sacramento Wash to the east of the Oatman-Topock Highway.

The potential nesting areas on the west side of Topock Marsh are included within the Action Area but range from more than 1,000 feet in the southern portion (near Topock Marina) to greater than 3,000 feet in the northern portion from proposed activities associated with the Freshwater Implementation Plan (i.e., well and pipeline construction activities). The potential tamarisk nesting areas on the east side of the Oatman-Topock Highway are adjacent to the Action Area. Both of these habitats are subject to regular human disturbances including recreational boating within Topock Marsh, ORV traffic within Sacramento Wash, and vehicular traffic along Oatman-Topock Highway.

The 2008 Sacramento Wash Fire destroyed the dense tamarisk along the west side of Oatman-Topock Highway and the burned area was subsequently cleared in late 2010 / early 2011. The fire reduced much of the potential southwestern willow flycatcher habitat within the northeastern portion of the Action Area. Annual protocol surveys that have been conducted between 2005 and 2010 and in 2012 have not documented southwestern willow flycatchers nesting in the area along the northeastern edge of the Action Area since the 2008 fire (GANDA, 2012). The burned tamarisk area is part of a planned restoration effort that seeks to re-establish native vegetation (Digital-Desert, 2013), so the nesting and foraging suitability within these habitats is expected to improve over time as the native plants mature. The 2008 Sacramento

Wash Fire did not affect the dense tamarisk thicket to the east of the Oatman-Topock Highway, which remains as potentially suitable, though marginal, southwestern willow flycatcher nesting habitat.

Within the Action Area to the west of the Colorado River, there is generally less suitable southwestern willow flycatcher nesting habitat than in Arizona. However, the existing habitats may be used for southwestern willow flycatcher roosting and foraging during migration. The tamarisk thickets in California are found below the BNSF Railway and Interstate 40 bridges (approximately 6 acres); near Bat Cave Wash at its confluence with the Colorado River (approximately 5 acres); near the unnamed western wash, which has its confluence with the Colorado River directly northwest of Bat Cave Wash (approximately 3 acres); and near the Park Moabi Marina (approximately 7 acres) as shown in Figure 10. These tamarisk thickets represent less than 1.5 percent of the total Action Area. The patches tend to be fragmented and are subject to regular human disturbance; two factors that may decrease the habitat value for the species (GANDA, 2005b). The habitats near the Park Moabi Slough are subject to regular recreational boating traffic and the adjacent habitats on the island north of the slough and north of the National Trails Highway between the Pirate's Cove Resort and the Bat Cave Wash outlet have an extensive network of ORV trails that were mostly added only in the past few years (i.e., post-2010).

While tamarisk occurs in and adjacent to the Action Area, the quality of this vegetation for nesting flycatchers is not nearly as suitable compared to other locations along the Lower Colorado River. USBR annual surveys indicate that nesting flycatchers are being found in higher-quality tamarisk vegetation compared to what is found in the Action Area (McLeod and Pellegrini, 2013). The higher-quality tamarisk vegetation was associated with higher soil moisture and more moderate temperatures, which would indicate that the tamarisk stands near the margin of the Topock Marsh are more suitable for nesting than what is found in the California portions of the Action Area. It should also be noted that this study documented a decline in nesting pairs in the Topock Marsh from 2004 (29 pairs) to 2008 and in 2011 (one pair only) and 2012 (no pairs detected). This decline in nesting pairs was attributed to lower water levels that led to drier, less suitable nesting conditions.

Although tamarisk habitat exists within the Action Area in California, the vegetation density, habitat structure, and patch-size of thickets are sparser, smaller, and more fragmented in comparison to observed/known breeding habitat within the Topock Marsh. Additionally, southwestern willow flycatchers are very rarely nest in mesquite, palo verde, and acacia trees (Sogge et al., 1997), which are the associated tree species in this part of the Action Area. Furthermore, there is no known breeding habitat within the Action Area

Additionally, biological monitors have logged several hundred hours performing pre-activity surveys on the California floodplain as part of compliance with the mitigation measures associated with the 2007 PBA and 2012 Reinitiated PBA and with revised well sampling procedures (CH2M HILL, 2005b), that require monitoring for any migratory bird nests by a qualified biologist within a 200-foot work area prior to construction-related activities that occur between March 15 and September 30. To date, no active nests of any migratory birds have been documented during these surveys or by protocol-level surveys conducted up to 2012.

5.2.1.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Details of the Final Groundwater Remedy were previously described in Section 3.3 and Table 2 and are shown in Figures 6 and 7. The Final Groundwater Remedy actions are summarized here as only they relate to potential direct effects to southwestern willow flycatcher.

Beginning in Arizona, the Freshwater Implementation Plan has the potential to have a direct effect on southwestern willow flycatcher due to anticipated activities in the northeastern portion of the Action Area. The Freshwater Implementation Plan is currently evaluating options for the freshwater supply well in Arizona. The first well being considered is HNWR-1, a well that has already been constructed by the refuge

along the west side of the Oatman-Topock Highway. A second potential supply well (Site B well) is located to the north of HNWR-1 on the northern margin of the Sacramento Wash channel and was completed in January 2014 with well testing finishing in March 2014. If these two wells are determined to be unsuitable for the freshwater source well, then a third location for a new well near the existing HNWR-1 would then be considered.

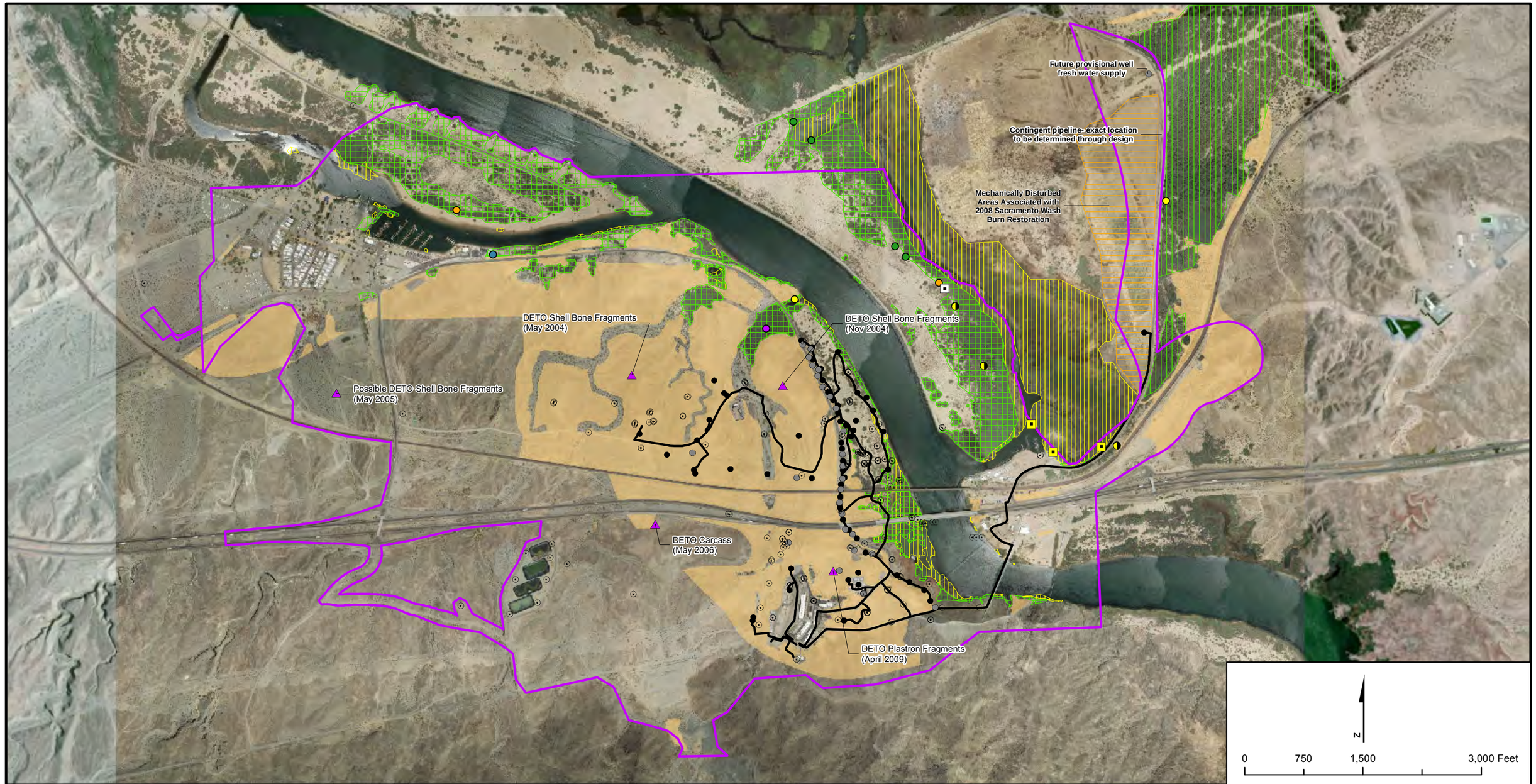
The Freshwater Implementation Plan activities are being completed under the 2012 Reinitiated PBA. The evaluations of HNWR-1 and the Site B well are expected to be completed prior to the March 15 date associated with southwestern willow flycatcher in-migration and nesting season in 2014, so that these activities are expected to have no effect on this species. Additional actions with impacts that would be related to the planned Final Groundwater Remedy may occur at whichever of these locations is chosen as the freshwater supply well because there could be other activities that could extend into the southwestern willow flycatcher nesting season. The additional Final Groundwater Remedy activities would include the construction of the pump and electronic control facilities, as well as security fence in proximity to the chosen supply well and the installation of the conveyance pipeline.

The tamarisk habitats near these well locations to the east of the Oatman-Topock Highway are marginal, but potentially suitable southwestern willow flycatcher nesting habitats. While annual protocol surveys that have been conducted between 2005 and 2010 and in 2012 have not documented southwestern willow flycatchers nesting in this area since the 2008 fire (GANDA, 2012), it is possible that birds could use this area for nesting in the future. The potential for direct impacts to southwestern willow flycatcher only exists if the freshwater supply pipeline construction occurred between March 15 and September 30. In accordance with established procedures, coordination of biological monitoring with BLM and USFWS would occur for this activity, and a qualified biological monitor would conduct pre-activity surveys for nesting birds as well as monitoring during construction.

To the maximum extent practicable, the water supply pipeline will be installed within the previously disturbed areas on the shoulder of the Oatman-Topock Highway. The underground pipeline will connect the supply wells to each other and to the conveyance pipeline that will convey the water to the Final Groundwater Remedy facilities in California (Figures 6 and 7). In proximity to HNWR-1 well, the underground pipeline will cross beneath the Oatman-Topock Highway from the west to the east side to avoid direct impacts to Topock Marsh, which is adjacent to the roadway at the marsh's southern margin. It is while pipeline construction is occurring along the northeastern edge of the Action Area along the Oatman-Topock Highway that potential direct impacts to southwestern willow flycatcher may occur because of the presence of the dense tamarisk that represents potentially suitable nesting habitat immediately adjacent to the east side of the Oatman-Topock Highway.

As the freshwater conveyance pipeline alignment extends south of the Topock Marsh, it will travel within the Oatman-Topock Highway roadbed and then cross beneath Interstate 40. The underground pipeline alignment will continue in a southeastern direction along the elevated river terrace to the existing pipe bridge (i.e., the former Route 66 bridge) upon which, it will cross above ground over the Colorado River (Figures 6 and 7). This alignment for the freshwater conveyance pipeline will avoid any direct impacts to the Colorado River floodplain, associated with the freshwater supply pipeline within the Action Area in Arizona or California.

Specific actions associated with construction of the Final Groundwater Remedy that will occur within or adjacent to suitable habitat in the floodplain in California have the potential to affect this species. This will include the activities that would be associated with the installation of remediation wells and pipelines for the in situ reduction zone, installation of monitoring wells, installation of remote wireless communications, and the use of two construction staging areas near the Bat Cave Wash outlet.



LEGEND

- PBA Update Action Area
- Existing Monitoring Well
- Future Provisional Wells
- Remediation Wells
- Pipeline For Remedy
- Western yellow-billed cuckoo 2008-2010 (GANDA 2012a)
- Desert Tortoise Findings (GANDA 2009a)
- YUCR Detection 2012 (GANDA 2012a)
- YUCR Detection (Konecny Biological Services 2012)

SWFL Detection Year (GANDA, 2012a)

- 2005
- 2007
- 2008
- 2009
- 2012

Habitat Areas

- Agassiz's Desert Tortoise
- Morafkai's Desert Tortoise
- Mechanical Soil Surfce Damage
- Southwestern willow flycatcher
- Western yellow-billed cuckoo
- Yuma clapper rail/California Black Rail

Notes:
1. Habitats are shown within the areas surveyed for the EIR and the Freshwater Implementation Plan in Arizona.
2. YUCR habitat areas are based upon data collected by Konency Biological Services 2012.

FIGURE 10
DESERT TORTOISE AND PBA-LISTED BIRD HABITATS
Final Groundwater Remedy
Programmatic Biological Assessment
PG&E Topock Compressor Station
Needles, California

CH2MHILL

Path: \\Zinfandel\proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2013\PBA\2013Q4\FIG10_DT_Habitat.mxd Date Saved: 4/22/2014 11:14:05 AM

Activities related to the construction of the Final Groundwater Remedy in upland areas will include the construction of carbon amendment storage and injection facilities, remedy-produced water conditioning system; and conditioned water storage facilities. It would also include a pre-injection freshwater treatment system if it is determined that such a system will be required. These activities will also include the installation of upland remediation wells and pipelines, installation of monitoring wells, and the use of construction staging/soil storage areas. These sites are located within the upland area that does not support riparian vegetation and other characteristics commonly associated with flycatcher habitat. For this reason, these activities are not expected to have any effect to this species due to unsuitable habitat at the specific project locations.

The Final Groundwater Remedy construction activities will involve the use of heavy equipment including, but not limited to, graders, backhoes and drill rigs that may be used to remove vegetation, grade the ground surface, and install remediation or monitoring wells or pipelines within the floodplain. Heavy equipment can create substantial ground disturbance and noise. Recognizing the potential for these impacts to occur, the General Project Measures presented in Section 3.4 were intended to minimize them.

The Colorado River may function as a migration corridor for southwestern willow flycatcher. During migration periods, this species may briefly stop to roost and/or forage within or adjacent to potentially suitable roosting and foraging habitats within the fragmented tamarisk patches in the Action Area located at Bat Cave Wash and the unnamed wash to the west; under the BNSF railroad and Interstate 40 overpasses; near Moabi Regional Park; and the eastern edge of the Action Area (Figure 10) (CH2M HILL, 2005b, 2005c).

Because flycatchers may potentially use the habitat in the Action Area for roosting and foraging during the spring and fall migration seasons, it is possible that construction and operational activities could alter the behavior of migrating individuals, but as discussed, the potential for impact is considered low. The greatest potential for direct effects to southwestern willow flycatcher would be within the short migratory period during arrival (mid-May through June) and departure (July through late September) when individuals could be passing through the Action Area to and from more suitable nesting locations.

Habitat elements such as patch size, shrub density, and the presence and/or location of water provide the appropriate habitat structure and features to allow for this behavior. However, annual surveys conducted from 2005 through 2010 and in 2012 have not documented any southwestern willow flycatcher nesting or presence (other than transients) using this habitat patch within the Action Area. Five riverbank remediation wells and associated water conveyance pipelines, as well as several monitoring wells would be constructed within or near the tamarisk thickets along the floodplain on the California side of the project. It is possible that future provisional wells may be installed if operational data indicate that they are needed. As previously explained, the regular disturbances by recreational boating and ORV traffic reduce the potential suitability of these areas for southwestern willow flycatcher use. Based on recent input from USFWS (2014a), it was determined that continuing protocol surveys for the southwestern willow flycatcher could be conducted based on the possibility for project work to occur in or near flycatcher habitat, with at least one protocol surveys occurring every 3 years. PG&E will supplement the flycatcher survey information in the Action Area with data being collected for ongoing flycatcher surveys by the USFWS in the HNWR. These survey results indicate that the likelihood of direct impacts to nesting birds is very low and discountable. They also indicate that any potential severity of direct impacts would occur primarily to migrating birds and, therefore, the effect would also be very low and insignificant. Given the application of conservation measures (pre-activity surveys and construction monitoring when working in or near flycatcher habitat during the nesting season), the effect of any direct impacts effects to nesting or migratory southwestern willow flycatchers is expected to be low to negligible.

Over time, tamarisk acreage resulting from human population growth (i.e., damming, water diversions, groundwater pumping) in the Colorado River corridor has significantly increased along the Lower Colorado River. These activities have altered the riparian hydrology and, by consequence, have created conditions that have favored the establishment of larger tamarisk thickets that are known to serve as southwestern

willow flycatcher breeding habitat. While several fragmented, small stands of tamarisk could be peripherally affected as a result of the proposed actions, most of the work will occur within sparsely vegetated areas within the floodplain in order to avoid and minimize habitat disturbance. Design efforts have and will continue to avoid dense contiguous stands of tamarisk greater than 1 acre and any associated vegetation as practicable. Limited riparian vegetation, primarily smaller patches or individual plants of tamarisk and arrow weed, may be crushed or trimmed as a result of the proposed actions. An 8.8-acre disturbance threshold within the historical floodplain will be followed in an attempt to lessen the potential effects to the species and habitat. Exceeding the 8.8-acre threshold will require consultation with USFWS and may require possible mitigation.

Project-related construction and operational activities will not occur within cottonwood-willow stands and, therefore, will have no direct effect upon the Colorado River's overall balance of remaining cottonwood-willow riparian stands that historically were the native habitat for this species.

5.2.1.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur are related to the long-term operation and maintenance of the Final Groundwater Remedy facilities after construction plus possible installation of future provisional wells or other contingency actions. They also include the decommissioning and restoration of IM No. 3 and the Final Groundwater Remedy.

The Final Groundwater Remedy activities related to operation and maintenance of the freshwater supply system would also include periodic maintenance and repair of well, pump, and electrical control equipment, pipeline maintenance and repair; stormwater pollution prevention; access roadway maintenance; well sampling; and eventual decommissioning of the well and pumping facilities. After decommissioning, these areas would be restored in accordance with the Remedy Decommissioning Plan, including a restoration plan that will be submitted by PG&E to DOI after receipt of DOI's certification of Remedial Action completion, and the Habitat Restoration Plan, where applicable, that will be submitted to the agencies with the Remedial Action Work Plan.

The Final Groundwater Remedy activities related to operation and maintenance of the remediation facilities and supporting systems would also include periodic maintenance and repair of well, pump, and electrical control equipment, pipeline maintenance and repair; stormwater pollution prevention; access roadway maintenance (include vegetation trimming); well sampling; and eventual decommissioning of the wells, pipelines, and pumping facilities. After decommissioning, these areas would be restored in accordance with the Remedy Decommissioning Plan, including a restoration plan that will be submitted by PG&E to DOI after receipt of DOI's certification of Remedial Action completion, and the Habitat Restoration Plan, where applicable, that will be submitted to the agencies with the Remedial Action Work Plan. Planned activities will also include the decommissioning of the IM No. 3 treatment facilities, and upland restoration including the areas on MW-20 Bench and IM No. 3 facilities.

Sampling of remediation or monitoring wells will occur more frequently in the initial years of operations and will likely require the use of off-road utility vehicles and possibly a small generator for power to activate the submersible pumps during water collection. The generators' noise output is minimal enough that a conversation can easily occur. These activities, happening within or adjacent to suitable SFWL habitat, may lead to alterations of southwestern willow flycatcher behavior. However, the lack of evidence of southwestern willow flycatcher nesting within this portion of the Action Area suggests that the probability of negatively altering southwestern willow flycatcher behavior during normal well sampling, carbon substrate injection, or equipment maintenance activities would be considered as a discountable effect. Further, the magnitude of project effects may be difficult to discern from other potentially impacting transportation activities (i.e., the Interstate 40 and the BNSF railroad) and recreational activities (e.g., watercraft) that occur with regularity within the Action Area.

More aggressive activities associated with certain non-routine well maintenance, pipeline repair, road repair; decommissioning and removal of facilities; and restoration activities would require the use of heavy equipment, trucks, materials, and crews to implement. However, the potential effects of these activities would be reduced by the application of general project management measures discussed in Section 3.4 and species-specific mitigation measures discussed in subsection 5.2.1.8, so that the potential for indirect effects on southwestern willow flycatcher are considered to be insignificant.

5.2.1.6 Cumulative Effects

Cumulative effects include future state and private activities, excluding federal activities that are reasonably certain to occur within the Action Area. Continued operation of the TCS will occur. It is reasonably certain that soil remedial activities will also occur within the Action Area. The final soil remedy, if required, will include heavy equipment and personnel with minor activities in the floodplain. Habitat loss would likely not be enough to reduce the habitat value and thereby, alter southwestern willow flycatcher use and behavior. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River and the HNWR, such as boating, fishing, and ORV use of the floodplain and surrounding areas. Examples of recent actions that have occurred within the Action Area in California since the 2007 PBA include the expansion of private commercial recreation facilities at the Moabi Regional Park (Pirate's Cove restaurant, individual lodging, motorized and non-motorized zip-line rides, as well as expanded ORV trail networks on the island north of the slough and north of the National Trails Highway east to the Bat Cave Slough outlet). Other actions include ongoing use of the open riding ORV areas to the south of Moabi Regional Park, although an official 2006 BLM road closure to the east of Park Moabi Road would be expected to limit this effect within the Action Area.

Within the Action Area in Arizona, ongoing and future actions include renovations at the Topock Marina (including current rental lodging, and a proposed hotel and new restaurant) and HNWR restoration efforts associated with the 2008 Sacramento Wash Fire. The HNWR restoration efforts are expected to have an overall positive effect on southwestern willow flycatcher habitat in the Action Area as those native plantings mature and the habitats are restored; however, the restoration plantings will not create additional southwestern willow flycatcher habitat. Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40, bridges, and other nearby roads and utilities are anticipated.

5.2.1.7 Critical Habitat Effects Determination

The nearest critical habitat for the southwestern willow flycatcher is located on the Big Sandy River located about 50 miles east of the Action Area (USFWS, 2013b). PG&E's activities are located outside designated critical habitat for the southwestern willow flycatcher. An effects determination of "no effect" to critical habitat is concluded.

5.2.1.8 Effects Determination

Although no southwestern willow flycatcher were detected in 2006 and 2010, in other surveys migrant southwestern willow flycatcher were detected at various locations within the Action Area (GANDA, 2005a; 2006a; 2007a; 2008a; 2009a; 2010; and 2012). The 2008 fire that destroyed much of the potential southwestern willow flycatcher habitat along the northeastern edge of the Action Area, along with vegetation clearance in the area, reduced the available southwestern willow flycatcher habitat (GANDA, 2012). Given the cumulative detections of southwestern willow flycatcher over the years, the presence of potentially suitable habitat, and the presence of nearby breeding populations, there is a potential for southwestern willow flycatcher to breed in the Action Area in the future (GANDA, 2012). To date, no incidental take of southwestern willow flycatcher (or any other migratory birds) has occurred within the Action Area from project activities.

Based on the results of previous protocol-level surveys conducted between 2005 and 2012, there has been no evidence of nesting flycatchers within the Action Area, although transient birds have been occasionally detected by auditory methods at several call stations in CA and AZ. The survey information suggests that it is unlikely that Final Remedy activities within the Action Area will affect nesting flycatchers, even if those activities were conducted between March 15 and September 30. For that reason, it is proposed that construction activities not be limited during this period. However, to ensure that no inadvertent impacts to southwestern willow flycatchers will occur during this period, pre-activity surveys will continue to be required to ensure that no nesting birds are present in or within 200 feet of proposed work areas. If nesting flycatchers are found to occur, construction activities would be halted, unless otherwise approved by the USFWS. The USFWS immediately consulted to determine an appropriate response to avoid the impact. Protocol-level surveys will be continued every 3 years with the next survey period in 2014 to document base conditions prior to the beginning of construction of the Final Groundwater Remedy.

Nesting of southwestern willow flycatchers is considered unlikely west of the Colorado River within the California portion of the Action Area. This can be attributed to the lack of appropriate vegetation composition, habitat structure, microclimate, and presence of water or moist soils. Negative effects to nesting southwestern willow flycatchers are not anticipated to occur.

Seasonal migratory use of habitat on the floodplains of California and Arizona can be anticipated to occur along the Colorado River as southwestern willow flycatchers move to and from other known breeding locations. Project activities, therefore, could influence activity during this period. To augment the understanding of southwestern willow flycatchers within the Action Area and to help guide in the conservation of this species, triennial protocol surveys (beginning in 2014) will continue to determine presence or absence of southwestern willow flycatcher. Similarly, pre-construction surveys and construction monitoring will also be conducted during the migratory/nesting season by qualified biological monitors to ensure that project effects on this species will be avoided.

The following mitigation measures will be applied to all actions associated with the Final Groundwater Remedy that will occur in or near potential southwestern willow flycatcher habitat, as shown in Figure 10.

1. Minimize the net increase of disturbed habitat in the Action Area.
2. Riparian areas surrounding the designated work areas and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatcher according to the protocol established by the USFWS. These surveys shall be completed every 3 years by a biologist permitted by the USFWS to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office and USFWS's Phoenix AESO on a triennial basis.
3. Construction and well development or rehabilitation activities that use heavy equipment should be completed prior to March 15, to the extent practicable. The use of any heavy equipment in or near southwestern willow flycatcher habitat after March 15 will be reassessed and additional conservation measures considered, including pre-activity surveys and construction monitoring by a qualified biologist. Preferably such activities would occur from October 1 to March 15.
4. Because protocol-level surveys within the Action Area have not indicated the presence of nesting willow flycatchers, work limitations between March 15 and September 30, do not appear warranted. However, pre-activity surveys will continued to be required during this period whenever activities are being conducted within the sensitive areas identified in Figure 10. If nesting flycatchers are found to occur, construction activities would be halted and the USFWS immediately consulted to determine an appropriate response to avoid the impact. If greater than 8.8 acres of historical floodplain habitat is lost or manipulated, specific project consultation with USFWS will be required and possible mitigation may be required. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.

5. Minimization measures outlined in the BIAMP for southwestern willow flycatcher will be implemented including preconstruction surveys during the nesting season, awareness training, pre-activity surveys, compliance monitoring, and reporting during field activities.

Future project activities, conducted in accordance with species-specific mitigation measures presented above and established mitigation measures (CH2M HILL, 2013f) will help to avoid, reduce, and mitigate operational and construction impacts to the biological environment within the Action Area. It is recognized that future minor additional tamarisk habitat may be lost, removed, or manipulated to conduct planned activities, which could potentially reduce overall habitat value and alter southwestern willow flycatcher behavior. Southwestern willow flycatchers have been documented in several areas in Arizona within the Action Area. Future project activities are anticipated to occur on the California floodplain in or near potentially suitable nesting/migratory habitat along the Colorado River and near the southern portion of the Topock Marsh on the HNWR. In general, these activities will be near marginal southwestern willow flycatcher habitats and of relatively short duration.

However, based on the location of project activities and distance from documented southwestern willow flycatcher nesting habitat; the fragmented distribution, composition and structure of habitat conditions in or adjacent to the Action Area; and the continued implementation of conservation measures identified in Section 3.0, the effects of planned project activities to the southwestern willow flycatcher are not expected to occur. For these reasons, any potential direct or indirect effects from project activities are likely to be either negligible or avoidable. An effects determination of “not likely to adversely affect” is concluded for this species.

5.2.2 Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

5.2.2.1 Status

The western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) was proposed for federal listing as threatened on October 3, 2013 [78 Fed. Reg. 61622], is a California State Endangered species, and is considered threatened on the list of Wildlife of Special Concern in Arizona. It is associated with large blocks of riparian woodland primarily composed of cottonwood and willow.

Although yellow-billed cuckoos are common in the east, the western population represents a distinct population segment (DPS) that has different habitat requirements than the eastern population. Major declines in the western populations are due to habitat loss and habitat fragmentation, local extinctions, and low colonization rates (Hughes, 1999).

5.2.2.2 Natural History, Distribution, Abundance and Habitat

The yellow-billed cuckoo is a medium-sized bird, about 30 centimeters (12 inches) long, with wings that are grayish-brown on top and white below and with reddish primary flight feathers. Tail feathers are grayish-brown above and black tipped with white below. The distinctive tail pattern is visible in flight and while perched. This species has a somewhat elongated body and a moderate to heavy bill that is moderately long and curved down with a hook at the tip. The upper mandible is black and the lower is yellow to orange yellow at the base with a dark tip. This species has a zygodactyl foot with two toes pointing forward and two toes pointing backwards (Hughes, 1999).

Two subspecies (western and eastern with the Pecos River, Texas, as the boundary between the two subspecies) have been recognized since the late 1880s; however, scientific studies to date have not conclusively determined whether western and eastern subspecies exist (Hughes, 1999). USFWS evaluated the available scientific evidence and determined that the recognition of the subspecies is not justified at this time (USFWS, 2013c). Instead, USFWS determined that the population segment of yellow-billed cuckoo nesting west of the Continental Divide is a DPS under the ESA.

The yellow-billed cuckoo is a neotropical migrant bird that breeds in North America and winters in South America. The breeding range historically included most of North America, from southeastern and western

Canada to the Greater Antilles and northern Mexico. Western yellow-billed cuckoo were once widespread and locally common in California and Arizona, locally common in a few river reaches of New Mexico and in portions of Oregon and Washington, and local and uncommon in western Colorado, western Wyoming, Idaho, Nevada, Utah, and southern British Columbia, Canada (Hughes, 1999). Over the last 90 years, the range has been reduced such that the northern limit of breeding is Sacramento Valley, California (though a small, potentially breeding population has been observed in northern California) and southeastern Idaho in the western interior states (USFWS, 2013c).

These birds were once considered widespread and locally common nesters in Arizona river bottoms, but the state population has declined sharply from an estimated 180 pairs present on the Arizona side of the lower Colorado River in 1976/1978 to 8 to 18 pairs estimated from surveys in 2010 (USFWS, 2013c). California once supported an estimated 15,000 pairs in the late 1800s, but massive declines have been documented into the 1980s due to loss of riparian gallery forest (less than 1 percent of original forest remaining) and egg-shell thinning from pesticide exposures (Hughes, 1999). The California population of western yellow-billed cuckoo today is less than one percent of its estimated historical population size and only three areas of the state have been identified as supporting more than a few breeding pairs on a regular basis. These include the Sacramento River (between Colusa and Red Bluff), South Fork of the Kern River upstream of Lake Isabella, and the lower Colorado River. In 2006, only one individual was detected on the California side of the lower Colorado River; however, 10 to 19 pairs were found in 2011 at a restored habitat area (USFWS, 2013c).

As an insectivore, yellow-billed cuckoo forages in open areas, woodland, orchards, and adjacent streams, gleaning grasshoppers, cicadas, caterpillars and other larger insects from the foliage. Occasionally it also forages on frogs or lizards and rarely on fruit during the breeding season (CDFW, 2013b; Hughes, 1999).

The onset of breeding is apparently correlated with an abundant local food supply or periods of greatest rainfall. Cuckoos may not breed if local food supply is inadequate on breeding grounds following spring migration. The breeding cycle is extremely rapid and requires only 17 days from egg-laying to fledging of young. Nesting activities take place between late June and late July, but may begin as early as late May and continue into September. Nest building typically takes 2 to 4 days. One brood of two to three young is raised per season. Cuckoos will occasionally double-brood in western populations if abundant food resources exist. Incubation begins with initiation of the first egg laying, known as asynchronous hatching, resulting in eggs and nestlings at different developmental stages in the same nest. Asynchronous hatching permits survival of the oldest nestlings in the event of a food shortage. The incubation period for yellow-billed cuckoos is 10 to 12 days. The young are fed large food items for the 5 to 8 day nestling period. Most young cuckoos leave the nest on day 6. After fledging, the young are dependent on the adults for at least 2 weeks (Hughes, 1999).

Western yellow-billed cuckoo occupy extensive deciduous riparian thickets or forests with dense, low-level or understory foliage and that are adjacent to slow-moving waterways, backwaters or seeps (CDFW, 2013b). In Arizona and southern California, western yellow-billed cuckoo prefer desert riparian woodlands comprised of willow, Fremont cottonwood, and dense mesquite (*Prosopis* spp). Nests are placed in willows, but cottonwood is used extensively for foraging (Hughes, 1999). Western yellow-billed cuckoo nest almost exclusively in low to moderate elevation riparian woodlands that cover 20 hectares (50 acres) or more within arid to semiarid landscapes. Western yellow-billed cuckoo may be restricted to the extensive, moist habitats because of humidity requirements for successful hatching and rearing of the young (Hughes, 1999; USFWS, 2013c).

Willow is almost always a dominant component of the vegetation. Along the Colorado River, western yellow-billed cuckoo may inhabit mesquite thickets where willow is absent, but nests are usually located in thickets with at least some willow, dense low-level or under-story foliage, high humidity, and wooded foraging spaces in excess of 93 meters (300 feet) in width and 10 hectares (25 acres) in area (CDFW, 2013b). Although breeding pairs have been observed in tamarisk, they are not found in areas that are totally dominated by tamarisk with a complete lack of willows or cottonwoods (USFWS, 2013c).

5.2.2.3 Status of the Species in the Area

The Action Area contains potentially suitable, though not preferred, nesting habitat for the species. The Action Area is located in the vicinity of two western yellow-billed cuckoo study areas (Lower Colorado River Multi-Species Conservation Program [LCMSCP], 2013)—the Topock Marsh (a portion of which is within the Action Area) and Topock Gorge (south of the Action Area). Potential nesting, foraging, and migratory habitat for the western yellow-billed cuckoo exists within and near the Action Area. The nesting and migratory period for western yellow-billed cuckoo occurs around late May (arrival) through late September (departure).

While not the particular focus of protocol surveys within the Action Area, incidental observations of western yellow-billed cuckoo have been made as part of annual protocol surveys that were conducted for southwestern willow flycatcher between 2005 through 2010 and in 2012 (GANDA, 2005a, 2006a, 2007a, 2008a, 2009a, 2010, and 2012). Throughout these surveys, a single western yellow-billed cuckoo individual was detected in three consecutive years between 2008 and 2010 (but not in 2012) at the same call point location (Figure 9) within the western portion of Topock Marsh in Arizona (GANDA, 2012).

These incidental sighting results at the same location seem to indicate that, even though no western yellow-billed cuckoo pairs were observed, there is potentially suitable nesting habitat in AZ along the western margin of the Topock Marsh. The topography along this peninsula from west to east consists of rolling sand dunes increasing in elevation from the levee road to an additional 20 feet and decreasing to tamarisk thicket and eventually to marsh habitat. Presumably, these areas may also contain sufficient willow shrubs (and, perhaps, even cottonwood trees) in addition to the tamarisk, which could support the nesting by western yellow-billed cuckoo. The recent floristic survey (GANDA and CH2M HILL, 2013a) indicated the presence of sand-bar willow in the southern portions of Topock Marsh that were surveyed within the Action Area. Based on this information, potentially suitable western yellow-billed cuckoo nesting habitat is presumed to occur along the western and southern margin of Topock Marsh.

Potentially suitable nesting habitat exists along the western margin of the Topock Marsh within dense tamarisk stands where an individual western yellow-billed cuckoo was documented at the same location for three consecutive years between 2008 and 2010. The potential nesting areas on the west side of Topock Marsh are included within the Action Area but range in distance from about 1,000 feet in the southern portion to greater than 3,000 feet in the northern portion from proposed activities associated with the Freshwater Implementation Plan (i.e., well and pipeline construction and operation and maintenance activities not already otherwise included in the environmental baseline). The burned tamarisk area to the east of the Oatman-Topock Highway is part of a planned restoration effort that seeks to re-establish native vegetation (Digital-Desert, 2013), so the potential suitability for western yellow-billed cuckoo foraging (and potentially nesting) in these habitats is expected to improve over time.

Conversely, the vegetation in the dense tamarisk stands associated with the Sacramento Wash to the east of the Oatman-Topock Highway was floristically surveyed and did not contain willow or cottonwood. For this reason, these areas would not be considered to be potentially suitable nesting western yellow-billed cuckoo habitat. Also, given the distance of these areas from the Colorado River (and associated cottonwood trees), the western yellow-billed cuckoo is not expected to make significant use of the Sacramento Wash tamarisk areas for roosting or feeding.

Within the CA portion Action Area to the west of the Colorado River, there is generally less suitable western yellow-billed cuckoo habitat than what is available in Arizona. Areas closer to the Colorado River are expected to be more suitable for migratory habitat as the birds migrate into and from suitable nesting habitats; however, the existing tamarisk habitats in California are still likely to have very limited use for roosting or feeding due to the nearly complete lack of willow and cottonwood. A single Gooding's willow was mapped on the island north of Park Moabi Slough and the presence of cottonwood was noted north and south of the slough only within Moabi Regional Park. The presence of sand-bar willow was noted in survey areas on both sides of the Colorado River throughout the Action Area and in the southern portion of

Topock Marsh (GANDA and CH2M HILL, 2013a), but was not considered sufficient to support western yellow-billed cuckoo.

In addition, the fragmented tamarisk thickets in California are too small to support western yellow-billed cuckoo. These thickets are found below the BNSF Railway and Interstate 40 bridges (approximately 6 acres); near the Bat Cave Wash at its confluence with the Colorado River (approximately 5 acres); near the unnamed western wash, which has its confluence with the Colorado River directly northwest of Bat Cave Wash (approximately 3 acres); and near the Park Moabi Marina (approximately 7 acres) as shown in Figure 10. These tamarisk thickets represent less than 1.5 percent of the total Action Area.

The tamarisk patches are also subject to regular human disturbance. The thickets near the Park Moabi Slough are subject to regular recreational boating traffic and the adjacent habitats on the island north of the slough and north of the National Trails Highway between the Pirate's Cove Resort and the Bat Cave Wash outlet have an extensive network of ORV trails.

Within the Action Area to the west of the Colorado River, there is generally less suitable western yellow-billed cuckoo nesting habitat than in Arizona. Tamarisk and arrow weed are the dominant vegetation types within the portion of the Action Area associated with the Colorado River floodplain. However, given the small size and relatively limited amount of sand-bar willow and nearly complete lack of cottonwood (except within Moabi Regional Park), the dense tamarisk thickets to the west of the Colorado River are not considered to be suitable nesting, or roosting and foraging habitat for western yellow-billed cuckoo. However, these habitats may still be used for western yellow-billed cuckoo roosting and foraging during migration. These tamarisk thickets represent less than 1.5 percent of the total Action Area. The patches tend to be fragmented and are subject to regular human disturbance; two factors that may decrease the habitat value for the species (GANDA, 2005a). The habitats near the Park Moabi Slough are subject to regular disturbance by recreational boat traffic and the adjacent habitats on the island north of the slough and north of the National Trails Highway between the Pirate's Cove Resort and the Bat Cave Wash outlet have an extensive network of ORV trails.

Although tamarisk habitat exists within the Action Area in California, the vegetation density, habitat structure, and patch-size of thickets are sparser, smaller, and more fragmented in comparison to observed potential breeding habitat within the Topock Marsh. While western yellow-billed cuckoo may inhabit mesquite thickets where willow is absent, nests are usually located in thickets with at least some willow, dense low-level or under-story foliage, high humidity, and wooded foraging spaces in excess of 93 meters (300 feet) in width and 10 hectare (25 acres) in area (CDFW, 2013b).

Additionally, biological monitors have logged several hundred hours performing pre-activity surveys on the California floodplain as part of compliance with the mitigation measures associated with the 2007 PBA and with revised well sampling procedures (CH2M HILL, 2005d) that require monitoring for any migratory bird nests by a qualified biologist within a 200-foot work area prior to construction-related activities that occur between March 15 and September 30. To date, no active nests of any migratory birds have been documented during these surveys.

5.2.2.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Details of the Final Groundwater Remedy were previously described in Sections 3.3 and Table 2 and shown in Figures 6 and 7. The Final Groundwater Remedy actions are summarized here as only they relate to potential direct effects to western yellow-billed cuckoo.

Beginning in Arizona, the Freshwater Implementation Plan would have no direct effect on western yellow-billed cuckoo from anticipated activities in the northeastern portion of the Action Area because of the lack of suitable habitat near the areas where planned activities associated with the water conveyance pipeline construction (Figure 10) would occur from either the HNWR-1 location and Site B well location. Nonetheless, pre-activity surveys and construction monitoring by a qualified biologist would still be conducted, especially

when the conveyance pipeline work is near the southern margin of Topock Marsh, in order to avoid potential project impacts to this species.

As the freshwater conveyance pipeline alignment extends south of the Topock Marsh, it will travel in the Oatman-Topock Highway and then cross beneath Interstate 40. The underground pipeline alignment will continue in a southeastern direction along the elevated river terrace to the existing pipe bridge (i.e., the former Route 66 bridge) upon which, it will cross above ground over the Colorado River (Figures 6 and 7). This alignment for the freshwater conveyance pipeline will avoid any direct impacts to the Colorado River floodplain within the Action Area in Arizona or California. However, the pipe bridge crosses over marginal, but potential western yellow-billed cuckoo habitat along the California shore of the river. Pre-construction surveys and construction monitoring by a qualified biologist would be conducted when the conveyance pipeline activities were traversing this area.

Specific actions occurring within or adjacent to potentially suitable habitat in the floodplain in California have the potential to affect this species. This will include the activities that would be associated with the installation of remediation wells and pipelines for the in situ reduction zone, installation of monitoring wells, installation of remote wireless communications, and the use of a construction staging area near the Bat Cave Wash outlet.

Activities related to the construction of the Final Groundwater Remedy in upland areas will include the construction of carbon amendment storage and injection facilities, remedy-produced water treatment system; a pre-injection freshwater treatment system (if required), and conditioned water storage facilities. These activities will also include the installation of upland remediation wells and pipelines, installation of monitoring wells, and the use of construction staging/soil storage areas. These sites are located within the upland that does not support riparian vegetation and other characteristics commonly associated with western yellow-billed cuckoo habitat. For this reason, these activities are not expected to have any effect to this species due to unsuitable habitat at the specific project locations.

The Final Groundwater Remedy construction activities proposed by PG&E will involve the use of heavy equipment including, but not limited to, backhoes and drill rigs that may be used to remove vegetation, grade the ground surface, and install remediation or groundwater monitoring wells or pipelines within the floodplain. This equipment can create substantial ground disturbance and noise.

The Colorado River may function as a migration corridor for the western yellow-billed cuckoo. During migration periods, this species may briefly stop to roost and/or forage within or adjacent to potentially suitable roosting and foraging habitats within the fragmented tamarisk patches in the Action Area that are located at Bat Cave Wash and the unnamed wash to the west; under the BNSF railroad and Interstate 40 overpasses; near Park Moabi Regional Park; and the eastern edge of the Action Area (Figure 10) (CH2M HILL, 2005a; 2005b; 2005c).

Because western yellow-billed cuckoo may potentially use the habitat in the Action Area for roosting and foraging during the spring and fall migration seasons, it is possible that operational activities could alter the behavior of migrating individuals, but as discussed, the potential for impact is considered low. The greatest potential for direct effects to western yellow-billed cuckoo would be within the short migratory period during arrival (late May through June) and departure (July through late September) when individuals could be passing through the Action Area to and from more suitable nesting locations.

Habitat elements such as patch size, shrub density and the presence and/or location of water provide the appropriate habitat structure and features to allow for this behavior. However, annual surveys conducted from 2005 through 2010 and in 2012 have not documented any western yellow-billed cuckoo nesting or presence (other than transients) using the habitat patches in the historical or current Colorado River floodplain within the Action Area. Five riverbank remediation wells and associated water conveyance pipelines, as well as several monitoring wells would be constructed within or near the tamarisk thickets along the floodplain on the California side of the project. As previously explained, the regular disturbances

by recreational boating and ORV traffic reduce the potential suitability of these areas for western yellow-billed cuckoo use. Also, based on the combination of biennial survey results and the application of conservation measures, any direct effects to nesting or migratory western yellow-billed cuckoos is expected to be low to negligible.

Over time, tamarisk acreage may significantly increase along the Colorado River corridor and the larger thickets may serve as western yellow-billed cuckoo breeding habitat when they are found in conjunction with willow and cottonwood. While several fragmented, small stands of tamarisk could be peripherally affected as a result of the proposed actions, most of the work will occur within sparsely vegetated areas within the floodplain in order to avoid and minimize habitat disturbance. Design efforts will avoid dense contiguous stands of tamarisk greater than 1.0 acre and any associated vegetation as practicable. Limited riparian vegetation, primarily smaller patches or individual plants of tamarisk and arrow weed, may be crushed or trimmed as a result of the proposed actions. An 8.8-acre disturbance threshold will be followed in an attempt to lessen the potential effects to the species and habitat. Exceeding the 8.8-acre threshold will require consultation with USFWS and may require possible mitigation.

Project-related construction and operational activities will not occur within cottonwood-willow stands and; therefore, will have no direct effect upon the Colorado River's overall balance of remaining cottonwood-willow riparian stands that historically were the native habitat for this species.

5.2.2.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur are related to the long-term operation and maintenance of the Final Groundwater Remedy facilities after construction and the decommissioning and restoration of IM No. 3 and the Final Groundwater Remedy.

The Final Groundwater Remedy activities related to operation and maintenance of the freshwater supply system would also include periodic maintenance and repair of well, pump, and electrical control equipment, pipeline maintenance and repair; stormwater pollution prevention; access roadway maintenance; well sampling; and eventual decommissioning of the well and pumping facilities once remedial objectives were achieved. After decommissioning, these areas would be restored in accordance with the Remedy Decommissioning Plan, including a restoration plan that will be submitted by PG&E to DOI after receipt of DOI's certification of Remedial Action completion, and the Habitat Restoration Plan, where applicable, that will be submitted to the agencies with the Remedial Action Work Plan. As previously mentioned, these activities will occur in areas that are not within or nearby suitable western yellow-billed cuckoo habitat, so the effect of these activities is expected to be negligible.

The Final Groundwater Remedy activities related to operation and maintenance of the remediation facilities and supporting systems would also include periodic maintenance and repair of well, pump, and electrical control equipment, pipeline maintenance and repair; stormwater pollution prevention; access roadway maintenance; well sampling; and eventual decommissioning of the wells, pipelines, and pumping facilities once remedial objectives were achieved. After decommissioning, these areas would be restored in accordance with the Remedy Decommissioning Plan, including a restoration plan, which will be submitted by PG&E to DOI after receipt of DOI's certification of Remedial Action completion, and the Habitat Restoration Plan, where applicable, that will be submitted to the agencies with the Remedial Action Work Plan. Planned activities will also include the decommissioning of the IM No. 3 treatment facilities, and upland restoration including the areas on MW-20 Bench and IM No. 3 facilities.

Regular sampling of remediation or monitoring wells may occur on a weekly, biweekly, or monthly basis and will likely require the use of off-road utility vehicles and possibly a small generator for power to activate the submersible pumps during water collection. The generators' noise output is minimal enough that a conversation can easily occur. These activities happening within or adjacent to suitable western yellow-billed cuckoo habitat may lead to alterations of western yellow-billed cuckoo behavior. However, the lack of

evidence of western yellow-billed cuckoo nesting within this portion of the Action Area suggests that the probability of negatively altering western yellow-billed cuckoo behavior during normal well sampling, carbon substrate injection, or equipment maintenance activities would be relatively low. Further, the magnitude of project effects may be difficult to discern from other potentially impacting transportation activities (i.e., the Interstate 40 and the BNSF Railroad) and recreational activities (e.g., watercraft) that occur with regularity within the Action Area.

More aggressive activities associated with non-routine well maintenance, pipeline repair, certain road repair; decommissioning and removal of facilities; and restoration activities would require the use of heavy equipment, trucks, materials, and crews to implement. However, the potential effects of these activities would be reduced by the application of general project management measures discussed in Section 3.4 and species-specific mitigation measures discussed below in subsection 5.2.2.8, so that the potential for indirect effects on western yellow-billed cuckoo are considered to be low.

5.2.2.6 Cumulative Effects

Cumulative effects include future state and private activities, excluding federal activities that are reasonably certain to occur within the Action Area. Continued operation of the TCS will occur. It is reasonably certain that remedial activities will also occur within the Action Area. The final soil remedy, if required, will include heavy equipment and personnel with minor activities in the floodplain. Habitat loss would likely not be sufficient enough to reduce the habitat value and thereby, alter western yellow-billed cuckoo use and behavior. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River and the HNWR, such as boating, fishing, and ORV use of the floodplain and surrounding areas. Examples of recent actions that have occurred within the Action Area in California since the 2007 PBA include the expansion of private commercial recreation facilities at the Moabi Regional Park (Pirate's Cove restaurant, individual lodging, motorized and non-motorized zip-line rides, as well as expanded ORV trail networks on the island north of the slough and north of the National Trails Highway east to the Bat Cave Slough outlet). Other actions include ongoing use of the 'open riding' ORV areas to the south of Moabi Regional Park, although an official 2006 BLM road closure to the east of Park Moabi Road would be expected to limit this effect within the Action Area.

Within the Action Area in Arizona, ongoing and future actions include renovations at the Topock Marina (including current rental lodging, and a proposed hotel and new restaurant) and HNWR restoration efforts associated with the 2008 Sacramento Wash Fire. The HNWR restoration efforts are expected to have an overall positive effect on western yellow-billed cuckoo habitat in the Action Area as those native plantings mature and replace lost native habitats; however, the restoration plantings will not create additional western yellow-billed cuckoo habitat. Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40, bridges, and other nearby roads and utilities are anticipated.

5.2.2.7 Critical Habitat Effects Determination

Because western yellow-billed cuckoo is not a current federal listed species, critical habitat for this species has not been identified. Constituent elements that will be part of any future critical habitat designation would be expected to include dense riparian areas that are dominated by willow, cottonwood, and mesquite. These areas would have to have shallow groundwater levels that would support the trees and create humid conditions. They would also need to have a suitable prey base of large insects. These particular conditions are not present within the Action Area and, given the current hydrological management of the Colorado River, they are unlikely to become present. Because the proposed activities for the Final Groundwater Remedy would not affect these resources, the potential for adversely affecting constituent elements or future critical habitat is considered discountable.

5.2.2.8 Effects Determination

As shown in Figure 10, individual western yellow-billed cuckoos were detected at a single call location in Arizona in three consecutive years between 2008 and 2010 (GANDA, 2012). It was presumed that this could indicate the presence of suitable nesting habitat within the Action Area on the western side of Topock Marsh. Given the multiple detections of western yellow-billed cuckoo over several years, the presence of potentially suitable habitat, and the presence of nearby breeding populations, there is a potential for western yellow-billed cuckoo to breed in the Action Area in the future. However, nesting of western yellow-billed cuckoo is considered unlikely in other portions of the Action Area along the western shore of the Colorado River due to the lack of appropriate vegetation composition, habitat structure, and size. Furthermore, due to the regular disturbances from recreational boating and ORV traffic, especially on the western side of the Colorado River near the Park Moabi Slough, the potential for negative effects to western yellow-billed cuckoo are very low and would therefore be considered insignificant. To date, no take of western yellow-billed cuckoos (or any other migratory birds) has occurred within the Action Area from project activities.

Protocol-level surveys for western yellow-billed cuckoos will be conducted for two consecutive years (2014 and 2015). Depending on the findings of those surveys, the subsequent surveys may follow a similar frequency (triennial) as the southwestern willow flycatcher (USFWS, 2014a). In addition, pre-project surveys by qualified biologists will be conducted to identify the presence of western yellow-billed cuckoos and adapt operations to minimize any potential for effects. Further, it is expected that project activities (especially those involving heavy equipment for the construction, development, or maintenance of wells in proximity to potentially suitable western yellow-billed cuckoo nesting habitat) will occur before May 15 or after September 30 (the migratory/nesting season) within the Action Area, where practicable, any potential effects would be a non-issue.

Nesting of western yellow-billed cuckoo on the floodplain is considered unlikely west of the Colorado River within the California portion of the Action Area. However, seasonal migratory use of habitat on the floodplains of California and Arizona can be anticipated to occur along the Colorado River as western yellow-billed cuckoos move to and from other known breeding locations. Project activities, therefore, could influence western yellow-billed cuckoo activity during this period.

The following mitigation measures will be applied to all actions associated with the Final Groundwater Remedy that will occur in or near potential western yellow-billed cuckoo habitat, as shown in Figure 10.

1. Minimize the net increase of disturbed habitat in the Action Area.
2. Riparian areas surrounding the designated work areas and subject to influence of operations and maintenance activities shall be surveyed by a USFWS permitted biologist for western yellow-billed cuckoo according to the protocol established by the USFWS. After the initial 2 years of surveys, ongoing surveys shall be performed according to USFWS's recommendations until the action has been completed and all facilities have been removed. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office and to the USFWS's Phoenix AESO each time they are performed.
3. Construction and development activities that use heavy equipment should be completed prior to May 15. The use of any heavy equipment in or near western yellow-billed cuckoo habitat after May 15 will be required to be reassessed and additional conservation measures may be considered. Preferably such activities would occur from September 30 to May 15.
4. To the extent feasible, future project activities within the sensitive areas identified in Figure 10 (i.e., potential western yellow-billed cuckoo habitat, wetlands, 100-year floodplain, and a 60-foot buffer from the Colorado River) should be avoided. Further, if greater than 8.8 acres of floodplain habitat is lost or manipulated, specific project consultation with USFWS will be required and possible mitigation may be required. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.

5. A biologist will be assigned to field teams for remediation activities within western yellow-billed cuckoo habitat during the period of May 15 through September 30.
6. Minimization measures outlined in the BIAMP will be implemented including preconstruction surveys during the nesting season, awareness training, pre-activity surveys, compliance monitoring, and reporting during field activities.

Future project activities, conducted in accordance with species-specific mitigation measures presented above and other established mitigation measures (CH2M HILL, 2012a) will help to avoid, reduce, and mitigate operational and construction impacts to the biological environment within the Action Area. It is recognized that additional minor amounts of tamarisk habitat may be lost, removed, or manipulated to conduct planned activities, which are not expected to significantly reduce overall habitat value and alter western yellow-billed cuckoo behavior. Western yellow-billed cuckoos have been documented in several areas throughout the Action Area and future project activities are anticipated to occur on the California floodplains in or near potentially suitable nesting/migratory habitat along the Colorado River. In general, these activities will be near marginal yellow-billed cuckoo habitats and of relatively short duration. However, no impacts are expected within the Topock Marsh on the HNWR where the suitable western yellow-billed cuckoo habitat occurs.

Based on the location of project activities and distance from potential suitable western yellow-billed cuckoo nesting habitat; the fragmented distribution, composition, and structure of habitat conditions in or adjacent to the Action Area; and the continued implementation of conservation measures identified in Section 3.4, adverse effects from the planned project activities to the western yellow-billed cuckoo are not expected to occur. For these reasons, any potential direct or indirect effects from project activities are likely to be either negligible or avoidable. An effects determination of “not likely to jeopardize” is concluded for this species.

5.2.3 Agassiz’s Desert Tortoise (*Gopherus agassizii*)

5.2.3.1 Status

The desert tortoise was listed as federally threatened on April 2, 1990 (USFWS, 1990a). Critical habitat was designated on February 8, 1994 (USFWS, 1994a). The Desert Tortoise Recovery Plan was released on June 28, 1994 (USFWS, 1994b). The desert tortoise was listed as threatened by the state of California in 1989.

The decline in the desert tortoise population is primarily due to habitat loss, degradation, and fragmentation resulting from increased human population and urbanization in the desert and arid regions of the southwestern United States. The increase in urbanization, collection of tortoises for pets, overgrazing, landfills, subsidized predation, highway mortality, vandalism, agriculture, fire, drought, and ORV use have all contributed to the decline of the tortoise in the wild. Another important reason for the tortoise decline in the western Mojave Desert is the introduction of an upper respiratory tract disease into many of the wild populations (USFWS, 1990a; 1994b).

5.2.3.2 Natural History, Distribution, Abundance, and Habitat

The desert tortoise is a large, herbivorous terrestrial reptile. The Agassiz’s desert tortoise has a high-domed shell that can reach a length of 36 centimeters (14 inches). The animal has stocky, elephant-like limbs and a short tail. The carapace (upper shell) is brown, and the plastron (lower shell) is yellow—both exhibiting prominent growth lines. Adult males can be distinguished from females by the concavity toward the rear of their plastron. Adult males also have larger chin glands and a longer tail and gular horn than females (Stebbins, 1985).

The adult desert tortoise is active from mid-March or April to November and, during the winter months, is dormant in underground burrows (Luckenbach, 1982). Desert tortoises will congregate in winter dens during colder weather, and then spread out to nearby areas during moderate weather in the spring and fall and retreat into short, individual burrows or beneath shrubs during more extreme heat in summer (Woodbury

and Hardy, 1940). During the summer active period, desert tortoises have home ranges from 12.7 to 72.1 hectares (5 to 29 acres) (O'Conner et al., 1994). During active periods, tortoises feed on a wide variety of herbaceous plants, including cactus, grasses, and annual flowering plants (USFWS, 1994a).

Desert tortoises may live beyond 80 years and have a relatively slow rate of reproduction. Sexual maturity is reached at the age of 15 to 20 years. Mating generally occurs in the spring (mid-March to late-May), with nesting and egg-laying occurring from April to mid-July (Rostral et al., 1994). The female tortoise lays her eggs in a hole, approximately 7 to 10 centimeters (2.7 to 3.9 inches) deep, dug near the mouth of a burrow (Woodbury and Hardy, 1948). Following egg-laying, the female covers the eggs with soil. Clutch size ranges from 2 to 14 eggs, with an average of 5 to 6 eggs (Luckenbach, 1982). Desert tortoise eggs typically hatch from August through October. These hatchlings are provided a food source in the form of an egg yolk that is assimilated into the underside of the shell. This yolk sac will sustain the animal for up to 6 months. The hatchling desert tortoise will go into hibernation in the late fall but can be active on warm sunny or rainy days (Luckenbach, 1982).

The Agassiz's desert tortoise can be found in desert and arid regions west and north of the Colorado River in Nevada, Arizona, and Utah (Stebbins, 1985). This species is primarily associated with flats and bajadas (shallow slopes that lie at the base of rocky hills), with soils ranging from sand to sandy-gravel but firm enough for the tortoise to construct burrows. In California, this desert tortoise is most commonly found in association with creosote bush scrub, with inter-shrub space for growth of herbaceous plants (USFWS, 1994a).

5.2.3.3 Status of the Species in the Area

From 2004 through 2013, PG&E contracted with CH2M HILL (2004i, 2010a), GANDA, 2005b; 2006b; 2007b; 2008b; and 2009b), and WSA (2013) to perform protocol-level presence/absence surveys for the desert tortoise in the Action Area. The majority of the desert tortoise studies (2004 through 2009) were conducted in the Action Area portions within California. The 2010 (CH2M HILL, 2010a) biological survey looked at three areas that were added to the Action Area, two of which, were in California.

Since desert tortoise surveys have been conducted within the Action Area, there have been no observed live tortoises or sign of active use. There have been, however, findings of desert tortoise bone fragments, disarticulated carcasses, and potential burrows, as described below. The location of the bone and carcass findings are all shown in Figure 10. The potential burrows were not included on this figure because subsequent interpretations determined that the burrows were likely created or maintained by mammals.

The first significant finding related to desert tortoise was on November 5, 2004. That finding was documented in a technical memorandum (CH2M HILL, 2004i) that was published as an addendum (No. 4) to the *Final Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System* (CH2M HILL, 2004a). The desert tortoise carcass was discovered on an elevated terrace in a Creosote Bush scrub 'badlands' with signs of previous vehicular traffic. The disarticulated carcass consisted of a plastron and a few portions of the carapace that were partially buried in the substrate or exposed at the ground surface. The bones showed signs of mineralization and were tan so that they blended with the color of the surrounding substrate. It was concluded, due to the condition of the bones, that the desert tortoise may have been entombed within a burrow which was subsequently eroded away. The age of the desert tortoise carcass was estimated be several decades (CH2M HILL, 2004i).

Another desert tortoise carcass was discovered within the Action Area in May 2006. This adult male carcass consisted of 14 scattered plastron and carapace bone fragments, which had serrated edges and were white. The external scutes had peeled off and were not present. This finding occurred to the south of Interstate 40 and to the northwest of the PG&E TCS (Figure 10). One additional set of disarticulated, scattered tortoise shell bone fragments was documented during the 2009 survey with the finding originally made on September 24, 2008 and reported to the USFWS and BLM on October 2, 2008. The set of bone fragments

was located to the northeast of the TCS near a wood post on the eastern edge of a wash (Figure 10). It was not possible to accurately determine the age of the bone fragments using available keys, however, it was confirmed that all of the tortoise remains were at least four years old. Later conclusions, taken in consultation with other experts, estimated that the remains were at least ten years old; and that, judging by their appearance, condition, and location, they were probably much older (GANDA, 2009b).

In addition to the carcasses documented above, two other sets of highly deteriorated bone shell fragments were discovered between May 2004 and April 2009. The bone fragments were estimated to be more than 4 years old. Two sets of bone shell fragments were associated with ephemeral drainages, indicating that they may have washed in from outside the Action Area during a rainstorm. This interpretation was based on the location of the finds, surrounding topography, and the lack of any other desert tortoise sign within the survey area. Burrows with entrances large enough to accommodate a desert tortoise were also observed during the multiple surveys. However, after repeated visits these possible desert tortoise burrows had no scat, tracks, or other signs within or surrounding the burrows. For these reasons, it was concluded that the burrow were likely created and maintained by a black-tailed jackrabbit or other burrowing mammal species (GANDA, 2009b).

It was concluded that the desert tortoise remains indicated historical use of the area but that no recent use was occurring. The survey area has been highly disturbed by numerous uses and is fragmented by the BNSF Railroad and Interstate 40, which are known to cause desert tortoise mortality. Linear transportation features contribute to habitat degradation for desert tortoise related to the increased dispersal of invasive weeds; increased populations of the common raven (*Corvus corax*) that prey on young tortoises; alter the dynamics of rainwater runoff; and provide additional human access and use. It was also hypothesized that the Interstate 40, BNSF Railroad, Highway 95, and Oatman-Topock Highway have effectively fragmented and isolated the habitats within the Action Area and surrounding vicinity. Given the dates when these roadways were constructed, it is likely that they have negatively affected desert tortoise populations within the Action Area for decades (GANDA, 2009b). Based on the survey findings above, the USFWS concurred with a PG&E request that regular protocol-level surveys for desert tortoise be stopped, while pre-activity surveys and construction monitoring would continue (USFWS, 2010a).

In 2010, three additional areas outside of the Action Area were surveyed for desert tortoise. As shown in Figures 2 and 10, two of the three survey areas were located on the California side of the river to the northeast and west of Park Moabi. No desert tortoises or other potential sign were documented within these survey areas (CH2M HILL, 2010a). These three areas were added to the Action Area based on consultations with the tribes. Based on the survey results described above, desert tortoises were concluded to be absent throughout the California portion of the Action Area.

Despite the absence of live or recent tortoise observations, there is a possibility; however, that desert tortoises could enter the Action Area from the west. The probability of this occurring is very low, owing to the relatively poor quality of the creosote bush scrub habitat in the Action Area, which typically lacks annual vegetation for forage and adequate burrowing environments for shelter. Combined with the presence of steep rocky slopes of the Chemehuevi Mountains and associated deeply incised drainages, along with the presence of major linear transportation facilities such as the Interstate 40 and BNSF railroad, the probability of permanent occupation by desert tortoises within the Action Area is unlikely.

5.2.3.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Details of the Final Groundwater Remedy were previously described in Sections 3.3 and Table 2 and shown in Figures 6 and 7. The Final Groundwater Remedy actions are summarized here as only they relate to potential direct effects to Agassiz's desert tortoise.

The Freshwater Implementation Plan activities within Arizona will have no direct effects on Agassiz's desert tortoise because this species occur only occurs to the west and north of the Colorado River.

Specific actions occurring within suitable habitat in upland areas within California have the potential to affect this species. Activities related to the construction of the Final Groundwater Remedy in upland areas will include the construction of carbon amendment storage and injection facilities, remedy-produced water treatment system; a pre-injection freshwater treatment system (if required); and conditioned water storage facilities. These activities will also include the installation of upland remediation wells and pipelines; installation of monitoring wells; and the use of construction staging/soil storage areas. These sites are located within the upland areas that could be potential desert tortoise habitats.

A large portion of the Action Area (approximately 988 acres) is located on the uplands within desert habitat that is referred to as creosote bush scrub (Figure 8). Protocol-level surveys that were conducted between 2005 and 2009 by GANDA did not indicate that desert tortoise was currently occupying the Action Area. Although the area is considered poor desert tortoise habitat, a transient could potentially enter the site. By conducting proposed construction and operational activities in accordance with established access routes (CH2M HILL, 2005e), as well as mitigation measures presented in Section 3.4 and noted below in subsection 5.2.3.8, it is expected that impacts within the creosote bush scrub habitat will be kept to a minimum.

The project activities proposed by PG&E on the uplands will occasionally involve the use of heavy equipment including but not limited to graders, backhoes, drill rigs, and water trucks that may be used to remove vegetation, grade the ground surface including dirt roads, extract soil samples, drill or maintain remediation or monitoring wells, and install other facilities. This equipment can create substantial ground disturbance and noise. The planned activities project also includes the continued operations of IM No. 3 involving vehicles traveling on unpaved roads to access sites and associated human activity until such time as the Final Groundwater Remedy is constructed and the IM No. 3 is put into a lay-up condition prior to decommissioning. Existing access routes (Figure 6) will be used wherever possible, so that direct effects to the creosote bush scrub habitat would be very low.

5.2.3.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur are related to the long-term operation and maintenance of the Final Groundwater Remedy facilities after construction and the decommissioning and restoration of IM No. 3 and the Final Groundwater Remedy.

The Final Groundwater Remedy activities related to operation and maintenance of the remediation facilities and supporting systems would also include periodic maintenance and repair of well, pump, and electrical control equipment, pipeline maintenance and repair; storm water pollution prevention; access roadway maintenance; well sampling; and eventual decommissioning of the wells, pipelines, and pumping facilities once remedial objectives were achieved. After decommissioning, these areas would be restored in accordance with the Remedy Decommissioning Plan, including a restoration plan, which will be submitted by PG&E to DOI after receipt of DOI's certification of Remedial Action completion, and the Habitat Restoration Plan, where applicable, that will be submitted to the agencies with the Remedial Action Work Plan. Planned activities will also include the decommissioning of the IM No. 3 treatment facilities, and upland restoration including the areas on MW-20 Bench and IM No. 3 facilities.

Regular sampling of remediation or monitoring the wells may occur on a weekly, biweekly, or monthly basis and will likely require the use of a pickup truck or in some cases an off-road utility vehicles and possibly a small generator for power to activate the submersible pumps during water collection. The generators' noise output is minimal enough that a conversation can easily occur. These activities happening within or adjacent to suitable desert tortoise habitat may lead to alterations of desert tortoise behavior, if they are present. Additionally, activities associated with non-routine well maintenance; pipeline repair; certain road repair; decommissioning and removal of facilities; and restoration activities would require the use of heavy equipment, trucks, materials, and crews to implement.

However, the lack of evidence of desert tortoise within this portion of the Action Area suggests that the probability of negatively altering desert tortoise behavior during normal well sampling, non-routine well maintenance, carbon substrate injection, or equipment maintenance activities would be relatively low. Further, the magnitude of project effects may be difficult to discern from other potentially impacting transportation activities (i.e., the Interstate 40 and the BNSF Railroad).

The potential for indirect effects to the desert tortoise is related to the possibility of a transient entering the Action Area during the proposed activities. However, based on past survey findings and a full-time biological monitor onsite to conduct pre-activity surveys, the probability of potential impact is considered low to negligible. Additionally, negative effects to tortoises may be further complicated by nearby natural and man-made barriers such as the Chemehuevi Mountains, Colorado River, BNSF railroad, Interstate 40, and other paved and unpaved roadways, which have fragmented and isolated the landscapes within the Action Area. In particular, indirect effects associated resulting from operational activities are expected to be negligible or avoidable.

As with other construction and maintenance actions, there is a risk of altering individual tortoise behavior from the restoration of degraded sites. This will involve recontouring, removing structures, driving trucks, using bobcats, and replanting native vegetation, for example. Once established, the restoration will presumably improve the quality of the Creosote Bush Scrub habitat for this species and other wildlife species. Any indirect effects associated with restoration of this habitat are expected to be beneficial to this species and habitat.

Overall, the potential effects of these activities would be reduced by the application of general project management measures discussed in Section 3.4 and species-specific mitigation measures discussed below in subsection 5.2.3.8, so that the potential for indirect effects to desert tortoises are considered to be low.

5.2.3.6 Cumulative Effects

Cumulative effects include future state and private activities, excluding federal activities that are reasonably certain to occur within the Action Area. Continued operation of the TCS will occur. It is reasonably certain that remedial activities could occur within the Action Area. The final soil remedy, if required, will include heavy equipment and personnel with minor activities in upland areas. Habitat loss would not likely be enough to reduce the habitat value and thereby, alter desert tortoise use and behavior. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities along the Colorado River and the HNWR, as well as ongoing use of the ‘open riding’ ORV areas to the south of Moabi Regional Park. These ORV activities are particularly significant to desert tortoise within the Action Area because ORV traffic may impact established trails or previously undisturbed habitat areas, or result in desert tortoise mortality within the designated ‘open riding’ areas (CTUC, 2011). Furthermore, it is possible that ORV traffic may extend well beyond the designated areas through trespass. Open access to unpaved roadways south of the Park Moabi Road exit off Interstate 40, also offers ORV access to the these portions of the Action Area. It is expected that the official 2006 BLM road closure to the east of Park Moabi Road would limit this adverse effect within the Action Area.

Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40 and other nearby roads and utilities are anticipated.

5.2.3.7 Critical Habitat Effects Determination

The nearest critical habitat for Agassiz’s desert tortoise is located within the Chemehuevi Valley located approximately 9 miles west of the Action Area (USFWS, 1994a). PG&E’s activities are located outside designated critical habitat for the Agassiz’s desert tortoise. An effects determination of “no effect” to critical habitat is concluded.

5.2.3.8 Effects Determination

Recent evidence of desert tortoise presence was not detected during the protocol surveys of the Action Area from 2004 through 2010 (CH2M HILL, 2004i, 2005c, 2010a; and GANDA, 2005b, 2006b, 2007b, 2008b, and 2009b). However, remains of desert tortoises have been documented within the Action Area. These remains were highly degraded and of an older, undetermined age, and so, were not considered to be indicative of recent occupation by the desert tortoise. There has been no reported take of this species resulting from investigative and remedial activities to date.

The upland landscape is considered poor habitat for the desert tortoise. It is estimated that no more than 3.6 acres of new upland habitat would be affected by future proposed actions. The intent of PG&E will be to use those areas already disturbed by project activities so as to minimize the net increase of affected habitat. It should also be noted that this PBA does not imply the approval of actions and/or the degradation of the landscape at the expense of risk to other resources (e.g., cultural resources).

The following mitigation measures will be applied to all actions associated with the Final Groundwater Remedy that will occur in or near potential Agassiz' desert tortoise habitat, as shown in Figure 10.

1. PG&E will minimize the net increase of disturbed habitat in the Action Area.
2. If future activities require the loss or manipulation of greater than 3.6 acres of upland habitat, specific project consultation with the USFWS will need to occur and possible mitigation may be required. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.
3. PG&E is to have a USFWS-approved desert tortoise handler available if and when a tortoise is found within the Action Area and requires relocation.

The documentation of aged desert tortoise remains and the presence of two possible burrows within the Action Area, although difficult to interpret, do indicate that individuals have been present within the Action Area in the past, and could potentially do so in the future. However, 7 years of protocol-level surveys within the Action Area have concluded that this species is currently absent. The Action Area has relatively low quality habitat that has been isolated and fragmented by several large, busy transportation features including highways and a railroad grade. The Action Area is also relatively distant from known suitable habitat and tortoise populations.

For these reasons, taken together with the implementation of mitigation measures presented above, the effects from proposed project activities to the Agassiz's desert tortoise are not expected to occur. Therefore any potential direct or indirect effects from project activities are either negligible or avoidable. An effects determination of "not likely to adversely affect" is concluded for this species.

5.2.4 Morafkai's Desert Tortoise (*Gopherus morafkai*)

5.2.4.1 Status

In December 2010, the USFWS determined the Sonoran population of desert tortoise warranted protection under the ESA, but that listing was precluded by higher priority listing needs, placing them as a candidate for listing. In June 2011, the USGS conducted a study confirming that the desert tortoise, thought to be one species for the past 150 years, now includes two separate and distinct species. The newly recognized species, Morafkai's desert tortoise, was formerly considered the Sonoran population of the desert tortoise. The study's finding that the Morafkai's desert tortoise is a new species confirms the USFWS's decision to evaluate this population independently from the Agassiz's desert tortoise, and will not change the status of the species under the ESA or change existing recovery plans. Morafkai's desert tortoise is currently considered as a Candidate species for listing.

The causes contributing to the decline in the Morafkai's desert tortoise population are similar to those listed for the Agassiz's desert tortoise in Section 5.2.2.1.

5.2.4.2 Natural History, Distribution, Abundance, and Habitat

Morafkai's desert tortoise has a flatter, pear-shaped shell compared to the high-domed shell of the Agassiz's desert tortoise. The animal has stocky, elephant-like limbs and a short tail. The carapace (upper shell) is brown, and the plastron (lower shell) is yellow—both exhibiting prominent growth lines. Adult males can be distinguished from females by the concavity toward the rear of their plastron. Adult males also have larger chin glands and a longer tail and gular horn than females (Stebbins, 1985).

The adult desert tortoise is active from mid-March or April to November and, during the winter months, is dormant in underground burrows (Luckenbach, 1982). Desert tortoises will congregate in winter dens during colder weather, and then spread out to nearby areas during moderate weather in the spring and fall and retreat into short individual burrows or under shrubs during more extreme heat in summer (Woodbury and Hardy, 1940). During the summer active period, desert tortoises have home ranges from 12.7 to 72.1 hectares (5 to 29 acres) (O'Conner et al., 1994). During active periods, tortoises feed on a wide variety of herbaceous plants, including cactus, grasses, and annual flowering plants (USFWS, 1994b).

Desert tortoises may live beyond 80 years and have a relatively slow rate of reproduction. Sexual maturity is reached at 15 to 20 years of age. Mating generally occurs in the spring (mid-March to late-May), with nesting and egg-laying occurring from June to early August (Rostral et al., 1994). The female tortoise lays her eggs in a hole, approximately 7 to 10 centimeters (2.7 to 3.9 inches) deep, dug near the mouth of a burrow (Woodbury and Hardy, 1948). Following egg-laying, the female covers the eggs with soil. Clutch size ranges from 2 to 14 eggs, with an average of 5 to 6 eggs (Luckenbach, 1982). Desert tortoise eggs typically hatch from August through October. These hatchlings are provided a food source in the form of an egg yolk that is assimilated into the underside of the shell. This yolk sac will sustain the animal for up to 6 months. The hatchling desert tortoise will go into hibernation in the late fall but can be active on warm sunny or rainy days (Luckenbach, 1982).

This species of tortoise inhabits rugged uplands such as rocky bajadas, hillsides, mountain slopes, and canyons. Populations in northwestern Arizona inhabit more moderate terrain such as gentle bajadas and low valleys. It shelters and hibernates in self constructed burrows that are often excavated under large rocks as well as in naturally occurring cavities under rocks or in the banks of washes (USFWS, 1990a).

5.2.4.3 Status of the Species in the Area

In 2010, a protocol-level desert tortoise survey was conducted in one area on the Arizona side of the project as part of a detailed biological resources survey of three areas initially outside of the Action Area, as shown on Figures 2 and 10 (CH2M HILL, 2010a). This area was evaluated for the Freshwater Implementation Plan as part of the Final Groundwater Remedy.

Two potential desert tortoise burrows were documented during the 2010 surveys in Arizona; however, these were considered to be mammal burrows that had taken on the appearance of tortoise burrows through weathering/erosion. No desert tortoises or other potential sign were documented during the surveys (CH2M HILL, 2010a). In 2013, the area being investigated for the Freshwater Implementation Plan were expanded as shown Figure 2 and these additional areas (including the original 2010 survey area) were surveyed for desert tortoise in May 2013 (WSA, 2013). No individual tortoises or tortoise sign were observed during the surveys and the survey concluded that desert tortoise were absent within the Arizona freshwater investigation area.

Almost the entire survey area, with the exception of a limited portion in the sparsely vegetated hills to the east of the BNSF alignment, was determined to lack suitable desert tortoise habitat. The relatively level survey areas were previously disturbed; had some level of recent human disturbance; or had loose soils that were considered as unstable for burrowing. In addition, the low-lying level areas around the Sacramento Wash were subject to periodic flooding. The findings of this desert tortoise survey were deemed consistent with past surveys conducted around the PG&E TCS (WSA, 2013).

While GANDA (2009b) conducted their protocol-level surveys of the Action Area on the west side of the Colorado River, several of the conclusions related to habitat suitability are also applicable to the Action Area on the east side of the Colorado River within Arizona. In particular, this portion of the Action Area has also been highly disturbed by numerous uses and is fragmented by the BNSF Railroad and Interstate 40, known to be causes of desert tortoise mortality. Linear transportation features contribute to habitat degradation for desert tortoise related to the increased dispersal of invasive weeds; increased populations of the common raven that prey on young tortoises; alter the dynamics of rainwater runoff; and provide additional human access and use. It is possible that the Interstate 40, BNSF railroad, Highway 95, and Oatman-Topock Highway have effectively fragmented and isolated the habitats within the Action Area and surrounding vicinity. Given these roadways and other linear facilities were constructed between 40 and more than 100 years ago, it is likely that they have negatively affected desert tortoise populations within the Action Area for decades (GANDA, 2009b). Based on the protocol-level survey results, it was concluded that Morafkai's desert tortoises were absent within the Arizona portions of the Action Area. Only a small portion of the Action Area along the east side of the BNSF railroad alignment was considered to be marginally suitable desert tortoise habitat; however, there will be no activities associated with the Freshwater Implementation Plan (such as the water supply pipeline) that will intercept pass through or near this potentially suitable habitat.

5.2.4.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Details of the Final Groundwater Remedy were previously described in Sections 3.3 and Table 2 and shown in Figures 6 and 7.

Project-related construction and operational activities proposed for the Arizona side of the project are related only to the Freshwater supply system. However, none of these activities will occur within habitat used by Morafkai's desert tortoise. Additionally, with the implementation of mitigation measures presented in Section 3.4 for Morafkai's desert tortoise and used again in subsection 5.2.4.8, the effects of proposed project activities to the Morafkai's desert tortoise are not expected to occur.

5.2.4.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur within the Arizona portion of the Action Area will include the maintenance of freshwater conveyance facilities (i.e., well, pump, electrical controls, and pipeline) after construction; the decommissioning of those facilities once the remedial objectives have been met; and eventual restoration of the areas once the facilities have been removed or suitably abandoned in place.

These activities would require heavy equipment, trucks, materials and crews to implement. Because these activities would occur outside of the Morafkai's desert habitat and would be completed in conjunction with pre-activity surveys and construction monitoring by a qualified biologist, any indirect effects are considered to be negligible or avoidable.

5.2.4.6 Cumulative Effects

Cumulative effects include future state and private activities, excluding federal activities that are reasonably certain to occur within the Action Area. Continued operation of the TCS will occur. The interim and remedial actions that may occur within the Action Area are focused on the supply of freshwater to support groundwater cleanup actions in the Action Area to the east of the Colorado River. It is reasonably certain that additional freshwater supply activities and investigations similar to the actions that have already been implemented to date will occur. The level and use of equipment, materials and personnel will be similar as well. There would be no tortoise habitat loss that would reduce the habitat value and thereby, alter desert tortoise use and behavior.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River and the HNWR, such as boating, and fishing at the Topock Marina. A new Topock Marina restaurant was constructed in 2013 and other improvement of those facilities (i.e., hotel and new restaurant) may occur in the future. Nearby federal ongoing and future actions include the restoration of the Sacramento Wash Burn area on the north and west sides of the Oatman-Topock Highway. These activities are outside of the potentially suitable habitat for Morafkai's desert tortoise.

Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40 and other nearby roads and utilities are anticipated. Those activities have the potential to affect Morafkai's desert tortoise only in the south-easternmost portion of the Action Area.

5.2.4.7 Critical Habitat Effects Determination

As a candidate species, critical habitat has not been designated for Morafkai's desert tortoise. An effect determination of "no effect" for critical habitat is concluded for this species.

5.2.4.8 Effects Determination

Recent protocol-level surveys did not reveal evidence of the presence of Morafkai's desert tortoise within the Arizona portion of the Action Area in 2010 or in 2013 (CH2M HILL, 2010a; WSA, 2013). These studies also did not indicate the presence of suitable desert tortoise habitat in the portion of the Action Area where Final Groundwater Remedy actions will occur that are associated with the freshwater supply system. There has been no reported take of this species resulting from investigative and remedial activities to date.

The intent of PG&E will be to use areas that are already disturbed for project activities so as to minimize the net increase of affected, undisturbed habitat.

The following mitigation measures will be applied to all actions associated with the Final Groundwater Remedy that will occur in or near potential Morafkai's desert tortoise habitat, as shown in Figure 10.

1. PG&E will minimize the net increase of disturbed habitat in the Action Area.
2. If future activities require the loss or manipulation of greater than 3.6 acres of new upland habitats, specific project consultation with the USFWS will need to occur and possible mitigation may be required. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.
3. PG&E is to have a USFWS-certified desert tortoise handler available if and when a tortoise is found within the Action Area and requires relocation.

It is possible for a transient individual to enter the Action Area in Arizona. The Action Area has relatively low quality habitat that has been isolated and fragmented by several large, busy transportation features including highways and a railroad grade. The Action Area is also relatively distant from known suitable habitat and tortoise populations. These reasons, taken together with the implementation of mitigation measures presented above, indicate that any adverse effects from proposed project activities to the Morafkai's desert tortoise are not expected to occur.

Therefore any potential direct or indirect effects from project activities are either negligible or avoidable. An effects determination of "not likely to adversely affect" is concluded for this species.

5.3 Marsh Species

5.3.1 Yuma Clapper Rail (*Rallus longirostris yumanensis*)

5.3.1.1 Status

The Yuma clapper rail was listed as a federally endangered species on March 11, 1967, under endangered species legislation enacted in 1966. Critical habitat has not been designated for this species. The Yuma Clapper Rail Recovery Plan was released on February 4, 1983 (USFWS, 1983) with a draft revised plan released in 2010 (USFWS, 2010d). The Yuma clapper rail is a fully protected species in California and was listed as threatened by California in 1978.

Much of the decline of the Yuma clapper rail can be attributed to altered seasonal flow regimes and lost marsh habitat due to the construction of hydro facilities and dredging on the Lower Colorado River. Population changes on a local level have been documented, but these changes may be based on changes in habitat quality. In turn, a decline in habitat quality may be the result of the aging of existing cattail stands to a less suitable condition for rail occupancy. Historically, the marshes seldom accumulated large amounts of dead vegetative material because of floods and changes to the river channel, which washed away cattail stands on a repeating cycle (USBR, 2004).

5.3.1.2 Natural History, Distribution, and Abundance and Habitat

The Yuma clapper rail is a chicken-sized marsh bird with a long down-curved beak. Both sexes are slate brown above, with light cinnamon underparts and barred flanks. This subspecies is slightly lighter in color and slightly thinner than other clapper rails. The bird measures 14 to 16 inches long once it is fully grown (Eddleman, 1989).

Yuma clapper rails are found in emergent wetland vegetation such as dense or moderately dense stands of cattails (*Typha latifolia* and *T. domingensis*) and California bulrush (Eddleman, 1989; Todd, 1986). They can also occur, in lesser numbers, in sparse cattail-bulrush stands or in dense reed (*Phragmites australis*) stands (Rosenberg et al., 1991). The most productive clapper rail areas consist of a mosaic of uneven-aged marsh vegetation interspersed with open water of variable depths (Conway et al., 1993). Annual fluctuation in water depth and residual marsh vegetation are important factors in determining habitat use by Yuma clapper rails (Eddleman, 1989).

Yuma clapper rails may begin exhibiting courtship and pairing behavior as early as February. Nest building and incubation can begin by mid-March, with the majority of nests being initiated between late April and late May (Eddleman, 1989). The rails build their nests on dry hummocks, on or under dead emergent vegetation and at the bases of cattail or bulrush. Sometimes they weave nests in the forks of small shrubs that lie just above moist soil or above water that is up to about 2 feet deep. The incubation period is approximately 28 days so the majority of clapper rail chicks should be fledged by August (Eddleman, 1989). Yuma clapper rails nest in a variety of different micro habitats within the emergent wetland vegetation type, with the only common denominator being a stable substrate. Nests can be found in shallow water near shore or in the interior of marshes over deep water. Nests usually do not have a canopy overhead as surrounding marsh vegetation provides protective cover (Eddleman, 1989).

Crayfish (*Procambarus clarki*) are the preferred prey of Yuma clapper rails. Crayfish comprise as much as 95 percent of the diet of some Yuma clapper rail populations (Ohmart and Tomlinson, 1977). Availability of crayfish may be a limiting factor in clapper rail populations and is believed to be a factor in the migratory habits of the rail (Rosenberg et al., 1991). However, Eddleman (1989) found that crayfish populations in some areas remain high enough to support clapper rails all year and that seasonal movement of clapper rails cannot be correlated to crayfish availability. However, due to the species' secretive nature, nests are difficult to find and reproductive effects are difficult to assess (USFWS, 2005b).

5.3.1.3 Status of the Species in the Area

The Topock Marsh near the Topock Marina is located within a USFWS study site and is also within the Action Area. Several call stations have been surveyed annually for Yuma clapper rail by the USFWS along the South Dike that is located within the HNWR. In past years, this species has been detected south of the new South Dike and north of the Topock Marina (USFWS, 2005e). In 2005, seven Yuma clapper rails were detected along the South Dike transect (Fitzpatrick, 2006). More recent surveys by USFWS along the South Dike transect documented 21 rails in 2012 and 13 rails in 2013 (Fitzpatrick, 2014).

In addition to the USFWS detections, Yuma clapper rails were detected as incidental observations in annual southwestern willow flycatcher surveys during the 2008, 2009, 2010, and again in 2012 along the western edge of Topock Marsh and east of the Topock Marina within the Action Area in Arizona (GANDA, 2012), as shown in Figure 9.

Based on prior discussions, PG&E received a letter from USFWS Havasu National Wildlife Refuge (HNWR) staff in January 2005 requesting that protocol surveys for the Yuma clapper rail not be performed because HNWR staff were interested in avoiding duplication of existing USFWS survey efforts and were concerned with potential added stress to the Yuma clapper rail (USFWS, 2005a).

A focused survey for Yuma clapper rail was also conducted within the Action Area in 2012 by KBS. While no Yuma clapper rails were discovered within California, a pair of birds was observed in Arizona on five of six survey events. Two individual, advertising (kekking) male birds were also observed during all six of the surveys events. These Yuma clapper rail sightings were located within the marsh immediately east and northeast of the Topock Marina (KBS, 2012).

The suitable emergent habitat includes the entire Topock Marsh (Figure 9). The western portion of the Topock Marsh, north- northeast of the Topock Marina, is located within the Action Area and extends to the northern Action Area boundary. While the eastern portion of the Topock Marsh is not included within the Action Area, suitable emergent habitat is located approximately 530 feet west of freshwater supply well, HNWR-1, and is located approximately 2,300 feet west of the Site B supply well.

Within the Action Area on the California side of the Colorado River, there are twelve small, fragmented shoreline wetlands that are potentially suitable emergent wetlands (Figure 9). Four of these small emergent marsh habitats are located within the Park Moabi Slough to the west of the marina and another emergent marsh habitat along the southern shoreline of the Park Moabi Slough inlet. There are two additional habitats on the north side of the National Trails Highway at the outlets of the unnamed wash and Bat Cave Wash. The small pond to the south of the National Trails Highway within the unnamed wash is also an emergent marsh habitat. There is another single emergent wetland north of the BNSF bridge. Beneath and south of the Interstate 40 Bridge is the largest emergent marsh on the California side of the river. There are also two small emergent marshes further south of this area. All of these areas were surveyed in 2012 and, as previously mentioned, no rails were detected in California (KBS, 2012).

5.3.1.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Details of the Final Groundwater Remedy were previously described in Section 3.3 and Table 2 and are shown in Figures 6 and 7. The Final Groundwater Remedy actions are summarized here as only they relate to potential direct effects to Yuma clapper rail.

Beginning in the eastern portion of the Action Area in Arizona, the Freshwater Implementation Plan has the potential to have a direct effect on Yuma clapper rail due to anticipated activities in the eastern portion of the Action Area near the southern margin of the Topock Marsh. The planned activities could include the installation of a new freshwater supply well; construction of pumping facilities in proximity to the supply well; and installation of the conveyance pipeline, as well as the periodic maintenance and eventual decommissioning of the well, pumping, and pipeline facilities once remedial objectives were achieved, followed by restoration of the affected areas. With respect to the Yuma clapper rail, it will be the activities

related to the conveyance pipeline, maintenance, decommissioning, and restoration that are most relevant because they occur closest to the suitable Yuma clapper rail along the southern margin of the Topock Marsh.

The Freshwater Implementation Plan is currently evaluating options for the freshwater supply well in Arizona. The first well being considered is HNWR-1, a well that has already been constructed by the refuge along the west side of the Oatman-Topock Highway. A second supply well (Site B well) is located to the north of HNWR-1 on the northern margin of the Sacramento Wash channel and was completed in March 2014. Based on current evaluations, the Site B well may not be suitable as a primary supply well; however, it may still serve as a backup supply well or be used for blending freshwater with another primary supply well. A third location for a new well near the existing HNWR-1 is also being considered. That new well installation is addressed in the 2007 PBA (as re-initiated in 2012). Because these well locations are not near suitable Yuma clapper rail habitat, none of the planned activities associated with construction, operation, decommissioning, or restoration of these sites will have any effect on this species.

The water supply pipeline will be installed within the previously disturbed areas on the shoulder of the Oatman-Topock Highway. The underground conveyance pipeline will connect the chosen supply well to the Final Groundwater Remedy facilities in California (Figures 6 and 7). The conveyance pipeline alignment will not directly impact suitable emergent marsh habitat but will occur close enough to represent a noise disturbance when the pipeline passes along the southern portion of Topock Marsh. For this reason, construction in this area will be completed outside of the time period when nesting young may not be mobile (March 15 to May 31). Work in this area that is conducted after this period will be completed in the shortest timeframe possible, so that it is expected that the effect on Yuma clapper rail will be negligible and discountable.

The dense tamarisk that was present near the southern Topock Marsh margin prior to being burned in the 2008 Sacramento Wash Fire, may have once provided a marginal buffer for the Oatman-Topock Highway for the Yuma clapper rail habitat north of the southern limits of Topock Marsh. However, without the tamarisk, the pipeline installation activities will no longer benefit from this marginal buffer. While the Oatman-Topock Highway and nearby Topock Marina are sources for relatively frequent (but short) year-round disturbances from vehicular and boating traffic, the pipeline installation activities represent a more sustained disturbance. For this reason, pre-construction surveys and the timing of the activities to avoid clapper rail nesting periods will be especially important to avoid disturbing nesting birds within the nearby Topock Marsh. In accordance with established procedures, a qualified biological monitor would conduct pre-activity surveys and construction monitoring for nesting birds if the work was occurring within the nesting season (mid-March to late May). If nesting birds are determined to be present, then there would be no construction activities within 200 feet of suitable nesting habitat during the period when young may be present but not mobile (mid-March to late May), unless otherwise approved by the USFWS. Construction activities could occur after this period but would need to minimize in terms of total duration (7 to 10 days at any one event, unless otherwise approved by the USFWS). It is expected that mobile adults and young birds may be able to move away from the temporary disturbance but could move back when the disturbance abated.

As the freshwater conveyance pipeline alignment extends south of the Topock Marsh, it will travel in the Oatman-Topock Highway and then cross beneath Interstate 40. The underground pipeline alignment will continue in a southeastern direction along the elevated river terrace to the existing pipe bridge (i.e., the former Route 66 bridge) upon which, it will cross above ground over the Colorado River (Figures 5 and 6). This alignment for the freshwater conveyance pipeline will avoid any direct impacts to the Colorado River floodplain, associated with the freshwater supply pipeline within the Action Area in Arizona or California.

Specific actions occurring within or adjacent to potentially suitable habitat (emergent marsh) along the margins of the floodplain in California have the potential to affect this species. This will include the activities that would be associated with the installation of remediation wells and pipelines for the *in situ* reduction zone; installation of monitoring wells; installation of remote wireless communications; and the use of a construction staging area near the Bat Cave Wash outlet.

The Final Groundwater Remedy activities proposed by PG&E will involve the use of heavy equipment including, but not limited to, backhoes and drill rigs that may be used to remove vegetation, grade the ground surface, and install remediation or groundwater monitoring wells or pipelines within the floodplain. This equipment can create substantial ground disturbance and noise.

The Colorado River may function as a seasonal movement or dispersal corridor for the Yuma clapper rail. During these movements, this species may briefly stop to shelter and/or forage within or adjacent to potentially suitable sheltering and foraging habitats within the fragmented emergent marsh patches in the Action Area that are located at Bat Cave Wash and the unnamed wash to the west; north of the BNSF railroad and beneath the Interstate 40 overpasses; and within the Park Moabi Slough (Figure 10) (CH2M HILL, 2005a; 2005b).

Because Yuma clapper rail may potentially use the habitat in the Action Area for sheltering and foraging during the year, it is possible that construction and operational activities could alter the behavior of dispersing or seasonally moving, but as discussed, the potential for impact is considered low because actions within the suitable habitat are not planned and activities adjacent to suitable habitats have limited effects (noise, duration, etc.).

Habitat elements such as patch size, shrub density and the presence and/or location of water provide the appropriate habitat structure and features to allow for movements among and between marsh areas in and adjacent to the Action Area. It should be noted; however, that seasonal bird surveys are not likely to detect dispersal of young or movement of adults. However, annual surveys conducted from 2005 through 2010 and in 2012 have not documented any nesting or transient Yuma clapper rail using the habitat patches within these portions of the Action Area. As previously explained, the regular disturbances by recreational boating and ORV traffic also lower the potential suitability of these areas for Yuma clapper rail use.

Activities related to the Final Groundwater Remedy will occur in upland areas that do not support the marsh vegetation and other characteristics commonly associated with Yuma clapper rail habitat. For this reason, these activities are not expected to have an effect to this species due to unsuitable habitat at the specific project location.

None of the proposed remediation wells or associated water conveyance pipelines would be constructed within the emergent marsh habitats along the floodplain on the California side of the Action Area. Based on the application of pre-activity surveys and construction monitoring and lack of evidence of suitable nesting sites, any direct effects to Yuma clapper rail is expected to be negligible or avoidable.

5.3.1.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur are related to the long-term operation and maintenance of the Final Groundwater Remedy facilities after construction and the decommissioning and restoration of IM No. 3 and the Final Groundwater Remedy.

The Final Groundwater Remedy activities related to operation and maintenance of the freshwater supply system would also include periodic maintenance and repair of well, pump, and electrical control equipment, pipeline maintenance and repair; storm water pollution prevention; access roadway maintenance; well sampling; and eventual decommissioning of the well and pumping facilities once remedial objectives were achieved. After decommissioning, these areas would be restored in accordance with the Remedy Decommissioning Plan, including a restoration plan, which will be submitted by PG&E to DOI after receipt of DOI's certification of Remedial Action completion, and the Habitat Restoration Plan, where applicable, that will be submitted to the agencies with the Remedial Action Work Plan.

The Final Groundwater Remedy activities related to operation and maintenance of the remediation facilities and supporting systems would also include periodic maintenance and repair of well, pump, and electrical control equipment, pipeline maintenance and repair; storm water pollution prevention; access roadway

maintenance; well sampling; and eventual decommissioning of the wells, pipelines, and pumping facilities once remedial objectives were achieved. After decommissioning, these areas would be restored in accordance with the restoration plan that will be developed prior to the achievement of the Final Groundwater Remedy RAOs. Planned activities will also include the decommissioning of the IM No. 3 treatment facilities, and floodplain restoration for those areas.

Regular sampling of remediation or monitoring the wells may occur on a weekly, biweekly, or monthly basis and will likely require the use of off-road utility vehicles and possibly a small generator for power to activate the submersible pumps during water collection. The generators' noise output is minimal enough that a conversation can easily occur. These activities happening within or adjacent to suitable Yuma clapper rail habitat may lead to alterations of Yuma clapper rail behavior.

However, the lack of evidence of Yuma clapper rail nesting within this portion of the Action Area suggests that the probability of negatively altering Yuma clapper rail behavior during normal well sampling, carbon substrate injection, or equipment maintenance activities would be relatively low. Further, the magnitude of project effects may be difficult to discern from other potentially impacting transportation activities (i.e., the Interstate 40 and the BNSF Railroad) and recreational activities (e.g., watercraft) that occur with regularity within the Action Area. Activities associated with non-routine well maintenance, pipeline repair, certain road repair; decommissioning and removal of facilities; and restoration activities would require the use of heavy equipment, trucks, materials, and crews to implement.

However, the potential effects of these activities would be reduced by the application of general project management measures discussed in Section 3.4 and species-specific mitigation measures discussed below in subsection 5.3.1.8, so that the potential for indirect effects on Yuma clapper rail are considered to be low.

5.3.1.6 Cumulative Effects

Cumulative effects include future state and private activities, excluding federal activities that are reasonably certain to occur within the Action Area. Continued operation of the TCS will occur. It is reasonably certain that soil remedial activities could occur within the Action Area. The final soil remedy, if required, will include heavy equipment and personnel with minor activities in the floodplain. There will be no loss of emergent marsh habitat loss that would reduce the habitat value and thereby, alter Yuma clapper rail use and behavior.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River and the HNWR, such as boating, fishing, and ORV use of the floodplain and surrounding areas. Examples of recent actions that have occurred within the Action Area in California since the 2007 PBA include the expansion of private commercial recreation facilities at the Moabi Regional Park (Pirate's Cove restaurant; individual lodging; motorized and non-motorized zip-line rides; as well as expanded ORV trail networks on the island north of the slough and north of the National Trails Highway east to the Bat Cave Slough outlet).

Within the Action Area in Arizona, ongoing and future actions include a renovations at the Topock Marina (including current rental lodging, and a proposed hotel and new restaurant) and HNWR restoration efforts associated with the 2008 Sacramento Wash Fire. The fire restoration efforts are expected to have an overall positive effect on Yuma clapper rail habitat in the Action Area by improving foraging opportunities as the native plantings mature through greater species diversity; however, the restoration plantings will not create additional Yuma clapper rail habitat. Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40 and other nearby roads and utilities are anticipated.

5.3.1.7 Critical Habitat Effects Determination

Critical habitat has not been designated for the Yuma clapper rail. An effects determination of "no effect" for critical habitat is concluded for this species.

5.3.1.8 Effects Determination

Yuma clapper rails have been documented in suitable nesting habitat along the western and southern edge of the Topock Marsh on the HNWR near the eastern boundary of the Action Area in Arizona. Suitable emergent wetland habitats are approximately 530 feet west of the water supply well HNWR-1 and approximately 2,300 feet west of the Site B supply well. Well construction was completed before the Yuma clapper rail nesting period before April 2014 so they had no effect on Yuma clapper rail. Installation and testing activities for those wells were covered under the 2007 PBA (as re-initiated in 2012).

Potential disturbances to Yuma clapper rail habitats could occur during the water conveyance pipeline installation along the Oatman-Topock Highway near the southern portion of the Topock Marsh. However, adverse effects for work being conducted in this area can be avoided by implementing bird impact avoidance measures, as described in Section 3.4 and the BIAMP (CH2M HILL, 2013f), and by conducting pre-activity surveys and construction monitoring to avoid inadvertent impacts to Yuma clapper rail. Furthermore, the regular disturbances from recreational boating at Topock Marina and from traffic along the Oatman-Topock Highway make the potential for negative effects to Yuma clapper rail very low. To date, no take of Yuma clapper rails (or any other migratory birds) has occurred within the Action Area from project activities.

Pre-project surveys will be conducted by qualified biologist during the nesting/molting season (March 15 and September 15) to identify the presence of Yuma clapper rails and adapt operations to minimize any potential for effects. Further, it is expected that project activities (especially those involving heavy equipment for the construction of the freshwater pipeline in proximity to potentially suitable Yuma clapper rail nesting habitat) will occur outside of the March 15 to end of May time period when resident clapper rail nests may be occupied by immobile young. Beginning in June, it is expected that mobile adults and young may be able to temporarily move away from short-term (7 to 10 days) impacts that would be associated with the noise from the pipeline construction activities.

Seasonal use of habitat on the floodplains of California and Arizona can be anticipated to occur along the Colorado River as Yuma clapper rails move within existing habitat areas outside of the breeding season. Project activities; therefore, could influence activity during this period. To track clapper rail activity in the Action Area, PG&E will coordinate with USFWS to obtain the results of ongoing clapper rail survey results within the Action Area on the Arizona side of the Colorado River. At this point PG&E will not be conducting focused clapper rail surveys on the California side of the Colorado River; however, should future information from existing and pre-activity surveys indicate that clapper rails are actually using those habitats, focused surveys between February 15 and May 30 could be required at some appropriate interval (e.g., every 3 years).

The following mitigation measures will be applied to all actions associated with the Final Groundwater Remedy that will occur in or near potential Yuma clapper rail habitat, as shown in Figure 10.

1. To further minimize potential impacts to the Yuma clapper rail as a result of project activities on the Arizona side of the project, PG&E will coordinate with USFWS to obtain clapper rail survey results within the Action Area on the Arizona side of the Colorado River.
2. Minimization measures outlined in the BIAMP will be implemented including preconstruction surveys during the nesting season, awareness training, pre-activity surveys, compliance monitoring, and reporting during field activities throughout the year.
3. Specific to the Arizona portion of the Action Area, all construction and development activities should be completed prior to March 15. Preferably, such activities would occur from June 1 to March 15 in order to avoid nesting periods when immobile young may be present. Any construction or repair activities within 200 feet of potentially suitable nesting habitat during this time will be kept to the minimum duration possible.

Future project activities, conducted in accordance with established mitigation measures presented in Section 3 and other relevant documents (CH2M HILL, 2005a, 2013f) will help to avoid, reduce, and mitigate operational and construction impacts to the biological environment within the Action Area. It is expected that no emergent marsh habitats will be lost, removed, or manipulated to conduct planned activities, especially those within the Topock Marsh on the HNWR.

However, based on the location of project activities and the fragmented distribution, composition and structure of habitat conditions in or adjacent to the Action Area; and the continued implementation of conservation measures identified in Section 3.4 and as listed above, adverse effects of planned project activities to the Yuma clapper rail are not expected to occur.

For these reasons, any potential direct or indirect effects from project activities are likely to be either negligible or avoidable. An effects determination of “not likely to adversely affect” is concluded for this species.

5.4 Aquatic

5.4.1 Razorback Sucker (*Xyrauchen texanus*)

5.4.1.1 Status

The razorback sucker was listed as a federally endangered species on October 23, 1991, with an effective date of November 22, 1991. The Razorback Sucker Recovery Plan was released in 1998 (USFWS, 1998). The recovery plan was supplemented with the Upper Colorado River Endangered Fish Recovery Program (USFWS, 2001a) and the Razorback Sucker Recovery Goals (USFWS, 2001b). The razorback sucker is a fully protected species in California and was listed as endangered by the State of California in 1974.

Critical habitat was designated in 15 river reaches within the historic range of the razorback sucker on March 21, 1994, with an effective date of April 20, 1994 (USFWS, 1994c). This includes Lake Mead to its full pool elevation, the Colorado River and its 100-year floodplain between Hoover Dam and Davis Dam (including Lake Mohave to its full pool elevation), and the Colorado River and its 100-year floodplain from Parker Dam to Imperial Dam (USFWS, 1994c).

The trend for the razorback sucker is for a continued rangewide decrease in wild populations due to lack of sufficient recruitment of young adults, with the loss of old adults due to natural mortality. The primary limiting factor for the razorback sucker appears to be non-native fish predation of the early life stages (USFWS, 2005b).

5.4.1.2 Natural History, Distribution, Abundance and Habitat

The razorback sucker is a large fish, measuring over 2 feet long and weighing 8 pounds. Sexual dimorphism is present, with males being smaller, slimmer, and having larger fins than females. During the breeding season males have nuptial tubercles covering posterior fins and portions of the body. Females tend to be larger, heavier-bodied, and have fins that are somewhat smaller in proportion to their body size (Minckley, 1973).

The razorback sucker is endemic to large rivers of the Colorado River Basin from Wyoming to Mexico. Present distribution of natural populations is limited to Lake Mohave, Green River Basin, and the Upper Colorado River Basin. Historically razorback suckers inhabited the Colorado, Gila, Salt, Verde, and San Pedro rivers.

Presently, natural adult populations exist only in Lake Mohave, Lake Mead, and Lake Havasu. This species uses a variety of habitat types from mainstem channels to slow backwaters of medium and large streams and rivers, sometimes around cover. In impoundments they prefer depths of 1 meter or more over sand, mud, or gravel substrates. (AGFD, 2002). Early explorers report the fish as extremely abundant (Gilbert and Scofield, 1898). In central Arizona it was abundant enough to be commercially harvested for human and animal food and for fertilizer in the late 1800s. Similar abundances have been noted for the upper basin (Bestgen, 1990). Today the species occupies only a small portion of its historical range, and most occupied areas have very low

numbers of fish. Between Davis Dam and Lake Havasu, observations of razorback suckers were extremely rare (USBR, 2004) until more recent stocking efforts in the Colorado River main stem.

Spawning occurs from late winter through spring along gravelly shorelines or bays. Evidence suggests that suckers migrate from larger rivers to smaller tributaries prior to spawning. A single female is attended by 2 to 12 males, and the group moves in tight circles over the bottom. The eggs are adhesive and attach to the interstitial spaces within the gravel substrate. The young hatch in a few days and live along the shoreline for a time. Females will spawn repeatedly with several males. Hatching success is highly dependent on water temperature with complete mortality in temperatures less than 10 degrees Celsius (50 degrees Fahrenheit) (AGFD, 2002).

5.4.1.3 Status of the Species in the Area

The Lower Colorado River supports the largest remaining populations of razorback sucker. The population consists primarily of subadults. In 2005, razorback suckers were documented near Needles, California. In 2006, 236 suckers were captured and released at that spawning site. The likelihood of this species being in the area around Park Moabi and Topock Marina is very high (Fitzpatrick, 2006).

Stocking efforts in the Upper Colorado River Basin and in Lakes Mohave and Havasu and the Lower Colorado River below Parker Dam are ongoing, with the 30,000-fish requirement for Lake Havasu completed in 2001. The most critical of these efforts is the replacement of the Lake Mohave population using wild-caught larvae from the lake. By the end of 2001, the initial goal to stock 50,000 subadult fish into Lake Mohave was achieved. The Lake Mohave efforts will continue towards the second goal, which is to establish a population of 50,000 adults. The ongoing stocking and habitat improvement programs continue to add fish to this reach of the river (USFWS, 2008a, 2011). To date, from 2005 through 2012, the LCRMSCP Native Fish Augmentation Program has been responsible for stocking over 54,000 razorback sucker to Reach 3 of the river (encompassing the Topock Site and Havasu National Wildlife Refuge) (LCRMSCP, 2014).

Specific studies, focusing on spawning habitat, numbers of adult spawners, and juvenile success in specific backwater habitats, are being used to focus the stocking efforts and habitat conservation plans for both razorback sucker and bonytail chub (LCRMSCP, 2011).

5.4.1.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Details of the Final Groundwater Remedy were previously described in Sections 3.3 and Table 2 and shown in Figures 6 and 7. All activities will occur outside of the Colorado River, therefore, no direct effects are anticipated.

Activities that may occur within the 100-year floodplain include the construction of a freshwater supply pipeline beneath the Interstate 40 and BNSF bridges. This pipeline will follow an existing access roadway through the western edge of the 100-year floodplain. No other Final Groundwater remedy facilities will occur within the 100-year floodplain. While the pipeline construction normally involves the use of heavy equipment such as a backhoe, smaller equipment such as a bobcat and/or quad-runners will be used if work is required directly within the 100-year floodplain. However, the magnitude of riparian function that may be reduced by the proposed action is not expected to impact the razorback sucker due to very limited project-related activities and associated minor footprints that are adjacent to the Colorado River floodplain.

Additionally, a 3.7-acre current floodplain vegetation removal threshold has been established to minimize any reduced function of the riparian zone.

5.4.1.5 Indirect effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur are related to the long-term operation and

maintenance of the Final Groundwater Remedy facilities after construction and the decommissioning and restoration of the Final Groundwater Remedy.

Because these activities will occur at the edge of the 100-year floodplain, it is expected that the work can be completed from the adjacent upland area; by using hand tools; or within minimal incursion into the 100-year floodplain, so that the effect on the floodplain itself would be minimal. For this reason, the indirect effects of the planned activities on razorback suckers are expected to be negligible or avoidable.

5.4.1.6 Cumulative Effects

Cumulative effects are of those future state and private activities, excluding federal activities that are reasonably certain to occur within the Action Area. Continued operation of the TCS will occur. It is reasonably certain that soil remedial activities could occur within the California portion of the Action Area.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River such as boating, camping, and fishing. Examples of recent actions that have occurred within the Action Area in California since the 2007 PBA include the expansion of private commercial recreation facilities at the Moabi Regional Park (Pirate's Cove restaurant; individual lodging; motorized and non-motorized zip-line rides; as well as expanded ORV trail networks on the island north of the slough and north of the National Trails Highway east to the Bat Cave Slough outlet). As previously noted, the Moabi Regional Park island to the north of the slough that could extend to within the 100-year floodplain. The restaurant building at the Topock Marina was also upgraded in 2013 and proposed projects include a new hotel and restaurant.

No other changes in land use or water use of the Colorado River within the Action Area are foreseen.

5.4.1.7 Critical Habitat Effects Determination

Critical habitat for the razorback sucker does not occur within the Action Area. An effect determination of "no effect" for critical habitat is concluded for this species.

5.4.1.8 Effects Determination

Razorback suckers have been documented north of the Action Area in Park Moabi Lagoon and near Needles, California. There is a high likelihood for this species to use the mainstem Colorado River upstream and downstream of the Action Area as well as the backwater areas of Park Moabi and the Topock Marina. No future project activities are anticipated to occur in the Colorado River; however, there will be additional remediation activities within the 100-year floodplain, although the amount of riparian habitat altered within the 100-year floodplain is expected to be minimal.

The following mitigation measures will be applied to all actions associated with the Final Groundwater Remedy that will occur in or near the mainstem Colorado River, as well as the backwater areas of Park Moabi and the Topock Marina.

1. Consideration was given to minimize the net increase of habitat disturbance that may affect riparian areas and the project altogether. If greater than 8.0 acres of habitat within the general and 100-year floodplain is destroyed or manipulated, specific project consultation with the USFWS will be required and possible mitigation may be required.
2. Proposed project activities that differ from surface water sampling, within the Colorado River should preferably occur between June 1 and January 31.
3. In the event an emergency situation (e.g., a spill into the Colorado River), where actions to abate the problem are to occur along the shoreline/river interface or in the water, a negative impact to this species may occur. Those actions which may adversely affect this species and constitute a 'take', are not covered within this scope of this determination in this Final Groundwater Remedy PBA. If an emergency situation occurs, immediate consultation with the USFWS will be required.

However, because no direct or indirect impacts are expected from planned activities within the Colorado River and the implementation of habitat avoidance and conservation measures described above, negative effects of the proposed project activities to the razorback sucker are unlikely to occur. Therefore, an effects determination of "not likely to adversely affect" is concluded for this species.

5.4.2 Bonytail Chub (*Gila elegans*)

5.4.2.1 Status

The bonytail chub was listed as a federally endangered species on April 24, 1980, with an effective date of May 23, 1980. The Bonytail Chub Recovery Plan was updated in 1990 (USFWS, 1990b). The recovery plan was supplemented with the Upper Colorado River Endangered Fish Recovery Program (USFWS, 2001a) and the Bonytail Chub Recovery goals (SWCA, 2001). The bonytail chub was listed as endangered by the State of California in 1974.

Critical habitat was designated in six river reaches in the historical range of the bonytail chub on March 21, 1994, with an effective date of April 20, 1994, in designated portions of the Colorado, Green, and Yampa Rivers in the Upper Basin and the Colorado River in the Lower Basin (USFWS, 1994c). In relation to the Action Area, critical habitat includes the Colorado River and the 100-year floodplain from Parker Dam to the northern boundary of the HNWR just south of Needles, California.

The trend for the bonytail chub is for a continued rangewide decrease in wild populations due to lack of sufficient recruitment of young adults with the loss of old adults due to natural mortality. Like the razorback sucker, the primary limiting factor for bonytail appears to be nonnative fish predation of the early life stages (USFWS, 2005b).

5.4.2.2 Natural History, Distribution, Abundance and Habitat

In appearance, bonytail are gray to gray-green on the dorsal, with silvery sides fading to a white ventral surface. The fish is elongated and somewhat laterally compressed with a narrow caudal peduncle. Adults are from 11 to 13 inches in length, although larger individuals (up to 24 inches) are occasionally identified. A smooth pre-dorsal hump is present in the adult form. Breeding males can be distinguished by reddish marks on the paired fins and the presence of tubercles anterior on the body (Vanicek, 1967).

In Lake Mohave, spawning has been observed during the month of May, while in the upper Green River, spawning occurs in June and July at water temperatures of about 18 degrees Celsius (64 degrees Fahrenheit) (Minckley, 1973). Eggs are scattered over the bottom; no parental care occurs. Cold water released below dams precludes successful hatching of eggs (Bagley, 1989).

The bonytail was once widely distributed throughout the Colorado River and its main tributaries, to include the Green River in Utah and Wyoming, and the Colorado, Gila, Salt, and Verde rivers in Arizona. Currently, this species is found only in isolated populations in the Yampa River, Green River, Colorado River at the Colorado/Utah border, and at the confluence of the Green and Colorado Rivers. In the lower basin, the bony tail is found only in Lake Mohave with possible individuals between Parker Dam and Davis Dam (AGFD, 2001). They were still abundant in Lake Mead after the completion of Hoover Dam; however, by 1950 they were considered rare. By the time concern was raised for this fish, it had disappeared from much of its range. Loss of the extant wild populations is expected.

Extinction of this fish in the wild throughout its historic range is being forestalled by the stocking of subadult fish into the Upper Colorado River Basin and Lakes Mohave and Havasu in the Lower Colorado River (USFWS, 2005a). These stockings are intended to create populations of young adults that may be expected to persist for 40 to 50 years. While it is expected that these young adults will reproduce, the successful recruitment of wild born young fish to the population may not occur without additional management of habitat and biological factors. Management and research on these populations will be critical to provide for the survival and recovery of the species. Of vital importance to the stocking program is maintenance and enhancement of the existing bonytail broodstock (USFWS, 2005b).

5.4.2.3 Status of the Species in the Area

A portion of Action Area is within the 100-year floodplain of the Colorado River that delineates critical habitat for the bonytail chub. From south to north, this area extends from a river-associated wetland (as described for the Yuma clapper rail) to a deep sand and drier environment of dredge spoils deposited by the Army Corps of Engineers from excavating the river channel. The gradient ranges from river level to possibly 20 feet created by the dredge spoils. The dredge spoils environment can be described as sand, tamarisk, and arrow weed. The mouths of the washes have channels and bridges that would allow water to flood these areas if a larger event was to occur. The lower ends of the washes are vegetated primarily of tamarisk. Normally, except for isolated rain events, there is no overland flow connectivity to the river.

The Lower Colorado River supports populations of bonytail chub. The populations consist primarily of sub-adults. In 2005, eight individuals were captured and released near Park Moabi (Fitzpatrick, 2006). However, long-term survival rates from past stocking efforts have not been very successful for a number of reasons related to the age and size of stocked fish, handling practices at the rearing and stocking locations, and conditions in the receiving waters (LCRMSCP, 2008). Nevertheless, there is an active and ongoing stocking and monitoring program and habitat enhancement efforts (USFWS, 2008b, 2011) To date, from 2005 through 2012, the LCRMSCP Native Fish Augmentation Program has been responsible for stocking over 30,000 bonytail chub to Reach 3 of the river (encompassing the Topock Site and Havasu National Wildlife Refuge)(LCRMSCP, 2014). The species restoration efforts have benefited from recent spawning studies in riverine backwater areas (LCRMSCP, 2011).

5.4.2.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Details of the Final Groundwater Remedy were previously described in Sections 3.3 and Table 2 and shown in Figures 6 and 7. All activities will occur outside of the Colorado River; therefore, no direct effects are anticipated.

Activities that may occur within the 100-year floodplain include the construction of a freshwater supply pipeline beneath the Interstate 40 and BNSF bridges. This pipeline will follow an existing access roadway through the western edge of the 100-year floodplain. No other Final Groundwater remedy facilities will occur within the 100-year floodplain. While the pipeline construction normally involves the use of heavy equipment such as a backhoe, smaller equipment such as a bobcat and/or quad-runners will be used if work is required directly within the 100-year floodplain. However, the magnitude of riparian function that may be reduced by the proposed action is not expected to impact the razorback sucker due to very limited project-related activities and associated minor footprints that are adjacent to the Colorado River floodplain.

Additionally, a 3.7-acre floodplain vegetation removal threshold has been established to minimize any reduced function of the riparian zone.

5.4.2.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur are related to the long-term operation and maintenance of the Final Groundwater Remedy facilities after construction and the decommissioning and restoration of the Final Groundwater Remedy.

The Final Groundwater Remedy activities related to operation and maintenance of the freshwater conveyance pipeline; and eventual decommissioning of the pipeline once remedial objectives were achieved. After decommissioning, these areas would be restored in accordance with the Remedy Decommissioning Plan, including a restoration plan, which will be submitted by PG&E to DOI after receipt of DOI's certification of Remedial Action completion, and the Habitat Restoration Plan, where applicable, that will be submitted to the agencies with the Remedial Action Work Plan. Because these activities will occur near the edge of the 100-year floodplain, it is expected that the work can be completed from the adjacent upland area or by using hand tools, so that the effect on the floodplain itself would be minimal.

For this reason, the indirect effects of the planned activities on bonytail chub are expected to be negligible or avoidable.

5.4.2.6 Cumulative Effects

Cumulative effects are of those future state and private activities, excluding federal activities that are reasonably certain to occur within the Action Area. Continued operation of the TCS will occur. It is reasonably certain that soil remedial activities may occur within the California portion of the Action Area. The final soil remedy, if required, will include heavy equipment and personnel with minor activities in the floodplain.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River and HNWR, such as boating, camping, and fishing. As previously noted there, the Topock Marina has recent and proposed upgrade projects (i.e., hotel and restaurant). There is also a system of ORV trails on the island to the north of the slough at the Moabi Regional Park that could extend to within the 100-year floodplain.

No other changes in land use or water use of the Colorado River within the Action Area are foreseen.

5.4.2.7 Critical Habitat Effects Determination

Critical habitat in relationship to the Action Area includes the 100-year floodplain of the Colorado River from Parker Dam to the northern boundary of the HNWR south of Needles, California. Project activities will be occurring within this designation. However, based on the small footprint of project activities; the limited amount of vegetation removal within the 100-year floodplain that will not have an adverse effect on the physical and biological factors or on their associated primary constituent elements. Furthermore, the proposed impacts will occur closer to the upland edge of the floodplain, well away from the river, so the effects would be mitigated by a broad swath of undisturbed vegetation between the facilities and the river. Accompanied by the conservation measures listed below in subsection 5.4.3.8, the reduction of critical habitat function is likely to be unmeasurable or undetectable.

Therefore, any potential direct or indirect effects of planned project activities to critical habitat for the bonytail chub will be either negligible or avoidable. An effects determination of “not likely to destroy or adversely modify” is concluded for critical habitat of this species.

5.4.2.8 Effects Determination

Bonytail chubs have been captured and released near Park Moabi making the likelihood for this species to use the mainstem Colorado River and backwater areas (near Park Moabi and Topock Marina) within and near the Action Area a possibility. Future project activities are anticipated to occur along the margins or just within the 100-year floodplain of the Colorado River.

The following mitigation measures will be applied to all actions associated with the Final Groundwater Remedy that will occur in or near the mainstem Colorado River, as well as the backwater areas of Park Moabi and the Topock Marina.

1. Consideration was given to minimize the net increase of habitat disturbance that may affect riparian areas and the project altogether. If greater than 8.0 acres of habitat within the general and 100-year floodplain is destroyed or manipulated, specific project consultation with the USFWS will be required and possible mitigation may be required.
2. Proposed project activities that differ from surface water sampling within the Colorado River should preferably occur between June 1 and January 31.

3. In the event an emergency situation (e.g., a spill into the Colorado River), where actions to abate the problem are to occur along the shoreline/river interface or in the water, a negative impact to this species may occur. Those actions which may adversely affect this species and constitute a take, are not covered within this scope of this determination in this Final Groundwater Remedy PBA. If an emergency situation occurs, immediate consultation with the USFWS will be required.

However, because no direct impacts are expected from planned activities within the River; the minimal amount of riparian habitat that would be altered within the 100-year floodplain; and accompanied by the conservation measures described above, the effects of project activities to the bonytail chub could not be meaningfully measured, detected, or evaluated and are not expected to occur.

Therefore, any potential direct or indirect effects from project activities are either negligible or avoidable. An effects determination of “not likely to adversely affect” is concluded for this species.

SECTION 6.0

Effects Determination Summary

6.1 Southwestern Willow Flycatcher

An effects determination of “not likely to adversely affect” is concluded for the southwestern willow flycatcher.

A critical habitat effects determination of “no effect” is concluded for this species due to no designated critical habitat in the Action Area.

6.2 Western Yellow-Billed Cuckoo

An effects determination of “not likely to adversely affect” is concluded for the Western yellow-billed cuckoo.

Because critical habitat has not yet been designated for this species, a determination of no effect is concluded for this species. However, an evaluation of the constituent elements that would be expected to be part of any future critical habitat was considered. These constituent elements include dense riparian areas that are dominated by willow, cottonwood, and mesquite with shallow groundwater levels that would support the trees and create humid conditions, as well as a suitable prey base of large insects. These particular conditions are not present within the Action Area and, given the current hydrological management of the Colorado River, they are unlikely to become present. Because the proposed activities for the Final Groundwater Remedy would not affect these resources, the potential for adversely affecting likely constituent elements or future critical habitat is considered discountable.

6.3 Agassiz’s Desert Tortoise

An effects determination of “not likely to adversely affect” is concluded for the Agassiz’s desert tortoise.

A critical habitat effects determination of “no effect” is concluded for this species due to no designated critical habitat in the Action Area.

6.4 Morafkai’s Desert Tortoise

An effects determination of “not likely to adversely affect” is concluded for the Morafkai’s desert tortoise.

A critical habitat effects determination of “no effect” is concluded for this species since there is no designated critical habitat for candidate species.

6.5 Yuma Clapper Rail

An effects determination of “not likely to adversely affect” is concluded for the Yuma clapper rail.

A critical habitat effects determination of “no effect” is concluded for this species due to no designated critical habitat in the Action Area.

6.6 Razorback Sucker

An effects determination of “not likely to adversely affect” is concluded for the razorback sucker.

A critical habitat effects determination of “no effect” is concluded for this species due to no designated critical habitat in the Action Area.

6.7 Bonytail Chub

An effects determination of “not likely to adversely affect” is concluded for the bonytail chub.

A critical habitat effects determination of “not likely to destroy or adversely modify” is concluded for this species.

SECTION 7.0

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Appendix U
Programmatic Biological Assessment
(On CD-ROM Only)