Appendix G
Havasu National Wildlife Refuge, Habitat Restoration Plan
(*on CD-ROM only*)

Revised Final

Topock Compressor Station Groundwater Remediation Project, Havasu National Wildlife Refuge, Habitat Restoration Plan

Prepared for

Pacific Gas and Electric Company

November 2015

Prepared by

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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 (Figures 2A through 2C).

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.”

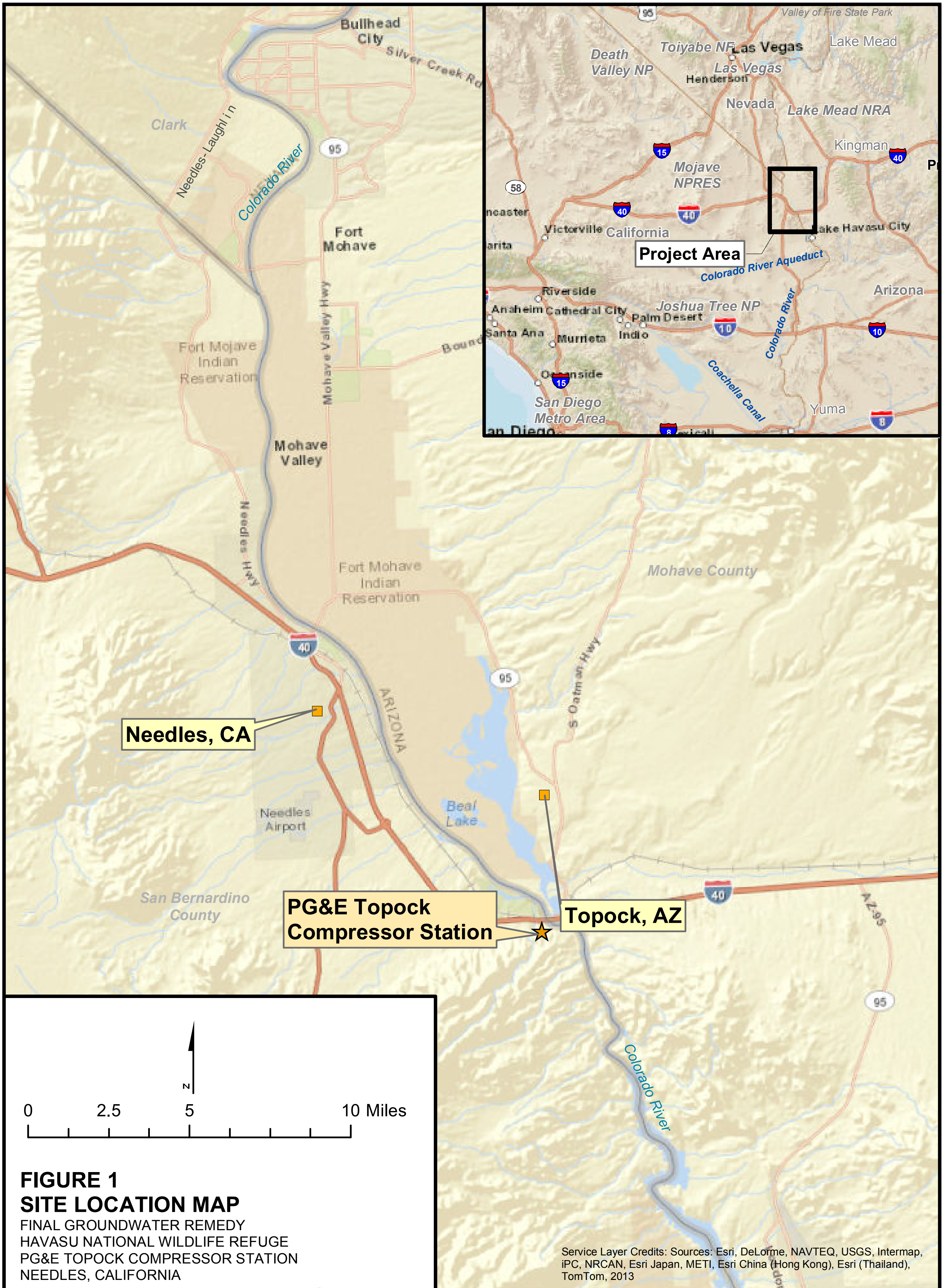

FIGURE 1
SITE LOCATION MAP
FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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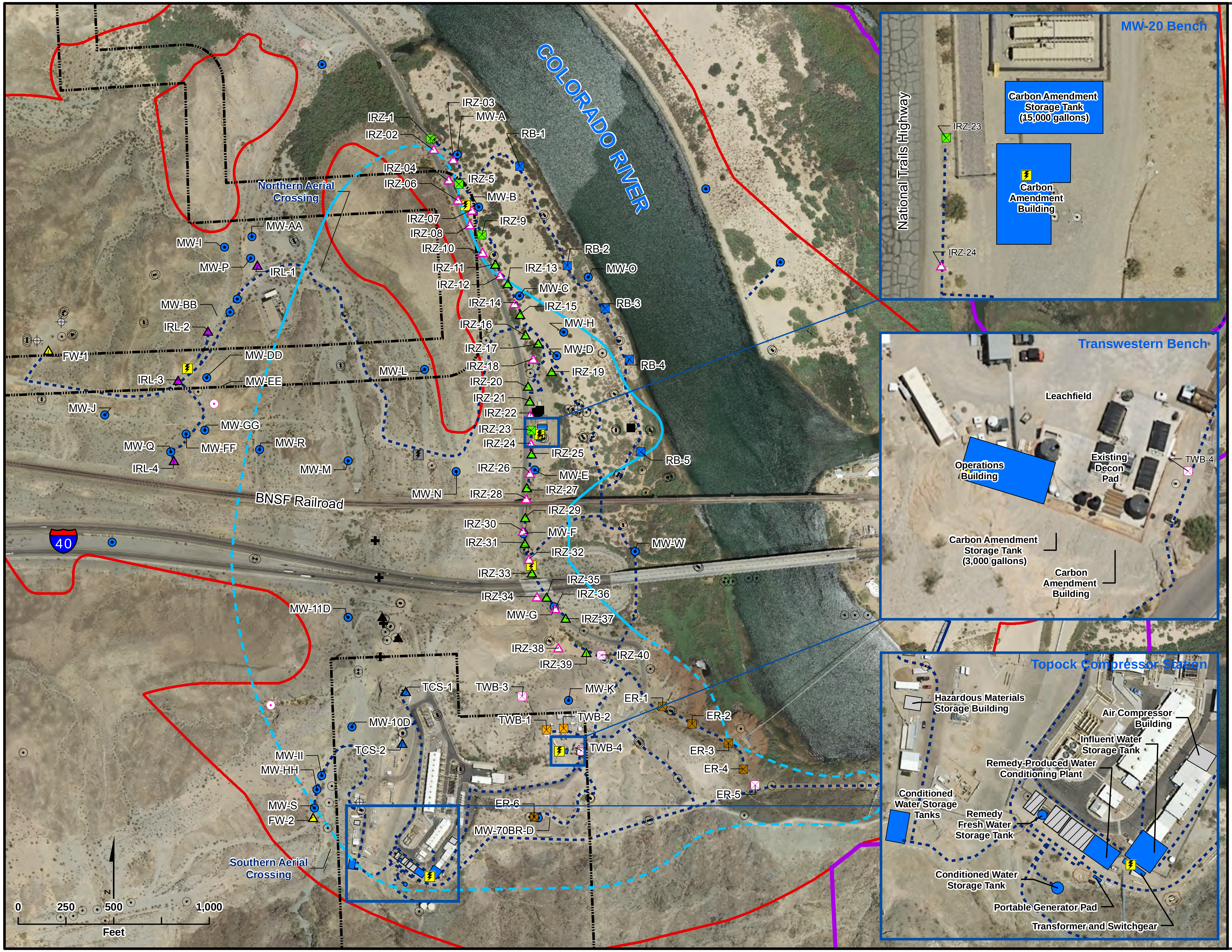

LEGEND

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)
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

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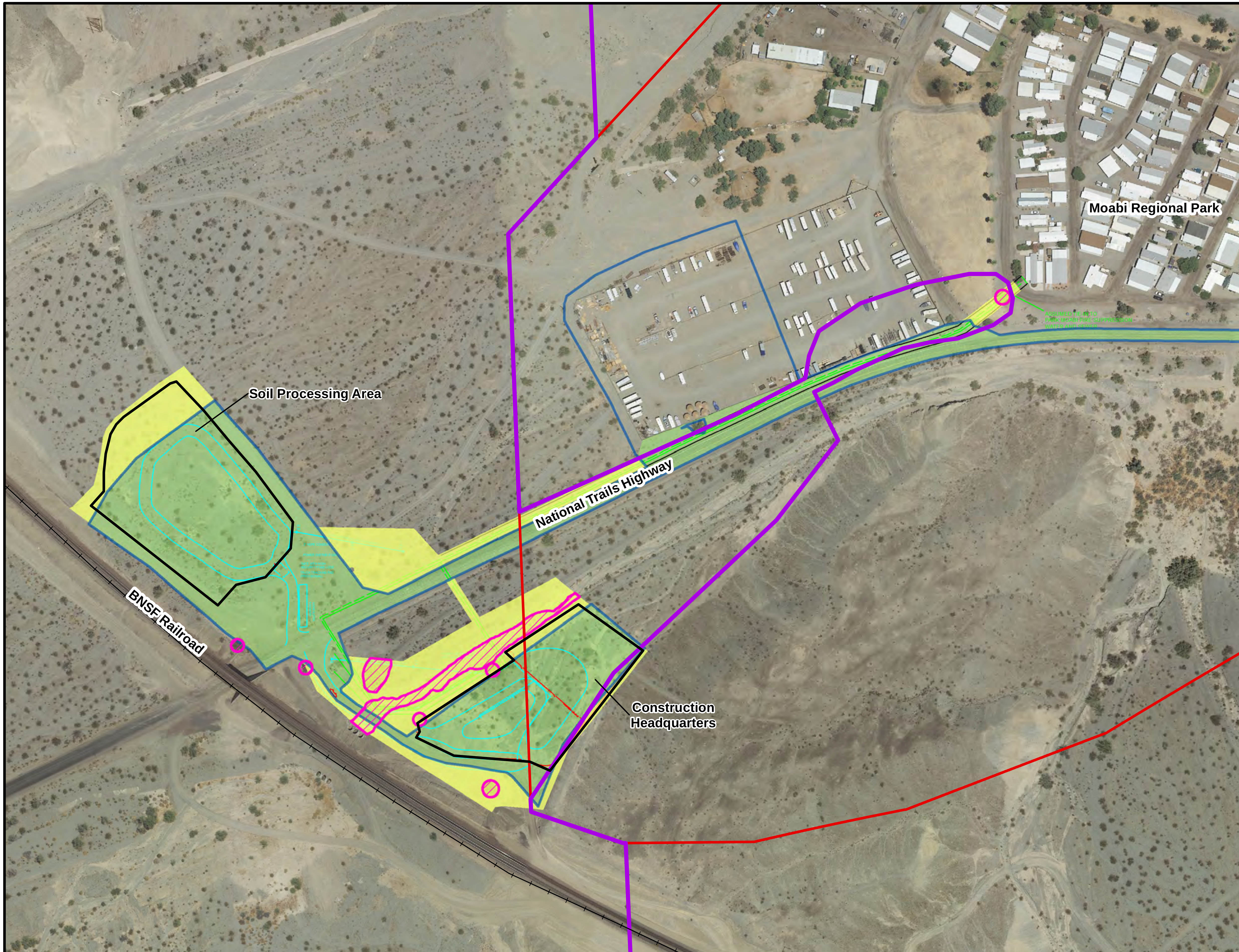
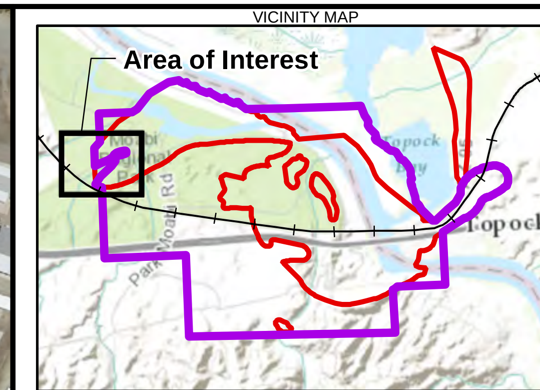


VICINITY MAP



LEGEND

- 2015 Construction Footprint
- 2015 Footprint Expansion Area
- 2014 Construction Footprint
- Potential Soil Storage and Staging Area
- BioExclusion Areas
- 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, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS

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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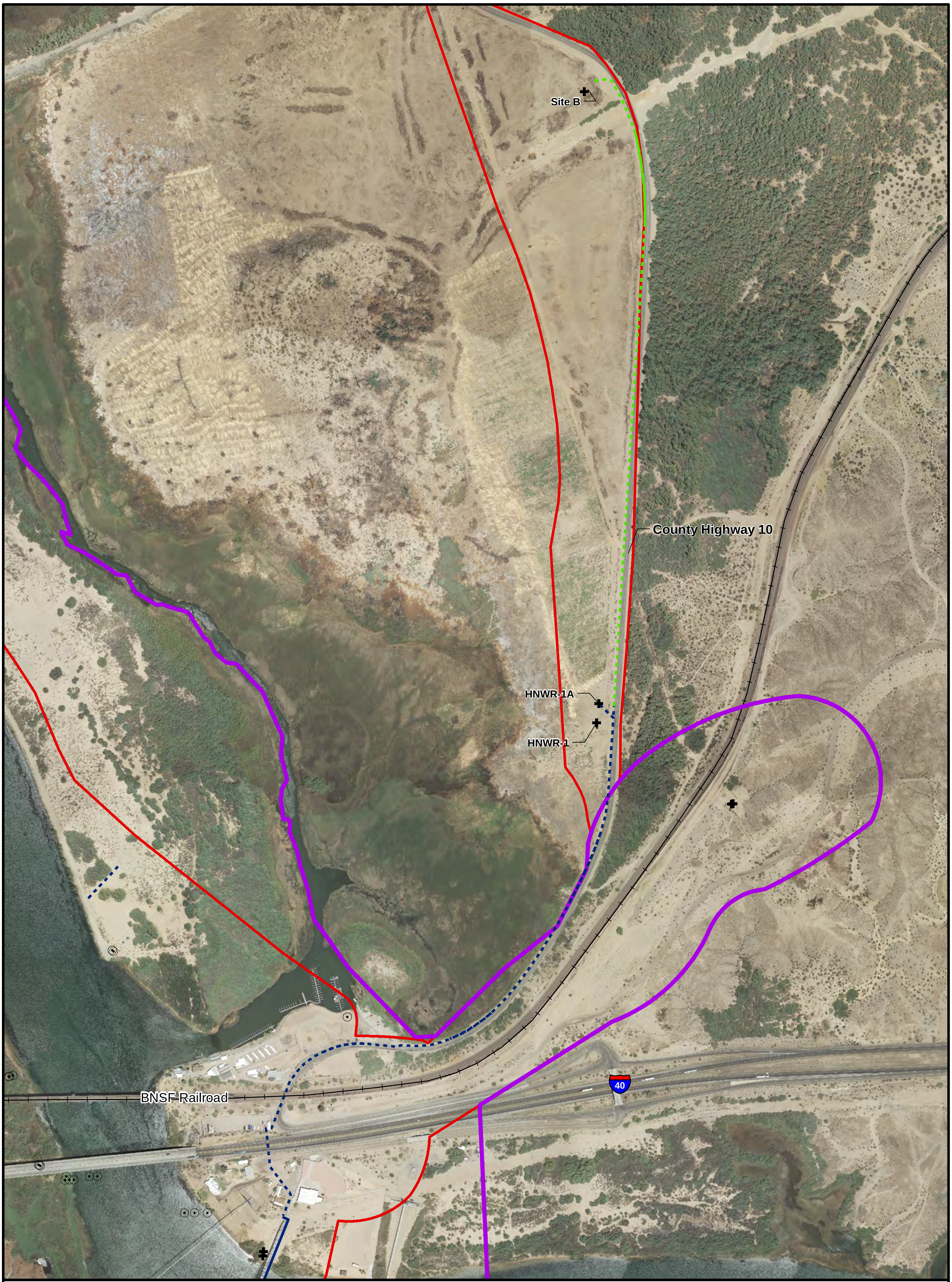
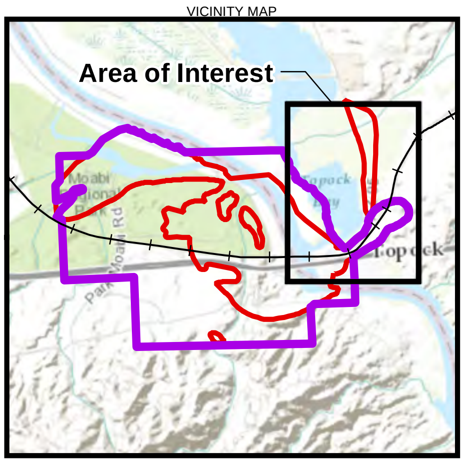


VICINITY MAP



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.

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

N

0 200 400 800 Feet

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 Final 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). Figures 2A-C 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

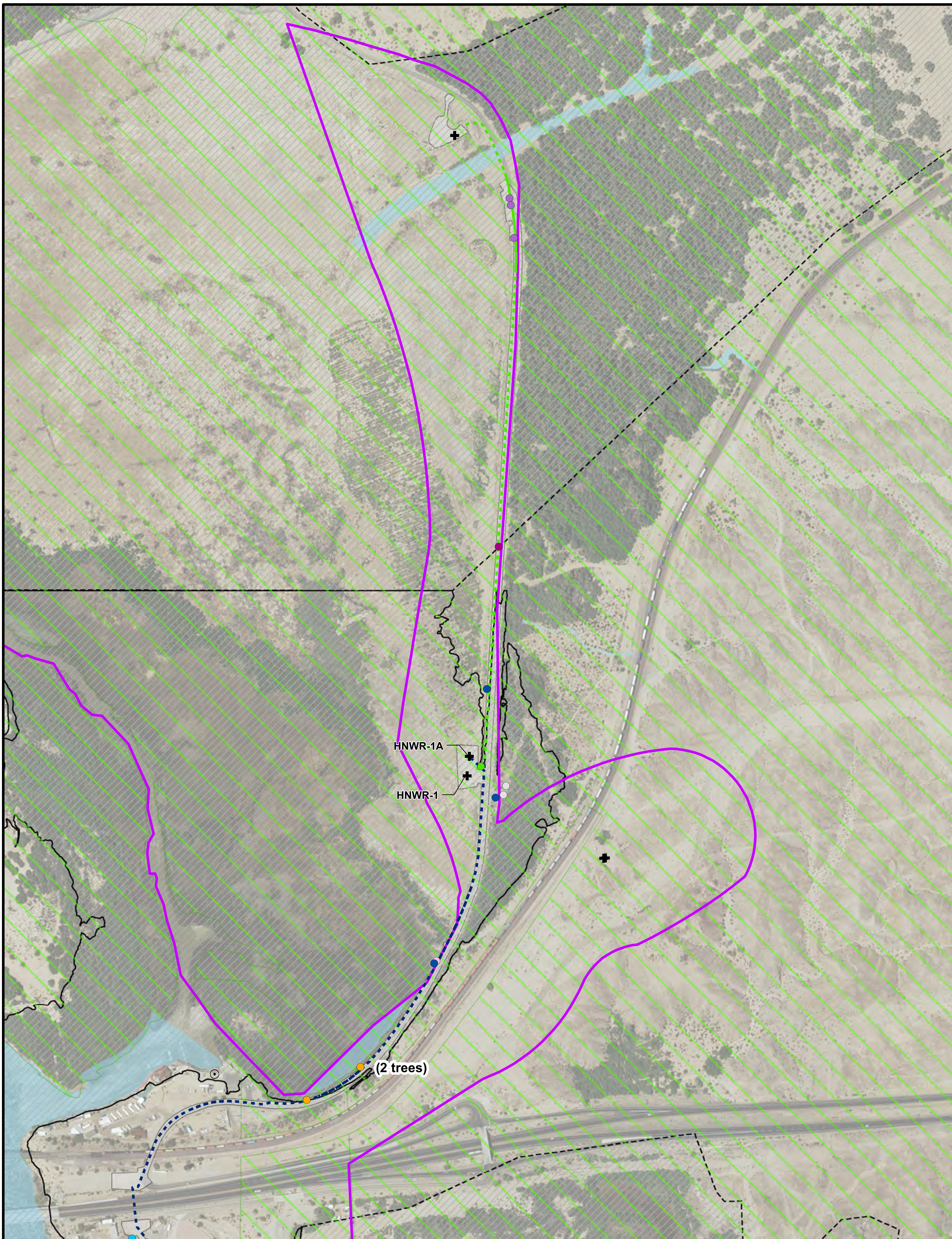
The groundwater remedy freshwater supply system begins with two existing wells: HNWR-1 and Site B well, which are west of the Oatman-Topock Highway in Arizona (Figure 3). A new, third well, HNWR-1A, was constructed in close proximity to HNWR-1 and will be the primary supply well. Both the HNWR-1 and 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 (Figures 6A and 6B). At this location, the freshwater pipeline will follow an existing access roadway to the northwest to where it enters and crosses Bat Cave Wash. The pipeline will then follow an existing access roadway on the western side of Bat Cave Wash to the south for approximately 400 feet until it reaches the freshwater injection well FW-2 as shown on Figure 6A. 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

Impacted Plants

- Arrowweed
- Big Saltbush
- Blue Palo Verde
- Cattle Saltbush
- Desert Smoke Tree
- Honey Mesquite
- Jimsome weed
- Salt Cedar

Existing Wells:

- Monitoring Well
- Water Supply Well
- 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

N

0 250 500 1,000 Feet

* Where line is dashed - 100 yr. Floodplain is inferred, taken from Federal Emergency Management Agency (FEMA) http://www.msc.fema.gov (11/7/2011).

FIGURE 3
AREA 1 – FRESHWATER WELL LOCATION

FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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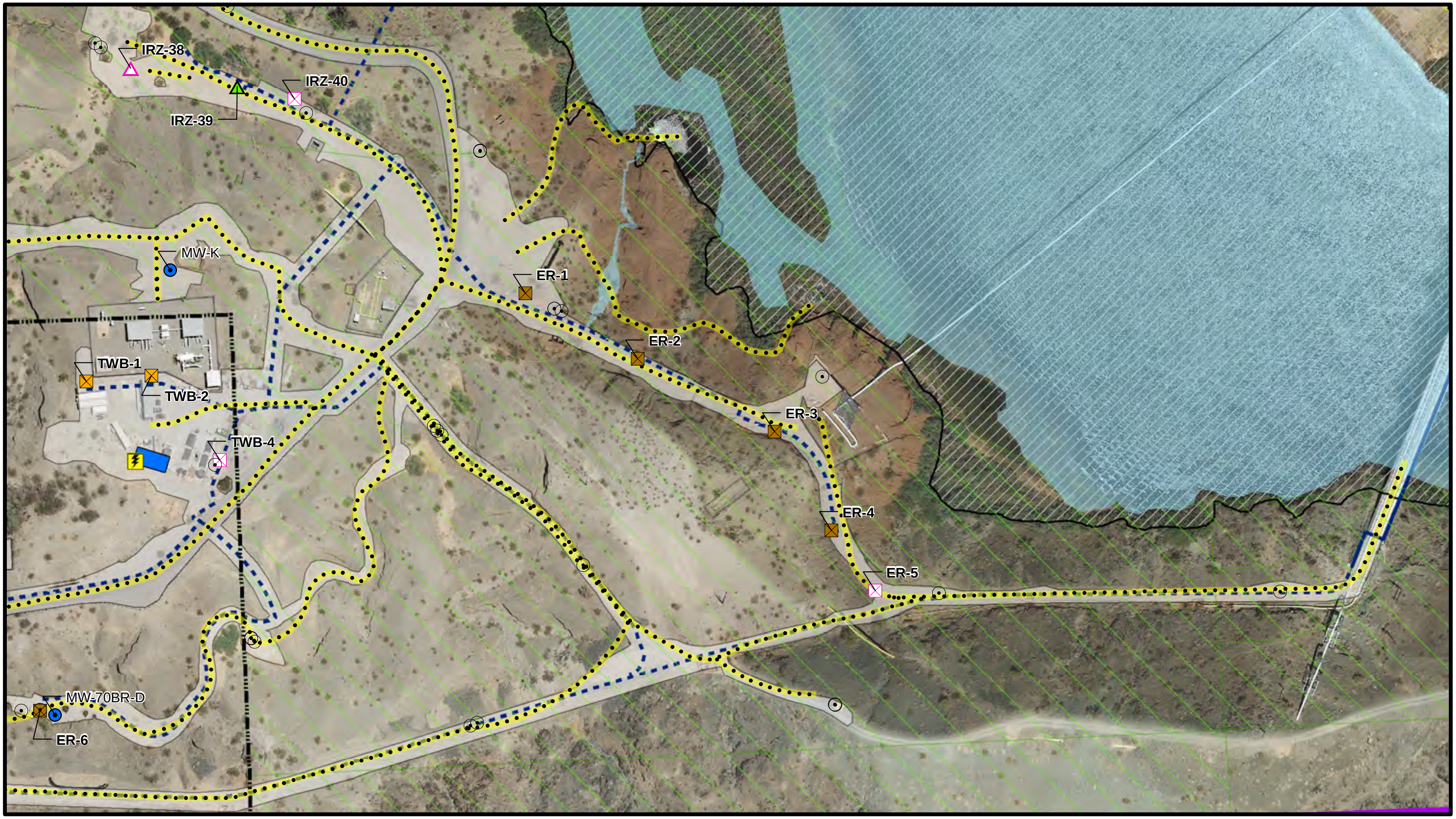

LEGEND

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

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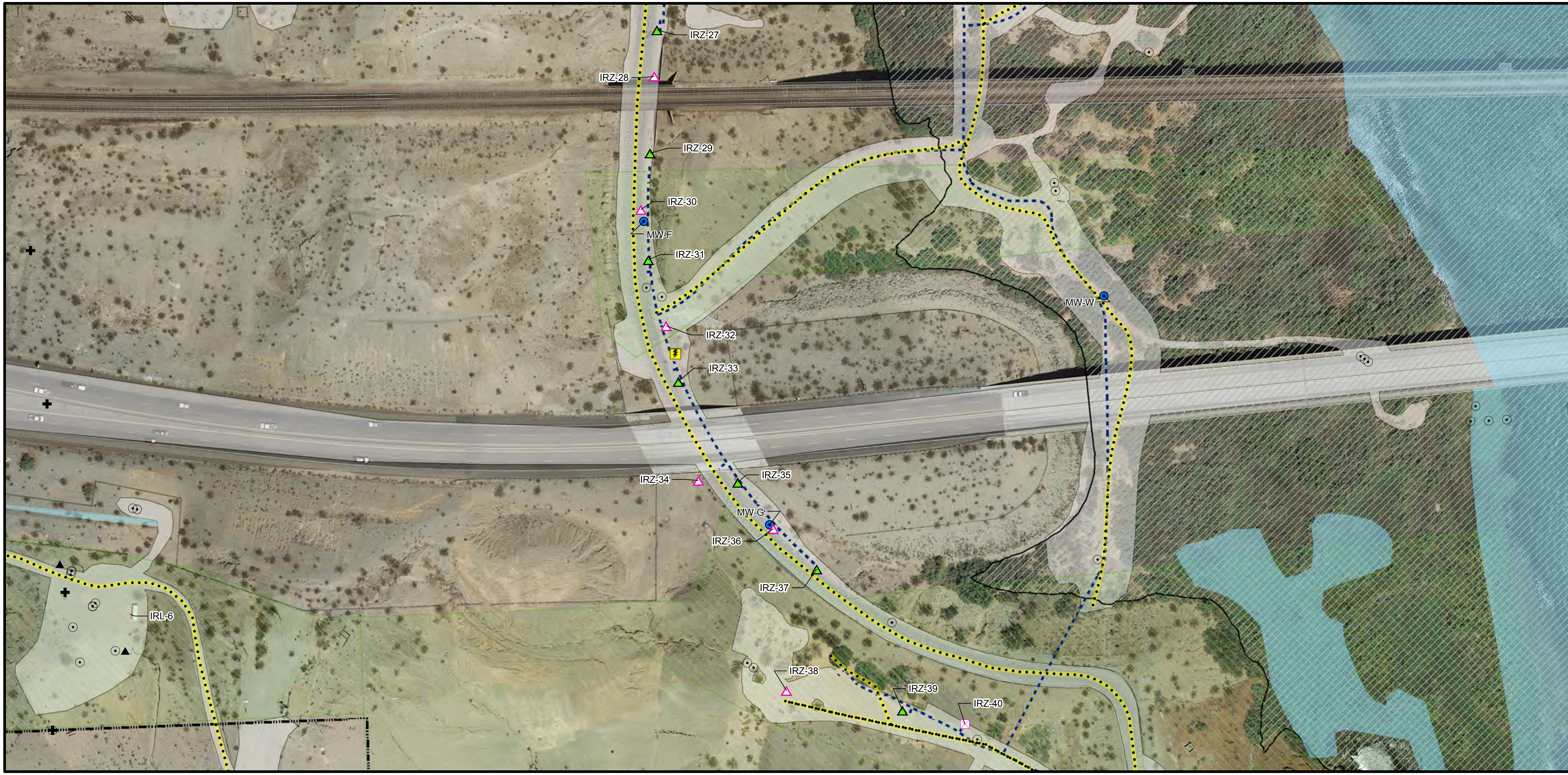

LEGEND

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

CH2MHILL

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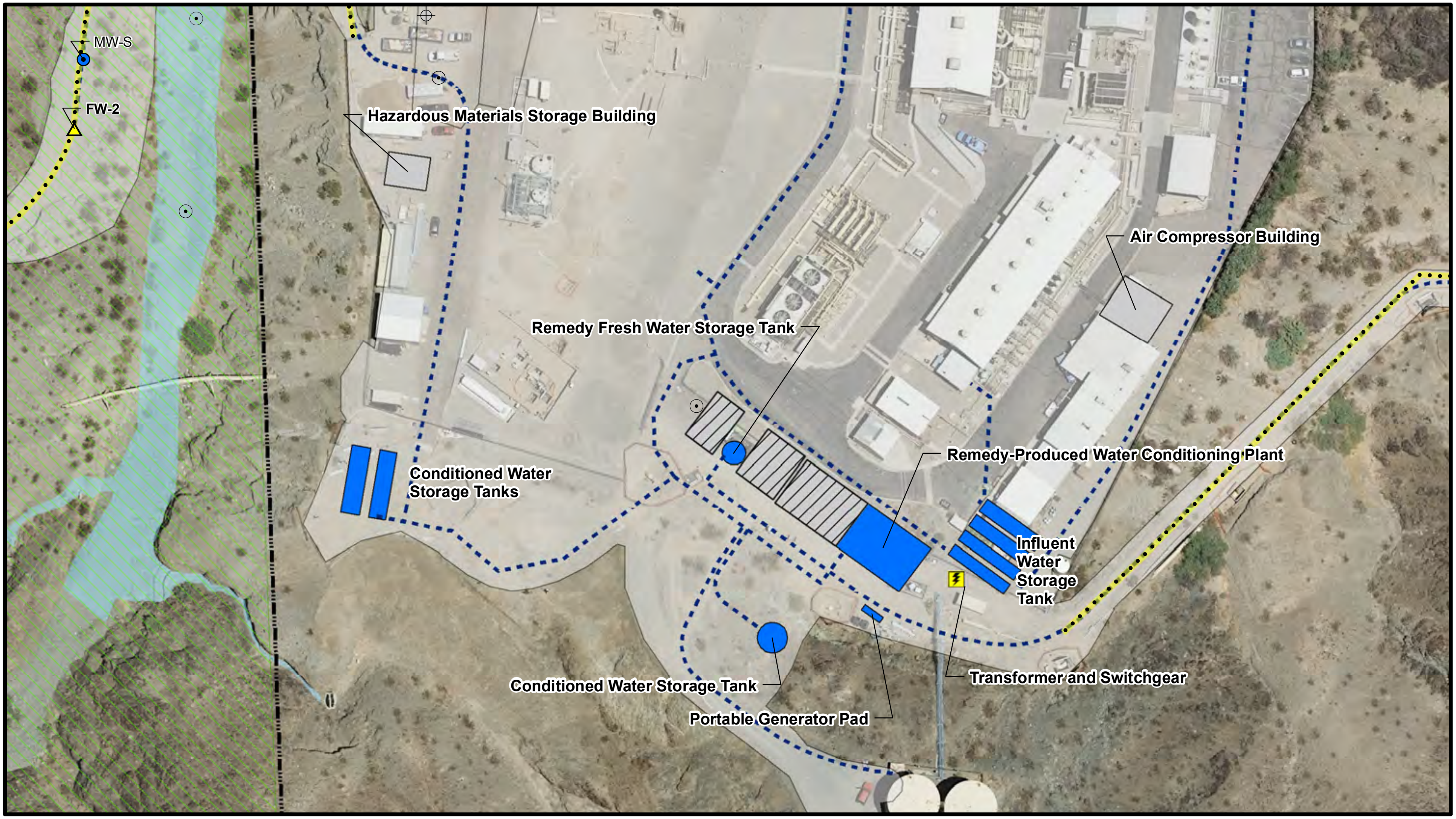


LEGEND

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

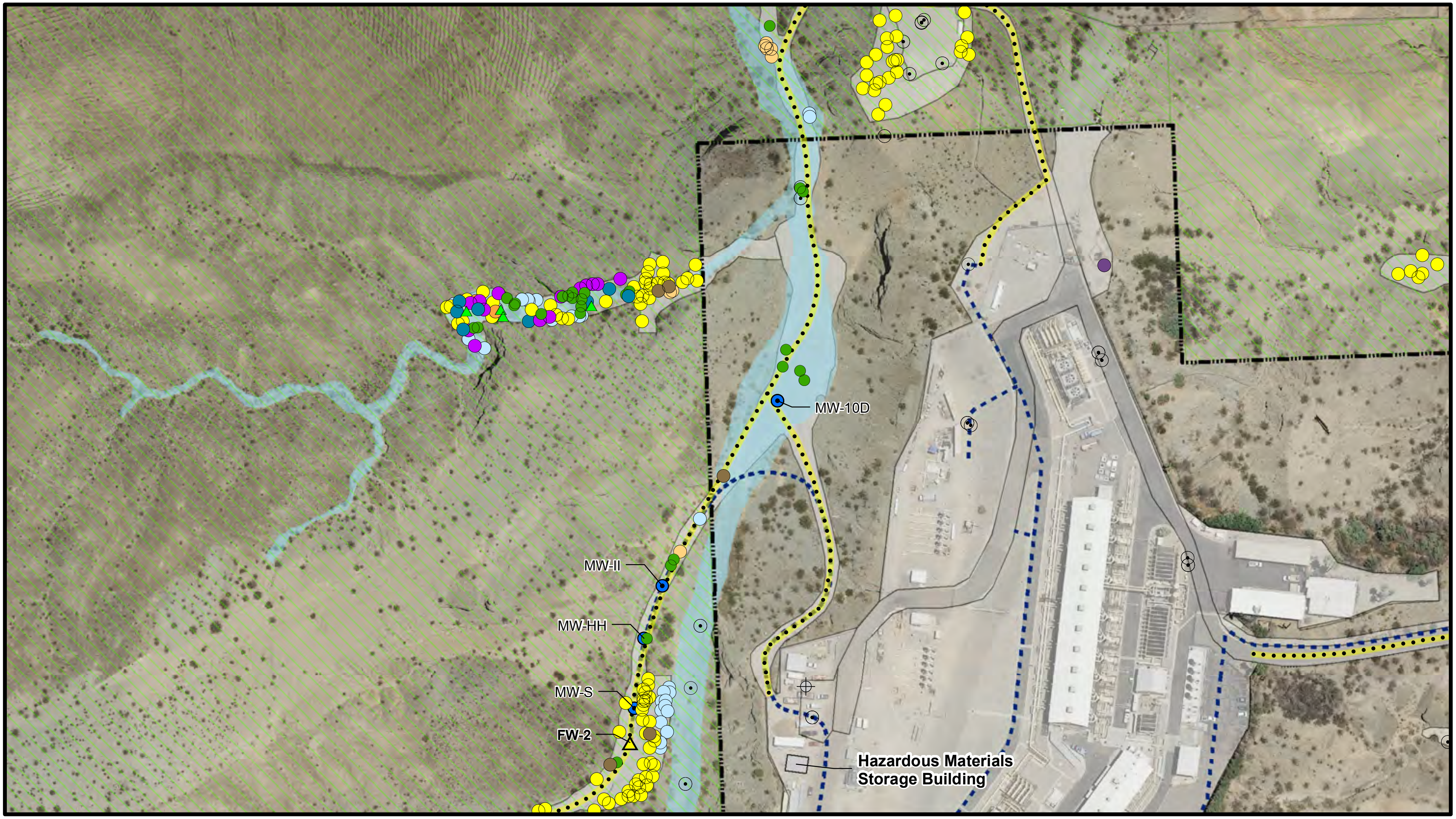
N

FIGURE 6A - SOUTH AREA 1 – WEST SIDE OF COMPRESSOR STATION

FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

Path: R:\PGEAlliance\Topock\MapFiles\2015\CMS\Final_HNWR_RestorationPlan\Figure6a_RemedyFacilities.mxd

CH2MHILL



LEGEND

Listed Plants
- Anderson desert thorn
- Beavertail
- Brittlebush
- Catclaw Acacia
- Cattle Saltbush
- Cheesebush
- Creosote Bush
- Desert Lavender
- Honey Mesquite
- Sweetbush
- White rhatany

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 50 100 200 Feet

N

FIGURE 6B - NORTH AREA 1 – WEST SIDE OF COMPRESSOR STATION

FINAL GROUNDWATER REMEDY
HAVASU NATIONAL WILDLIFE REFUGE
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

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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.

The last footnote in Table 1 above indicates that the boldface entries are the only plants that will be transplanted or replaced and the total acreage for just those items is 0.0843 acres. While it is recognized that, ultimately, the entire construction footprint on HNWR land will be subject to revegetation/ restoration, that process will occur primarily in the final phase of the project after operation, decommissioning, and removal of the groundwater remedy facilities. If there are portions of the construction footprint that can be re-planted in the interim, they will be.

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.

TABLE 1
Summary of Vegetation Impacts within the Final Design Footprint on HNWR Lands

Species	Number of Plants[a, b.]	Estimated Acreage
Anderson's desert thorn (*Lycium andersonii*)	4	0.0003
Arrow weed (*Pluchea sericea*)[c]	NA	0.0830
Beaver tail (*Opuntia basilaris*)	14	0.0005
Big saltbush (*Atriplex lentiformis*)	3	0.0002
Brittlebush (*Encelia farinosa*)	83	0.0015
White bursage (*Ambrosia dumosa*)	21	0.0060
Catclaw acacia (*Senegalia greggii*)	23	0.0338
Cattle saltbush (*Atriplex polycarpa*)	9	0.0001
Cheesebush (*Ambrosia salsola*)	44	0.0008
Creosote bush (*Larrea tridentata*)	300	0.4103
Desert lavender (*Hyptis emoryi*)	14	0.0088
Desert smoke tree (*Psorothamnus spinosus*)	1	<0.0001
Honey mesquite (*Prosopis glandulosa*)	8	0.0006
Jimson weed (*Datura wrightii*)	1	<0.0001
Honey sweet (*Tidestromia oblongifolia*)	3	0.0001
Blue palo verde (*Parkinsonia florida*)	18	0.0491
Pygmy cedar (*Peucephyllum schottii*)	2	0.0006
Salt cedar (*Tamarix ramosissima*)	NA	0.1209
Silver cholla (*Cylindropuntia echinocarpa*)	1	0.0003
Skeletonweed (*Stephanomeria paucifolia*)	1	<0.0001
Sweetbush (*Bebbia juncea*)	45	0.0032
White Rhatany (*Krameria grayi*)	5	0.0004
Total of Vegetation	**617**	**0.7206**

Notes
[a] Number of plants and estimated cover within the final 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 0.3321 acre of mapped polygons

BOLDFACE species are those that will be transplanted or replaced with new plantings.

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.

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[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	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint	
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge	
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream	
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush		
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite		
					Salt Cedar		

N

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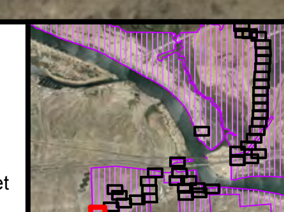

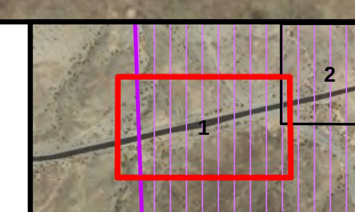

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 1 of 42

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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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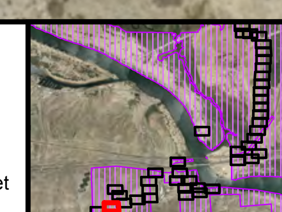

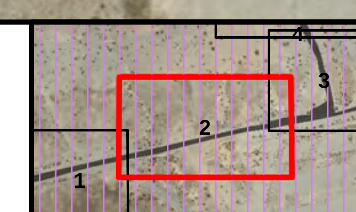

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 2 of 42

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Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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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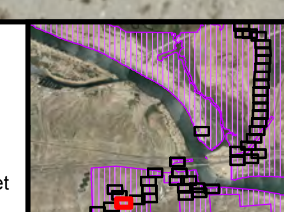

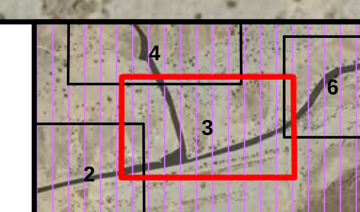

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 3 of 42

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Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint	
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge	
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream	
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush		
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite		
					Salt Cedar		

N

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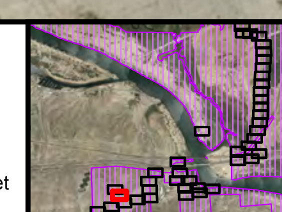

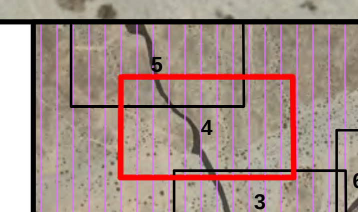

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 4 of 42

Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint	
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge	
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream	
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush		
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite		
					Salt Cedar		

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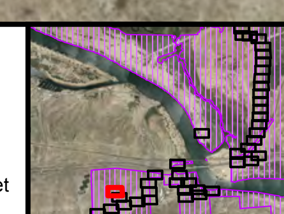

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 5 of 42

- Anderson's desert thorn
- Arroweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Catclaw acacia
- Cattle saltbush
- Cholla (various)
- Cheesebush
- Creosote bush
- Desert Lavender
- Desert Smoke Tree
- Foxtail Cactus
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Skeletonweed
- 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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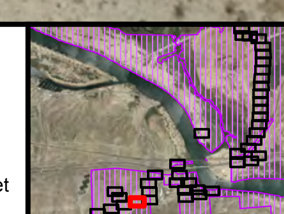
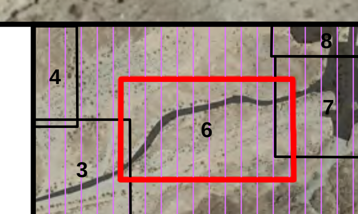
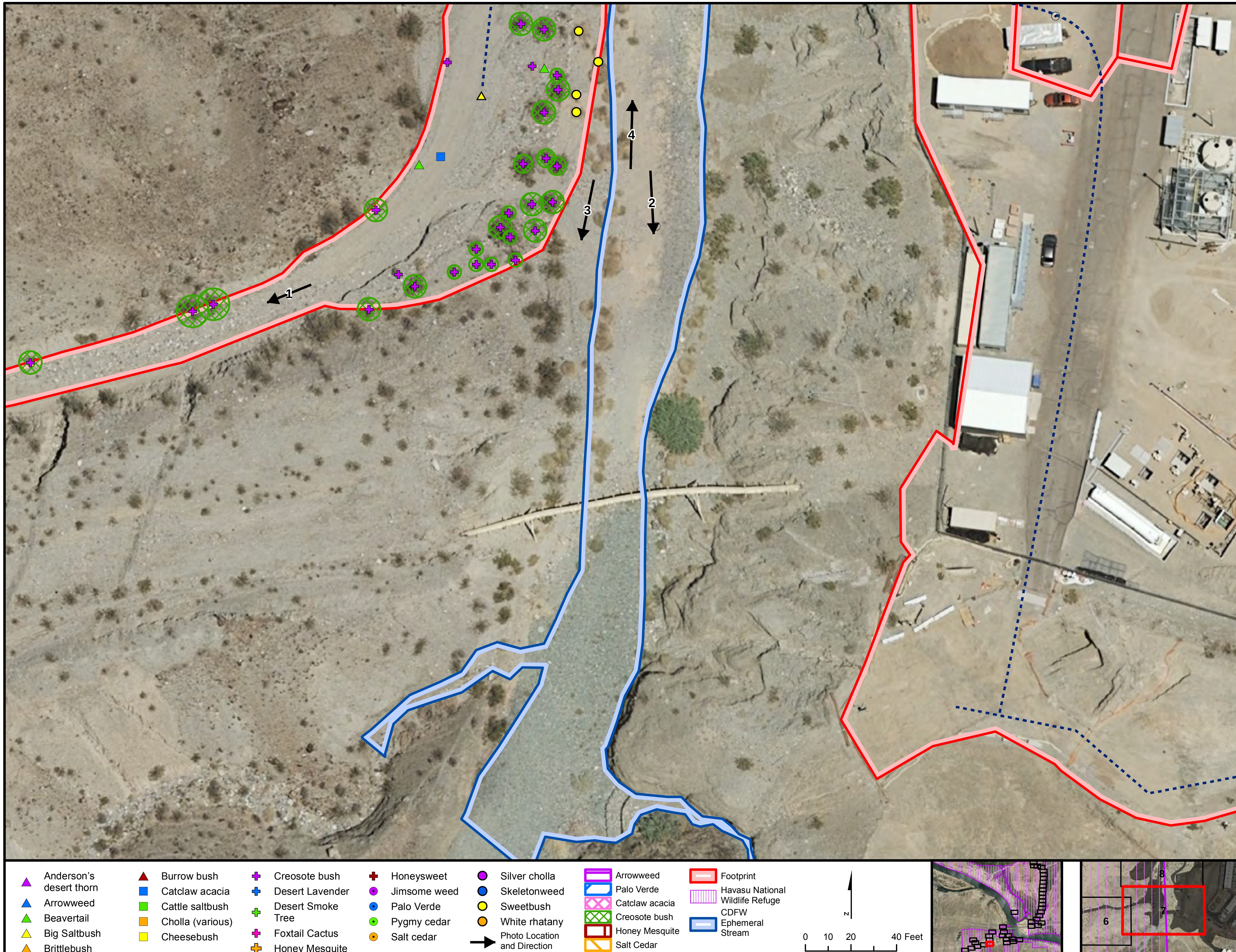




Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 6 of 42



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 7 of 42

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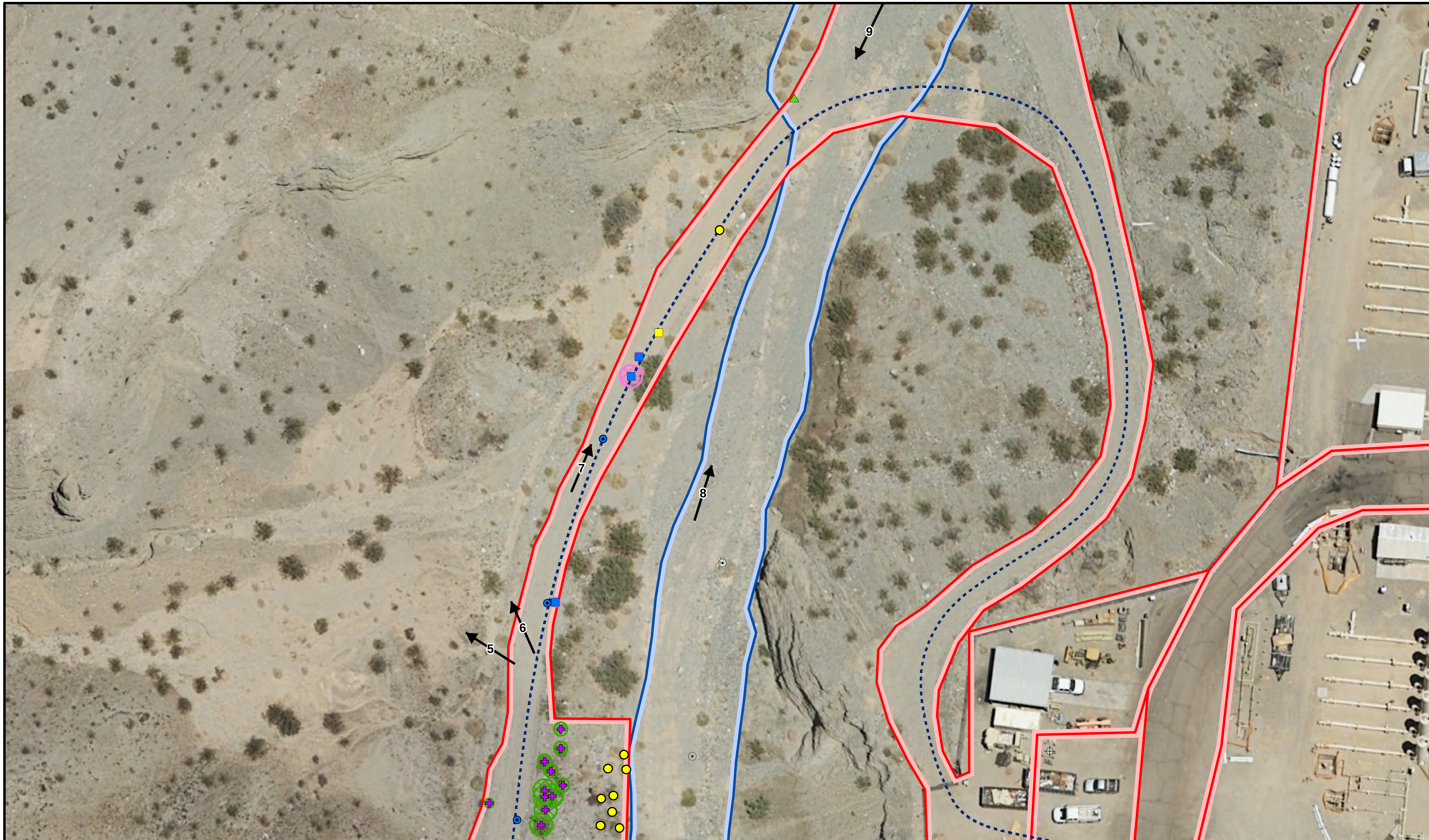

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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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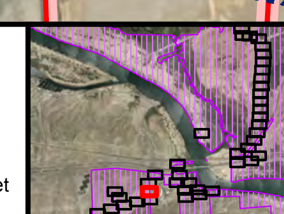
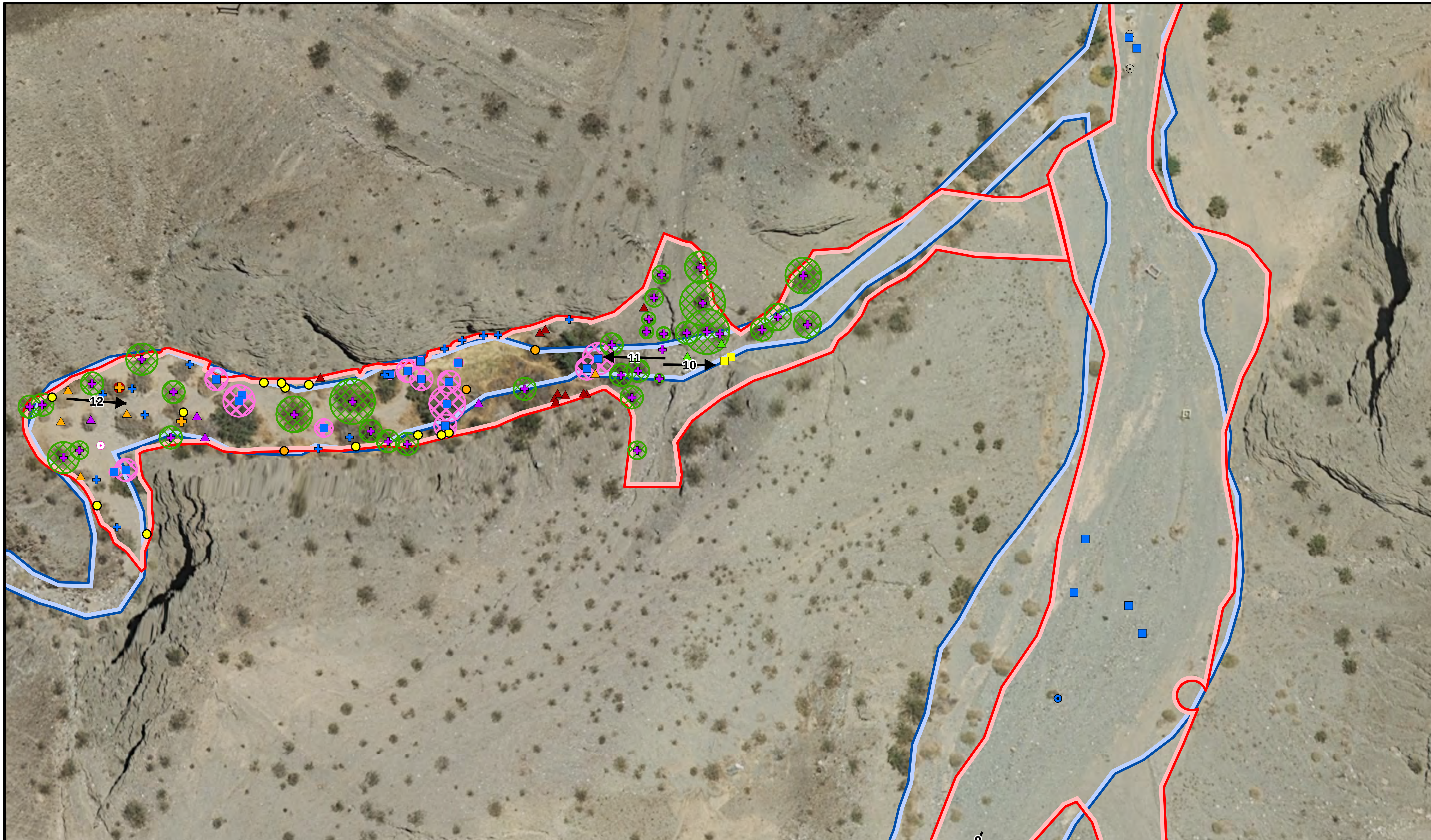


Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 8 of 42



Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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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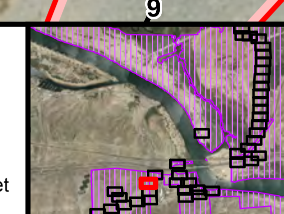
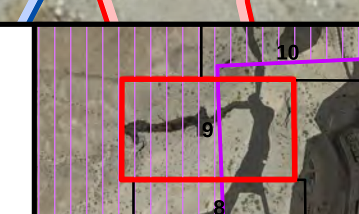
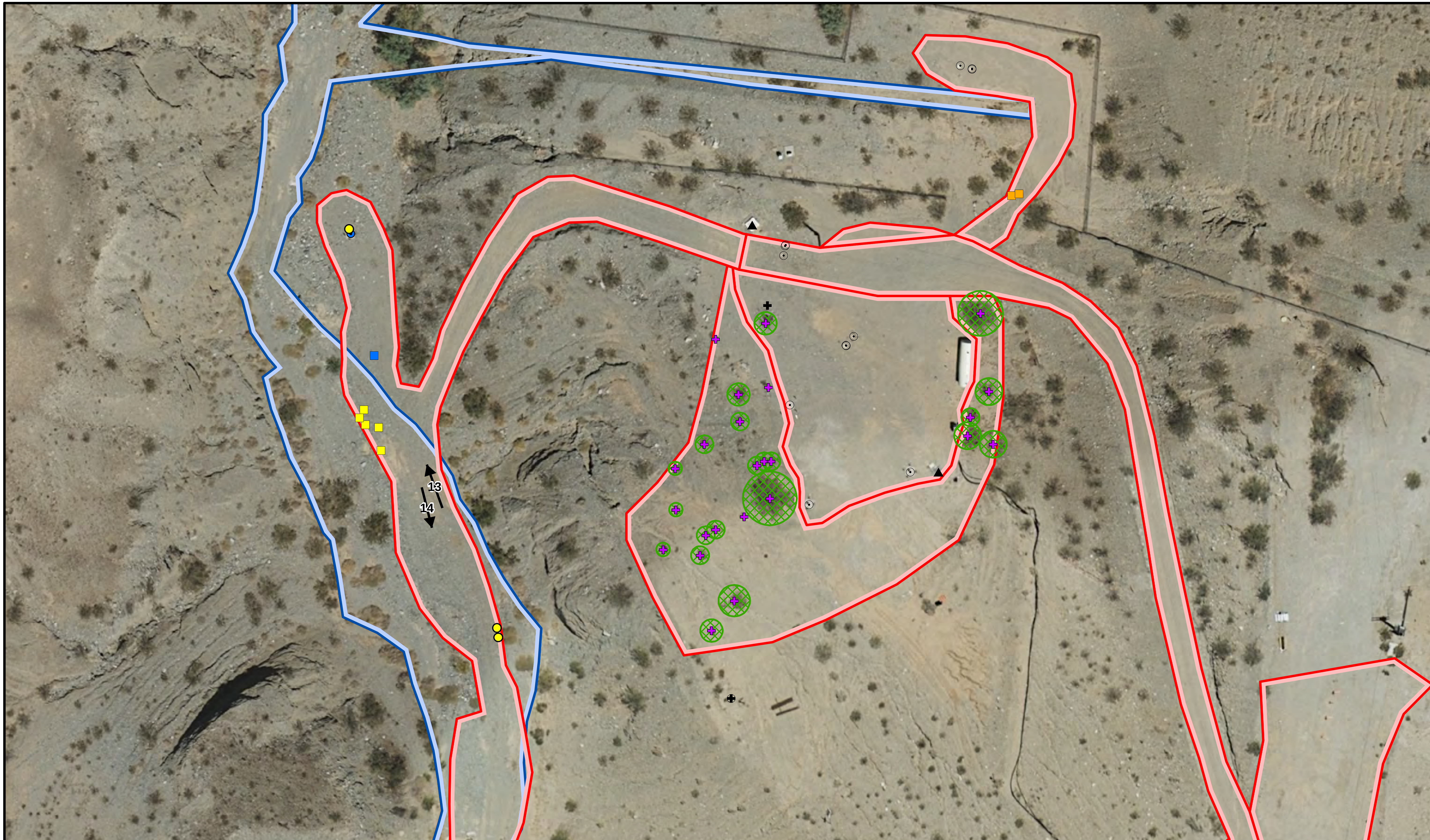




Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 9 of 42



- Anderson's desert thorn
- Arroweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Catclaw acacia
- Cattle saltbush
- Cholla (various)
- Cheesebush
- Creosote bush
- Desert Lavender
- Desert Smoke Tree
- Foxtail Cactus
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Skeletonweed
- 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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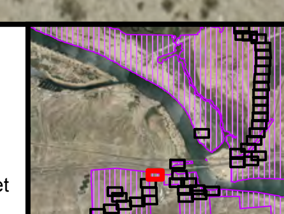
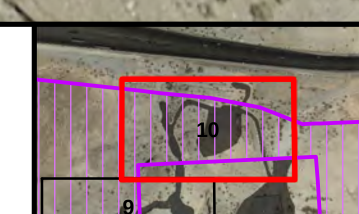
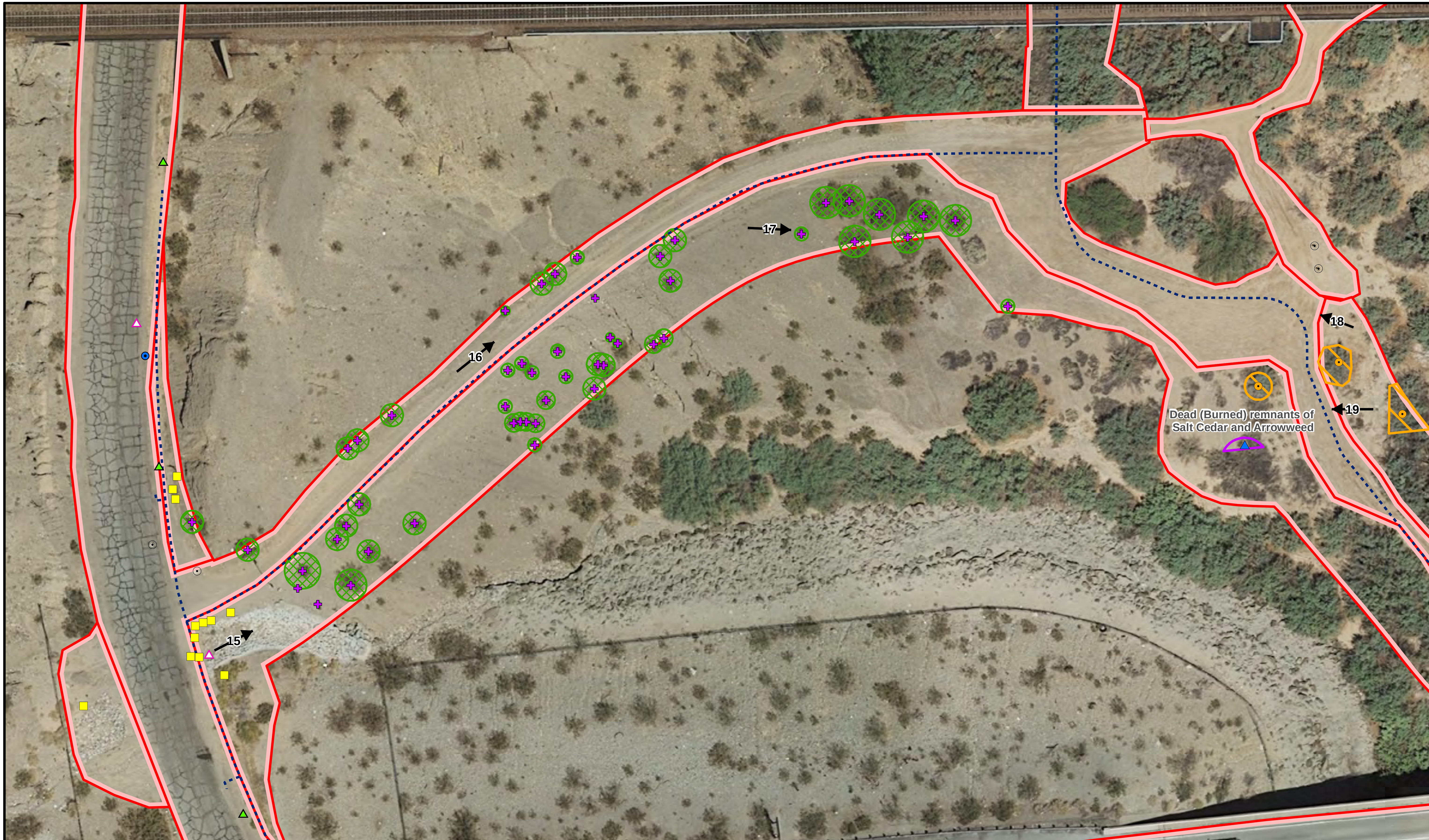




Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 10 of 42



Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
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Honeysweet
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Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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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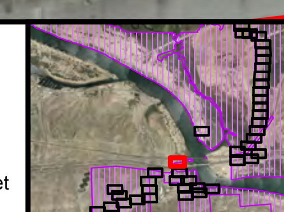
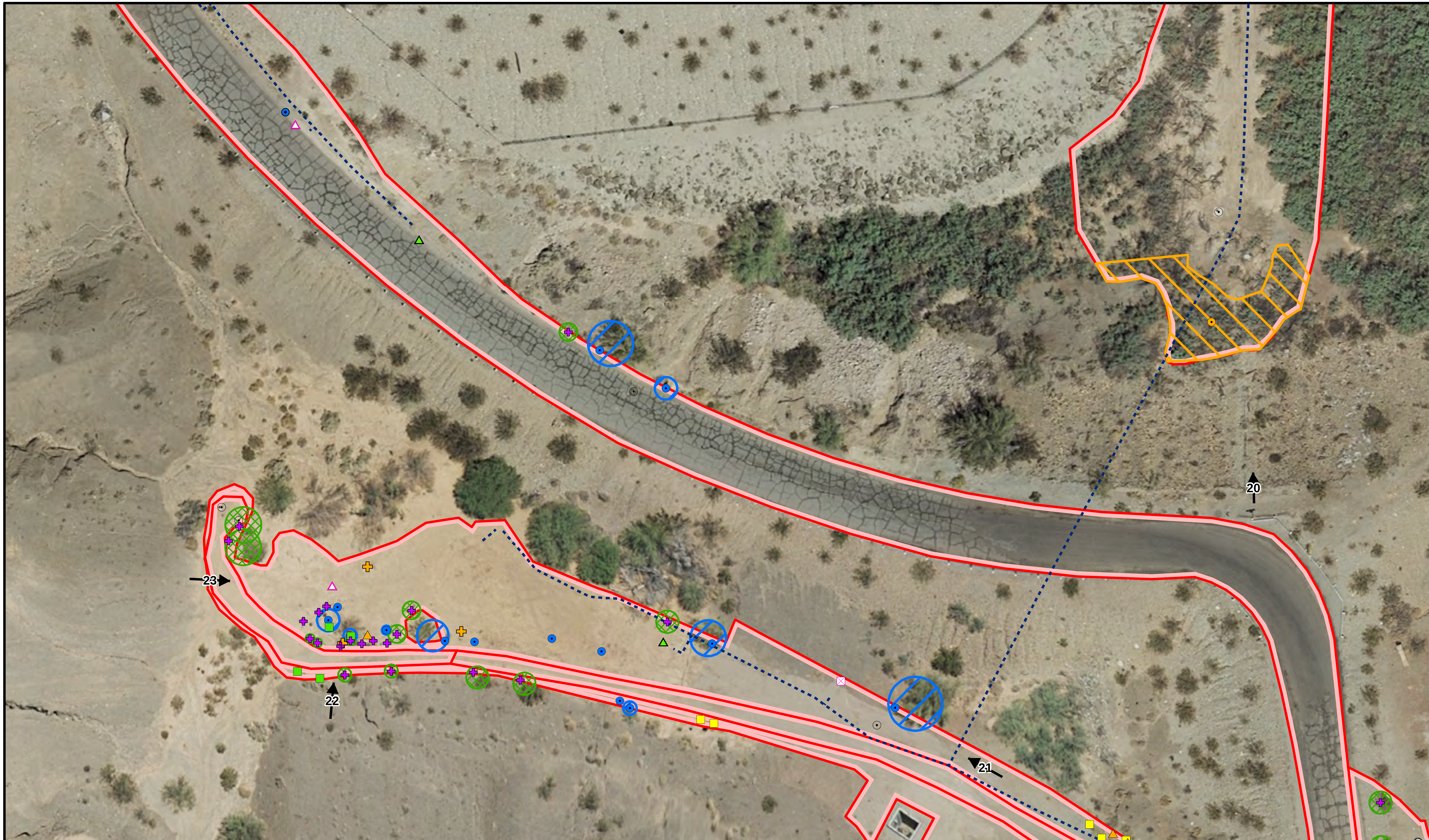


Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 11 of 42



Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush	
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite	
					Salt Cedar	

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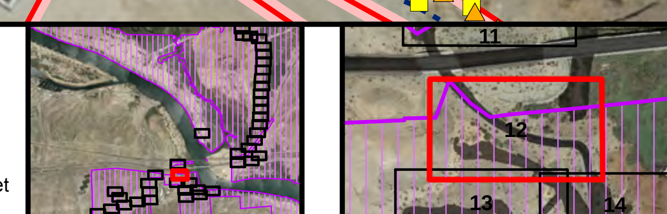
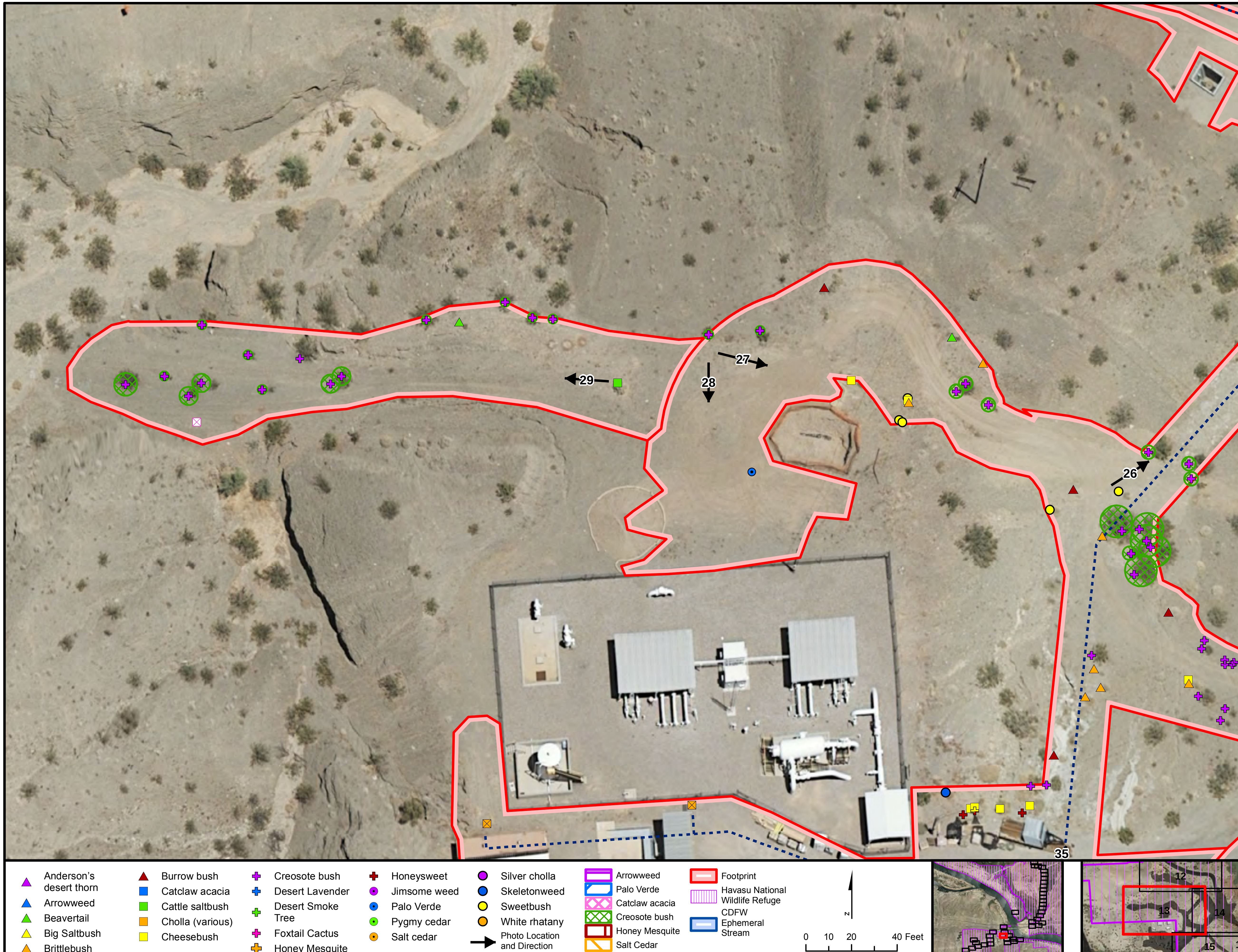


Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 12 of 42



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 13 of 42

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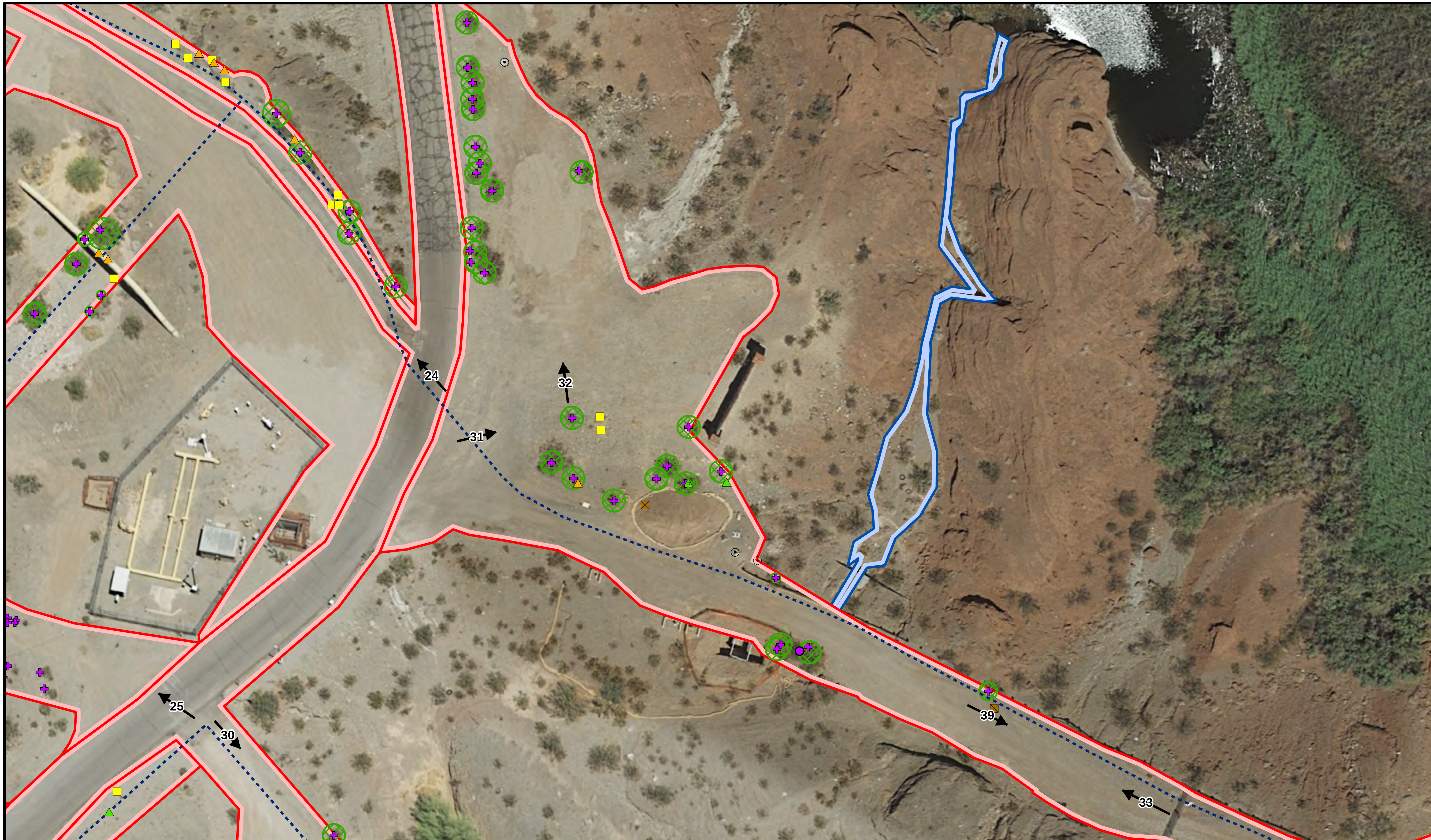

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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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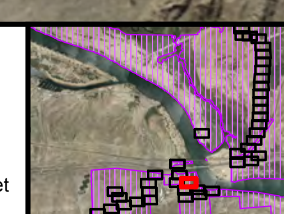

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 14 of 42

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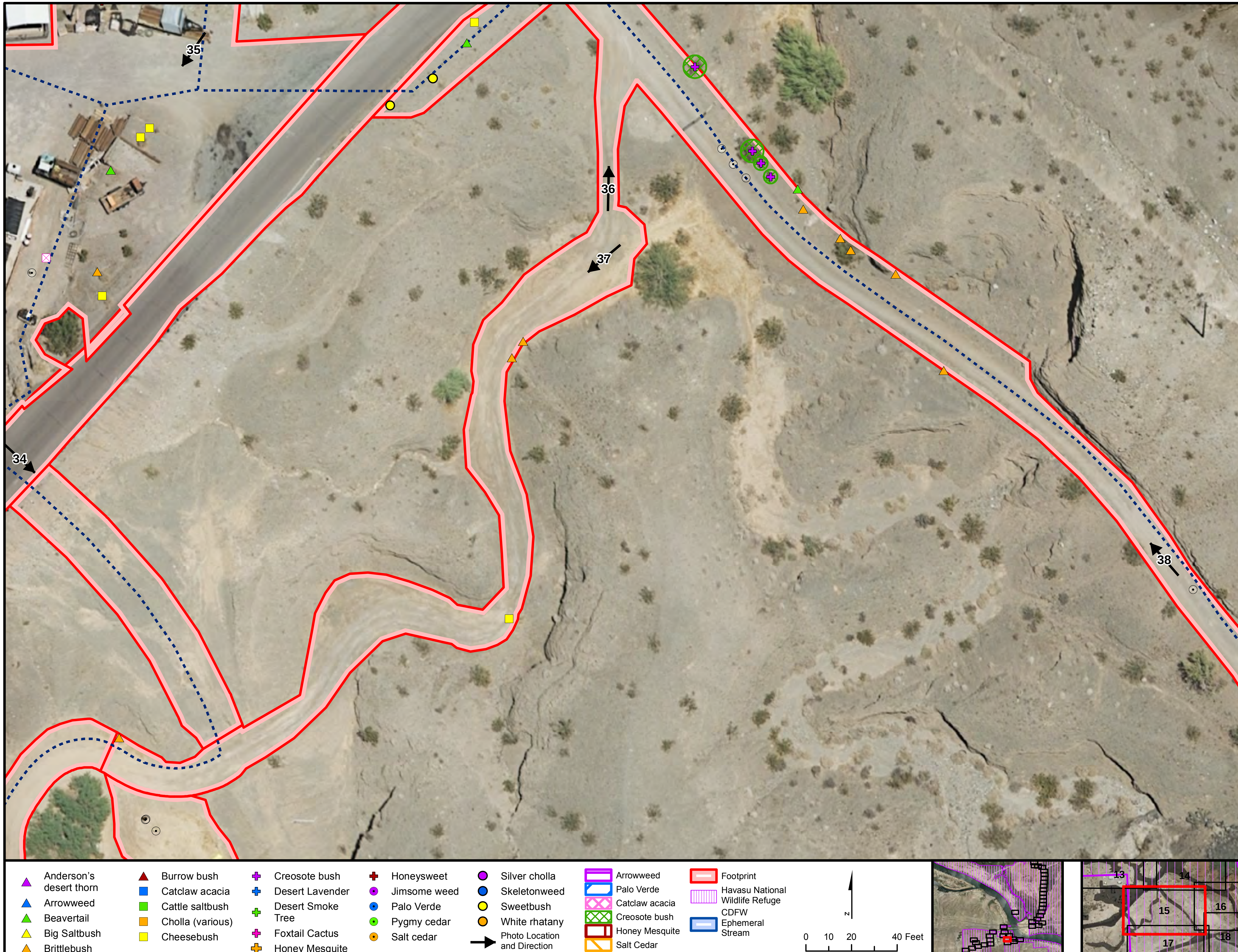

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 15 of 42

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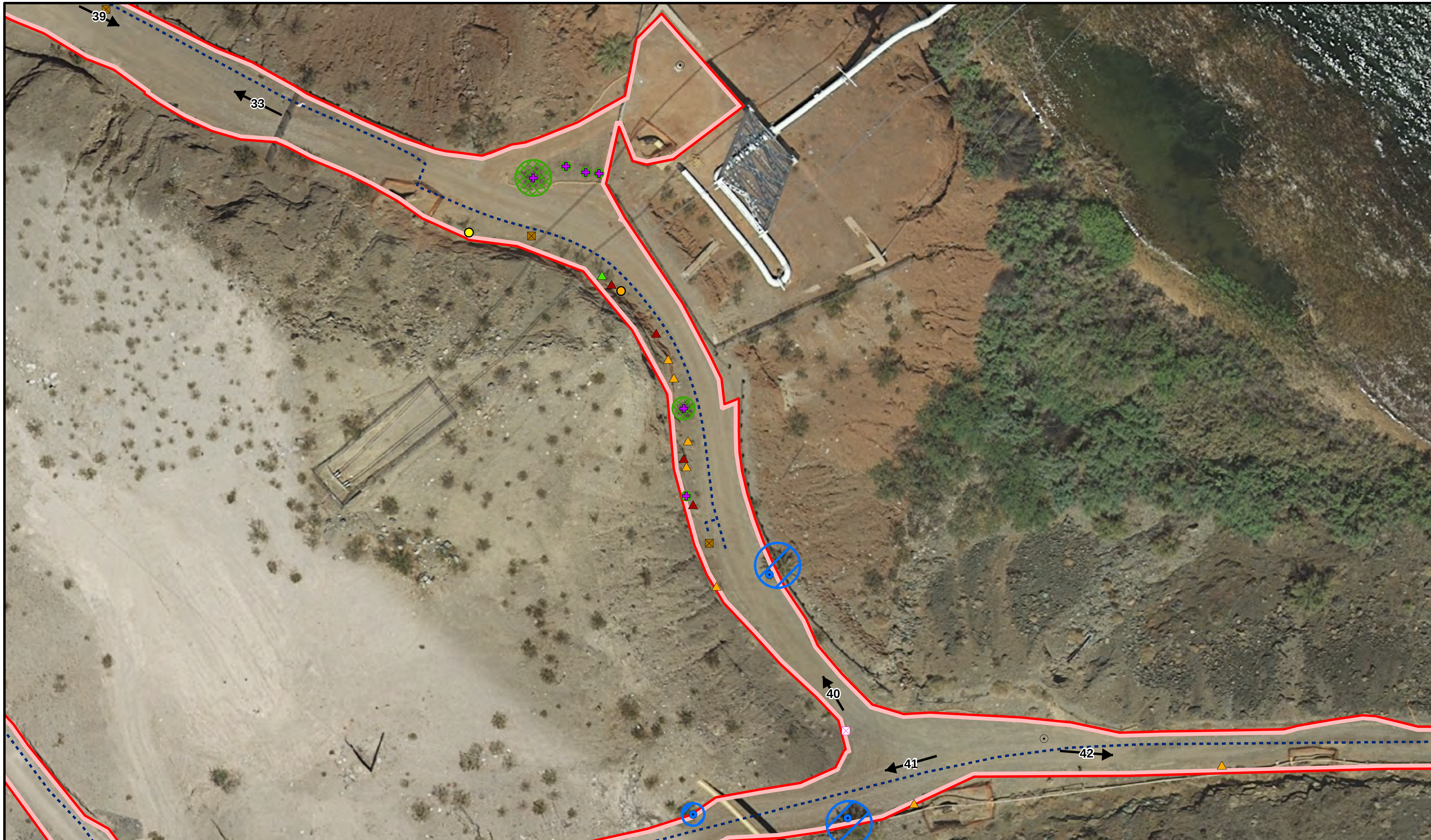

Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush	
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite	
					Salt Cedar	

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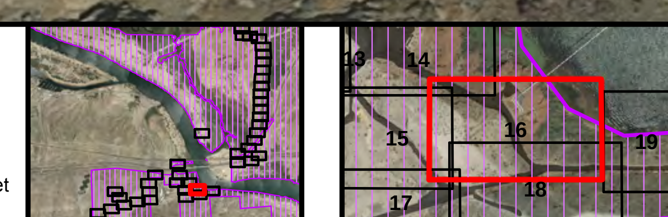


Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 16 of 42

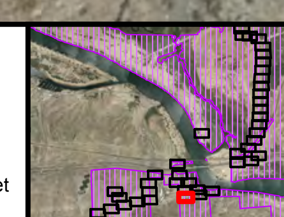
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
Sweetbush
White rhatany
Photo Location and Direction

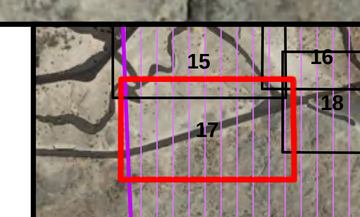
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

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

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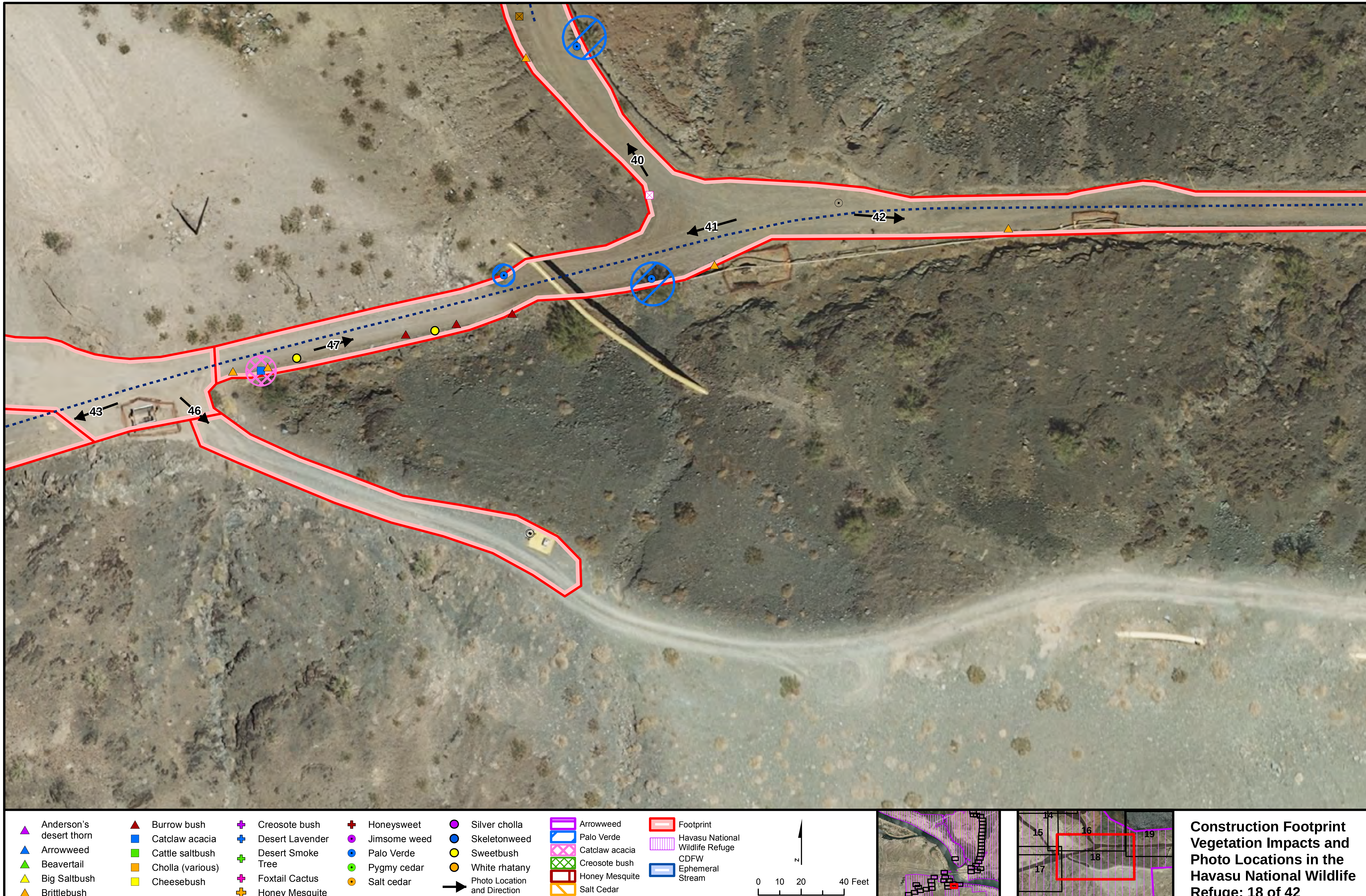
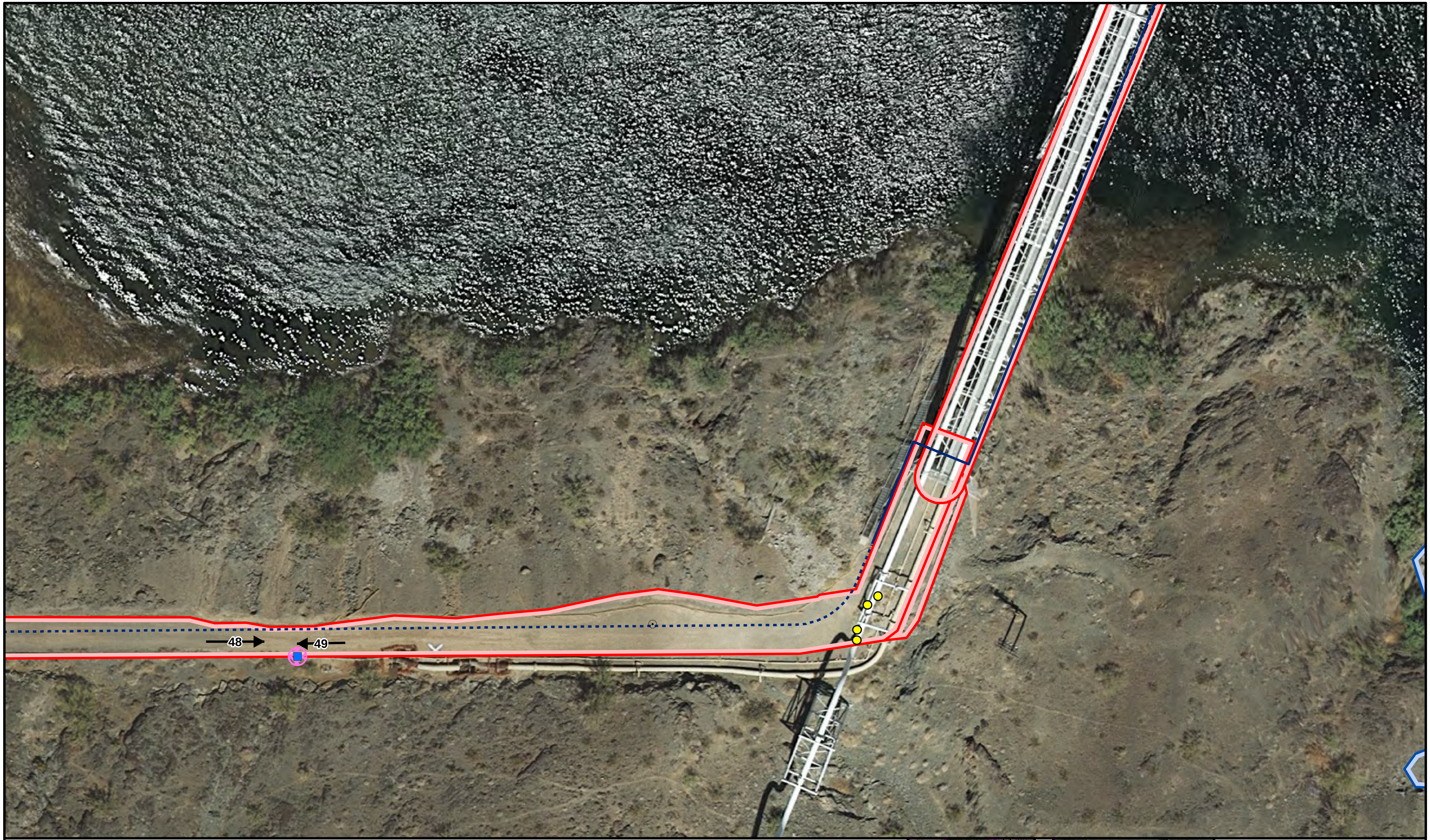


Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 18 of 42



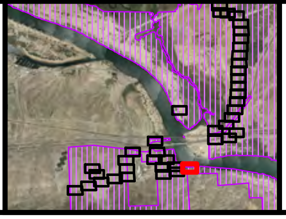
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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: 19 of 42

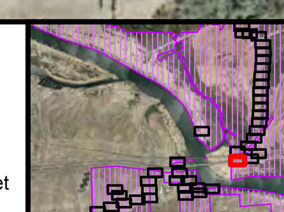
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
Sweetbush
White rhatany
Photo Location and Direction

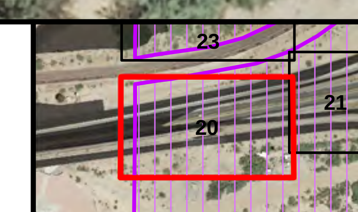
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

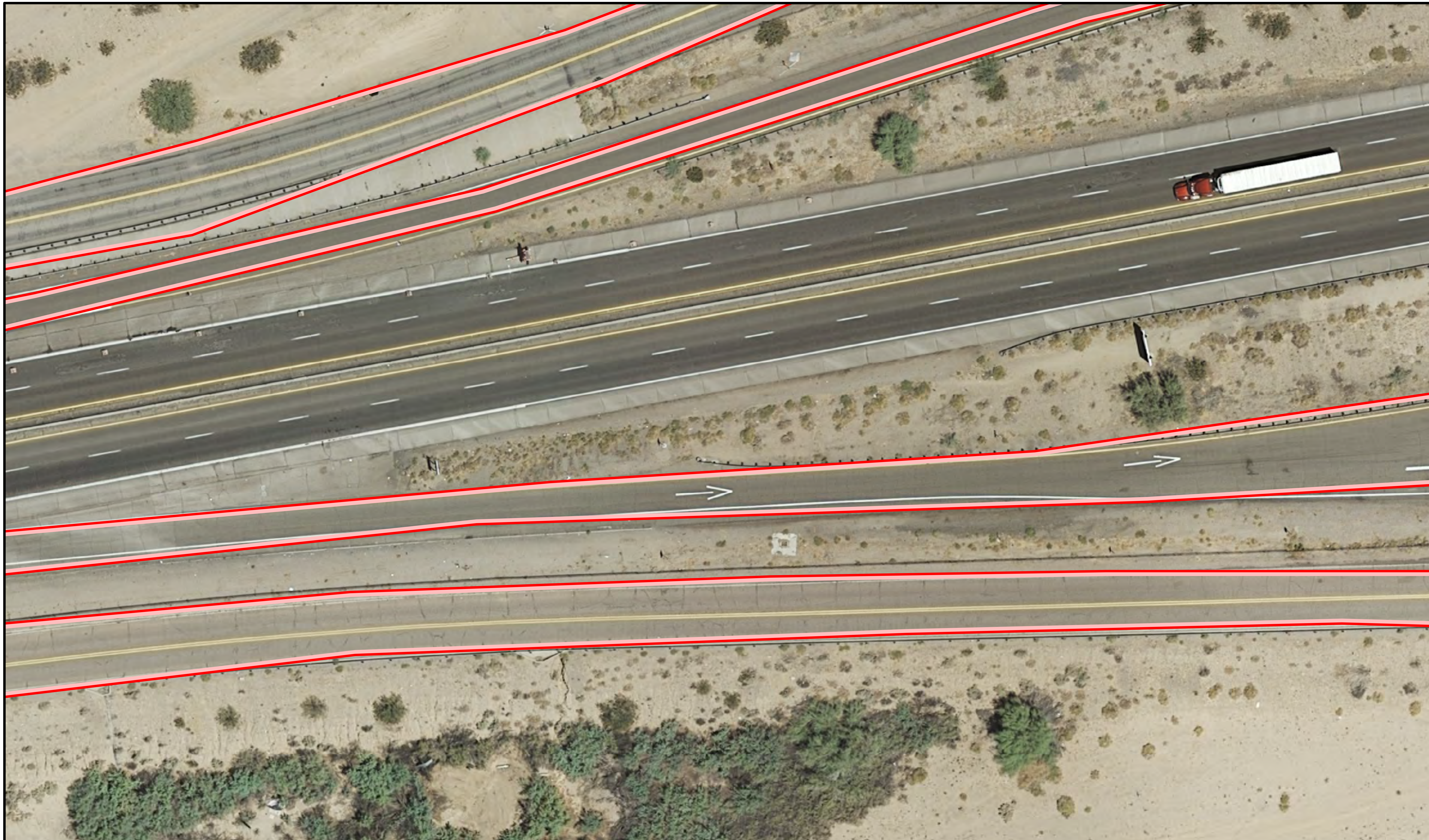
N

0 10 20 40 Feet





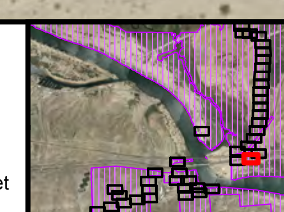
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 20 of 42

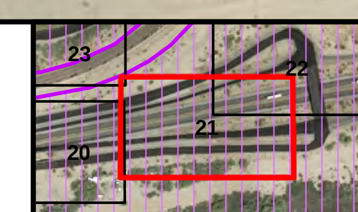


Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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

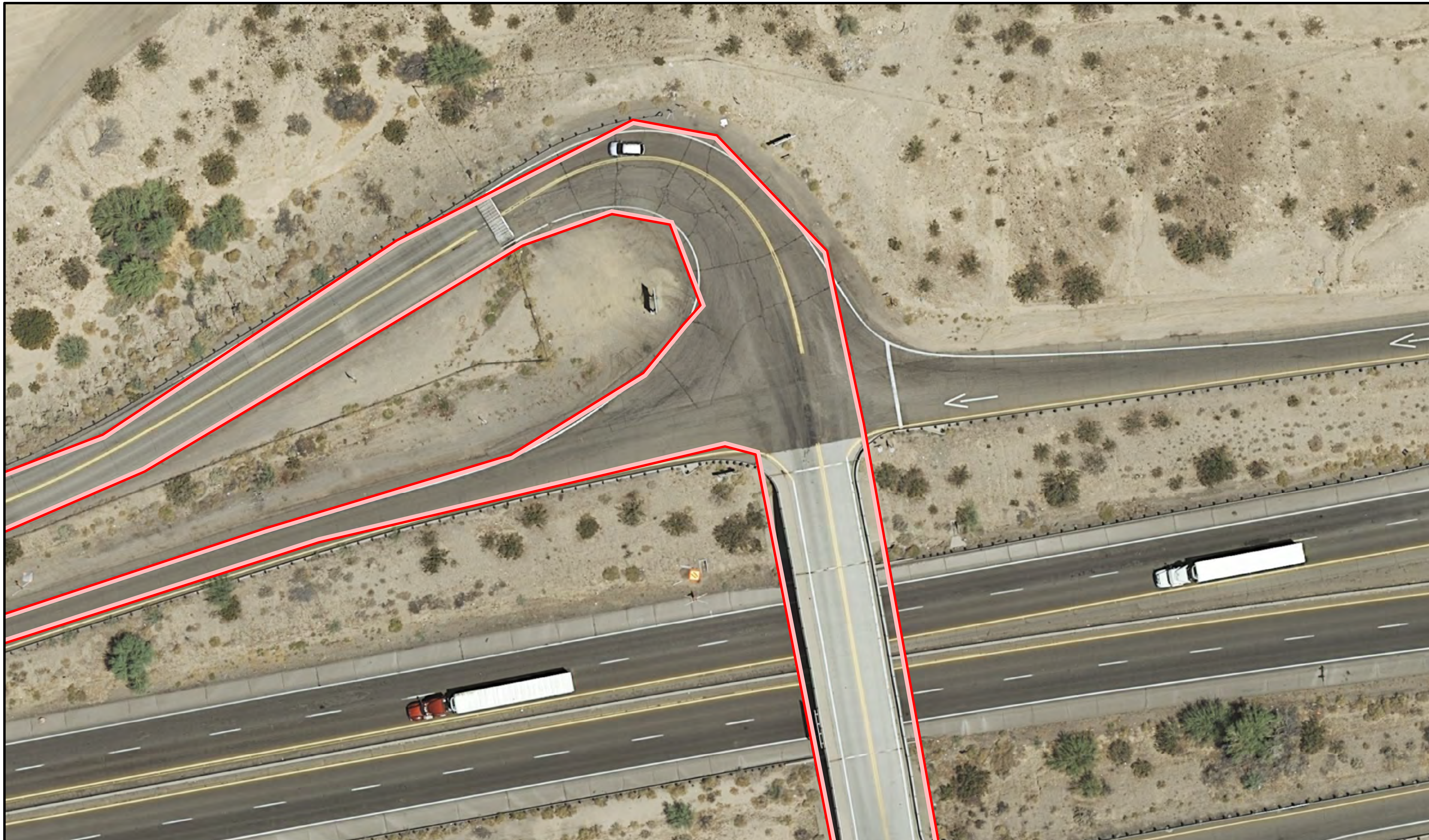
N

0 10 20 40 Feet





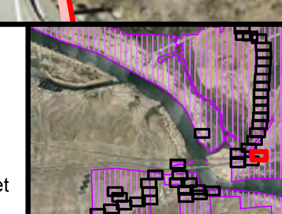
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 21 of 42

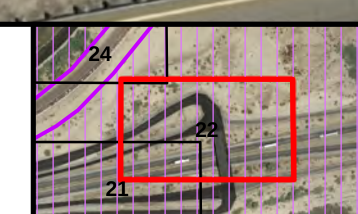


Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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

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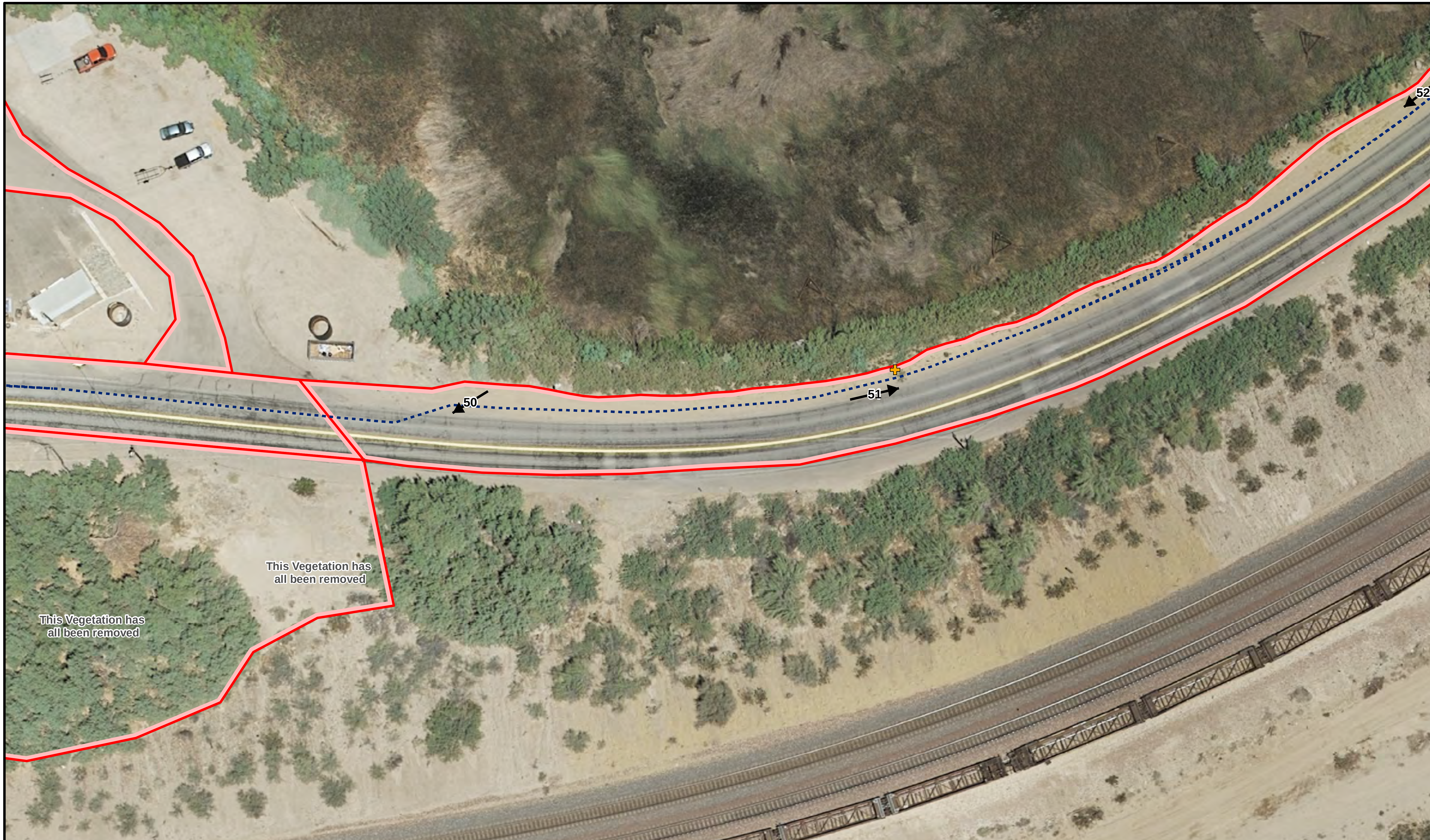
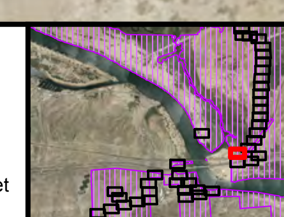


Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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

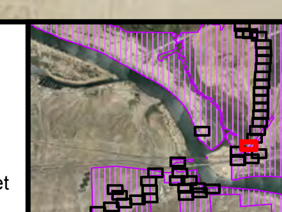
△ Anderson's desert thorn
△ Arrowweed
△ Beavertail
△ Big Saltbush
△ Brittlebush
▲ Burrow bush
■ Catclaw acacia
■ Cattle saltbush
■ Cholla (various)
■ Cheesebush
✚ Creosote bush
✚ Desert Lavender
✚ Desert Smoke Tree
✚ Foxtail Cactus
✚ Honey Mesquite
✚ Honeysweet
● Jimsome weed
● Palo Verde
● Pygmy cedar
● Salt cedar
● Silver cholla
● Skeletonweed
● Sweetbush
● White rhatany
→ Photo Location and Direction

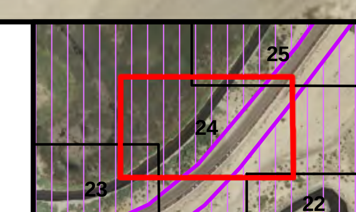
Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet





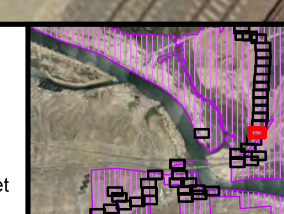
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 24 of 42

Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 25 of 42

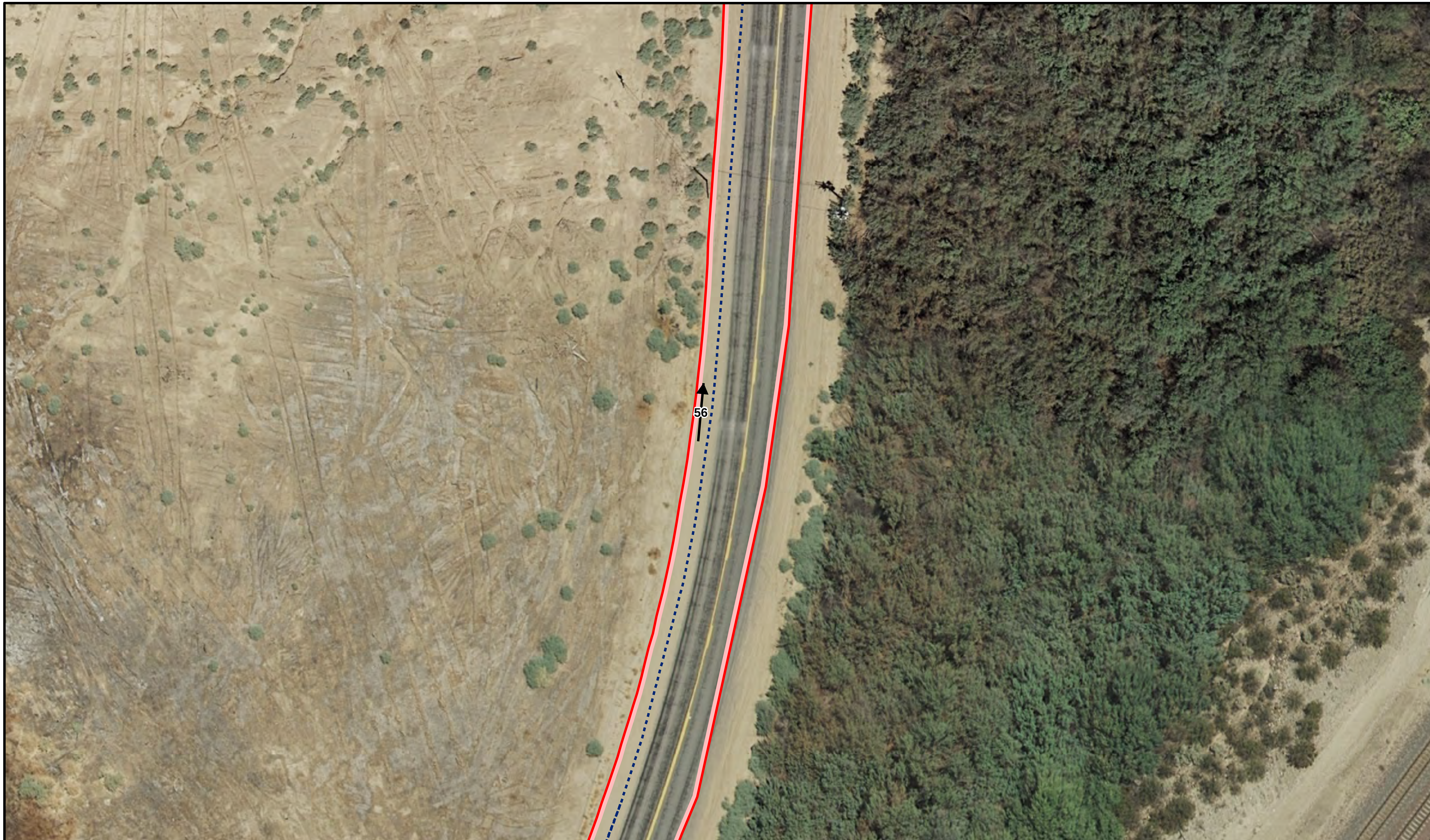
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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



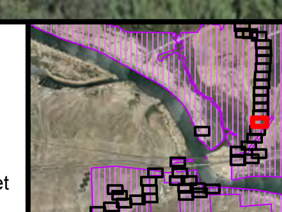
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 26 of 42



Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush	
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite	
					Salt Cedar	

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 27 of 42

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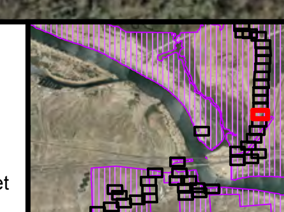
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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: 28 of 42

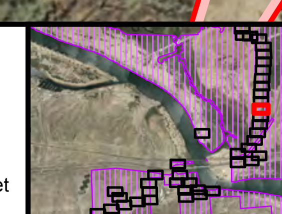
Anderson's desert thorn
Arroweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
Sweetbush
White rhatany
Photo Location and Direction

Arrowweed
Palo Verde
Catclaw acacia
Creosote bush
Honey Mesquite
Salt Cedar

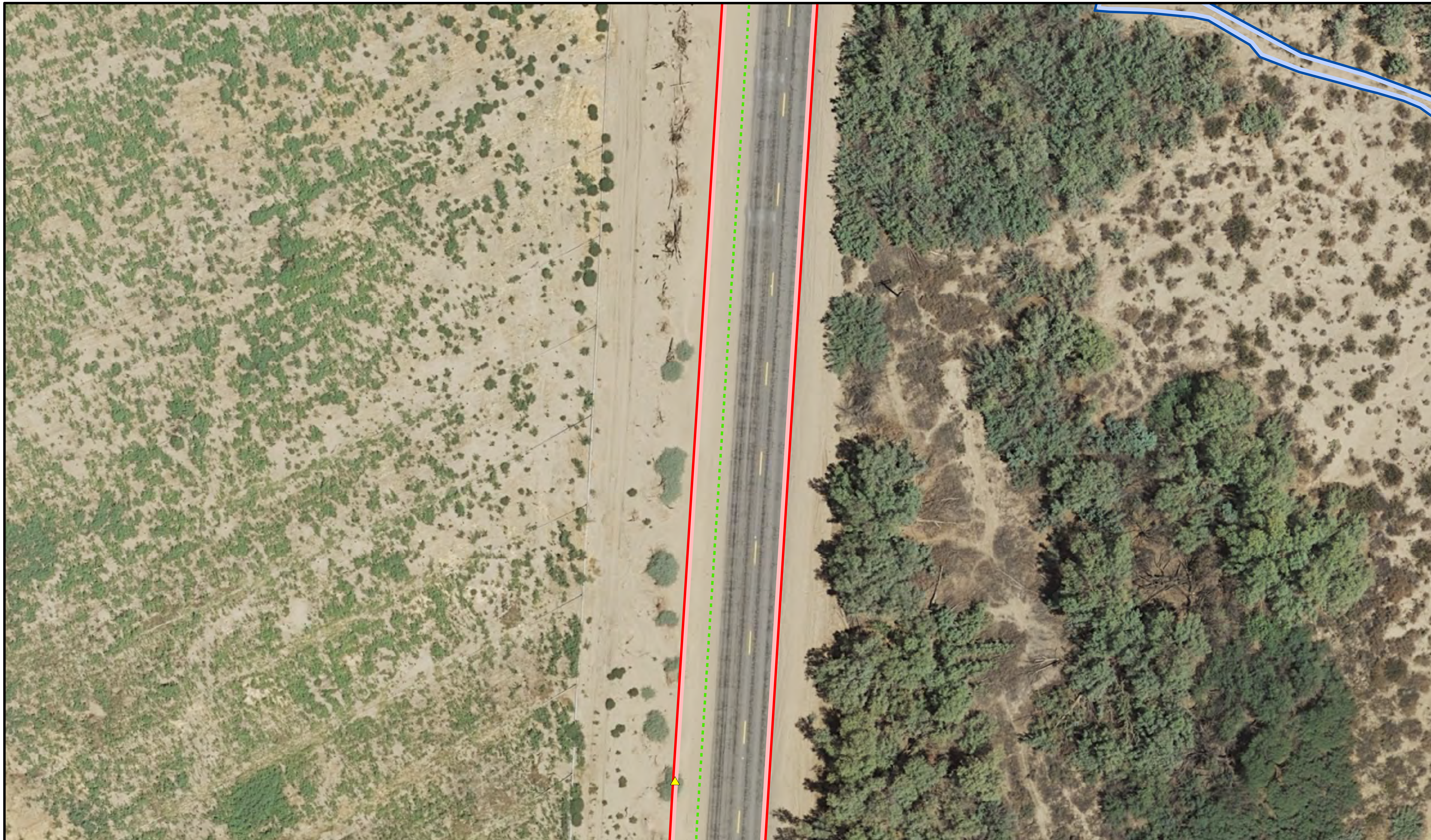
Footprint
Havasu National Wildlife Refuge
CDFW Ephemeral Stream

N

0 10 20 40 Feet



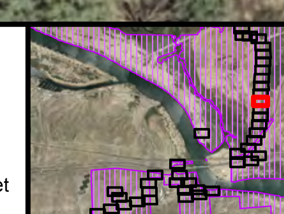
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 29 of 42



Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush	
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite	
					Salt Cedar	

N

0 10 20 40 Feet



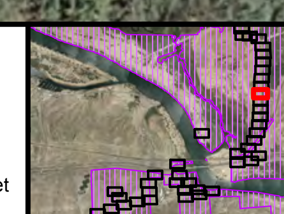
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 30 of 42

Path: R:\PGEAlliance\Topock\MapFiles\2015\CMS\FieldConstruction\FieldAnalysisMapbook_11112015_HNWR.mxd

Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush	
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite	
					Salt Cedar	

N

0 10 20 40 Feet

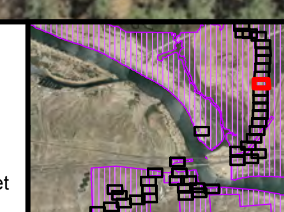


Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 31 of 42

Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush	
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite	
					Salt Cedar	

N

0 10 20 40 Feet



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 32 of 42

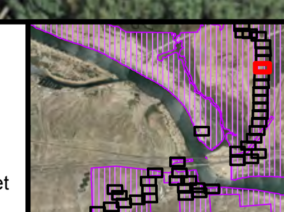
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 33 of 42

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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

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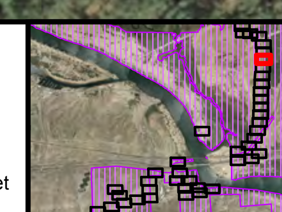
Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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



Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 35 of 42

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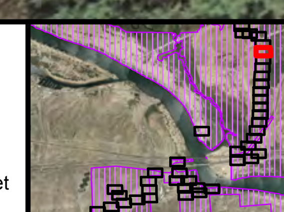


Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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

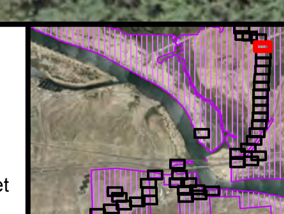
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 36 of 42

Path: R:\PGEAlliance\Topock\MapFiles\2015\CMS\FieldConstruction\FieldAnalysisMapbook_11112015_HNWR.mxd

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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

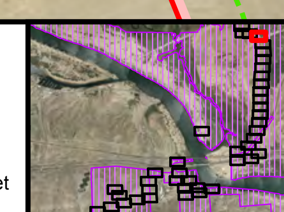


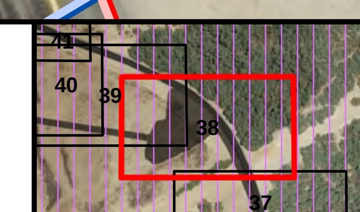
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 37 of 42

Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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



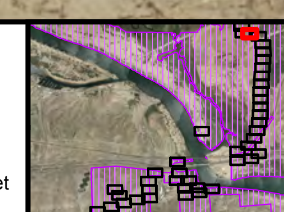


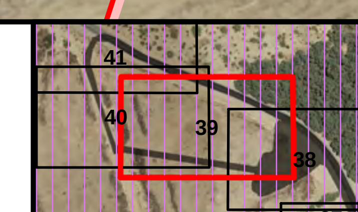
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 38 of 42

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Catclaw acacia
- Cattle saltbush
- Cholla (various)
- Cheesebush
- Creosote bush
- Desert Lavender
- Desert Smoke Tree
- Foxtail Cactus
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Skeletonweed
- 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



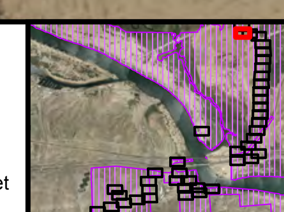


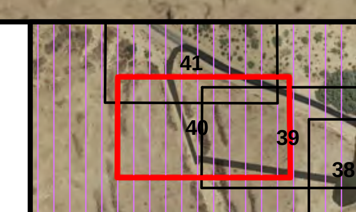
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 39 of 42

- Anderson's desert thorn
- Arrowweed
- Beavertail
- Big Saltbush
- Brittlebush
- Burrow bush
- Catclaw acacia
- Cattle saltbush
- Cholla (various)
- Cheesebush
- Creosote bush
- Desert Lavender
- Desert Smoke Tree
- Foxtail Cactus
- Honey Mesquite
- Honeysweet
- Jimsome weed
- Palo Verde
- Pygmy cedar
- Salt cedar
- Silver cholla
- Skeletonweed
- 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



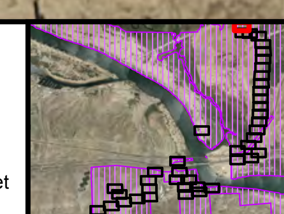


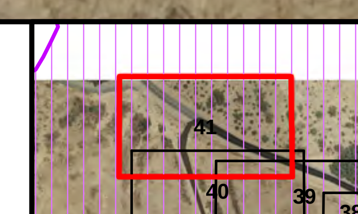
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 40 of 42

Anderson's desert thorn	Burrow bush	Creosote bush	Honeysweet	Silver cholla	Arrowweed	Footprint	
Arrowweed	Catclaw acacia	Desert Lavender	Jimsome weed	Skeletonweed	Palo Verde	Havasu National Wildlife Refuge	
Beavertail	Cattle saltbush	Desert Smoke Tree	Palo Verde	Sweetbush	Catclaw acacia	CDFW Ephemeral Stream	
Big Saltbush	Cholla (various)	Foxtail Cactus	Pygmy cedar	White rhatany	Creosote bush		
Brittlebush	Cheesebush	Honey Mesquite	Salt cedar	Photo Location and Direction	Honey Mesquite		
					Salt Cedar		

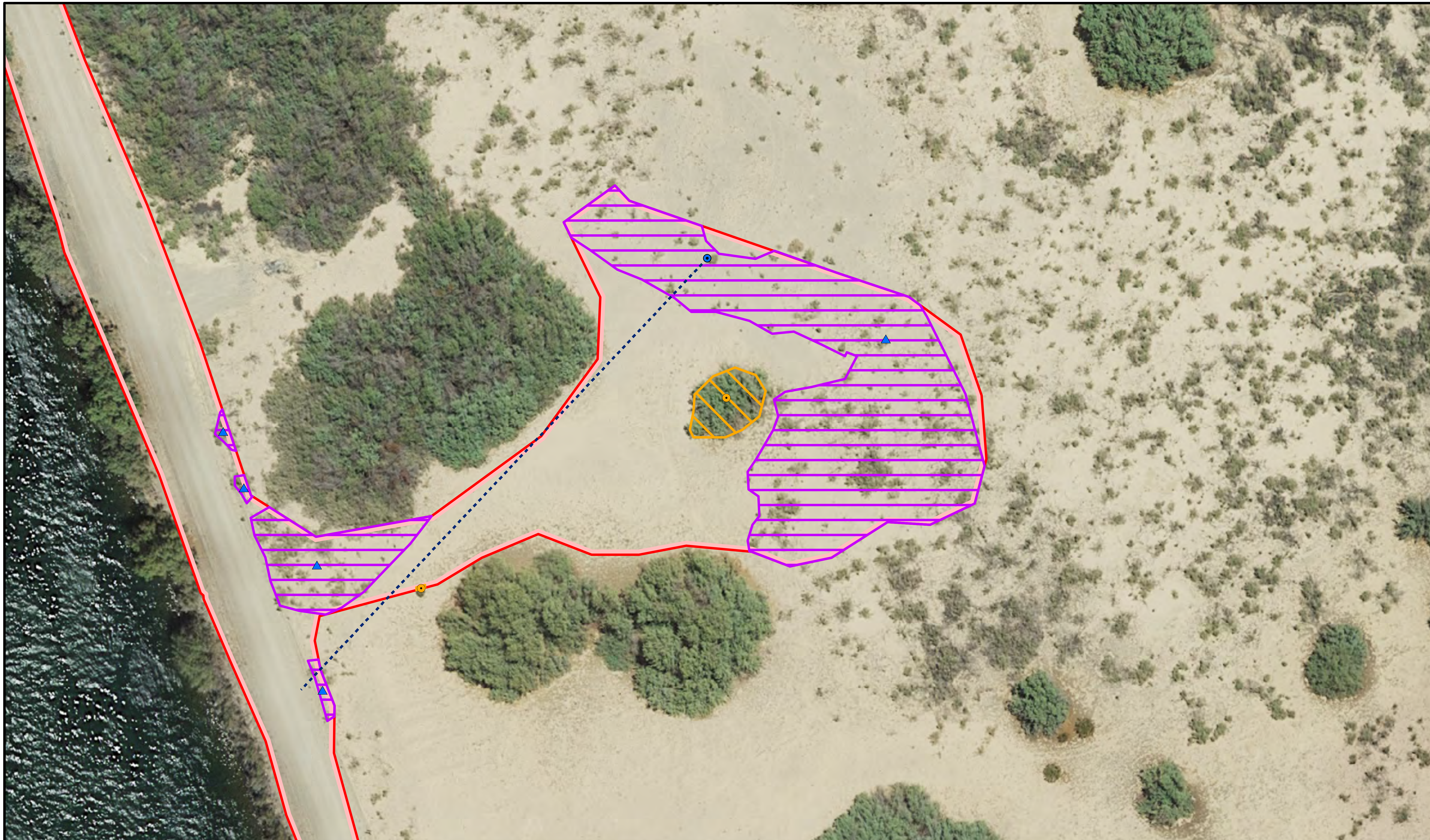
N

0 10 20 40 Feet





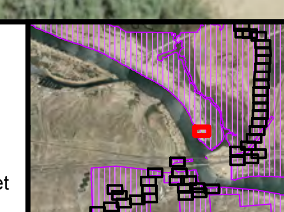
Construction Footprint Vegetation Impacts and Photo Locations in the Havasu National Wildlife Refuge: 41 of 42

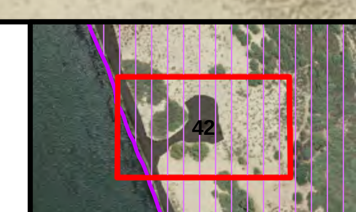


Anderson's desert thorn
Arrowweed
Beavertail
Big Saltbush
Brittlebush
Burrow bush
Catclaw acacia
Cattle saltbush
Cholla (various)
Cheesebush
Creosote bush
Desert Lavender
Desert Smoke Tree
Foxtail Cactus
Honey Mesquite
Honeysweet
Jimsome weed
Palo Verde
Pygmy cedar
Salt cedar
Silver cholla
Skeletonweed
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

Path: R:\PGEAlliance\Topock\MapFiles\2015\CMS\FieldConstruction\FieldAnalysisMapbook_11112015_HNWR.mxd

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

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

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

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

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

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 35

Photo 36

Photo 37

Photo 38

Photo 39 (April 9, 2014)

Photo 40

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 41

Photo 42

Photo 43

Photo 44

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 45

Photo 46

Photo 47

Photo 48

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 49

Photo 50

Preconstruction Photos – Havasu National Wildlife Refuge
All photos taken between August 6 and 8, 2014, unless otherwise noted

Photo 51 (April 7, 2014)

Photo 52 (April 7, 2014)

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)

Photo 57 (April 7, 2014)

Photo 58 (April 7, 2014)

Photo 59

Photo 60

Photo 61 (April 7, 2014)

Photo 62 (April 7, 2014)

Appendix B
Commercial Nurseries that Grow Native Mojave Desert Plants

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):

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____

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____

____

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: November 18, 2015 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:

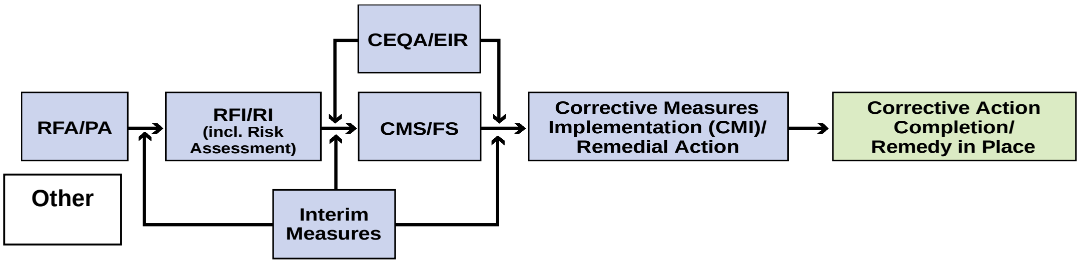
This report was prepared in response to mitigation measure CUL-1a-8.

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

November 2015

Cultural Impact Mitigation Program

Prepared for:

Pacific Gas and Electric Company

Date:

November 2015

Table of Contents

Figure

Appendices

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).

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[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., 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

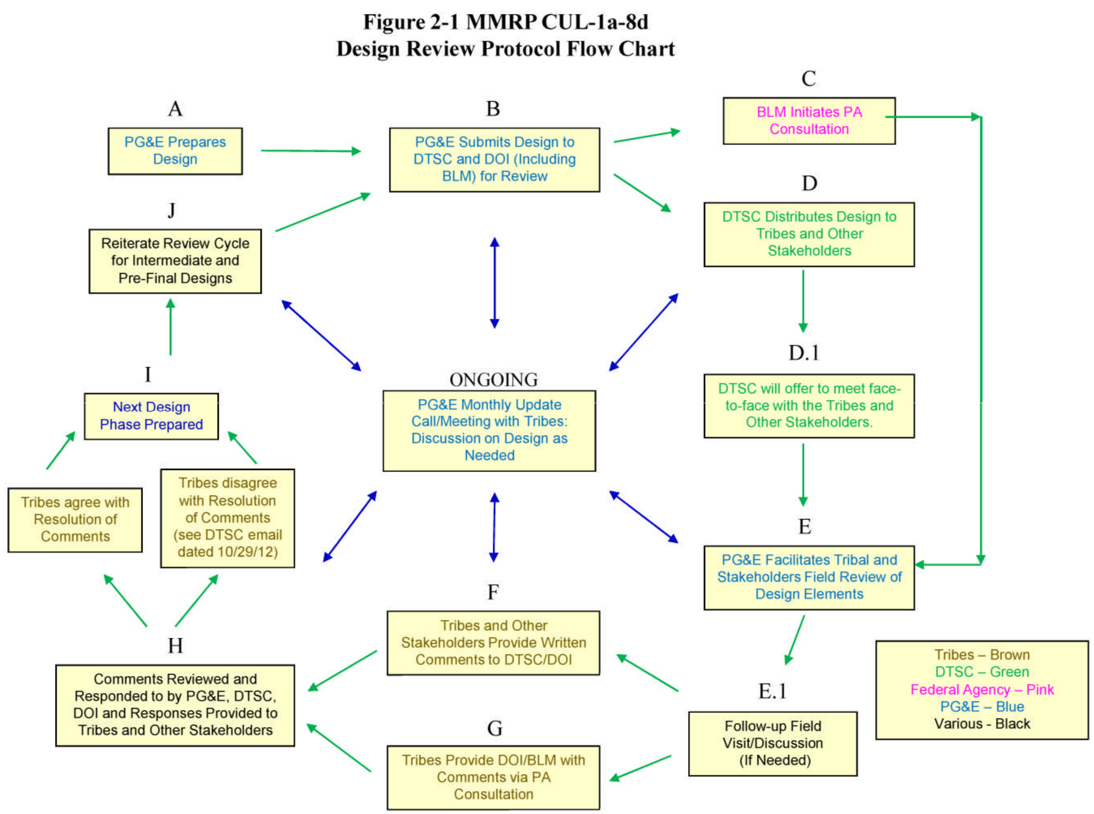
Figure 2-1 MMRP CUL-1a-8d
Design Review Protocol Flow Chart
A
PG&E Prepares Design
B
PG&E Submits Design to DTSC and DOI (Including BLM) for Review
C
BLM Initiates PA Consultation
D
DTSC Distributes Design to Tribes and Other Stakeholders
D.1
DTSC will offer to meet face-to-face with the Tribes and Other Stakeholders.
E
PG&E Facilitates Tribal and Stakeholders Field Review of Design Elements
E.1
Follow-up Field Visit/Discussion (If Needed)
F
Tribes and Other Stakeholders Provide Written Comments to DTSC/DOI
G
Tribes Provide DOI/BLM with Comments via PA Consultation
H
Comments Reviewed and Responded to by PG&E, DTSC, DOI and Responses Provided to Tribes and Other Stakeholders
Tribes agree with Resolution of Comments
Tribes disagree with Resolution of Comments (see DTSC email dated 10/29/12)
I
Next Design Phase Prepared
J
Reiterate Review Cycle for Intermediate and Pre-Final Designs
ONGOING
PG&E Monthly Update Call/Meeting with Tribes: Discussion on Design as Needed
Tribes – Brown
DTSC – Green
Federal Agency – Pink
PG&E – Blue
Various - Black

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

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 (100% 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 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

ARCADIS

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

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E2 Consulting Engineers, Inc.

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Appendix

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

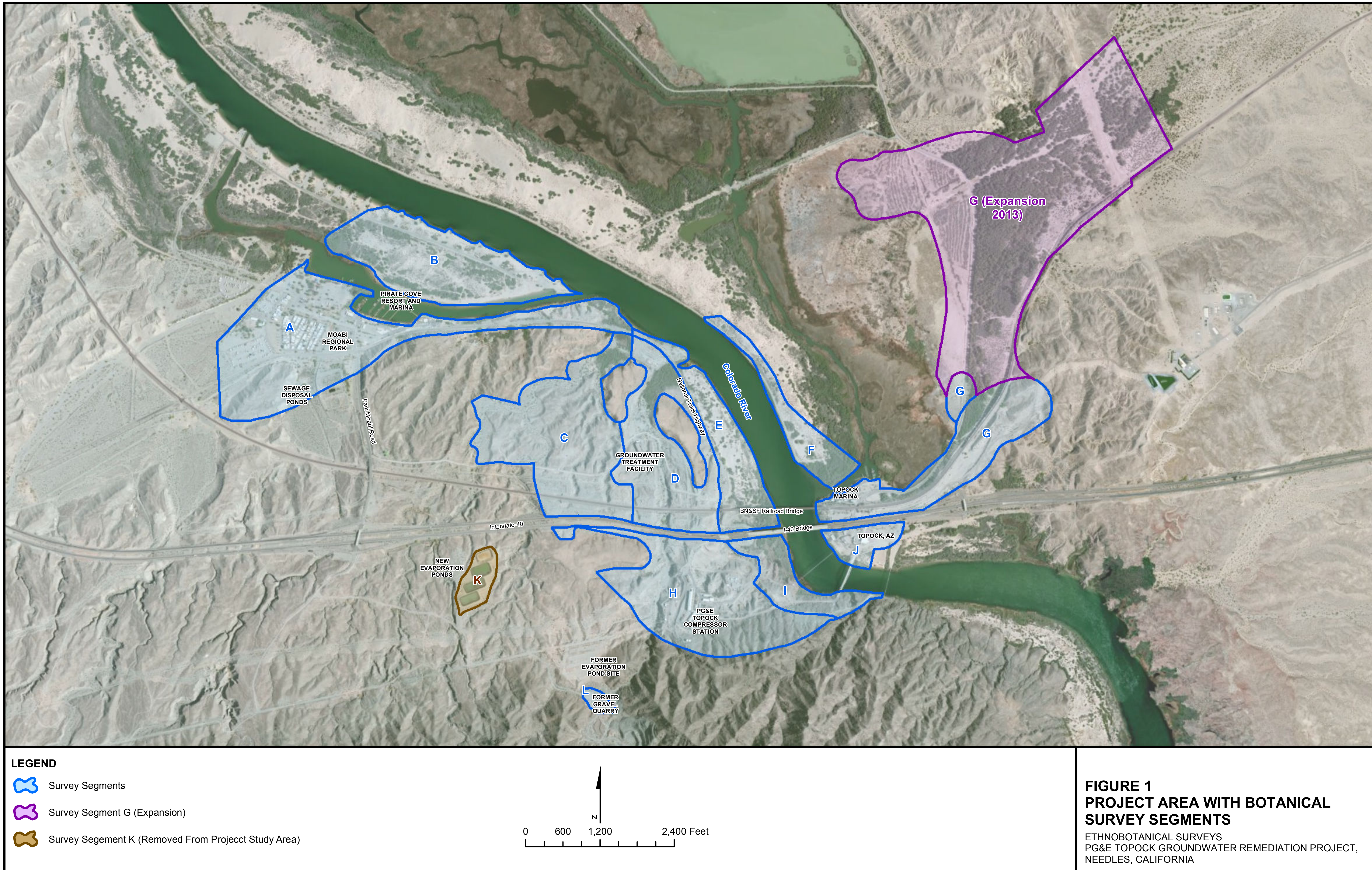


FIGURE 1
PROJECT AREA WITH BOTANICAL SURVEY SEGMENTS

ETHNOBOTANICAL SURVEYS
PG&E TOPOCK GROUNDWATER REMEDIATION PROJECT,
NEEDLES, CALIFORNIA

CH2MHILL

D:\Projects\Topock\MapFiles\2011\CMS\BioSurveySegements 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

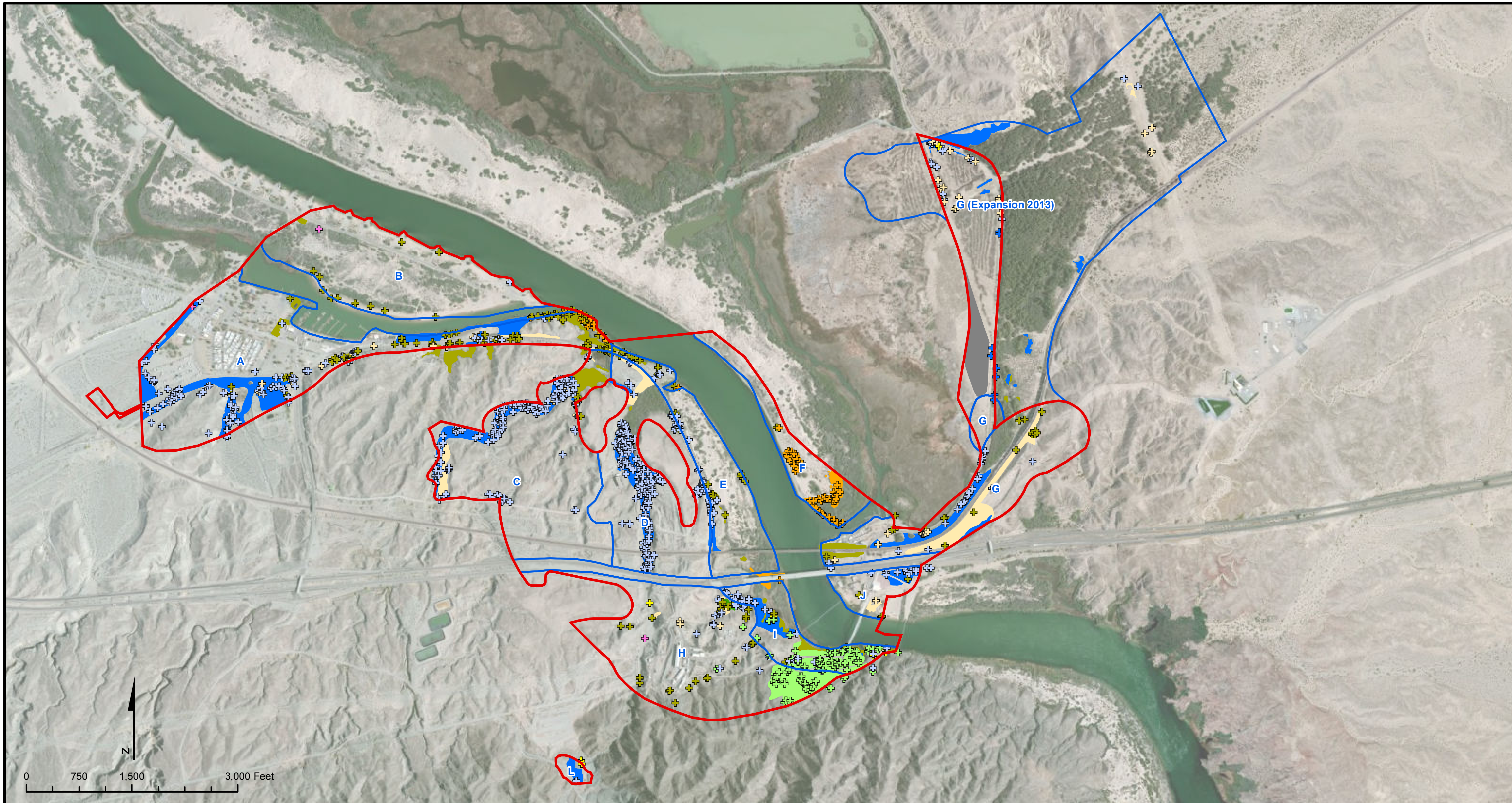
The distributions of several of the culturally significant plants (ethnoplants) in the Project Area and identified in the additional freshwater well survey areas are shown on Figure 2 and 3 as points or polygons. The locations of common, abundant and widely distributed species such as golden suncup (*Chylismia 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	Gooddings's Willow - Salix gooddingii
Blue Palo Verde - Parkinsonia florida	Hillside Palo Verde - Parkinsonia microphylla
Cattle Saltbush - Atriplex polycarpa	Honey Mesquite - Prosopis glandulosa
Desert Tobacco - Nicotiana obtusifolia	Screwbean Mesquite - Prosopis pubescens

Common Name - Scientific Name	
Blue Palo Verde - Parkinsonia florida	Hillside Palo Verde - Parkinsonia florida
Blue Paloverde/Honey Mesquite - Mixed	Honey Mesquite - Prosopis glandulosa
Cattle Saltbush - Atriplex polycarpa	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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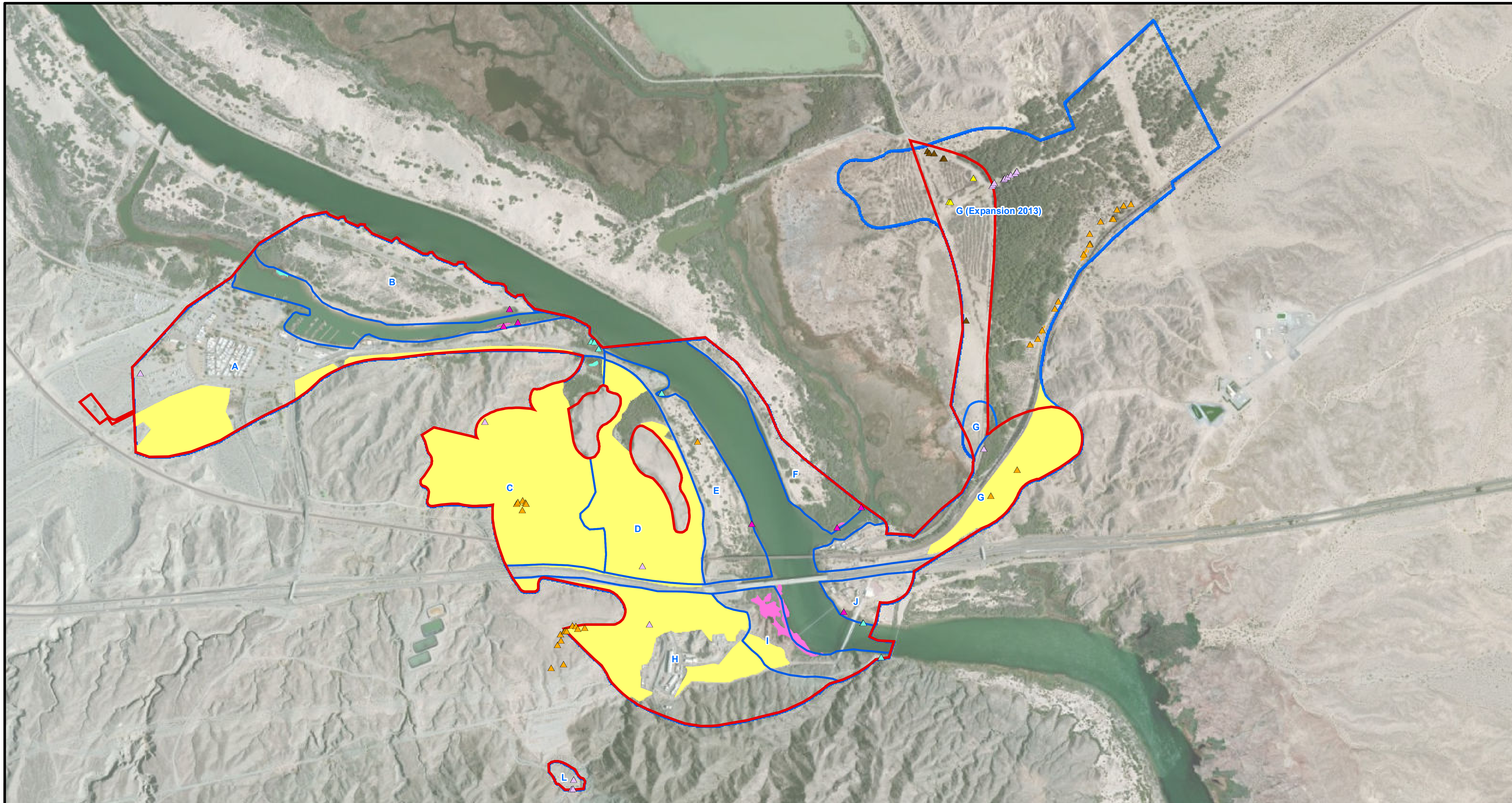

LEGEND

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*

0 750 1,500 3,000 Feet

N

FIGURE 3
CULTURALLY SIGNIFICANT HERBS IN THE PROJECT AREA
ETHNOBOTANY SURVEY
PG&E TOPOCK GROUNDWATER REMEDIATION PROJECT, NEEDLES, CALIFORNIA

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Document Path: D:\Projects\Topock\MapFiles\2014\Vegetation\EthnoBotany_SurveyReport\Final\FIG3_Herbs.mxd

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.

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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

ARCADIS

Appendix B

IM-3 Decommissioning Plan

Appendix F

Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan

PG&E Topock Compressor Station, Needles, California

Prepared for

Pacific Gas & Electric Company

November 2015

CH2MHILL®

155 Grand Avenue
Suite 800
Oakland, CA 94612

Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan

PG&E Topock Compressor Station Needles, California

Prepared for

Pacific Gas and Electric Company

November 18, 2015

Prepared by

November 18, 2015

John Porcella, P.E. C 70145
Project Engineer

Date

Approved by

November 18, 2015

Christina Hong, P.E. CH 4861
Project Manager

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Acronyms and Abbreviations

AOC	area of concern
AMO	air monitoring officer
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
BLM	U.S. Bureau of Land Management
BMP	best management practice
BOR	U.S. Bureau of Reclamation
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
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 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
General Permit	NPDES General Permit No. CAS00001
gpm	gallons per minute
HCI	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 and	IM-3 Treatment Plant, extraction, injection, and conveyance system components 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
PAMP	Perimeter Air Monitoring Plan
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
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
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

SECTION 1

Introduction

1.1 Purpose and Scope

Pacific Gas and Electric Company (PG&E) is implementing a final groundwater remedy (the Final Remedy, or the groundwater 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 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 are presented in the Basis of Design Report for the Final Remedy (part of the final design documents [CH2M HILL 2015a]) and the Construction/Remedial Action Work Plan (CH2M HILL 2015b) 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 confirming that the groundwater remedy has achieved plume control and is operating properly and

[1] PG&E and the United States executed the CD in 2012, and it was approved by the United States District Court for the Central District of California in November 2013.

successfully in accordance with the 2012 Settlement Agreement between DTSC and the FMIT (see Section 1.2.2 for details). 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.

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 (BOR), 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.

[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.

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 DTSC determines that the Final Remedy is operating properly and successfully and DOI provides concurrence on DTSC's determination.

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 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), IM-3 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 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 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 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 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
- 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.
- Four conduits and one water pipe buried in the steep slope east of the MW-20 Bench (PG&E understands that the current landowner BLM prefers that these conduits and water pipe be removed).

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.

As stated in Section 4 and illustrated in Figure 3-5 of this Work Plan, PG&E intends to abandon in place four water pipes and several conduits in a shared trench under Bat Cave Wash near the IM-3 treatment plant, to avoid disturbance to sensitive habitats in the wash. PG&E recognizes that FMIT as a landowner may have a preference to remove the pipes/conduits. PG&E will discuss this issue with FMIT prior to decommissioning, as part of its development of the final, detailed restoration plan.

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 IM-3 injection and extraction wells are needed to convey water to the IM-3 treatment plant or from the treatment plant for re-injection. The extracted groundwater cannot be re-injected without treatment and therefore these IM-3 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.

As for the existing IM-3 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, BOR, 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.

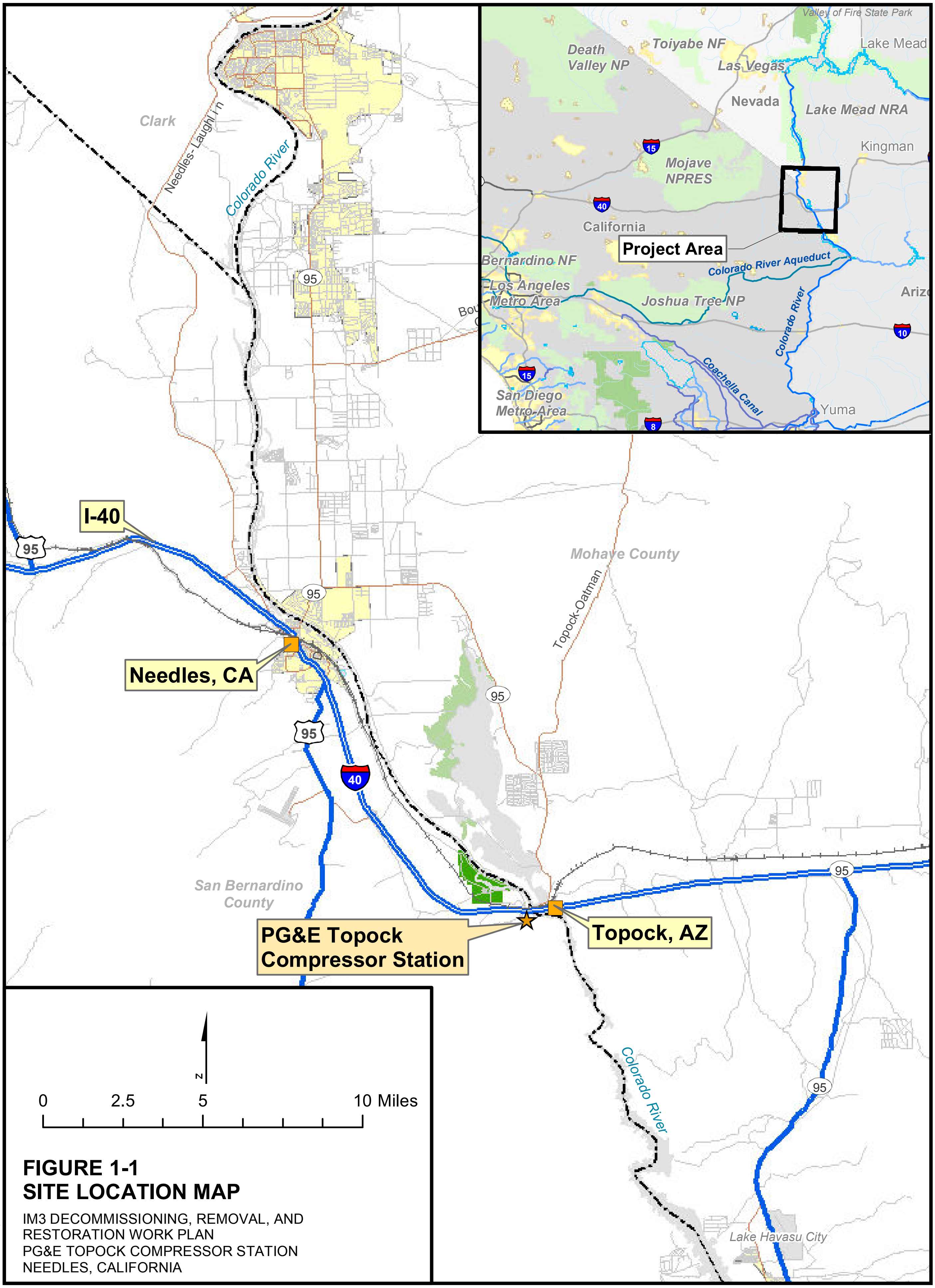
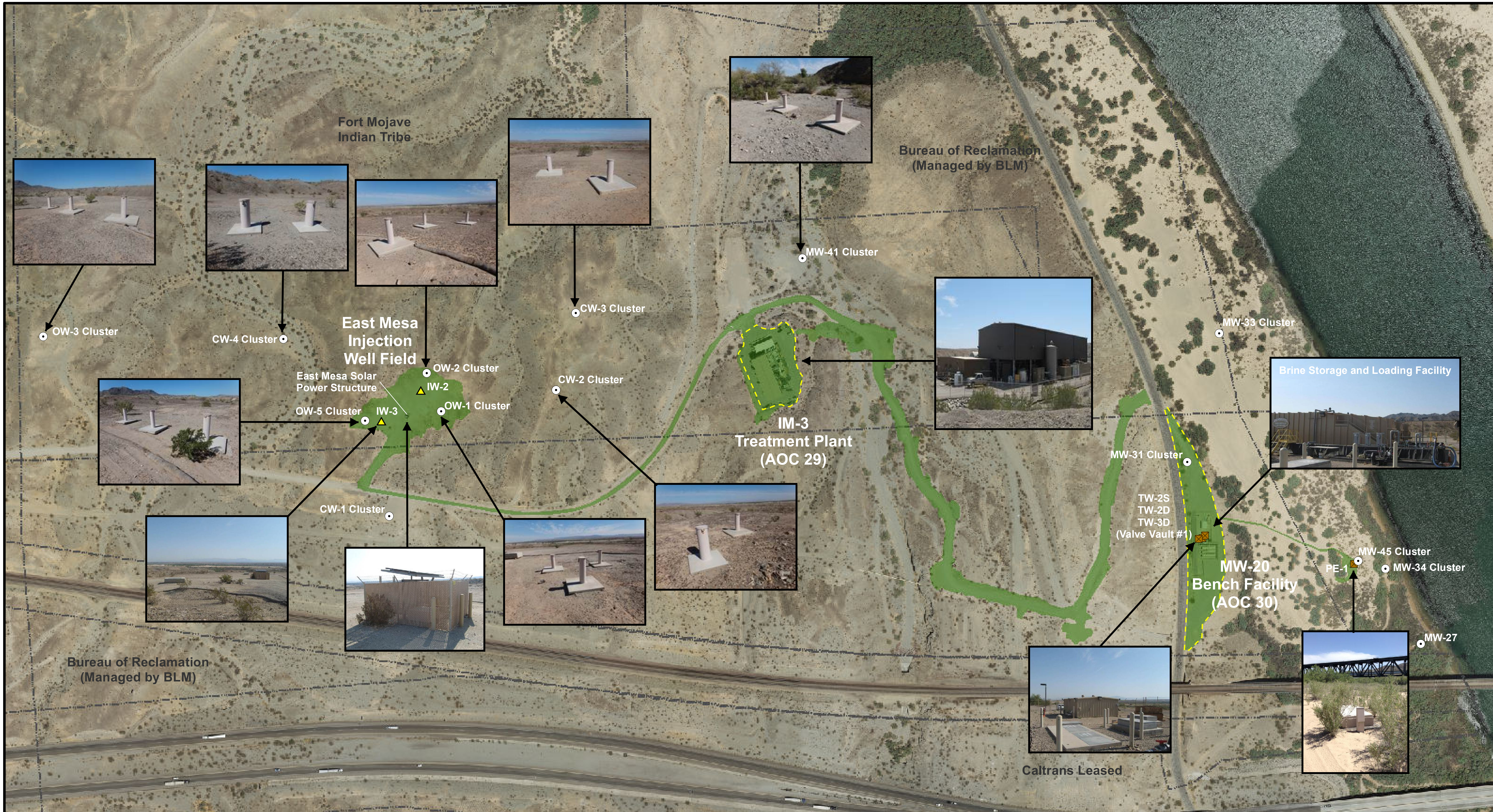


FIGURE 1-1
SITE LOCATION MAP

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 (November 2015) 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. The brine will then be hauled offsite to a permitted 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 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 [November 2015] 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. Test the liquid contents of the brine storage tanks that contain brine rinsate from Steps 8 and 9 to determine which of the following is the appropriate liquid management approach: 1) injecting the liquid contents into the in situ system, 2) transporting the liquid contents to the TCS evaporation ponds, or 3) arranging for offsite disposal to a permitted offsite facility(ies). The selection of an option will be affected by the quality of the water (e.g., effects of salinity on in situ microbial population) and regulatory requirements. The most appropriate option will be selected and performed. Using the brine system rinsate in the remedy will only be considered if appropriate for use in the remedy and if approval is obtained from the Colorado River Basin Regional Water Quality Control Board (Regional Water Board) through the Waste Discharge Requirements permit allowing such use.
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.
24. Verify lab equipment is clean and the laboratory is left in a clean and safe condition.
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.

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 the 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).

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.

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.
- 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 demarcated prior to commencing work in that primary work zone. Contaminant reduction zones are shown only at the IM-3 Treatment Facility on Figure 3-2. The project manager will establish contaminant reduction zones for other areas including the MW-20 Bench and along the extraction pipelines as needed to facilitate decommissioning activities and protect worker and public safety. 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 (note that portable toilets will not be placed in the support/staging area across from the IM3 Treatment Plant), 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.

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. Note that portable toilets will not be placed in the support/staging area across from the IM-3 Treatment Plant. 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 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 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 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 conduit 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.

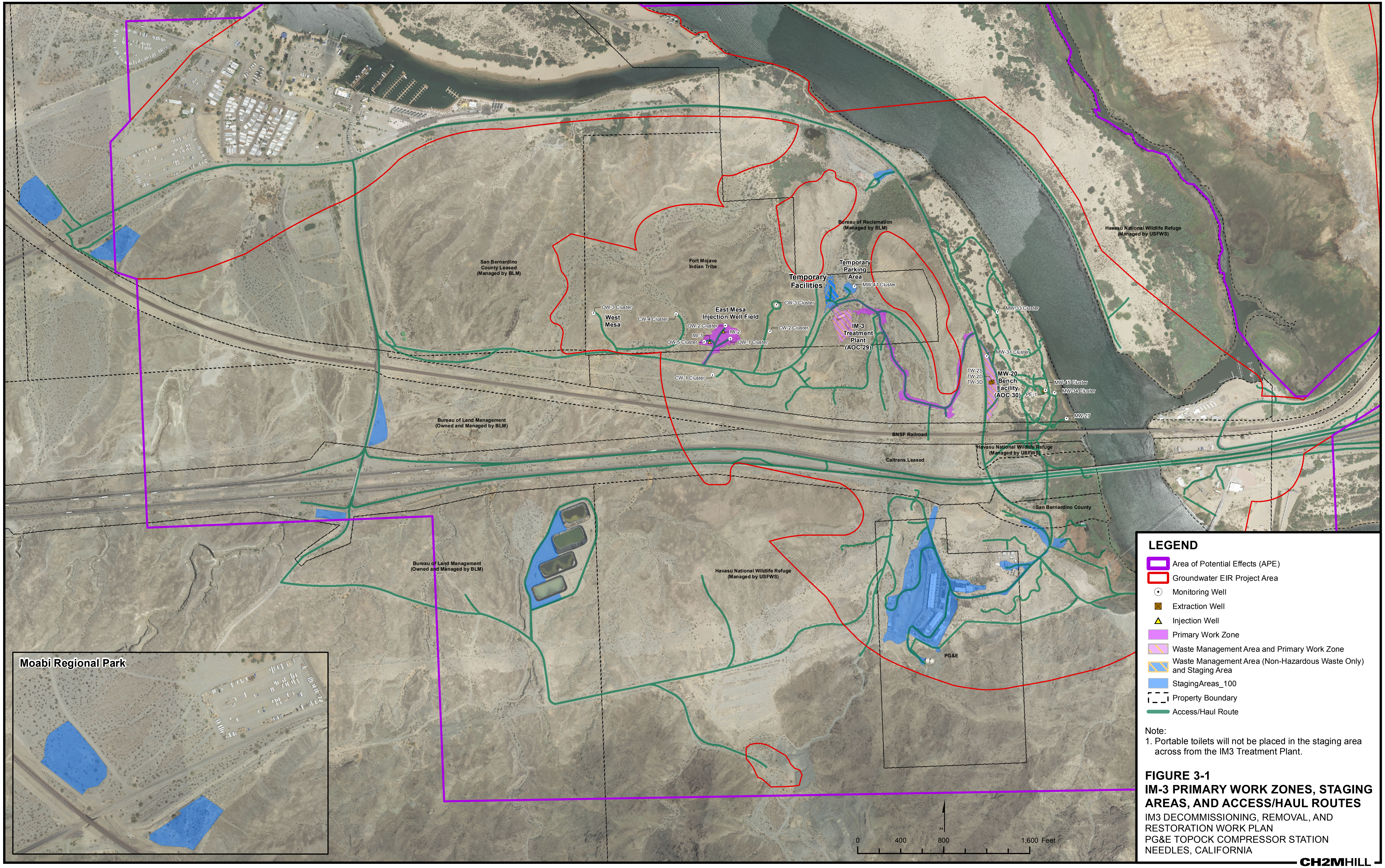
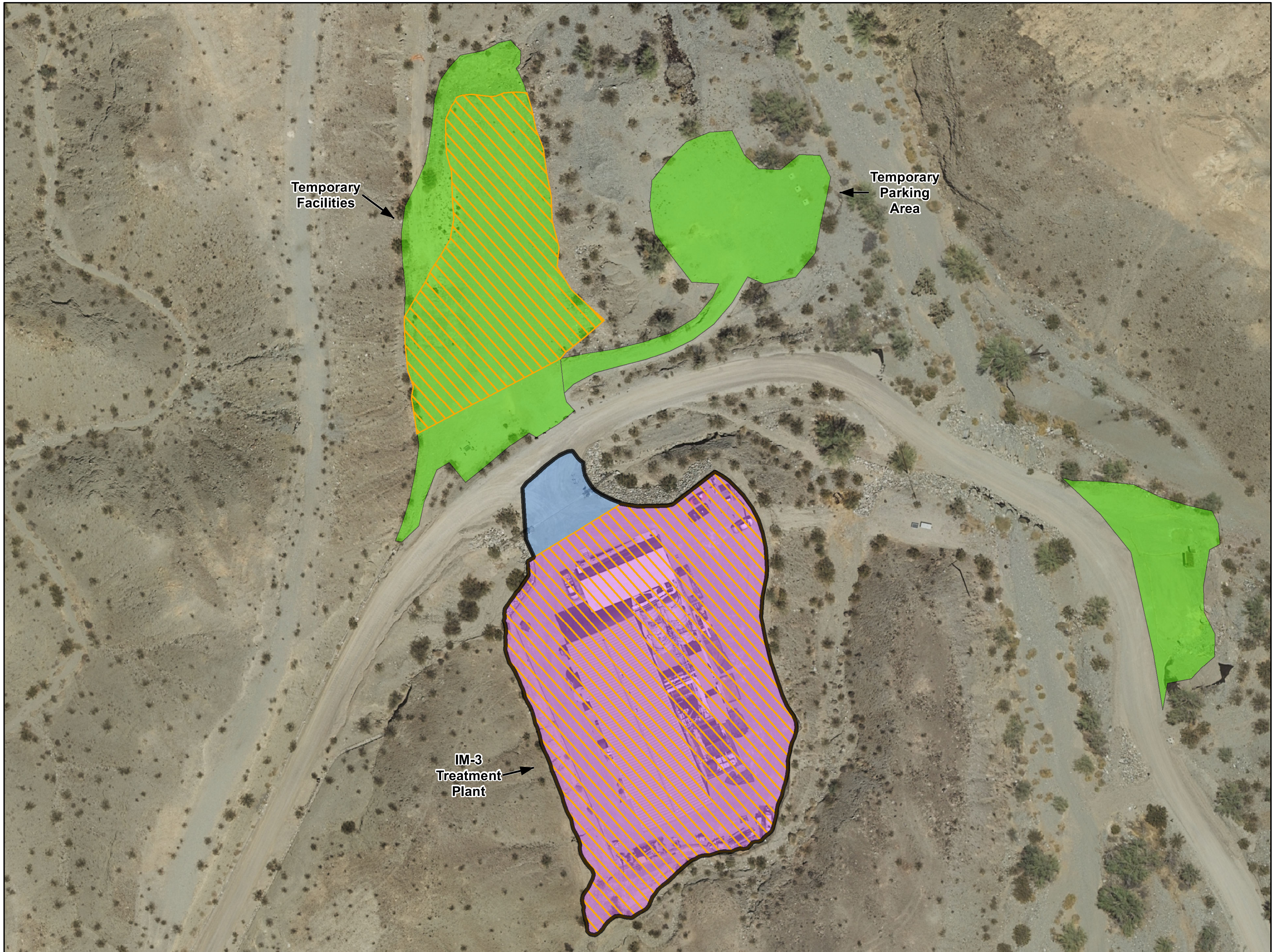


FIGURE 3-1
IM-3 PRIMARY WORK ZONES, STAGING AREAS, AND ACCESS/HAUL ROUTES
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



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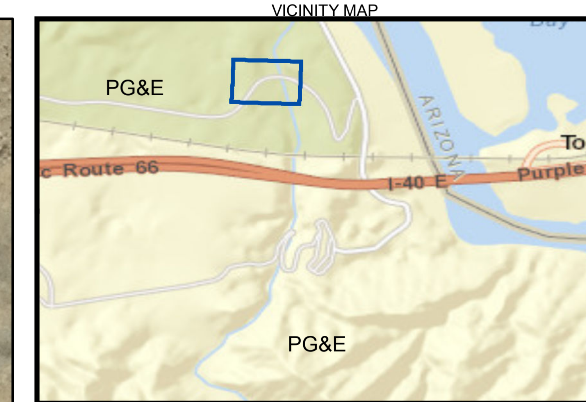


LEGEND

- Primary Work Zone Boundary
- Exclusion Zone
- Support Zone
- Contaminant Reduction Zone
- Exclusion Zone and Waste Management Area
- Support Zone and Waste Management Area

Notes

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.
2. Portable toilet(s) will not be placed in the support area across from the IM3 Treatment Plant.

N

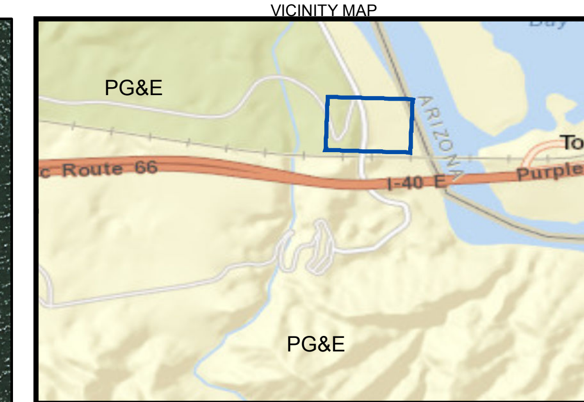
0 25 50 100 150

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

VICINITY MAP



LEGEND

Primary Work Zone Boundary

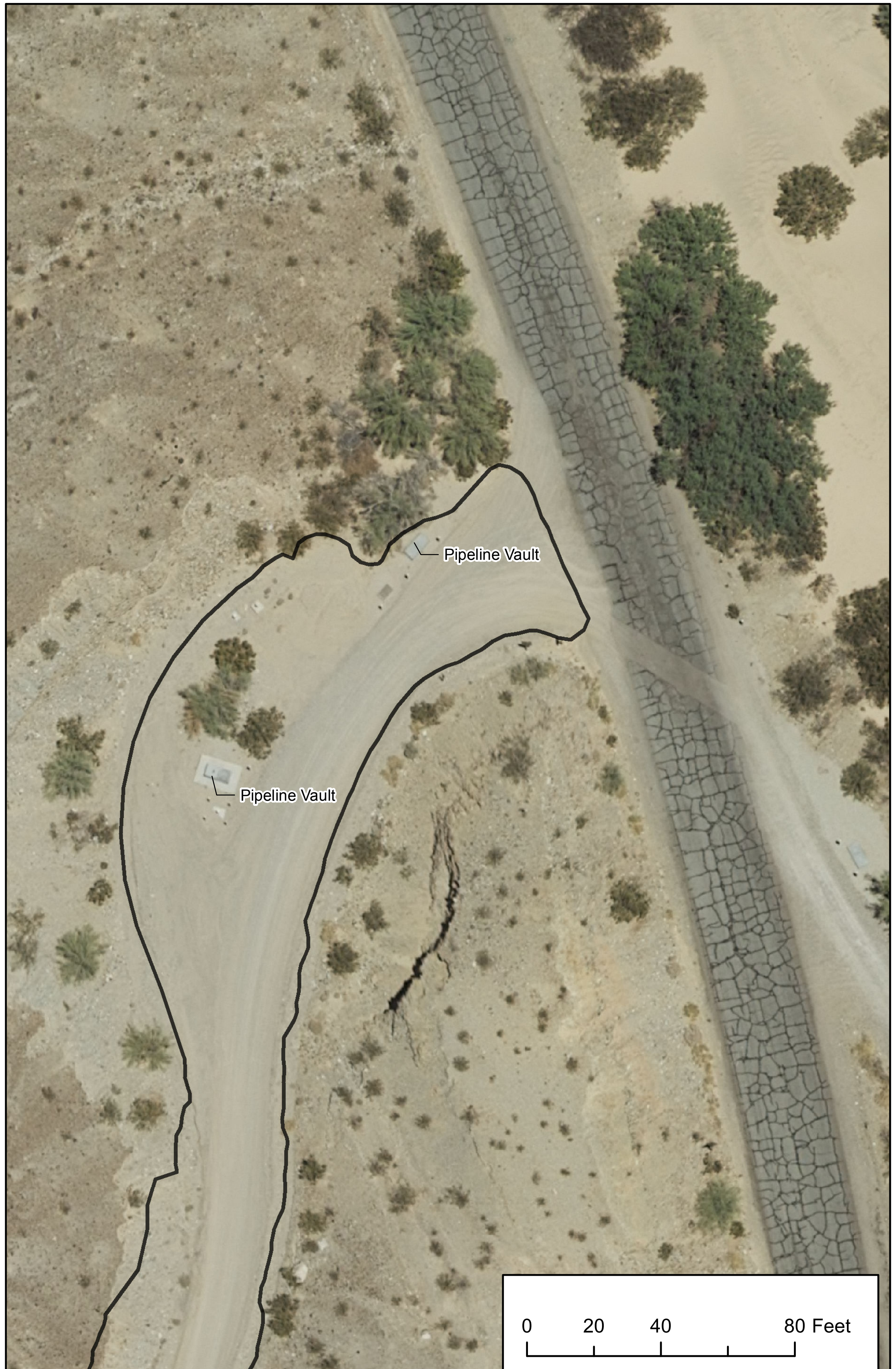
Note:
1. The primary work zone boundary is approximate and is estimated based on site history and observations. Air monitoring requirements and the requirements of the work may cause the boundary shown on this figure to change.
2. Contaminant reduction zones will be established as needed in the field by the project manager in accordance with the approved work plan.

N

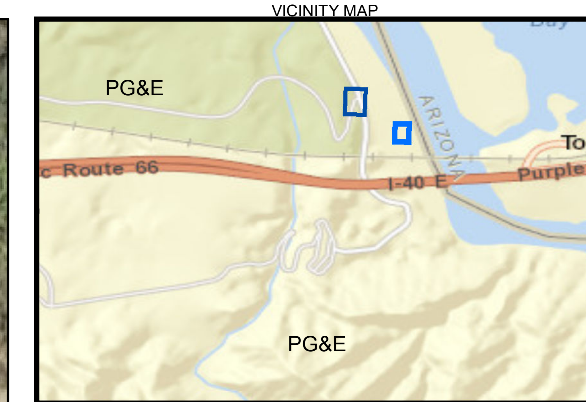
0 25 50 100 150 200
Feet

FIGURE 3-3
MW-20 BENCH FACILITY
PRIMARY WORK ZONE

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA



VICINITY MAP



LEGEND

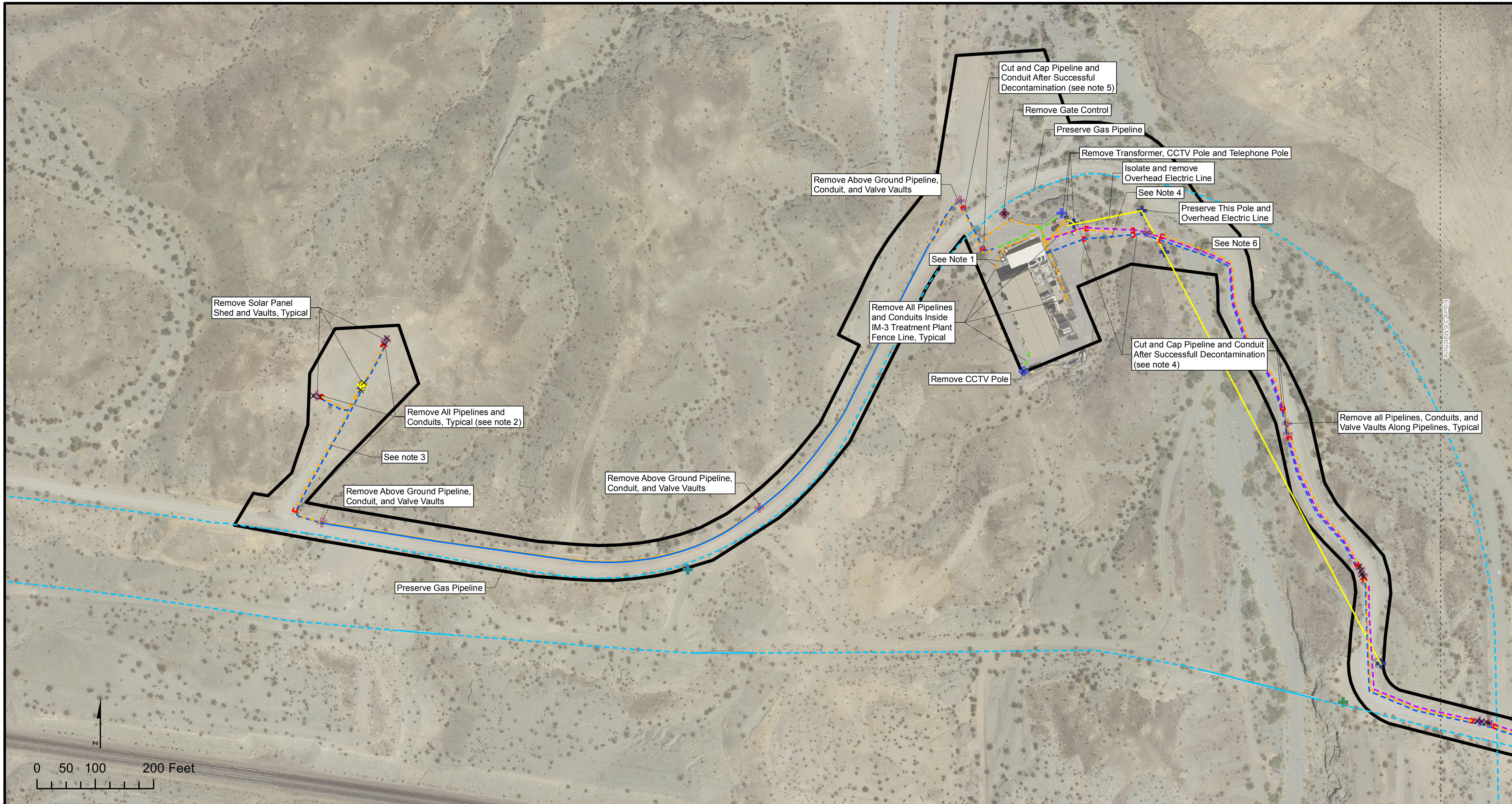
Primary Work Zone Boundary

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.
4. Contaminant reduction zones will be established as needed in the field by the project manager in accordance with the approved work plan.

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

CH2MHILL



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

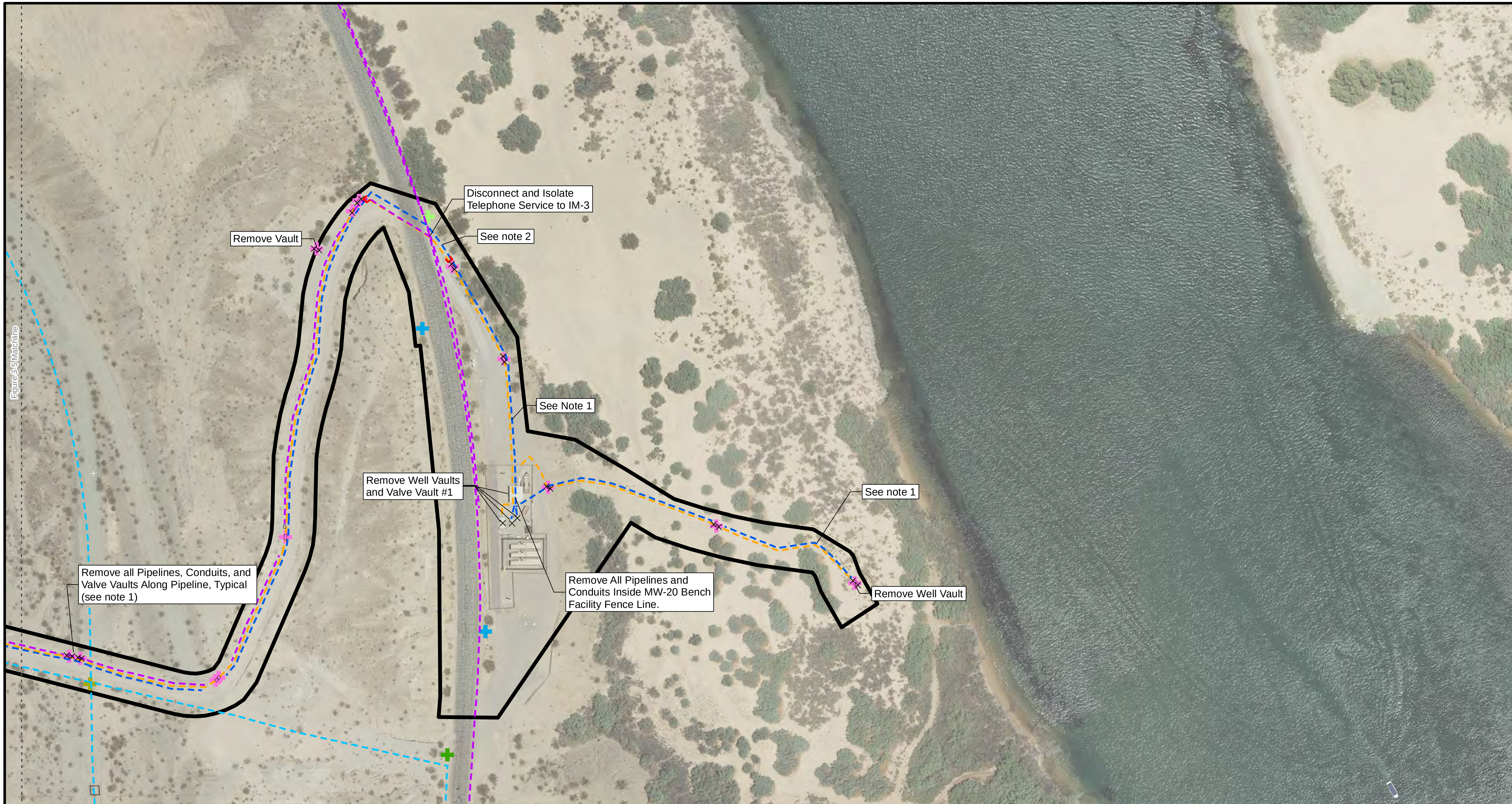
Notes:

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 pipelines and conduits in the shared trench are to be abandoned in place as shown to avoid disturbance to sensitive habitat.
7. Contaminant reduction zones will be established as needed in the field by the project manager in accordance with the approved work plan.

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



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

0 50 100 200 Feet

N

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 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).
3. Contaminant reduction zones will be established as needed in the field by the project manager in accordance with the approved work plan.

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

CH2MHILL

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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.

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 2015c). 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 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 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 (except for IW-2 and IW-3) because they are located in an area of contaminated soil and groundwater; however, this assumption will be confirmed with DTSC, DOI, the responsible agency (San Bernardino County), the affected land owner, Tribes, and other stakeholders before backfilling the wells. For wells IW-2 and IW-3, sealing material will be used to seal the well casing from total depth.

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 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 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.
4. Remove the valve vaults and the pipelines. The 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 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 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 conduit 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.

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.

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.

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:

1. Ferrous chloride storage and feed system
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 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 the Soil Management Plan (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 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.

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

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.]	Presumed Waste Category: Non-hazardous Waste: Non-hazardous Solid Waste No to Minimal Cleaning Required (Option to Recover Component or Structure in this Category)	Non-hazardous Waste: Non-hazardous Solid Waste Extensive Cleaning Required (Option to Recover Component or Structure in this Category)	Non-hazardous Waste: Cleaning Liquid and Solid Wastes Generated? (Y/N)	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)	Test Waste? (Y/N) *Refer to Section 5.1.2 of this Work Plan for Waste Characterization Procedures & Analysis Requirements*
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

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

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

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						
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)**	**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***
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.

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

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

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

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

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

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

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

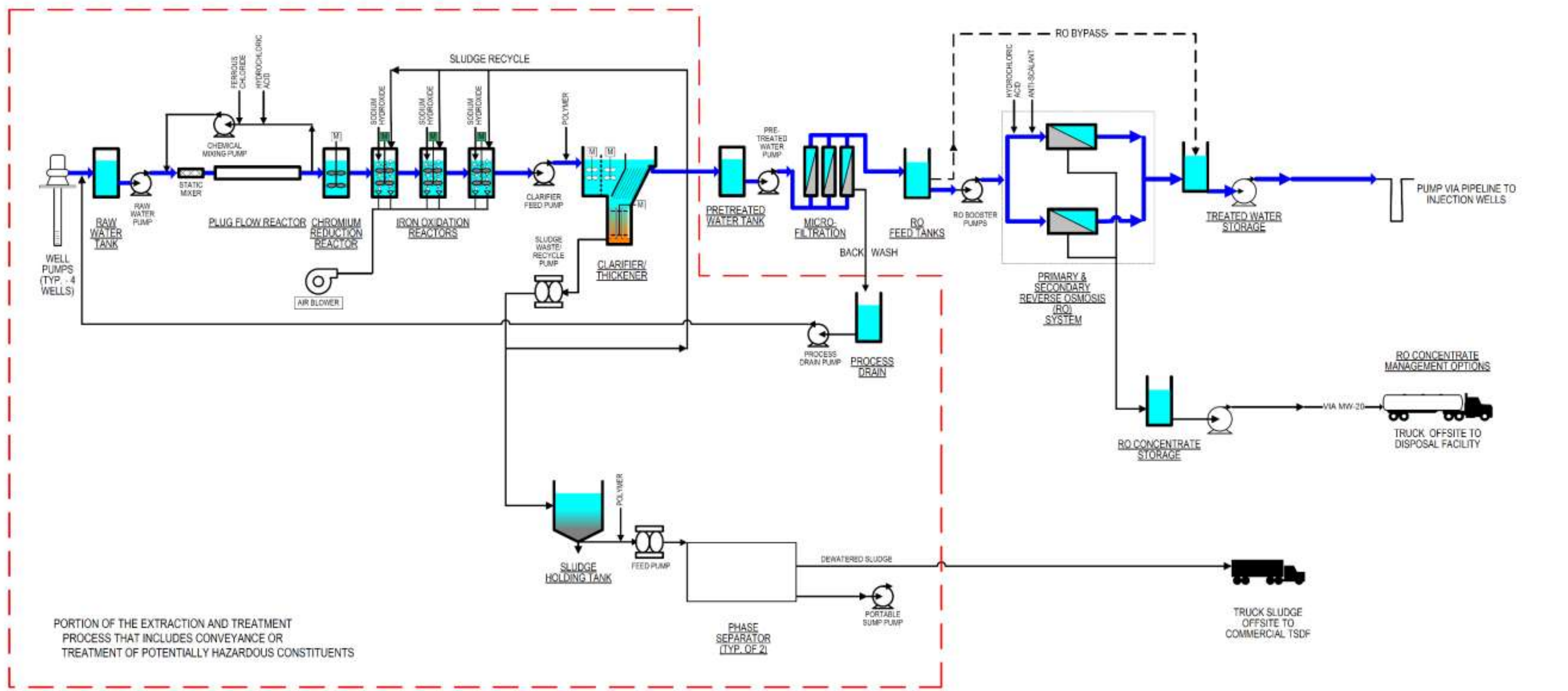
Specification	Description
Equipment Tag	Primary and Secondary RO Package System
Photo Numbers	29 and 31, (Appendix A)
Size/Type	Crown Solutions/Veolia Water – primary RO is 60 gpm with 75% recovery, followed by a secondary RO that is 15 gpm with 50% recovery
Materials of Construction	Superduplex, stainless 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

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



NEW LEGEND ADDED IN RESPONSE RTC #1155

Primary process line

Secondary process line

Membrane housing for reverse osmosis or microfiltration

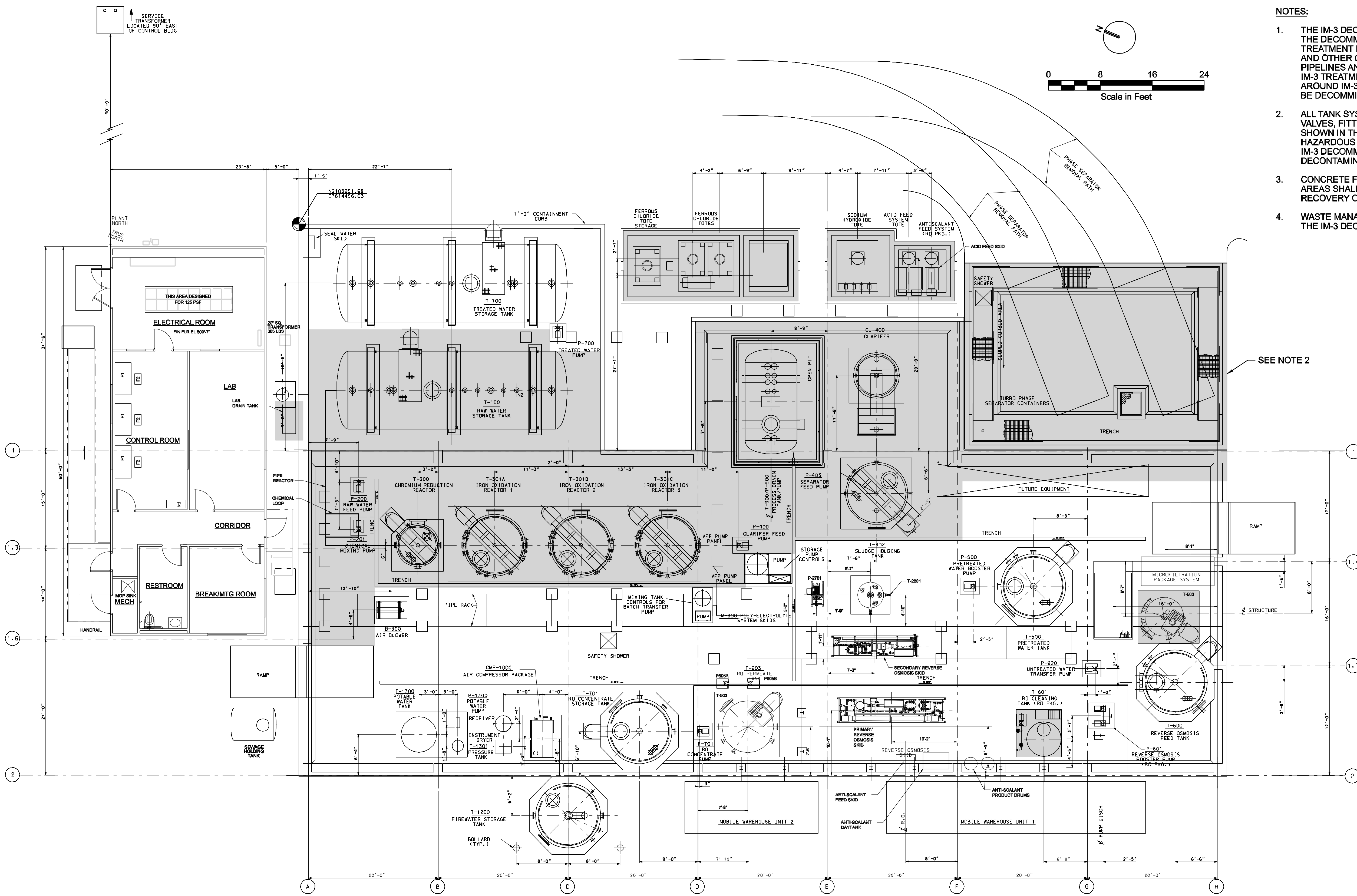
Process tank containing liquids (blue indicates water and gray or orange indicate solids or sludge)

Clarifier (orange shading indicates sludge accumulation)

Oxidation tank (circles in blue shaded area indicate bubbles)

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

CH2MHILL



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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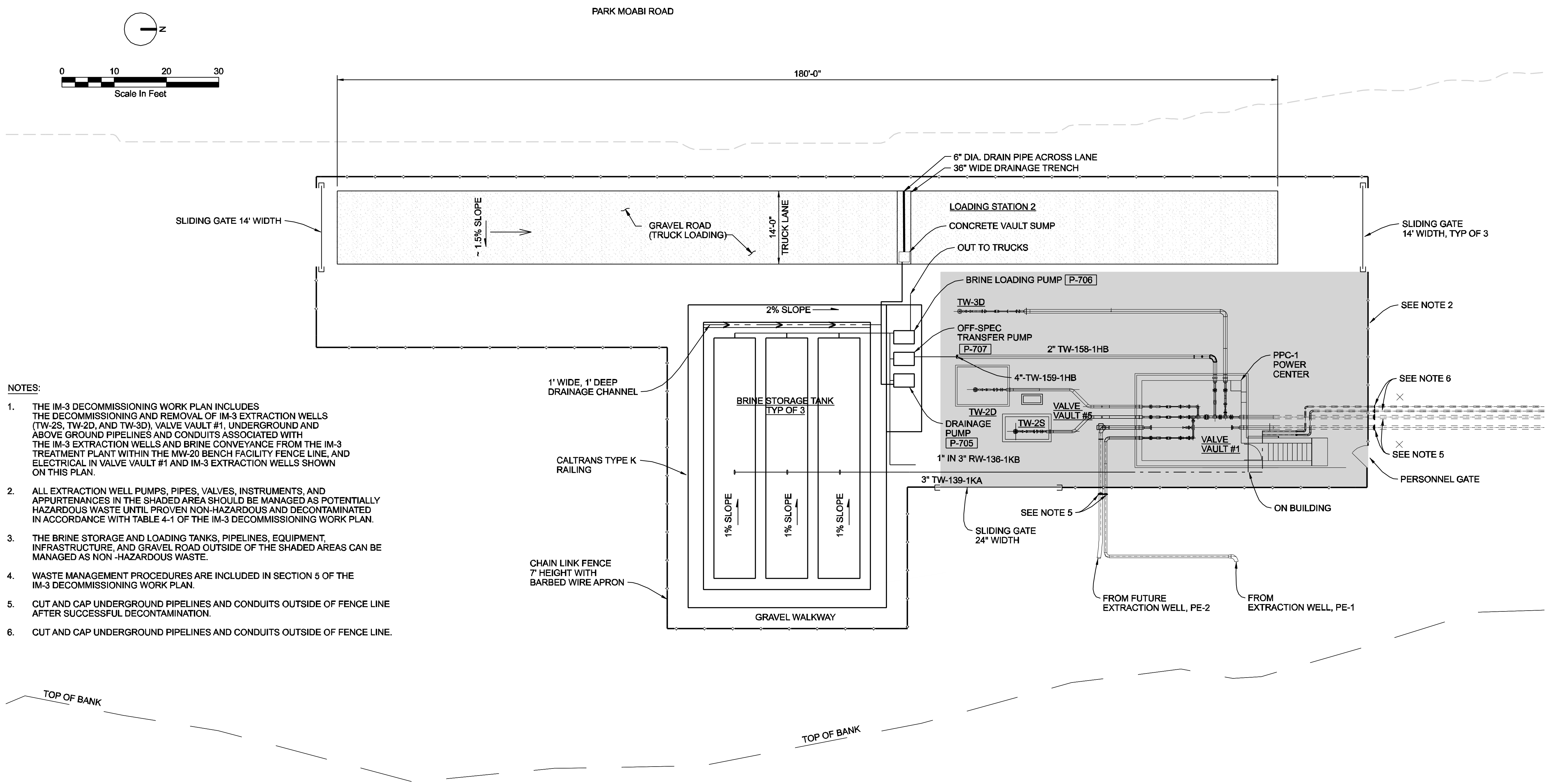
im-3 tpdp.dgn



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

CH2MHILL

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

FIGURE 4-6
Truck with typical pull behind water buffalo (front), typical crane (right)

FIGURE 4-7
Typical concrete crusher

FIGURE 4-8
Typical crane removing a typical tank

FIGURE 4-9
Typical roll off bins for temporary material storage/management (right)

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)

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)

FIGURE 4-14
Typical dump truck with second trailer

FIGURE 4-15
Typical front end crawler loader

FIGURE 4-16
Typical Reachfork

FIGURE 4-17
Typical excavator with pulverizer attachment

FIGURE 4-18
Typical vactor truck

FIGURE 4-19
Typical compactor

FIGURE 4-20
Typical personnel lifts (left), scissor lift (right)

FIGURE 4-21
Typical excavator using shear attachment

FIGURE 4-22
Typical water storage tanks (for dust control)

FIGURE 4-23
Typical compact excavator with breaker attachment

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 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 inside the containment structures for process chemicals and other containment areas exposed to treatment system sludge as well as visibly stained areas. 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 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, 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 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:

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.

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.

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

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.

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.

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.

TABLE 6-1
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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 (BOR), 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.

TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
IM-3 Decommissioning, Removal, and Restoration Work Plan
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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 (BOR), 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.

TABLE 6-1
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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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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-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.

TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
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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-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.

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
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.

TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
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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.

TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
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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-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 (BOR), 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.

TABLE 6-1
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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.
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.

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
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.
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.

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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.
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.

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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
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.

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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.
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.

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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.
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.

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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.	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.
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.			

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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.	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.
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.

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
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
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

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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.

TABLE 6-1
Summary of Compliance with Applicable EIR Mitigation Measures
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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.

TABLE 6-1
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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.

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, BOR 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 (BOR), 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.

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
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.
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 (BOR), 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.

TABLE 6-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
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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
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.
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 (BOR), 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.

TABLE 6-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
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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
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.

TABLE 6-2
Summary of Compliance with Applicable Programmatic Agreement (PA) Stipulations
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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.

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).

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, BOR, 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).

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
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).

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).

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
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 (BOR), 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.

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
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.
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.

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
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 was submitted to the Agencies shortly after the 90% design. Table 6-3 provides for IM-3 decommissioning, removal, and restoration activities, a summary of compliance with applicable CHPMP provisions.

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
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.

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
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	<u>Hazardous Waste Control Act (HWCA) -</u> 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.

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
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.

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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		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.
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 100% Basis of 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.

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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		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.
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.

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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.
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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PG&E Topock Compressor Station, Needles, California

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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 was submitted to the Agencies shortly after 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.

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
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).

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.

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.

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 final design for the groundwater 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 final 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). XRF samples will be analyzed for metals in accordance with SOP-B16, *Field-portable X-Ray Fluorescence Soil Sampling* (included in Appendix F [Soil Management Plan, Appendix A, Attachment 1]). The XRF SOP describes the calibration process and how to achieve better detection levels (i.e., homogenization of the sample, longer exposure time, and using two or more scan frequencies). In addition, XRF concentrations will be adjusted using linear least square fit equations calculated from the RCRA Facility Investigation/Remedial Investigation samples analyzed in the laboratory and by the XRF.

Step 2 Offsite Laboratory Analysis: If XRF metal results exceed applicable screening levels, a 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, soil samples will be collected at the XRF screening locations in operational areas or biased to those grid spaces 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. Agencies will be notified prior to implementation.

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, a hotspot analysis will be conducted; any hotspots will be evaluated separately. If no hotspots are identified, then the areas outside the AOC boundaries will be treated as one area and will include data from the baseline sampling along the pipeline alignments, the vaults associated with the injection wells, and the injection well support structure in the East Mesa. These data will be combined and an area-wide average 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.

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

TABLE 7-2
Sample Containers, Preservation, and Holding Times
IM-3 Decommissioning, Removal, and Restoration Work 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 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

TABLE 7-2
Sample Containers, Preservation, and Holding Times
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

		Container and Minimum Quantity			
Analyte	**Method**	**Water**	**Soil/Sediment**	**Preservation**	**Holding Time**
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

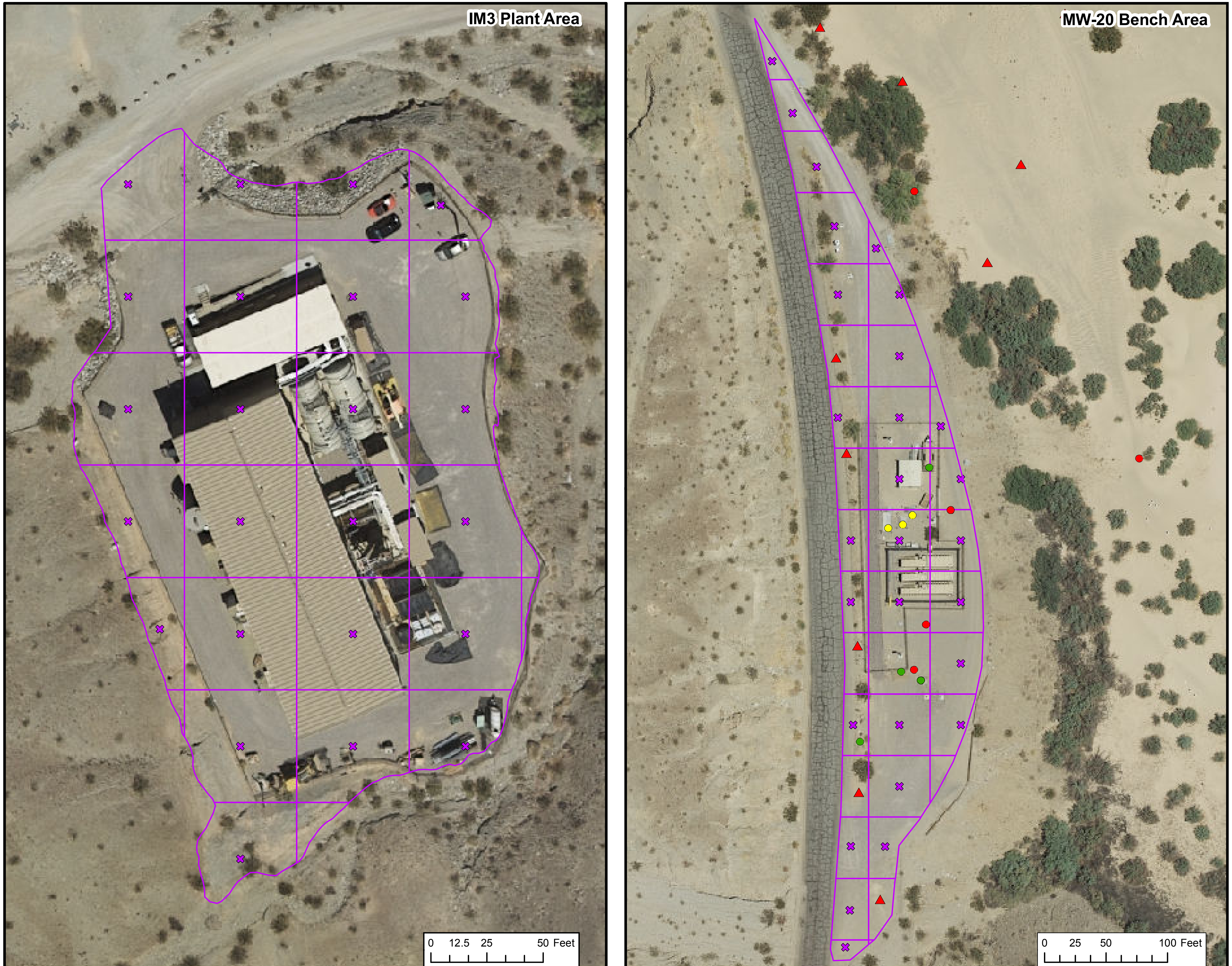
Notes:

<	=	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			

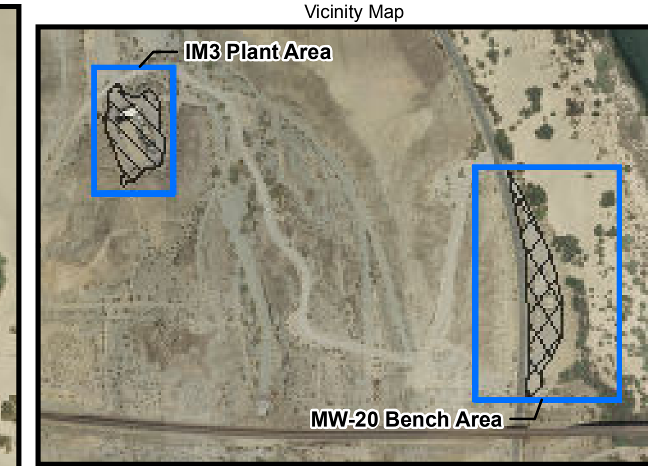
TABLE 7-3
Site-specific Background Values for Metals
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

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.



Vicinity Map



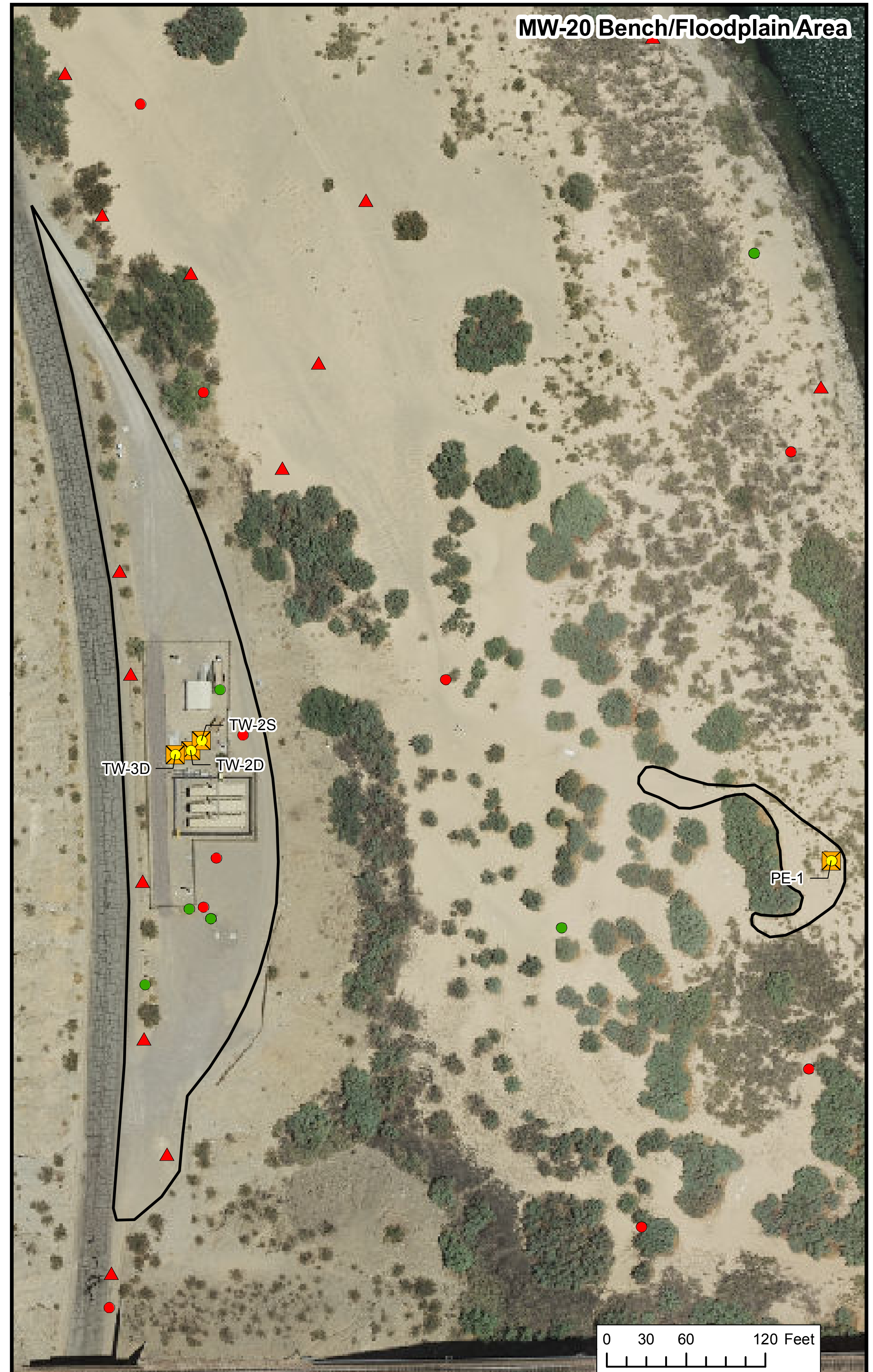
LEGEND

- 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

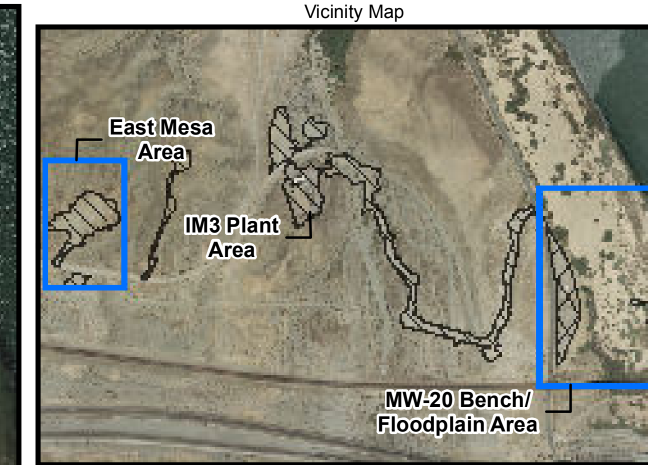
1. Baseline soil samples will be collected at 0.5 feet below ground surface (bgs) for aboveground Remedy System pipelines/conduit runs and from the bottom of the trench for underground Remedy System pipelines/conduit runs approximately every 500 linear feet along proposed pipeline/conduit runs.
2. Baseline 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, BOR, 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

[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."

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 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 Soil Management Plan, 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.
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 2014b) 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 2014c). 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 2014c), *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.
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, BOR, 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:

- **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.

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.

FIGURE 8-1
PLANNED IM-3 RESTORATION AREAS
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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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

Agency/Organization	Approvals and Authorizations
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.

9.2 Biological Evaluation

PG&E will outline how the IM-3 decommissioning, removal, and restoration activities will affect federally listed species in the area. Since 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, a new, separate consultation is not anticipated. The intent of the PBA (CH2M HILL 2014g) was to provide programmatic coverage of all groundwater remedial actions and avoid the need for individual project-specific consultations under the federal ESA. However, should PG&E determine that the PBA needs to be updated or that a separate, individual consultation on the IM-3 decommissioning is necessary, then PG&E will work with the BLM and the USFWS to address additional impacts to federally listed species. 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 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.

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

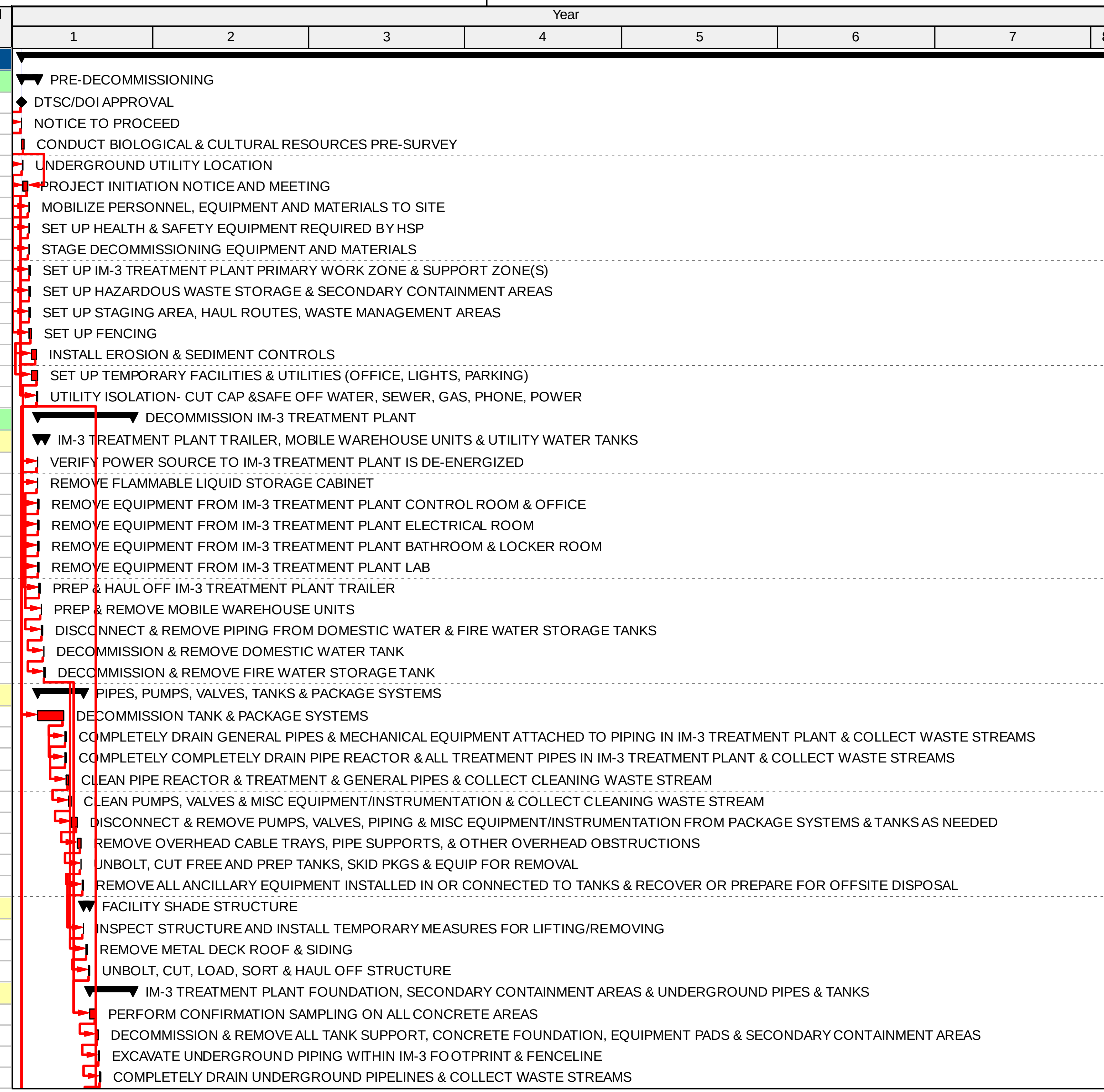
TABLE 9-1
IM-3 Operating Permits and Authorizations
IM-3 Decommissioning, Removal, and Restoration Work Plan
PG&E Topock Compressor Station, Needles, California

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.

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.

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, POWER	2
DECOMMISSION IM-3 TREATMENT PLANT		160
IM-3 TREATMENT PLANT TRAILER, MOBILE WAREHOUSE UNITS & UTILITY WATER TANK		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 & OFFICE	2
A2570	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT ELECTRICAL ROOM	2
A2580	REMOVE EQUIPMENT FROM IM-3 TREATMENT PLANT BATHROOM & LOCKER ROO	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 STORAC	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 TO P	3
A1250	COMPLETELY COMPLETELY DRAIN PIPE REACTOR & ALL TREATMENT PIPES IN IM-:	3
A2360	CLEAN PIPE REACTOR & TREATMENT & GENERAL PIPES & COLLECT CLEANING W/	5
A3050	CLEAN PUMPS, VALVES & MISC EQUIPMENT/INSTRUMENTATION & COLLECT CLEAI	5
A1290	DISCONNECT & REMOVE PUMPS, VALVES, PIPING & MISC EQUIPMENT/INSTRUMEN	10
A2840	REMOVE OVERHEAD CABLE TRAYS, PIPE SUPPORTS, & OTHER OVERHEAD OBSTF	5
A1470	UNBOLT, CUT FREE AND PREP TANKS, SKID PKGS & EQUIP FOR REMOVAL	2
A1310	REMOVE ALL ANCILLARY EQUIPMENT INSTALLED IN OR CONNECTED TO TANKS &	2
FACILITY SHADE STRUCTURE		12
A1330	INSPECT STRUCTURE AND INSTALL TEMPORARY MEASURES FOR LIFTING/REMO\	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 & UNDERG		71
A2600	PERFORM CONFIRMATION SAMPLING ON ALL CONCRETE AREAS	10
A2140	DECOMMISSION & REMOVE ALL TANK SUPPORT, CONCRETE FOUNDATION, EQUIF	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
Summary
Remaining Work
Milestone

Date	Revision	Checked	Approved
08-Oct-15	Draft R6		
08-Sep-14	Draft R5		

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 REMAINII	2
A3080	REMOVE TEMPORARY FENCING AT IM-3 TREATMENT PLANT PRIMARY WORK ZONI	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 FENCELINE	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 WELLS)	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 TW-3I	1
A2540	CLEAN AND REMOVE PIPELINES AT TW-2S, TW-2D AND TW-3D	3
A2960	DECOMMISSION TW-2S, TW-2D, & TW-3D WELLS ACCORDING TO SUPPLEMENTAL	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 REMOVE PIPELINES AT PE-1	3
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 WELLS)	2
A2910	TEST SOIL SAMPLES	40
A2920	BACKFILL, RECOMPACT & LEAVE SITE SAFE FOR FINAL RESTORATION	2
	DECOMMISSION INJECTION WELL FIELD, CONVEYANCE PIPELINES, CONDUITS, & VALVE '	104
	UNDERGROUND CONVEYANCE PIPELINES, CONDUITS & VALVE VAULTS	19
A2990	SET UP PRIMARY WORK ZONE & SUPPORT ZONE(S) ALONG UNDERGROUND PIPE	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 PIPELINE AT POINT OF ORIGIN	1
A2250	EXCAVATE & REMOVE VALVE VAULTS	5

Year: 1 2 3 4 5 6 7 8

Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

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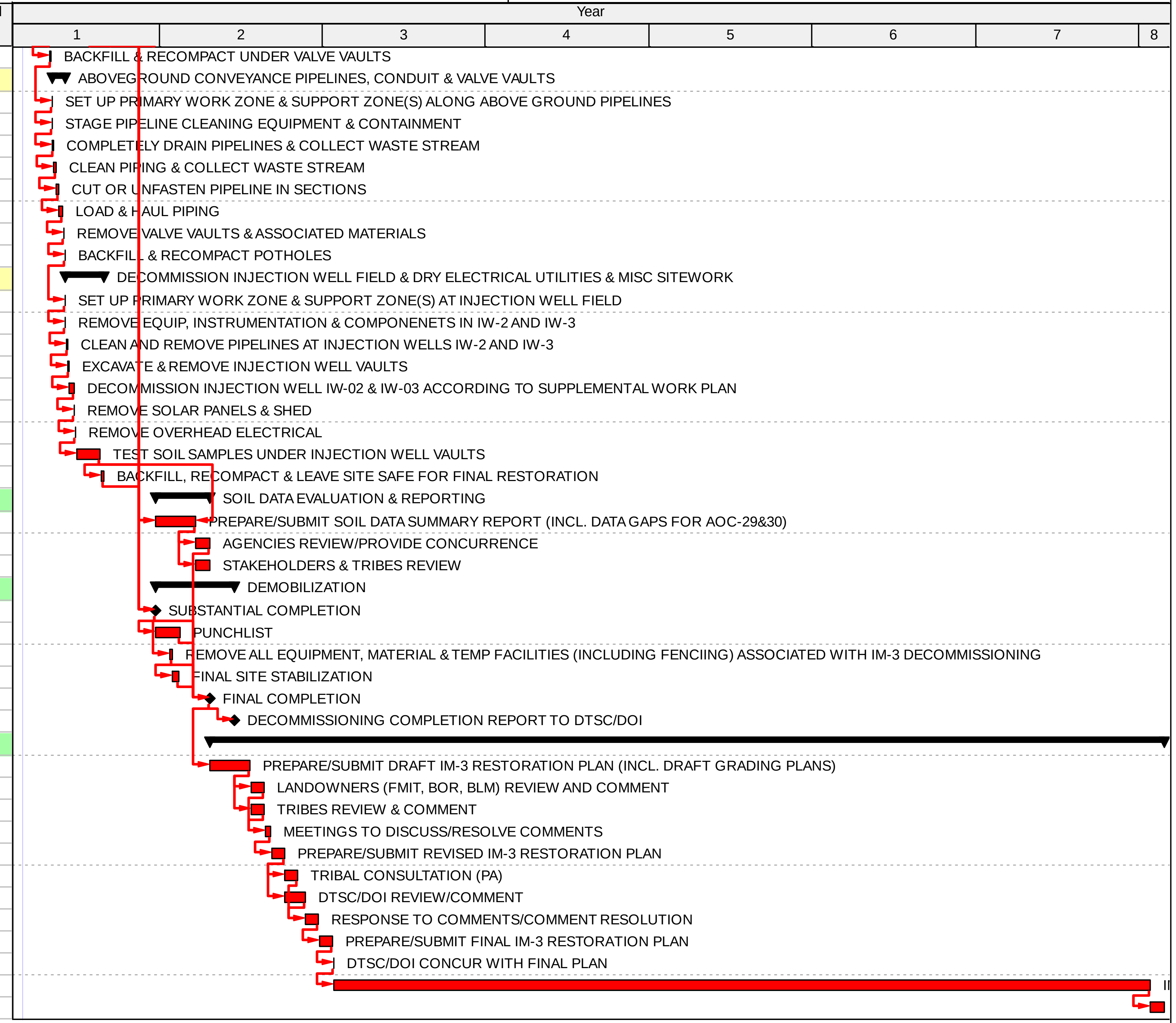
Activity ID	Activity Name	Estimated Duration
A2290	BACKFILL & RECOMPACT UNDER VALVE VAULTS	2
	ABOVEGROUND CONVEYANCE PIPELINES, CONDUIT & VALVE VAULTS	22
A3000	SET UP PRIMARY WORK ZONE & SUPPORT ZONE(S) ALONG ABOVE GROUND PIPE	1
A2120	STAGE PIPELINE CLEANING EQUIPMENT & CONTAINMENT	1
A1490	COMPLETELY 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 SITEWO	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	2
A2510	EXCAVATE & REMOVE INJECTION WELL VAULTS	3
A2860	DECOMMISSION INJECTION WELL IW-02 & IW-03 ACCORDING TO SUPPLEMENTAL	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-29&3	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 FENCIING) A!	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 PLANS	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 | Remaining Work | Critical Remaining Work | Milestone | Summary

Date	Revision	Checked	Approved
08-Oct-15	Draft R6		
08-Sep-14	Draft R5		

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

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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

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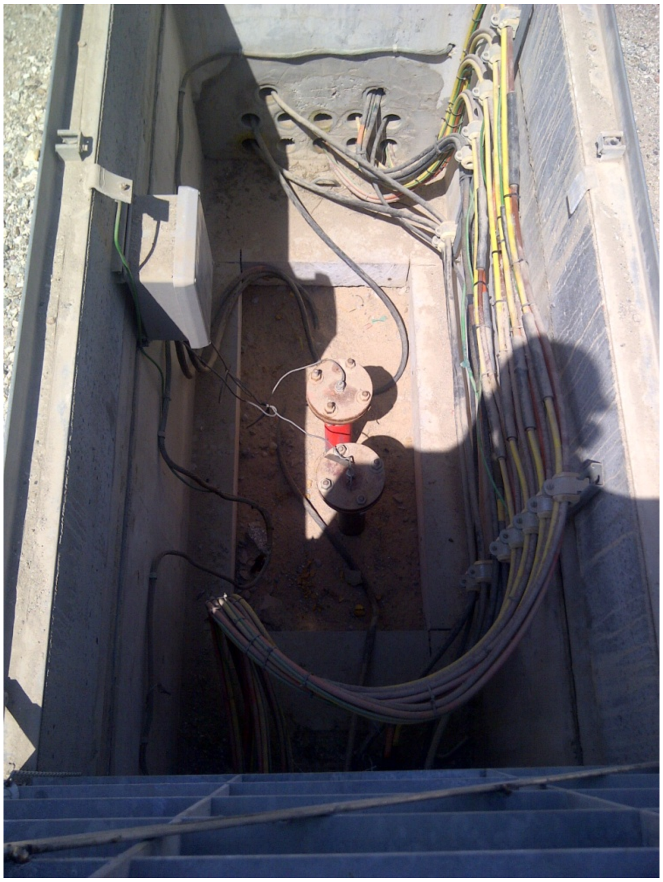
Underground Double Contained Extraction Pipelines and Brine Pipes

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

PHOTOGRAPH 13
IM-3 Treatment Plant

PHOTOGRAPH 14
IM-3 Treatment Plant Trailer with View of Plant Sunshade and Raw &Treated Water Storage Tanks
(Generator will not be onsite during time of IM-3 Decommissioning and Removal).

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Lab Drain Tank

PHOTOGRAPH 16
Raw Water Storage Tank

PHOTOGRAPH 17
Pipe Reactor and Chemical Mix Loop

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Chromium Reduction Reactor Tank
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Iron Oxidation Tanks, View from Back of Tanks

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Iron Oxidation Tank T-301C Side View

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Primary RO System

PHOTOGRAPH 30
Secondary RO Feed Tank

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Secondary RO System

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RO Permeate Tank

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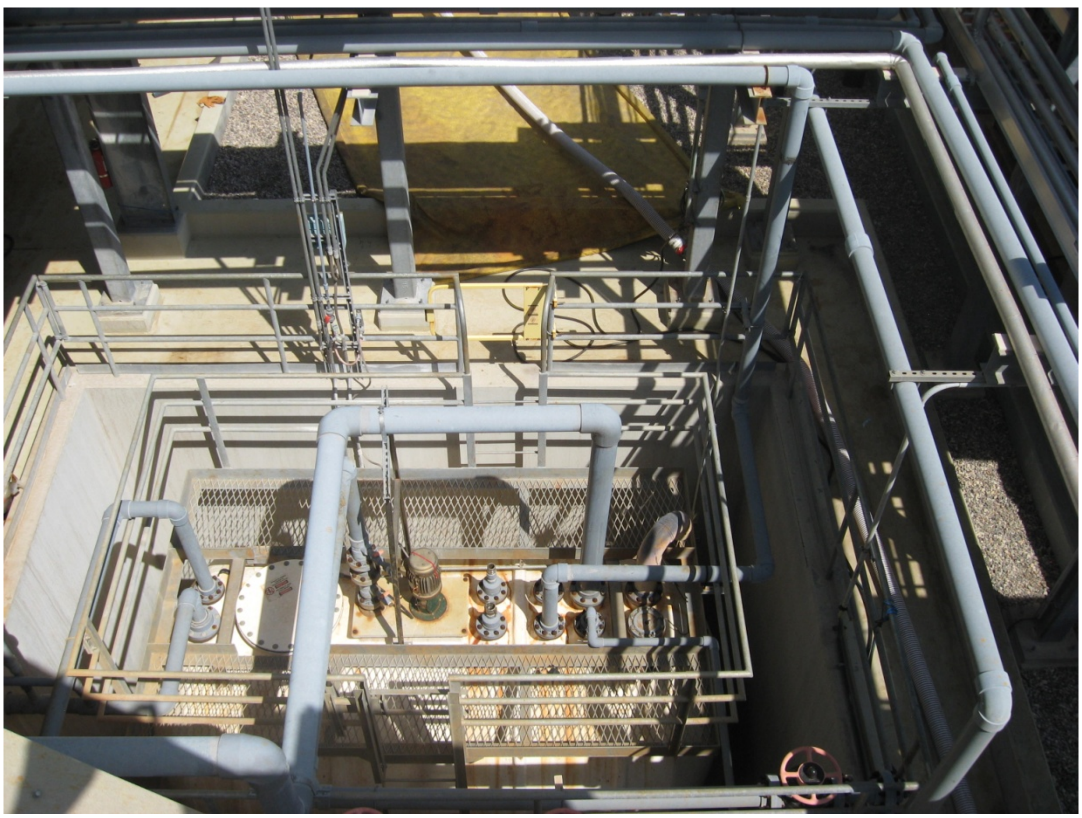
RO Concentrate (Brine) Storage Tank

PHOTOGRAPH 34
RO CIP System

PHOTOGRAPH 35
Underground Sewage Holding Tank

PHOTOGRAPH 36
Treated Water Storage Tank
(Tank to the Right)
Photograph also shows double contained extraction pipelines entering plant and single contained treated water (injection) pipelines leaving the plant.

PHOTOGRAPH 37
Raw Water Storage Tank (Left) and Treated Water Storage Tank (Right)



PHOTOGRAPH 38
Process Drains Tank

PHOTOGRAPH 39
Potable Water System

PHOTOGRAPH 40
Fire Water Storage Tank

PHOTOGRAPH 41
Air Compressor and Dryer

PHOTOGRAPH 42
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Hydrochloric Acid System in Chemical Storage Area

PHOTOGRAPH 44
Sodium Hydroxide System in Chemical Storage Area

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Ferrous Chloride System in Chemical Storage Area

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Polymer System Located Near Iron Oxidation Tanks

PHOTOGRAPH 48
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PHOTOGRAPH 50
Security Fence and Gate Around IM-3 Treatment Plant

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PHOTOGRAPH 56
Above Ground Injection Pipeline and Conduit

PHOTOGRAPH 57
Valve Vault Along Above Ground Injection Pipeline

PHOTOGRAPH 58
Injection Well Field on East Mesa
Injection Well Vaults over Injection Wells, IW-2 & IW-3, and Solar Panel Shed Shown

PHOTOGRAPH 59
Interior of Injection Well, Typical

PHOTOGRAPH 60
Solar Panel Shed Exterior

PHOTOGRAPH 61
Injection Well Control Panel inside Solar Panel Shed

PHOTOGRAPH 62
Brine Storage & Loading System on MW-20 Bench Facility

PHOTOGRAPH 63
Brine Storage and Loading System Secondary Containment

Appendix B
Decommissioning Quality Assurance and Control Plan

Interim Measure No. 3 Decommissioning, Removal, and Restoration Quality Assurance and Control Plan

PG&E Topock Compressor Station, Needles, California

Prepared for:

Pacific Gas & Electric Company

November 2015

Contents

Attachments

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

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 2015). 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.

SECTION 2

Organization and Responsibilities

The Project Quality Control (QC) Manager and Construction Manager 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 that consists of PG&E and its contractors, 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

- Construction Manager – responsible for the construction activities and overall implementation and enforcement of the DQAC plan.
- PM – responsible for the overall project.
- PQM – responsible for verification of the effectiveness of the program and project QC.
- Project QC Manager - responsible for performing inspection activities, conducting QC meetings, documenting compliance with project requirements, and implementation and enforcement of the DQAC plan.
- 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 Construction Manager. 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.

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 will provide notice to land owners, land managers, regulatory agencies, and stakeholders at least 14 days before the Final Inspection. A Final Acceptance Inspection will be considered closed when the work has been accepted by land owners, land managers, regulatory agencies, and stakeholders, and after acceptance has been documented and signed by all parties.

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.

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 Construction Manager. As project-specific tasks are identified, the Testing Plan and Log will be amended to include analytical tests and observations for those tasks.

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 Construction Manager, 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 Construction Manager 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.

- **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.

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.

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 Construction Manager 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 Construction Manager. The Construction Manager 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 Construction Manager 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.

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 Construction Manager. 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.

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, Construction Manager, 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 Construction Manager. 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 re-inspection. 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 Construction Manager that the change was indeed minor.

Where the RFI is marked as a Major Change, disposition must be sought from the Construction Manager 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 Construction Manager. 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 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.

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 Construction Manager, 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:

- 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 Construction Manager 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.

- 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
- 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

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 Construction Manager, 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.

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 Construction Manager, 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

SECTION 11
Work Cited

CH2M HILL. 2015. *Draft Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan, Topock Compressor Station, Needles, California*. Prepared for Pacific Gas and Electric Company. November 18.

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

TRANSMITTAL

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	

CH2MHILL

Project No. **Photo Log**

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

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

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

Contents

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

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.

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.

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 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.

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

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.

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.

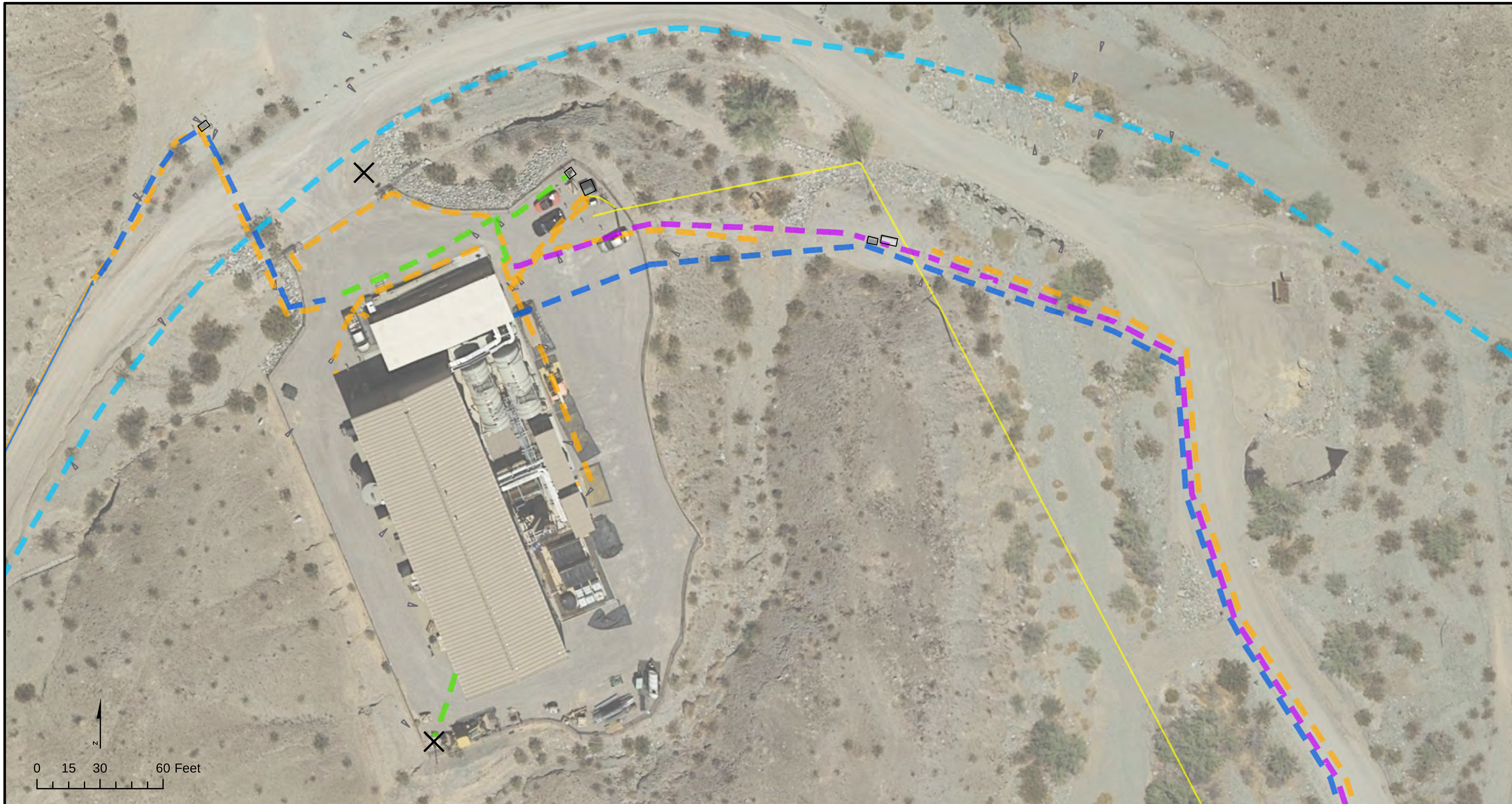
SECTION 7

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.

Appendix E
Utilities Drawing Set



LEGEND

× Remove Pipeline,Conduit, Well Vault, or Valve Vault as Indicated

Line Features (Underground)

- CCTV
- Electric Line
- Gas Pipe
- Telephone Line
- Water Line

Line Features (Aboveground)

- Electric Line
- Gas Pipe
- Overhead Electric
- Water Line

Note:
Utility locations shown are based on as-built drawings, field sketches and utility location surveys. Utility locations should be confirmed prior to future intrusive work.

IM-3 EXISTING UTILTIES PLAN

IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: R:\PGEAlliance\Topock\MapFiles\2015\CMS\100PercentDesign\Fig3_5_IM3_Utility_Existing.mxd

Appendix F
Soil Management Plan

Operation and Maintenance Manual

Volume 4

Soil Management Plan

Final (100%) Design Submittal for the Final Groundwater Remedy

PG&E Topock Compressor Station Needles, California

Prepared for

Pacific Gas & Electric Company

November 2015

CH2MHILL®

155 Grand Avenue
Suite 800
Oakland, CA 94612

Contents

Exhibit

Tables

Figures

Appendices

Acronyms and Abbreviations

AOC	Area of Concern
APE	Area of Potential Effects
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
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
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
HERO	California Department of Toxic Substances Control's Human and Ecological Risk Office
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
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 final design stage of the groundwater remediation project, proposed remedy infrastructure (excluding future provisional wells) is within 20 feet of or overlaps with twenty-four 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:
  - SWMU 5 – Sludge Drying Beds
  - SWMU 6 – Chromium Reduction Tank
  - SWMU 9 – Transfer Sump
  - 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 21 – Round Area by Sludge Drying Beds
  - AOC 22 – Unidentified Three-sided Structure
  - AOC 33 – Potential Former Burn Area near AOC 17
  - Unit 4.3 – Oil/Water Holding Tank
- Soil Investigation Areas outside Compressor Station:
  - 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
  - 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 final 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 2015). 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 will 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 2015), 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 will 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 *Revised Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E 2015) presented in Appendix B.
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. 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 2014) 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	Yes - pipes
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, pipe
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	Yes - pipes
SWMU 6	Chromate Reduction Tank	Yes - pipes
SWMU 8	Process Pump Tank	No
SWMU 9	Transfer Sump	Yes - pipes
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
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	Yes - pipes

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 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
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	Yes - pipes
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* (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. The Revised Final Soil RFI/RI Work Plan was approved by DTSC and DOI on August 24, 2015.

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
Volume 4: Soil Management Plan
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]	Yes
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], dioxins and furans	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, dioxins and furans	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
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
Volume 4: Soil Management Plan
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?
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
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
Volume 4: Soil Management Plan
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?
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

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
Volume 4: Soil Management Plan
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?
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
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
Volume 4: Soil Management Plan
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?
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
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?
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	Yes
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	Yes
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	Yes
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
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 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
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 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
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 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	Yes
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	Yes

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

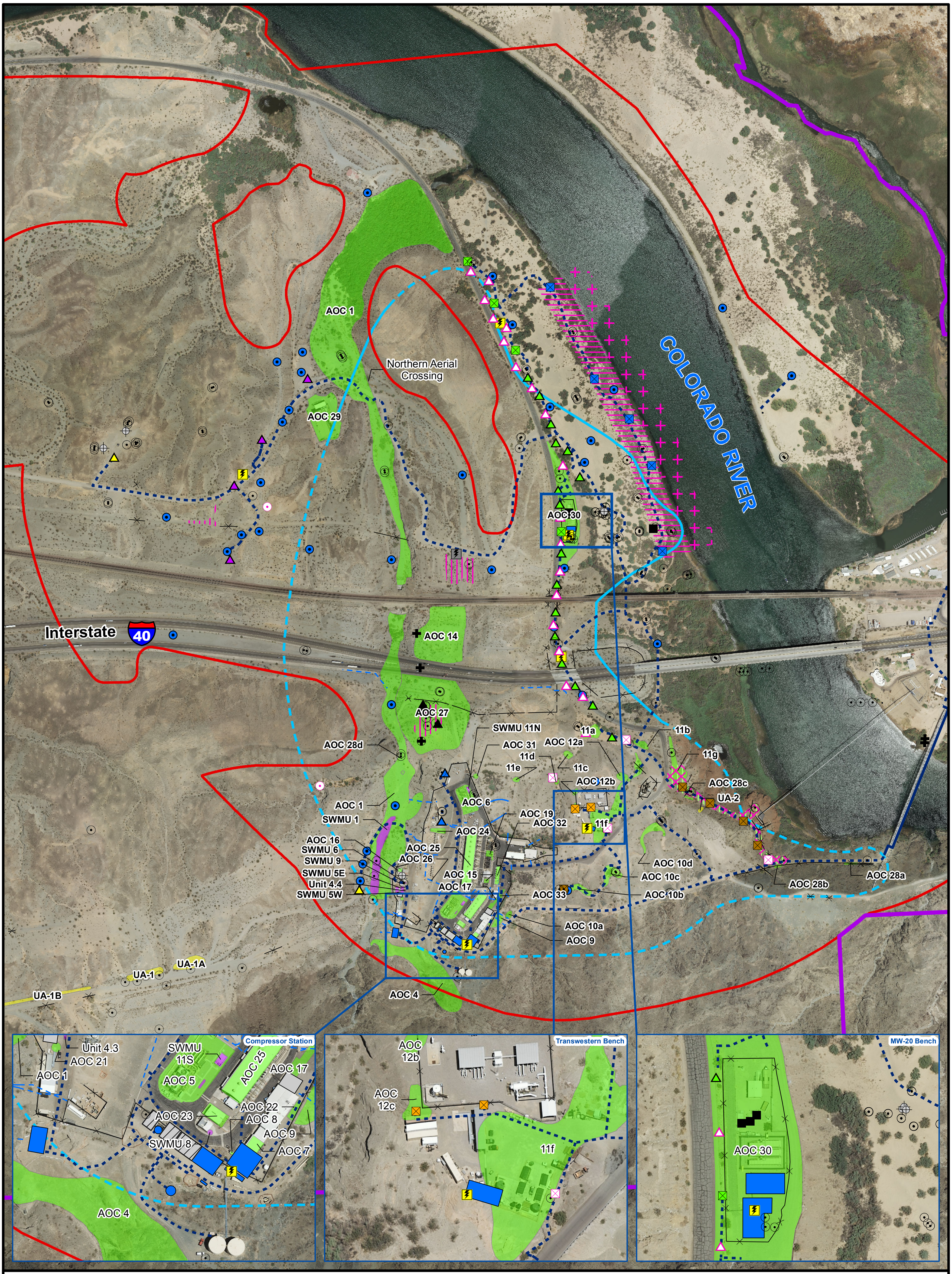
Volatile Organic Compounds (VOCs): Methyl acetate

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
- Area for East Ravine (ER) Wells (ER-7 to ER-11)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells

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 MW-T

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
- 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

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.

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

Path: R:\PGEAlliance\Topock\MapFiles\2015\CMS\100PercentDesign\OM_Manual\FIG101_RemedyLayout_AOCs_Samples.mxd Date Saved: 10/6/2015 12:15:03 PM

CH2MHILL

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 will 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 *Revised Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (Appendix B).

2.1 Soil RFI/RI Investigation Areas Intersected by the Groundwater Remedy Project

At the final 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 twenty-four Soil RFI/RI Investigation Areas. These areas are listed below and shown on Figure 1.0-1:

- SWMU 1 – Former Percolation Bed
- SWMU 5 – Sludge-Drying Beds
- SWMU 6 – Chromium Reduction Tank
- SWMU 9 – Transfer Sump
- 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-21 – Round Area by Sludge Drying Beds
- 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
- Unit 4.3 – Oil/Water Holding Tank
- 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, one four-point composite sample will be collected per 250 cubic yards.

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.

Soil at 1 foot below ground surface (bgs) from each new monitoring, extraction, and injection well locations will be characterized per Section 2.3 as part of the Baseline SAP. Drill cuttings from installation of new monitoring, extraction, and injection wells will be containerized in 55-gallon U.S. Department of Transportation (DOT) drums or lined roll-off bins and characterized as described below. Drill cuttings from RFI/RI Investigation Areas will be segregated from those not within Investigation Areas to prevent comingling. 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 *Revised Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E 2015) (see Appendix B).

Analytical results from the baseline soil sampling 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 soil sampling 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 Screening Level (*Human Health Risk Assessment Note 3 – DTSC-Modified Screening Levels* [HERO 2015]) or the ecological comparison value is used. If a DTSC Residential Screening Level is not available, then the lesser of the USEPA residential regional screening level or the ecological comparison value is used (the source document for the ecological comparison values is included in Appendix D of this SMP). 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. Once established, the project-specific cleanup goals will replace the interim screening 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 four 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 soil for offsite disposal — Soil that is not classified as a hazardous waste, and is greater than the interim screening level or project-specific cleanup goal (once established), will be disposed of offsite (as discussed in Section 2.5).
- 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).

2.4 Handling and Storage of Clean Soil

Non-hazardous clean displaced soil (i.e., soil below interim screening levels or project-specific cleanup goals [once established]) 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. For the purposes of this project the identification of a “clay bed,” and therefore the application of this special handling procedure, will be based on the practicability for the clay material to be separated from other excavated soils or drill cuttings. For example, when trenching with a backhoe it may be possible to identify relatively thin beds of clay material (e.g., less than a foot) and separate it from the rest of the excavated soil, but when drilling with a method that doesn’t retrieve cores that can be closely observed and precisely separated (e.g., hollow-stem auger), a relatively thin clay bed might not be identified or the clay material might become mixed with the rest of the cuttings to the point where it cannot be practicably separated. 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 11,000 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 proposed to use an area (located on federal land) in Moabi Regional Park for storage of non-hazardous clean soil (see Figure 2.4-1 at the end of this section). The estimated storage capacity in the identified area is 11,700 cubic yards. 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 soil sampling 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 Handling and Off-site Disposal of Non-Hazardous Soil

The SMP and the revised management protocol for handling and disposition of displaced site material (Appendix B) exclude storage of soil that is non-hazardous but unsuitable for final disposition onsite because contaminants are present above the interim screening level or project-specific cleanup goal (once established).

The estimated volume of non-hazardous soil (from construction of the groundwater remedy) (i.e., soil above interim screening levels) needing disposal is approximately 4,000 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 initially in roll-off bins and managed per the BMPs described in Section 3.1.3.

It is anticipated that project-specific cleanup goals will be established by the time of the decommissioning and removal of the IM-3 system. Displaced soils (from the decommissioning activities) that are above the clean-up goals will be disposed of offsite as described in the Revised Management Protocol (Appendix B). The volume and classification of this soil 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.

TABLE 2.4-1
Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)
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	4.8		EPA Residential RSL	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	4.8		EPA Residential RSL	See Table 2
	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		DTSC HHRA Note 2	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 2
	Arsenic	11	*	Background Level	See Table 2
	Barium	410	*	Background Level	See Table 2
	Beryllium	0.672		Background Level	See Table 2
	Cadmium	1.1	*	Background Level	See Table 2
	Calcium	66,500		Background Level	NE
	Chromium, Hexavalent	0.83	*	Background Level	See Table 2
	Chromium, total	39.8	*	Background Level	See Table 2
	Cobalt	12.7	*	Background Level	See Table 2
	Copper	16.8		Background Level	See Table 2
	Cyanide	0.9		Soil Ecological Comparison Value (ECV)	NE
	Iron	55,000		EPA Residential RSL	NE
	Lead	8.39	*	Background Level	See Table 2
	Magnesium	12,100		Background Level	NE
	Manganese	402	*	Background Level	NE
	Mercury	0.0125		Soil Ecological Comparison Value (ECV)	See Table 2
	Molybdenum	1.37	*	Background Level	See Table 2
	Nickel	27.3	*	Background Level	See Table 2
	Potassium	4,400		Background Level	NE
	Selenium	1.47	*	Background Level	See Table 2
	Silver	5.15		Soil Ecological Comparison Value (ECV)	See Table 2
	Sodium	2,070		Background Level	NE
	Thallium	0.78		EPA Residential RSL	See Table 2
	Vanadium	52.2	*	Background Level	See Table 2
	Zinc	58	*	Background Level	See Table 2

TABLE 2.4-1
Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)
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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 2
	4,4-DDE	2	EPA Residential RSL	See Table 2
	4,4-DDT	1.9	EPA Residential RSL	See Table 2
	Aldrin	39	EPA Residential RSL	See Table 2
	alpha-BHC	86	EPA Residential RSL	NE
	alpha-Chlordane	470	Soil Ecological Comparison Value (ECV)	See Table 2
	beta-BHC	300	EPA Residential RSL	NE
	delta-BHC	300	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table 2
	Endo sulfan I	470,000	EPA Residential RSL	NE
	Endo sulfan II	470,000	EPA Residential RSL	NE
	Endosulfan sulfate	470,000	EPA Residential RSL	NE
	Endrin	19,000	EPA Residential RSL	See Table 2
	Endrin aldehyde	19,000	EPA Residential RSL	NE
	Endrin ketone	19,000	EPA Residential RSL	NE
	gamma-BHC (Lindane)	570	EPA Residential RSL	See Table 2
	gamma-Chlordane	0.43	DTSC-Residential SLs	See Table 2
	Heptachlor	130	EPA Residential RSL	See Table 2
	Heptachlor Epoxide	70	EPA Residential RSL	See Table 2
	Methoxychlor	320,000	EPA Residential RSL	See Table 2
	Toxaphene	490	EPA Residential RSL	See Table 2
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	18,000	EPA Residential RSL	NE
	2-Methyl naphthalene	240,000	EPA Residential RSL	NE
	Acenaphthene	3,600,000	EPA Residential RSL	NE
	Acenaphthylene	3,600,000	EPA Residential RSL	NE
	Anthracene	18,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	16	EPA Residential RSL	NE
	Benzo (a) anthracene	160	EPA Residential RSL	NE
	Benzo (a) pyrene	16	EPA Residential RSL	NE
	Benzo (b) fluoranthene	160	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,800,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	0.39	DTSC-Residential SLs	NE
	Chrysene	3.9	DTSC-Residential SLs	NE
	Dibenzo (a,h) anthracene	16	EPA Residential RSL	NE
	Fluoranthene	2,400,000	EPA Residential RSL	NE
	Fluorene	2,400,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	160	EPA Residential RSL	NE
	Naphthalene	3,800	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	1,800,000	EPA Residential RSL	NE
	Pyrene	1,800,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	0.23	DTSC-Residential SLs	See Table 2
	Aroclor 1221	170	EPA Residential RSL	See Table 2

TABLE 2.4-1
Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)
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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	170	EPA Residential RSL	See Table 2
	Aroclor 1242	230	EPA Residential RSL	See Table 2
	Aroclor 1248	230	EPA Residential RSL	See Table 2
	Aroclor 1254	240	EPA Residential RSL	See Table 2
	Aroclor 1260	240	EPA Residential RSL	See Table 2
	Aroclor 1262	240	EPA Residential RSL	See Table 2
	Aroclor 1268	240	EPA Residential RSL	See Table 2
	Total PCBs	204	Soil Ecological Comparison Value (ECV)	See Table 2
Semivolatile Organic Compounds (µg/kg)				
	1,1´-Biphenyl	47,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	23,000	EPA Residential RSL	NE
	1,4-Dioxane	5,300	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,900,000	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,300,000	EPA Residential RSL	See Table 2
	2,4,6-Trichlorophenol	7.5	DTSC-Residential SLs	See Table 2
	2,4-Dichlorophenol	190,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,300,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	130,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,700	EPA Residential RSL	See Table 2
	2,6-Dinitrotoluene	360	EPA Residential RSL	NE
	2-Chloro naphthalene	4,800,000	EPA Residential RSL	NE
	2-Chlorophenol	390,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,200,000	EPA Residential RSL	See Table 2
	2-Nitroaniline	630,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,200	EPA Residential RSL	NE
	3-Nitroaniline	630,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	5,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,300,000	EPA Residential RSL	NE
	4-Chloroaniline	2,700	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table 2
	4-Nitroaniline	27,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,400	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	250,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,300,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	190,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	290,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	1,600,000	EPA Residential RSL	NE
	Dibenzofuran	73,000	EPA Residential RSL	NE
	Diethyl phthalate	51,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	51,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	630,000	EPA Residential RSL	NE
	Hexachlorobenzene	210	EPA Residential RSL	See Table 2

TABLE 2.4-1
Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)
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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)				
	Hexachloroethane	1,800	EPA Residential RSL	See Table 2
	N-Nitroso-di-n-propylamine	78	EPA Residential RSL	NE
	N-nitrosodiphenylamine	110,000	EPA Residential RSL	NE
	Pentachlorophenol	1,000	EPA Residential RSL	See Table 2
	Phenol	19,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	240	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as gasoline	770	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as motor oil	10,000	SF RWQCB ESL for direct exposure (2013)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	550	DTSC-Residential SLs	NE
	1,1,1-Trichloroethane	1,700	DTSC-Residential SLs	NE
	1,1,2,2-Tetrachloroethane	600	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	40,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	1,600	DTSC-Residential SLs	NE
	1,1-Dichloroethene	230,000	EPA Residential RSL	See Table 2
	1,1-Dichloropropene	1,800	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	63,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5.1	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	24,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	58,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.3	EPA Residential RSL	NE
	1,2-Dibromoethane	7.2	DTSC-Residential SLs	NE
	1,2-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,2-Dichloroethane	460	EPA Residential RSL	See Table 2
	1,2-Dichloropropane	1,000	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	210	DTSC-Residential SLs	NE
	1,3-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,3-Dichloropropane	420	DTSC-Residential SLs	NE
	1,4-Dichlorobenzene	2,600	EPA Residential RSL	See Table 2
	2,2-Dichloropropane	1,600,000	EPA Residential RSL	NE
	2-Chlorotoluene	480	DTSC-Residential SLs	NE
	2-Hexanone	200,000	EPA Residential RSL	NE
	4-Isopropyltoluene	1,900,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	140	EPA Residential RSL	NE
	Acrylonitrile	0.068	DTSC-Residential SLs	NE
	Benzene	0.33	DTSC-Residential SLs	See Table 2
	Bis (2-chloroethyl) ether	230	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,900	EPA Residential RSL	NE
	Bromobenzene	290,000	EPA Residential RSL	NE
	Bromochloromethane	150,000	EPA Residential RSL	NE
	Bromodichloromethane	280	DTSC-Residential SLs	NE
	Bromoform	19,000	EPA Residential RSL	NE
	Bromomethane	6,800	EPA Residential RSL	NE

TABLE 2.4-1

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)

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	770,000	EPA Residential RSL	NE
	Carbon tetrachloride	0.099	DTSC-Residential SLs	See Table 2
	Chlorobenzene	280,000	EPA Residential RSL	See Table 2
	Chloroethane	3.1	DTSC-Residential SLs	NE
	Chloroform	320	EPA Residential RSL	See Table 2
	Chloromethane	110,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	19	DTSC-Residential SLs	NE
	cis-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Cyclohexane	6,500,000	EPA Residential RSL	NE
	Dibromochloromethane	750	EPA Residential RSL	NE
	Dibromomethane	23,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	87,000	EPA Residential RSL	NE
	Ethylbenzene	5,800	EPA Residential RSL	NE
	Hexachlorobutadiene	1,200	EPA Residential RSL	See Table 2
	Hexachlorocyclopentadiene	1,800	EPA Residential RSL	NE
	Isophorone	570,000	EPA Residential RSL	NE
	Isopropylbenzene	1,900,000	EPA Residential RSL	NE
	m,p-Xylenes	550,000	EPA Residential RSL	NE
	Methyl acetate	24,000	DTSC-Residential SLs	NE
	Methyl ethyl ketone	27,000,000	EPA Residential RSL	See Table 2
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	47,000	EPA Residential RSL	NE
	Methylcyclohexane	6,500,000	EPA Residential RSL	NE
	Methylene chloride	5.5	DTSC-Residential SLs	NE
	N-Butylbenzene	1,200	DTSC-Residential SLs	NE
	Nitrobenzene	5,100	EPA Residential RSL	See Table 2
	N-Propylbenzene	3,800,000	EPA Residential RSL	NE
	o-Xylene	650,000	EPA Residential RSL	NE
	p-Chlorotoluene	440	DTSC-Residential SLs	NE
	sec-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Styrene	6,000,000	EPA Residential RSL	NE
	tert-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Tetrachloroethene	0.6	DTSC-Residential SLs	See Table 2
	Toluene	1,100	DTSC-Residential SLs	NE
	trans-1,2-Dichloroethene	190	DTSC-Residential SLs	NE
	trans-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Trichloroethene	940	EPA Residential RSL	See Table 2
	Trichlorofluoromethane (Freon 11)	730,000	EPA Residential RSL	NE
	Vinyl chloride	59	EPA Residential RSL	See Table 2
	Xylenes, total	650,000	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 HHRA Note 3 Residential Screening Levels (DTSC Residential SL) or the ecological comparison value is used. If a DTSC Residential SL 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-Residential SLs	Human Health Risk Assessment Note 3 – DTSC-Modified Screening Levels, May 2015.
EPA Residential RSL	United States Environmental Protection Agency Residential Soil Regional Screening Level (THQ=1.0), June 2015.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis 2008)
HHRA Note 2	DTSC Human Health Risk Assessment (HHRA) Note 2: Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Sites – Interim (May 2009).
SF RWQCB ESL	San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels for residential direct exposure (2013)
*	One or more screening levels (EPA Residential RSL, DTSC-Residential SLs, 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

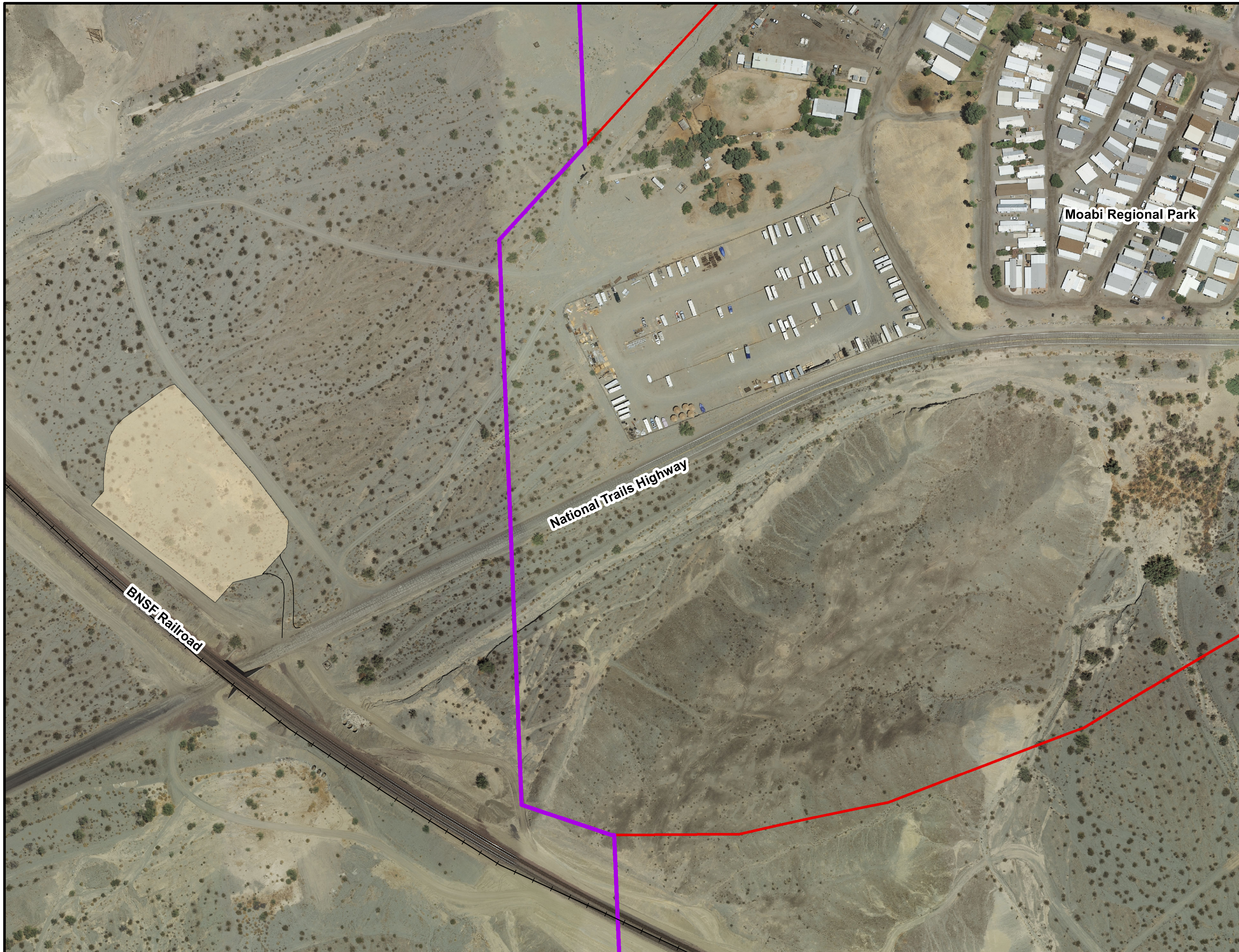
Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Polychlorinated Biphenyls							
Semivolatile Organic Compounds							
	2,4-Dinitrotoluene	NE	NE	2.6	NE	0.13	D030
	g 2-Methylphenol (o-Cresol)	NE	NE	4,000	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:

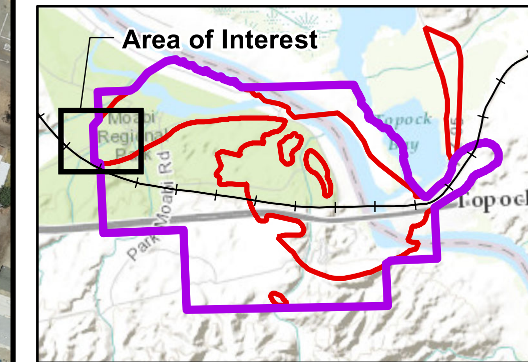
NE	not established
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
EPA HW	Environmental Protection Agency Hazardous Waste Code
TC	Toxicity Characteristic
TTLC	Total Threshold Limit Concentration
STLC	Soluble Threshold Limit Concentration
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity 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

- Clean Soil Storage Area (2.56 Acres Approximate)
- Area of Potential Effects (APE)
- EIR Project Area

N

0 90 180 360 Feet

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS

FIGURE 2.4-1
CLEAN SOIL STORAGE AREA
GROUNDWATER REMEDY IMPLEMENTATION - SOIL MANAGEMENT PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

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 streams:

- RCRA hazardous waste
- Non-RCRA hazardous waste
- Non-hazardous soil above interim screening levels or project-specific cleanup goals (once established)
- Clean soil

Soil that is classified as clean soil that is suitable for final deposition onsite will be managed following the BMPs described in Section 3.1.2 below, the PG&E Program Quality Assurance Project Plan (Appendix C of 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 will be in compliance with California action-specific ARAR #79 (22 CCR 66262.34). In addition, containerization of hazardous waste will 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.

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. If needed, 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 staged for offsite transportation 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 or project-specific cleanup goals (once established) 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 will consist of a single sheet of material, or multiple sheets with seams that are sealed together. Hazardous waste stockpiles will 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). Stockpiled soil will not contain free liquids.

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. After the final volume of stockpiled soil has been removed, the area will be inspected for visual contamination due to stockpiling activities, and any remaining residual contaminated material will be removed.

Non-Hazardous Soil Above Interim Screening Levels or Project-Specific Cleanup Goals (once established). It is anticipated that all soil that is above soil screening levels or project-specific cleanup goals will not be stockpiled and will be placed in roll-off bins or similar containers. If it is necessary to temporarily 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 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 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 C-1.
- After the final volume of stockpiled soil has been removed, the area will be inspected for visual contamination due to stockpiling activities, and any remaining residual contaminated material will be removed.

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 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 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 C-1.
- After the stockpile has been removed, all residual material will 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 will 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 Clean Soil/Non-Hazardous Soil

Containers and roll-off bins used to store/accumulate non-hazardous soil will be labeled as follows:

- Place a “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 Offsite Disposal” label on containers/roll-off bins containing soil identified for off-site disposal. 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 Offsite Disposal.”

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 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.

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

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 or non-hazardous waste soil. 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. Note that each load of non-hazardous waste will be accompanied by a properly completed non-hazardous waste manifest form or bill of lading.

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. These requirements do not apply to shipments of non-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 and Arizona 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. 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.

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 (and non-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 (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 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 (or non-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, and non-hazardous soil 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, and will comply with state law with regard to providing any further notifications. Additionally, PG&E will notify the state environmental official referenced above and the DOI Project Manager of any major changes in the shipment plan, such as a decision to ship the waste material to a different out-of-state facility.

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 *Revised Management Protocol for Handling and Disposition of Displaced Site Material* (Appendix B), 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 based on the final design for the groundwater remedy, current understanding of historical site activities, and available soil data. This final SMP is submitted with the final design documents. An addendum to the SMP will be prepared to update the screening levels for non-hazardous soil after the project specific cleanup goals are established and during future O&M activities, as warranted. A data report will be prepared after the implementation of the baseline soil sampling to document sampling results and refine soil classification volumes.

In addition, as the soil RFI/RI 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 (CMS/FS) for soil. The CMS/FS will develop project-specific goals and propose appropriate soil remedy(ies). In addition, screening levels included in Tables 2.4-1 and 2.4-2 will be updated as regulations change and project-specific decisions are made. PG&E will review all such new relevant information as it becomes available, incorporate it into future addendum to this SMP as appropriate, and submit the addendum to the regulatory agencies for review and approval.

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 Needles, San Bernardino County, 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. 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 *Revised Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E 2015) (Appendix B of the Soil Management Plan [SMP]) that was developed by a subgroup consisting of representatives from PG&E, Agencies, Interested Tribes, and other stakeholders. As discussed in Section 2.5 of the Soil Management Plan, the management protocol excludes the provision for long-term storage of soil above the interim screening levels. The process for assessing the baseline data for management of displaced materials is described in the main text of the 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 the final design stage (i.e., excluding future provisional wells) is within 20 feet of or overlaps with the following twenty-four Soil Investigation Areas:

- SWMU 1 – Former Percolation Bed
- SWMU 5 – Sludge Drying Beds
- SWMU 6 – Chromium Reduction Tank
- SWMU 9 – Transfer Sump
- 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 21 – Round Area by Sludge Drying Beds
- 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
- Unit 4.3 – Oil/Water Holding Tank
- 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 has 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 twenty-four Soil RFI/RI Investigation Areas as shown on Figures A-1 and A-1A. These investigation areas are currently undergoing investigations under the Soil RFI/RI program:

- SWMU 1 – Former Percolation Bed
- SWMU 5 – Sludge Drying Beds
- SWMU 6 – Chromium Reduction Tank
- SWMU 9 – Transfer Sump
- 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 21 – Round Area by Sludge Drying Beds
- AOC 22 – Unidentified Three-sided Structure (in upper yard)
- AOC 27 – MW-24 Bench
- AOC 28 –Pipeline Drip Legs
- AOC 30 – MW 20 Bench
- AOC 33 – Burn Area near AOC 17
- Unit 4.3 – Oil/Water Holding Tank
- 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
  - 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
- **Structures Located at the Transwestern Bench**
  - Operation Building
- **Structures Located at the MW-20 Bench**
  - Carbon Amendment Building
  - Carbon Storage Tank
- **Other Remedy Structures**
  - Well Vaults
  - Soil Storage/Processing 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 Final 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 *Revised Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (Soil Management Plan Appendix B).

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, Revision 2 (CH2M HILL 2015), 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 a data report, summarizing the sampling event and analysis results. The data report 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 report.

6.0 References

California Department of Toxic Substances Control's Human and Ecological Office (HERO). 2015. *Human Health Risk Note 3–DTSC-Modified Screening Levels*. May.

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). 2015. *Revised Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California*. Presented as Appendix B of the Soil Management Plan. November

United States Environmental Protection Agency (USEPA). 1999. *Contract Laboratory National Functional Guidelines for Organic Data Review*.

__________. 2002. *Contract Laboratory National Functional Guidelines for Inorganic Data Review.*

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.

K Sheets
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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]
SWMU 1 – Former Percolation Bed	Title 22 metals, hexavalent chromium, VOCs. SVOCs, PAHs, TPH, pH, pesticides, PCBs[2]
SWMU 5 – Sludge Drying Beds	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs
SWMU 6 – Chromium Reduction Tank	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs
SWMU 9 – Transfer Sump	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs
AOC 1 - Area Around Former Percolation Bed	Title 22 metals, hexavalent chromium, PAHs, pH, PCBs[2], and dioxins and furans
AOC 4 – Debris Ravine	Title 22 metals, PAHs, PCBs, and 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, dioxins and furans
AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)	Hexavalent chromium, Title 22, PAHs, PCBs, and pesticides
AOC 11 - Topographic Low Areas	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
AOC 12 - Fill Areas	Title 22 metals, hexavalent chromium, VOCs, TPH, PAHs, pH, asbestos, pesticides, and 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 21 – Round Area by Sludge Drying Beds	Title 22 metals, hexavalent chromium, calcium, sodium, and pH
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, PAHs, and dioxins and furans
AOC 28 - Pipeline Drip Leg	TPH, PAHs, and PCBs
AOC 30 - MW 20 Bench	Title 22 metals, hexavalent chromium, sodium, and 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
Unit 4.3 – Oil/Water Holding Tank	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs
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

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

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**
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 (rev. July 2015)

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	4.8		EPA Residential RSL	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	4.8		EPA Residential RSL	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		DTSC HHRA Note 2	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	0.78		EPA Residential RSL	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 (rev. July 2015)
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	EPA Residential RSL	See Table A-3
	4,4-DDT	1.9	EPA Residential RSL	See Table A-3
	Aldrin	39	EPA Residential RSL	See Table A-3
	alpha-BHC	86	EPA Residential RSL	NE
	alpha-Chlordane	470	Soil Ecological Comparison Value (ECV)	See Table A-3
	beta-BHC	300	EPA Residential RSL	NE
	delta-BHC	300	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table A-3
	Endo sulfan I	470,000	EPA Residential RSL	NE
	Endo sulfan II	470,000	EPA Residential RSL	NE
	Endosulfan sulfate	470,000	EPA Residential RSL	NE
	Endrin	19,000	EPA Residential RSL	See Table A-3
	Endrin aldehyde	19,000	EPA Residential RSL	NE
	Endrin ketone	19,000	EPA Residential RSL	NE
	gamma-BHC (Lindane)	570	EPA Residential RSL	See Table A-3
	gamma-Chlordane	0.43	DTSC-Residential SLs	See Table A-3
	Heptachlor	130	EPA Residential RSL	See Table A-3
	Heptachlor Epoxide	70	EPA Residential RSL	See Table A-3
	Methoxychlor	320,000	EPA Residential RSL	See Table A-3
	Toxaphene	490	EPA Residential RSL	See Table A-3
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	18,000	EPA Residential RSL	NE
	2-Methyl naphthalene	240,000	EPA Residential RSL	NE
	Acenaphthene	3,600,000	EPA Residential RSL	NE
	Acenaphthylene	3,600,000	EPA Residential RSL	NE
	Anthracene	18,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	16	EPA Residential RSL	NE
	Benzo (a) anthracene	160	EPA Residential RSL	NE
	Benzo (a) pyrene	16	EPA Residential RSL	NE
	Benzo (b) fluoranthene	160	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,800,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	0.39	DTSC-Residential SLs	NE
	Chrysene	3.9	DTSC-Residential SLs	NE
	Dibenzo (a,h) anthracene	16	EPA Residential RSL	NE
	Fluoranthene	2,400,000	EPA Residential RSL	NE
	Fluorene	2,400,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	160	EPA Residential RSL	NE
	Naphthalene	3,800	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	1,800,000	EPA Residential RSL	NE
	Pyrene	1,800,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	0.23	DTSC-Residential SLs	See Table A-3
	Aroclor 1221	170	EPA Residential RSL	See Table A-3

TABLE A-2

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)
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	170	EPA Residential RSL	See Table A-3
	Aroclor 1242	230	EPA Residential RSL	See Table A-3
	Aroclor 1248	230	EPA Residential RSL	See Table A-3
	Aroclor 1254	240	EPA Residential RSL	See Table A-3
	Aroclor 1260	240	EPA Residential RSL	See Table A-3
	Aroclor 1262	240	EPA Residential RSL	See Table A-3
	Aroclor 1268	240	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	47,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	23,000	EPA Residential RSL	NE
	1,4-Dioxane	5,300	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,900,000	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,300,000	EPA Residential RSL	See Table A-3
	2,4,6-Trichlorophenol	7.5	DTSC-Residential SLs	See Table A-3
	2,4-Dichlorophenol	190,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,300,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	130,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,700	EPA Residential RSL	See Table A-3
	2,6-Dinitrotoluene	360	EPA Residential RSL	NE
	2-Chloro naphthalene	4,800,000	EPA Residential RSL	NE
	2-Chlorophenol	390,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,200,000	EPA Residential RSL	See Table A-3
	2-Nitroaniline	630,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,200	EPA Residential RSL	NE
	3-Nitroaniline	630,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	5,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,300,000	EPA Residential RSL	NE
	4-Chloroaniline	2,700	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table A-3
	4-Nitroaniline	27,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,400	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	250,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,300,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	190,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	290,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	1,600,000	EPA Residential RSL	NE
	Dibenzofuran	73,000	EPA Residential RSL	NE
	Diethyl phthalate	51,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	51,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	630,000	EPA Residential RSL	NE
	Hexachlorobenzene	210	EPA Residential RSL	See Table A-3

TABLE A-2
Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)
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)				
	Hexachloroethane	1,800	EPA Residential RSL	See Table A-3
	N-Nitroso-di-n-propylamine	78	EPA Residential RSL	NE
	N-nitrosodiphenylamine	110,000	EPA Residential RSL	NE
	Pentachlorophenol	1,000	EPA Residential RSL	See Table A-3
	Phenol	19,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	240	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as gasoline	770	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as motor oil	10,000	SF RWQCB ESL for direct exposure (2013)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	550	DTSC-Residential SLs	NE
	1,1,1-Trichloroethane	1,700	DTSC-Residential SLs	NE
	1,1,2,2-Tetrachloroethane	600	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	40,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	1,600	DTSC-Residential SLs	NE
	1,1-Dichloroethene	230,000	EPA Residential RSL	See Table A-3
	1,1-Dichloropropene	1,800	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	63,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5.1	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	24,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	58,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.3	EPA Residential RSL	NE
	1,2-Dibromoethane	7.2	DTSC-Residential SLs	NE
	1,2-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,2-Dichloroethane	460	EPA Residential RSL	See Table A-3
	1,2-Dichloropropane	1,000	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	210	DTSC-Residential SLs	NE
	1,3-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,3-Dichloropropane	420	DTSC-Residential SLs	NE
	1,4-Dichlorobenzene	2,600	EPA Residential RSL	See Table A-3
	2,2-Dichloropropane	1,600,000	EPA Residential RSL	NE
	2-Chlorotoluene	480	DTSC-Residential SLs	NE
	2-Hexanone	200,000	EPA Residential RSL	NE
	4-Isopropyltoluene	1,900,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	140	EPA Residential RSL	NE
	Acrylonitrile	0.068	DTSC-Residential SLs	NE
	Benzene	0.33	DTSC-Residential SLs	See Table A-3
	Bis (2-chloroethyl) ether	230	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,900	EPA Residential RSL	NE
	Bromobenzene	290,000	EPA Residential RSL	NE
	Bromochloromethane	150,000	EPA Residential RSL	NE
	Bromodichloromethane	280	DTSC-Residential SLs	NE
	Bromoform	19,000	EPA Residential RSL	NE
	Bromomethane	6,800	EPA Residential RSL	NE

TABLE A-2

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)

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	770,000	EPA Residential RSL	NE
	Carbon tetrachloride	0.099	DTSC-Residential SLs	See Table A-3
	Chlorobenzene	280,000	EPA Residential RSL	See Table A-3
	Chloroethane	3.1	DTSC-Residential SLs	NE
	Chloroform	320	EPA Residential RSL	See Table A-3
	Chloromethane	110,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	19	DTSC-Residential SLs	NE
	cis-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Cyclohexane	6,500,000	EPA Residential RSL	NE
	Dibromochloromethane	750	EPA Residential RSL	NE
	Dibromomethane	23,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	87,000	EPA Residential RSL	NE
	Ethylbenzene	5,800	EPA Residential RSL	NE
	Hexachlorobutadiene	1,200	EPA Residential RSL	See Table A-3
	Hexachlorocyclopentadiene	1,800	EPA Residential RSL	NE
	Isophorone	570,000	EPA Residential RSL	NE
	Isopropylbenzene	1,900,000	EPA Residential RSL	NE
	m,p-Xylenes	550,000	EPA Residential RSL	NE
	Methyl acetate	24,000	DTSC-Residential SLs	NE
	Methyl ethyl ketone	27,000,000	EPA Residential RSL	See Table A-3
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	47,000	EPA Residential RSL	NE
	Methylcyclohexane	6,500,000	EPA Residential RSL	NE
	Methylene chloride	5.5	DTSC-Residential SLs	NE
	N-Butylbenzene	1,200	DTSC-Residential SLs	NE
	Nitrobenzene	5,100	EPA Residential RSL	See Table A-3
	N-Propylbenzene	3,800,000	EPA Residential RSL	NE
	o-Xylene	650,000	EPA Residential RSL	NE
	p-Chlorotoluene	440	DTSC-Residential SLs	NE
	sec-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Styrene	6,000,000	EPA Residential RSL	NE
	tert-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Tetrachloroethene	0.6	DTSC-Residential SLs	See Table A-3
	Toluene	1,100	DTSC-Residential SLs	NE
	trans-1,2-Dichloroethene	190	DTSC-Residential SLs	NE
	trans-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Trichloroethene	940	EPA Residential RSL	See Table A-3
	Trichlorofluoromethane (Freon 11)	730,000	EPA Residential RSL	NE
	Vinyl chloride	59	EPA Residential RSL	See Table A-3
	Xylenes, total	650,000	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 HHRA Note 3 Residential Screening Levels (DTSC Residential SL) or the ecological comparison value is used. If a DTSC Residential SL 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-Residential SLs	Human Health Risk Assessment Note 3 – DTSC-Modified Screening Levels, May 2015.
EPA Residential RSL	United States Environmental Protection Agency Residential Soil Regional Screening Level (THQ=1.0), June 2015.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis 2008)
HHRA Note 2	DTSC Human Health Risk Assessment (HHRA) Note 2: Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Sites – Interim (May 2009).
SF RWQCB ESL	San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels for residential direct exposure (2013)
*	One or more screening levels (EPA Residential RSL, DTSC-Residential SLs, 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

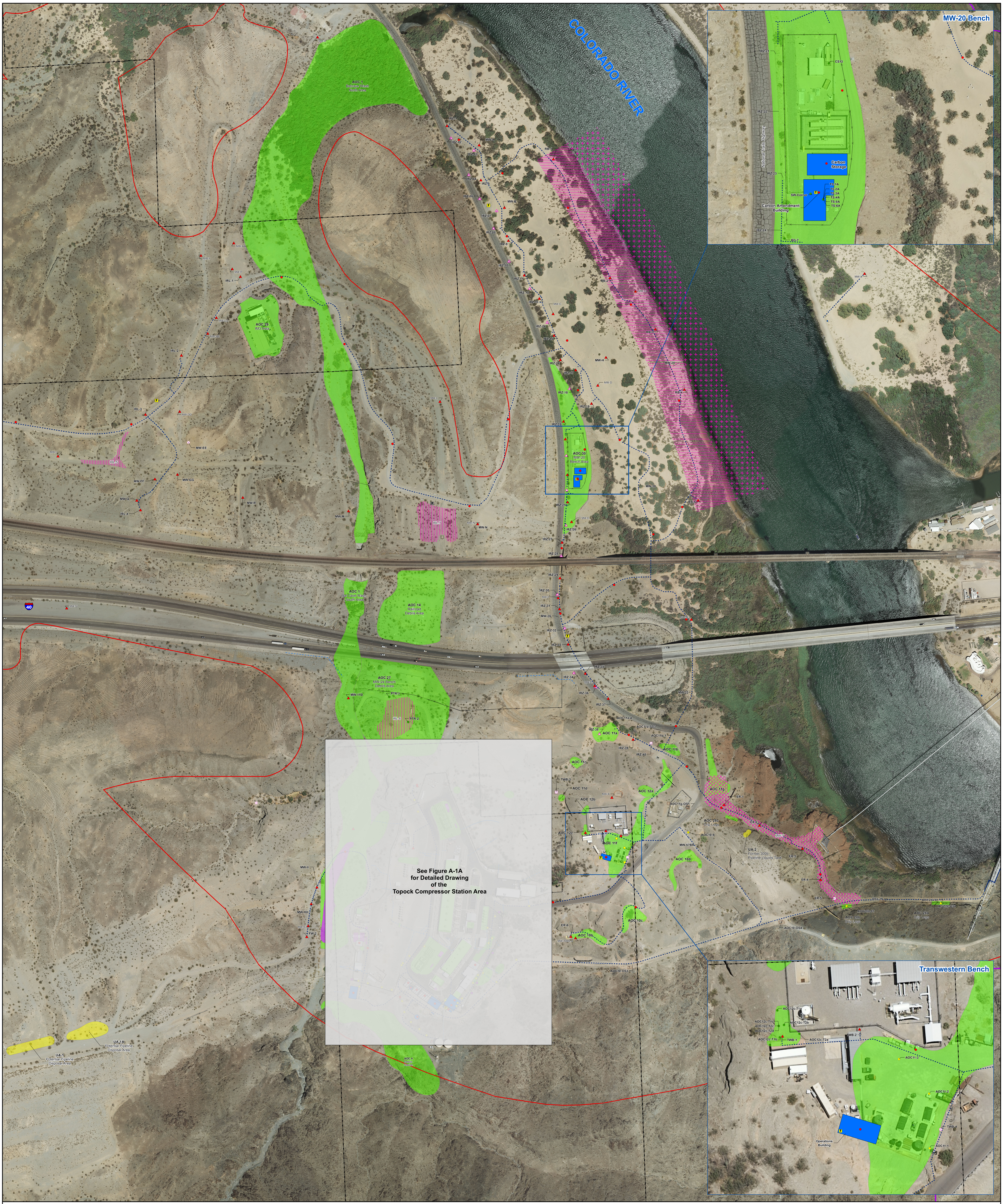
Notes:

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

- 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

- Area for East Ravine (ER) Wells (ER-7 to ER-11)
- Area for Potential Slant Well Screens
- Area for Inner Recirculation Loop (IRL) Wells
- Area for River Bank Extraction Wells

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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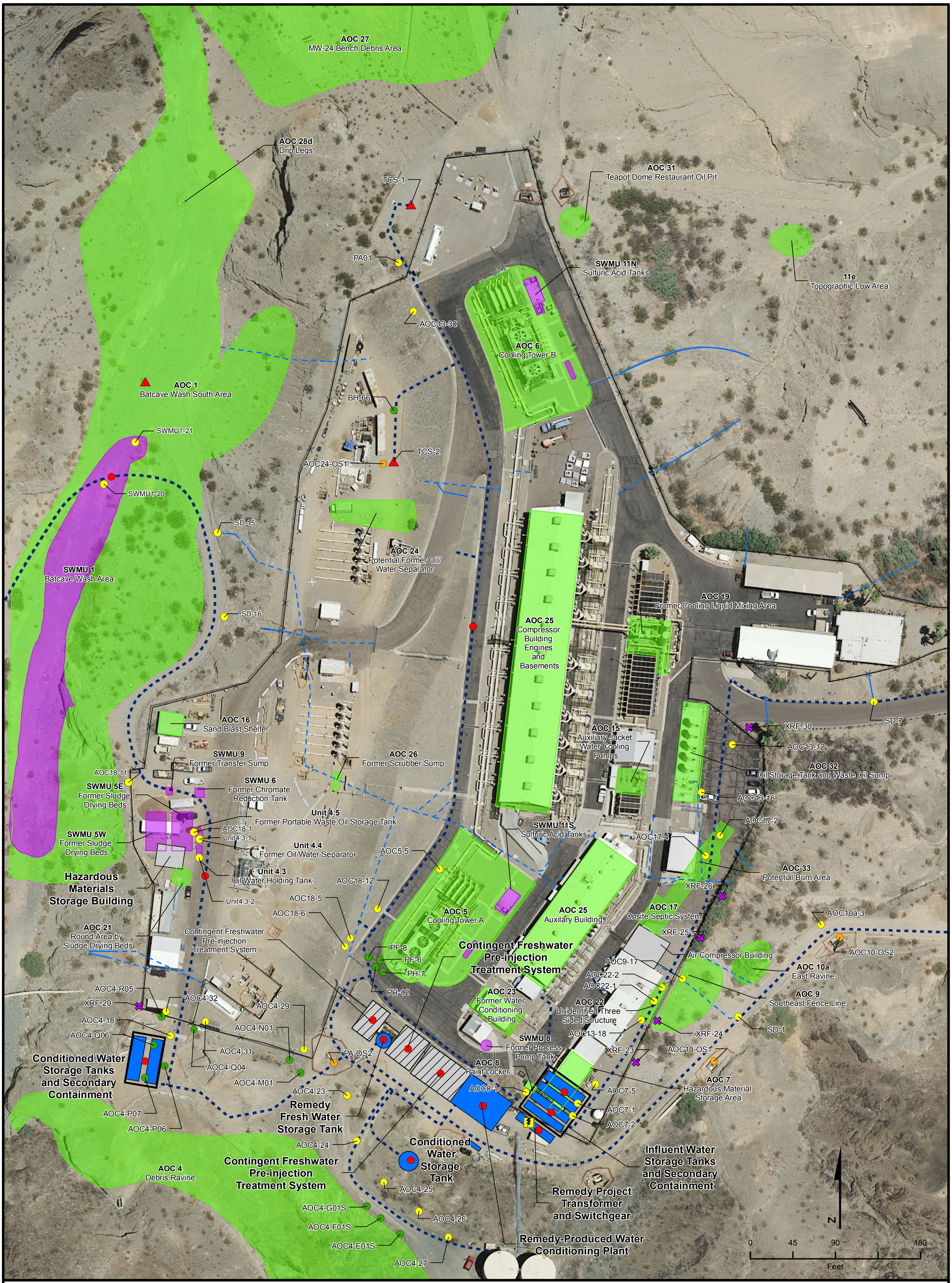

LEGEND

- Proposed Remedy System Soil Sample Location
- Planned Transformer
- Site Fence Boundary
- Stormwater Piping Below Ground
- Stormwater Piping Above Ground

Pipeline Corridor for Remedy

- 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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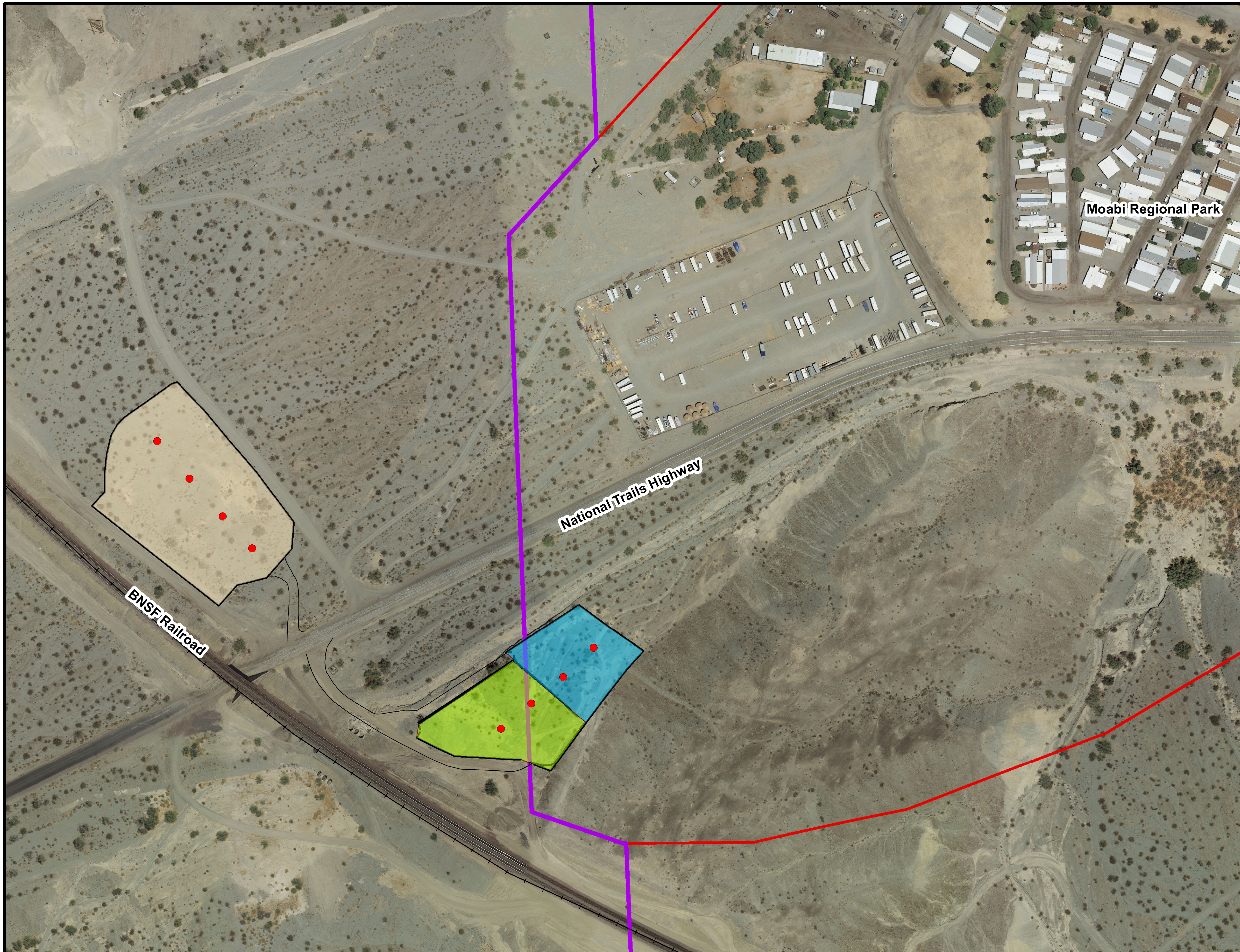

LEGEND

- Proposed Remedy System Soil Sample Location
- Long-term Remedy Support Area (0.8 Acres Approximate)
- Soil Storage/Processing Area (2.56 Acres)
- Temporary Construction Laydown Area (1.05 Acres Approximate)
- Area of Potential Effects (APE)
- EIR Project Area

Notes:
1. Soil sampling locations are approximate.
2. Surface soil samples (0.5 feet below ground surface) on a 100 foot grid within the soil processing area and the longterm remedy support/temporary construction laydown area.

N

0 90 180 360 Feet

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS

FIGURE A-2
MOABI REGIONAL PARK FACILITIES 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

Notes:
1. All remedy structure locations are approximate.

N

0 100 200 400 Feet

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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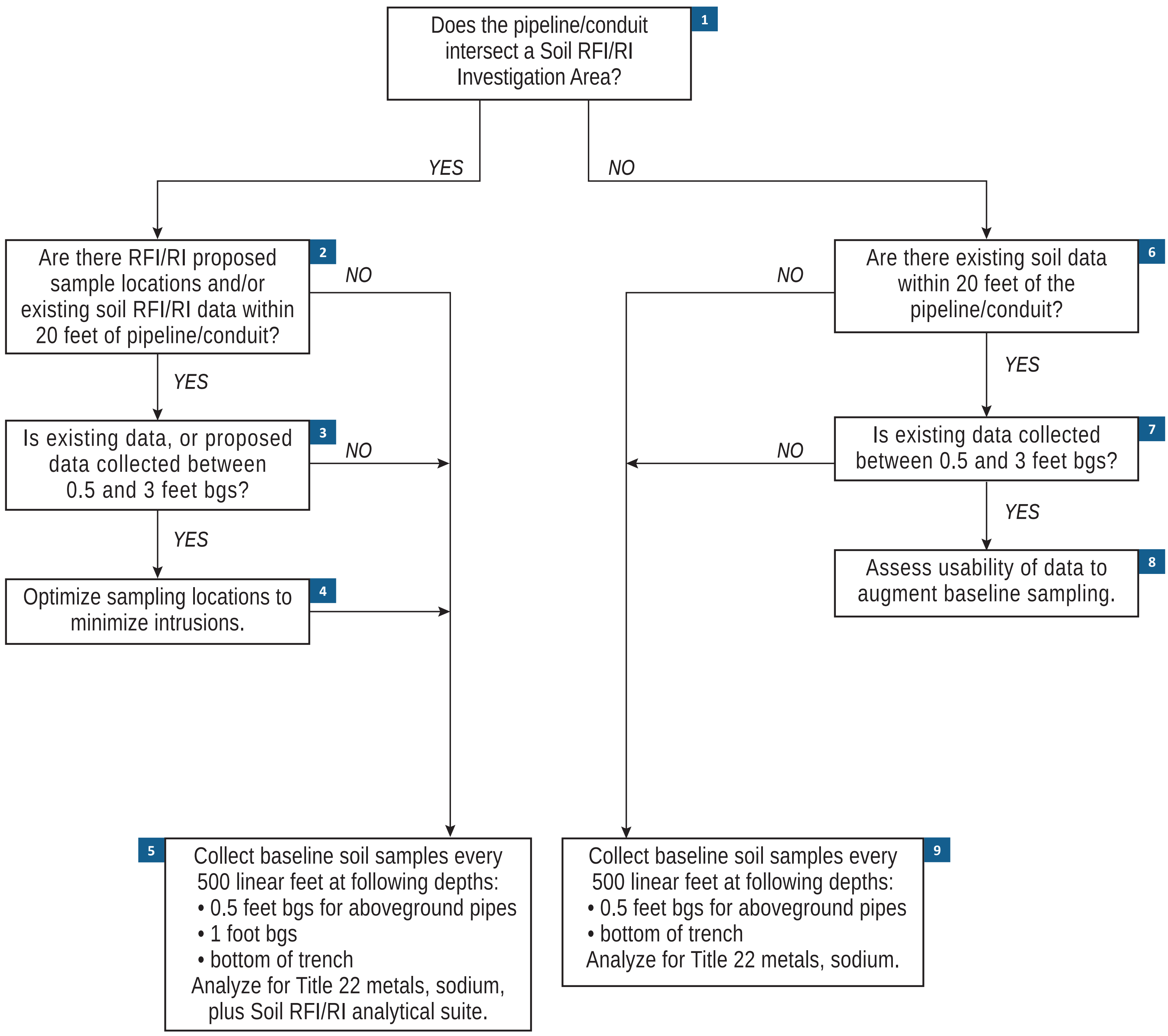
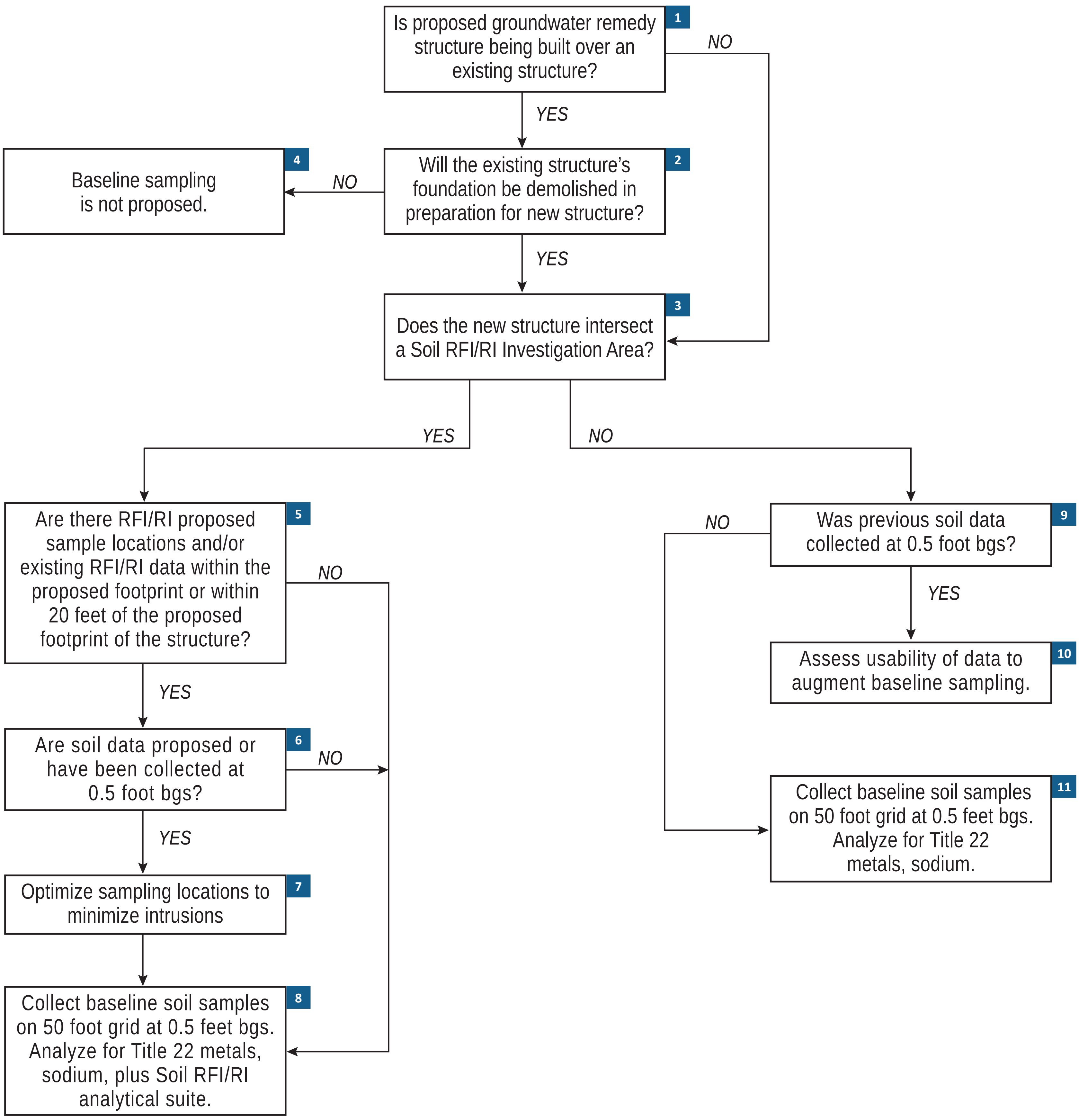


LEGEND

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



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

Attachment 1
Standard Operating Procedures (SOPs)

(Provided on CD-ROM Only)

Well-SOP-01 Rev. 0

Standard Operating Procedure for Well and Borehole Permanent 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.

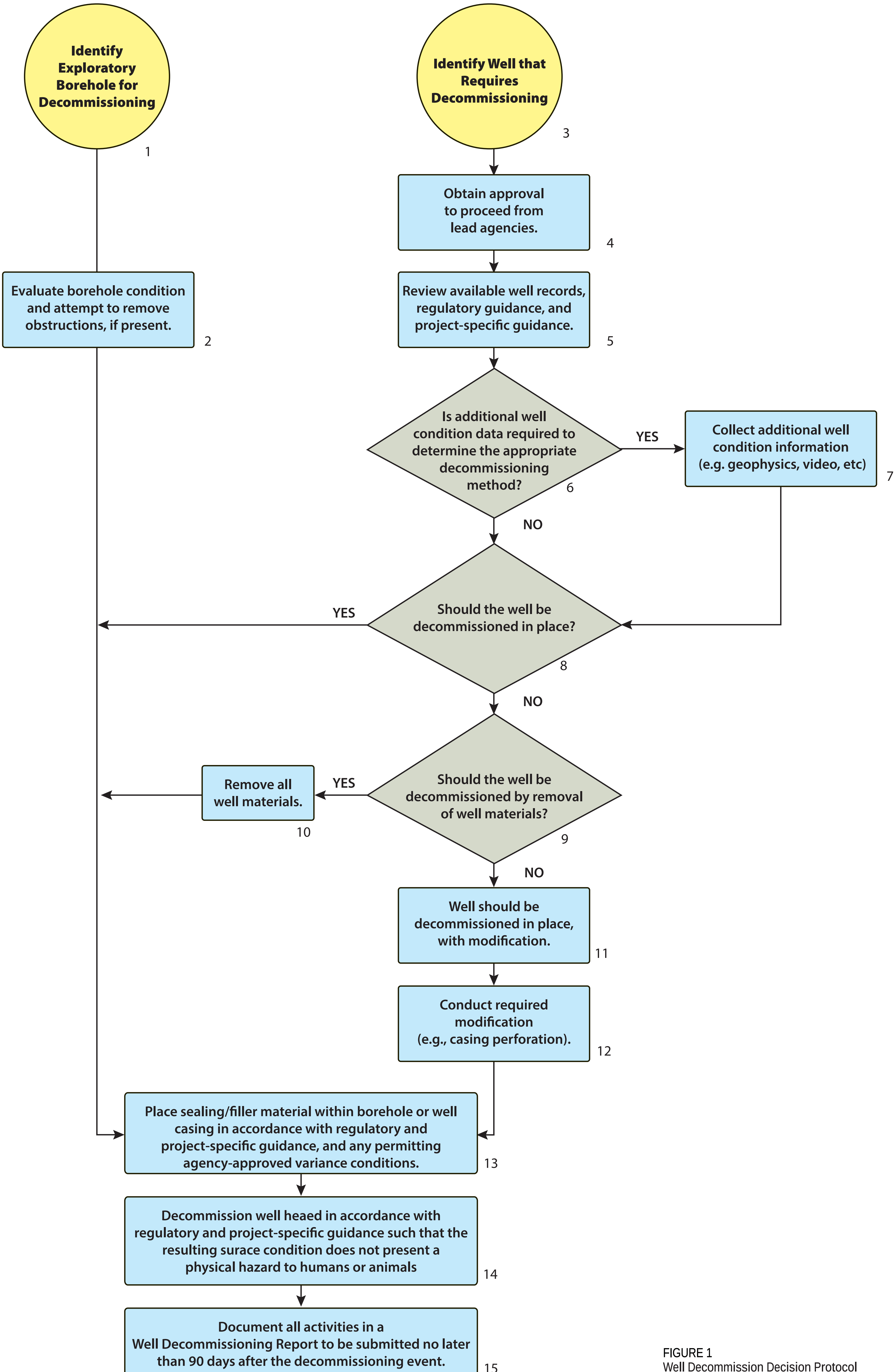


FIGURE 1
Well Decommission Decision Protocol
Standard Operating Procedure for
Well and Borehole Decommissioning
PG&E Topock Compressor Station
Needles, California

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.

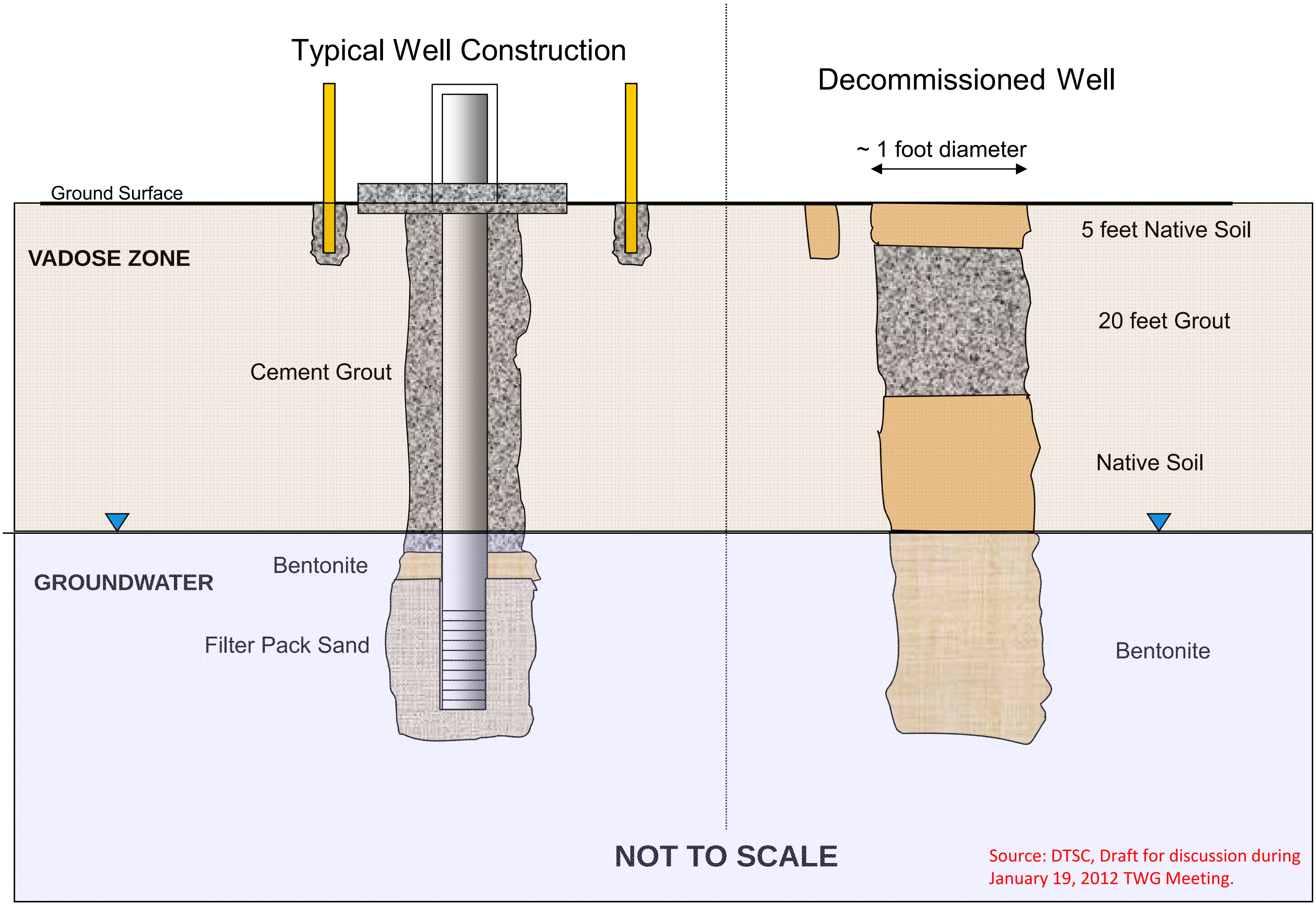
Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response	Summary of June 6, 2014 RTC Discussion
36	FMIT-5	Section 1.0		Both California and Arizona regulatory requirements are outlined in Section 1.0, however, the respective subsections fail to mention provisions for variances 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.

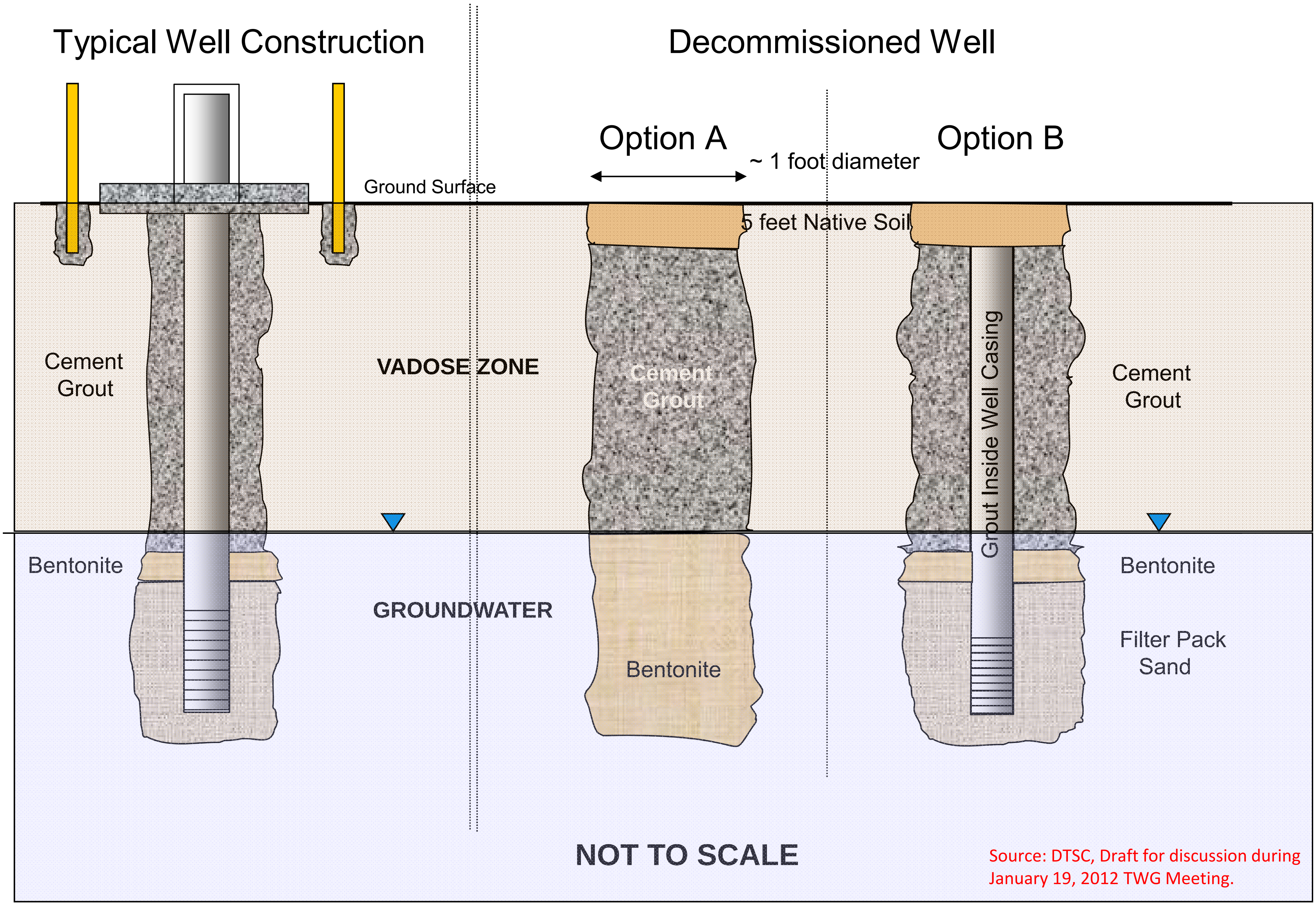
Attachment B
Draft DTSC Concepts for Well and Borehole Decommissioning

Category 1: Contaminant Free – No Variance



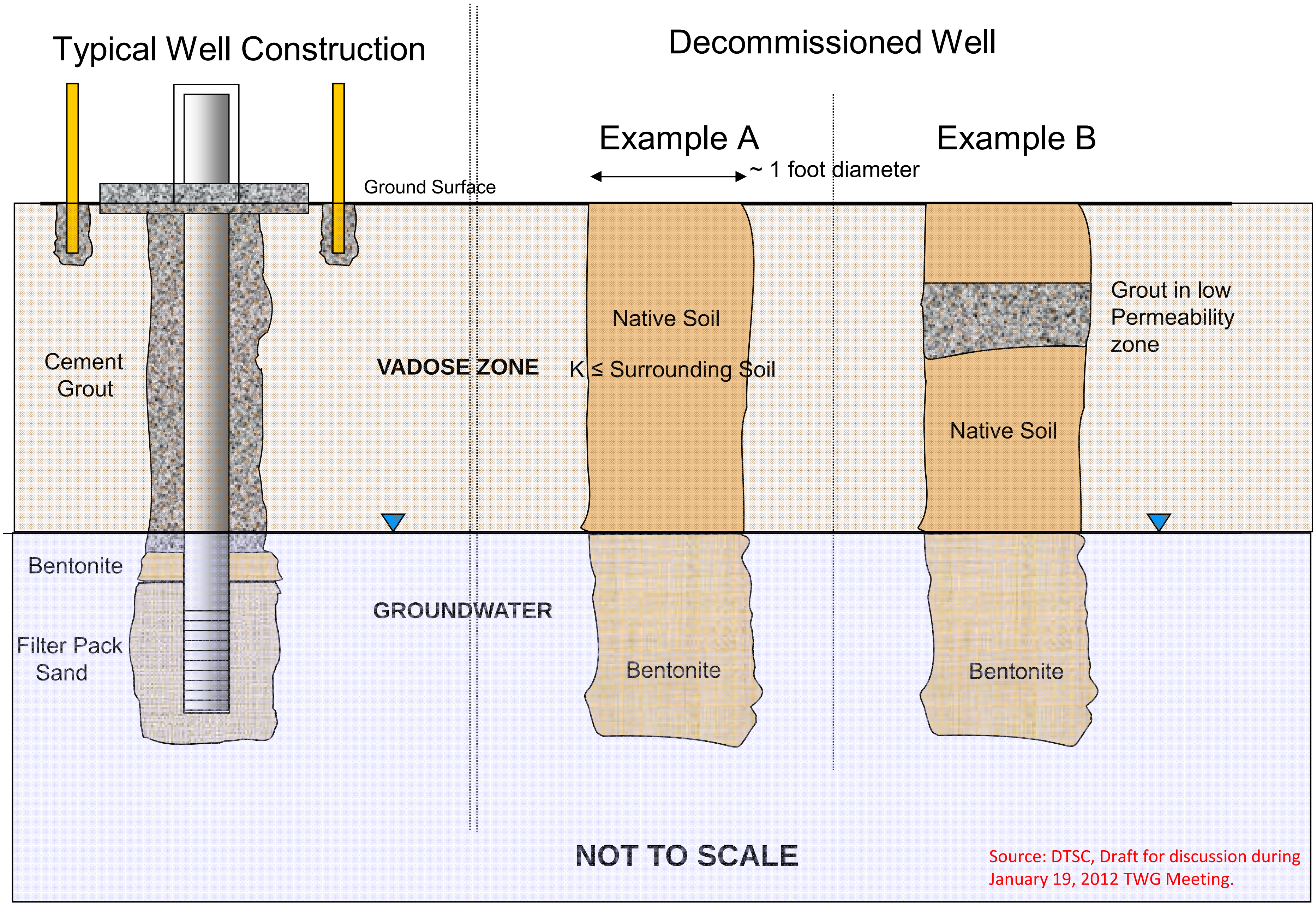
Source: DTSC, Draft for discussion during January 19, 2012 TWG Meeting.

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-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:	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.
0–6			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
6–17			10		- 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') - 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 - 65% sand, 30% gravel up to 4cm, 5% fines	
25			16	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	
30				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
35						

CH2MHILL

SHEET 2 of 9	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.
			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 - lt grey (10YR7/2) and powder dry - moist sandy zone, 55% gravel, 35% sand, 10% fines - dry silty lt grey GW below 65'	Collected Isoflow sample Drill rate slows to 2' / min
65						
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: 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.
			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			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			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			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	
			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	
			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			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			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			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			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	

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

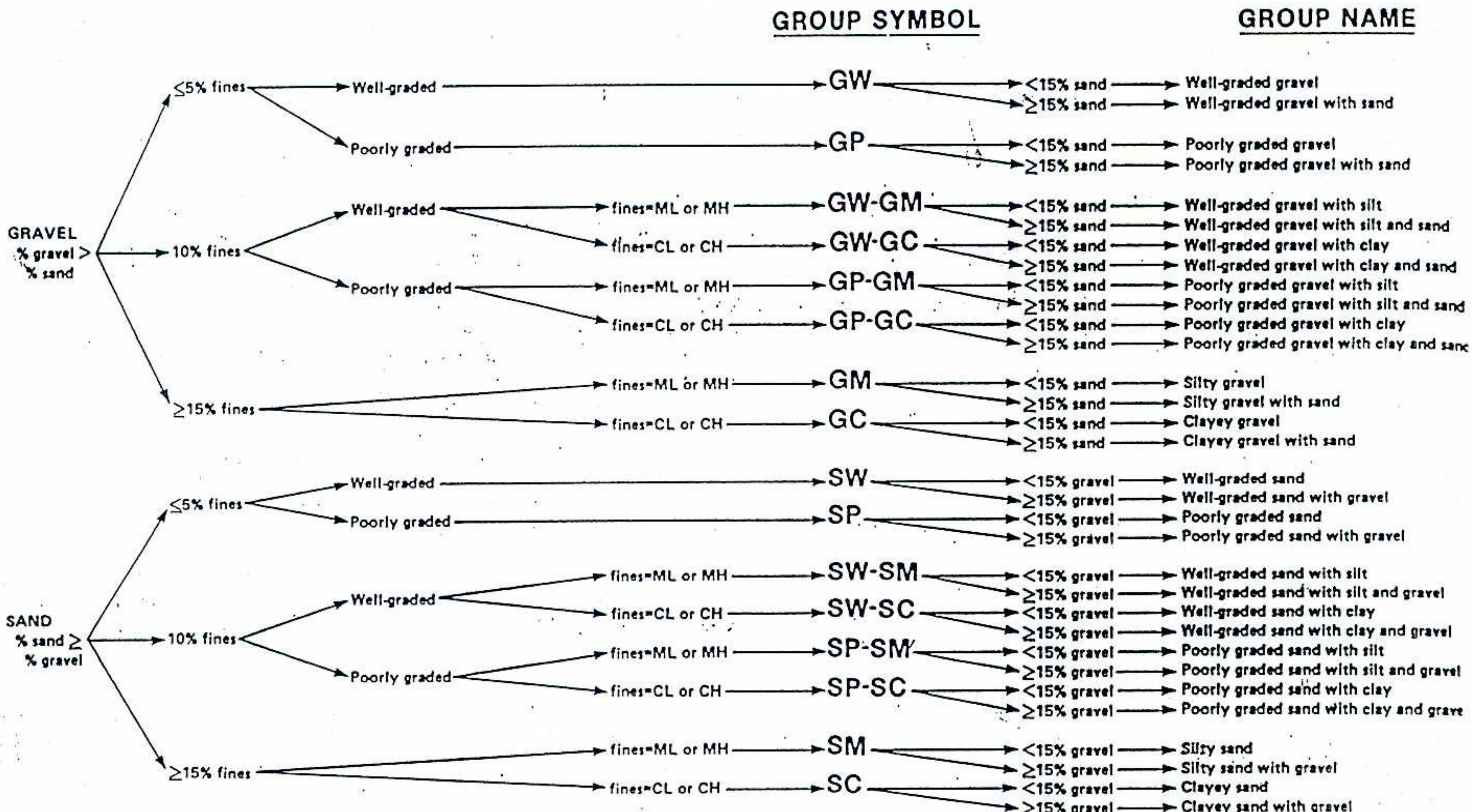
ATTACHMENT B

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

GROUP SYMBOL				GROUP NAME
CL	<30% plus No. 200	<15% plus No. 200		Lean clay
		15-25% plus No. 200	% sand ≥% gravel	Lean clay with sand
			% sand <% gravel	Lean clay with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy lean clay
			≥15% gravel	Sandy lean clay with gravel
		% sand <% gravel	<15% sand	Gravelly lean clay
			≥15% sand	Gravelly lean clay with sand
ML	<30% plus No. 200	<15% plus No. 200		Silt
		15-25% plus No. 200	% sand ≥% gravel	Silt with sand
			% sand <% gravel	Silt with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy silt
			≥15% gravel	Sandy silt with gravel
		% sand <% gravel	<15% sand	Gravelly silt
			≥15% sand	Gravelly silt with sand
CH	<30% plus No. 200	<15% plus No. 200		Fat clay
		15-25% plus No. 200	% sand ≥% gravel	Fat clay with sand
			% sand <% gravel	Fat clay with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy fat clay
			≥15% gravel	Sandy fat clay with gravel
		% sand <% gravel	<15% sand	Gravelly fat clay
			≥15% sand	Gravelly fat clay with sand
MH	<30% plus No. 200	<15% plus No. 200		Elastic silt
		15-25% plus No. 200	% sand ≥% gravel	Elastic silt with sand
			% sand <% gravel	Elastic silt with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy elastic silt
			≥15% gravel	Sandy elastic silt with gravel
		% sand <% gravel	<15% sand	Gravelly elastic silt
			≥15% sand	Gravelly elastic silt with sand

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.
0–6			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
5						
6–17			10		- slightly moist - dry	
10						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') - 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 - 65% sand, 30% gravel up to 4cm, 5% fines	
17–34			16			
20						
25				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	
30				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
35						

CH2MHILL

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
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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 - lt grey (10YR7/2) and powder dry - moist sandy zone, 55% gravel, 35% sand, 10% fines - dry silty lt grey GW below 65'	Collected Isoflow sample Drill rate slows to 2' / min
65						
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

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.
			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			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			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			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	
			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	
			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			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			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			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			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

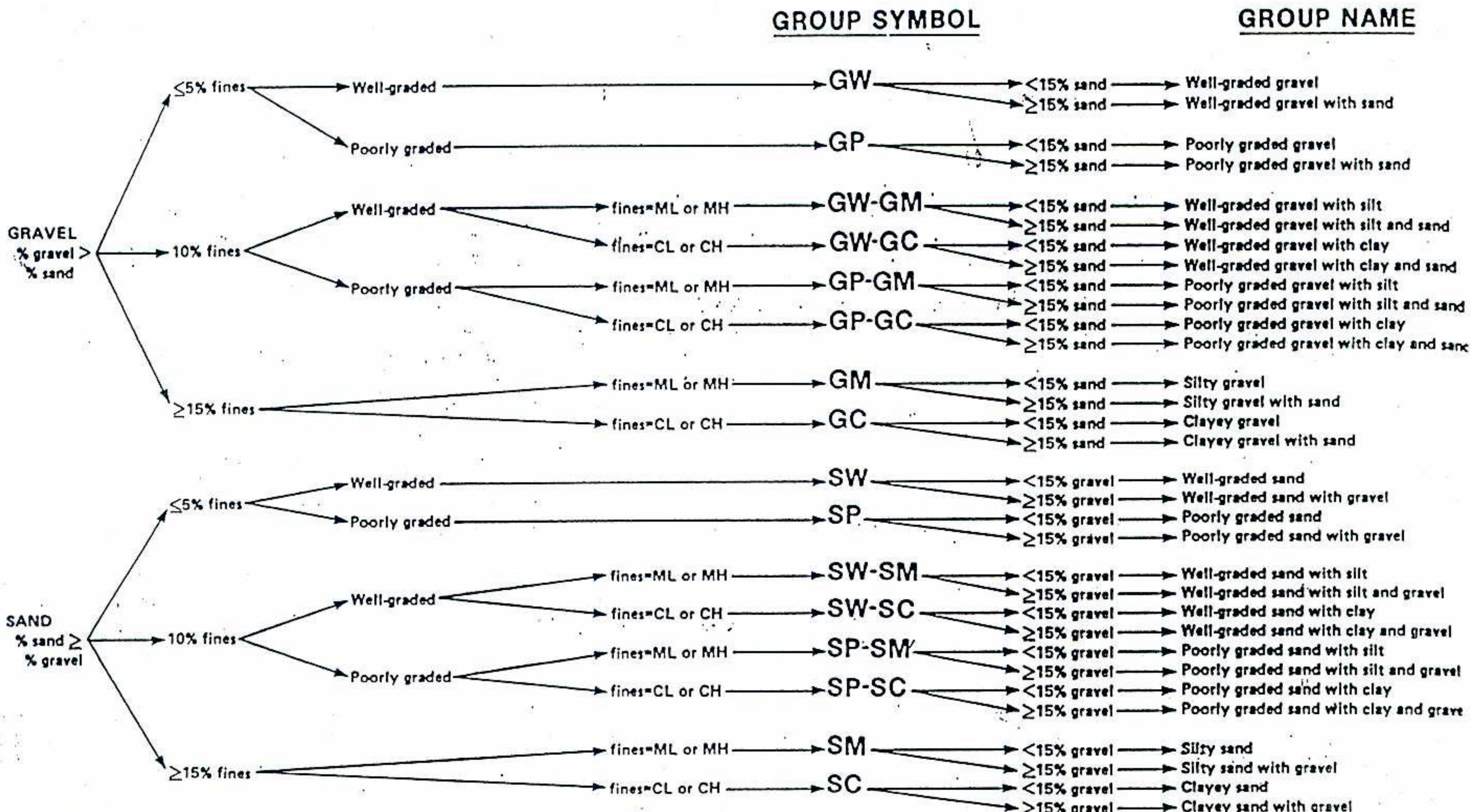
ATTACHMENT B

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

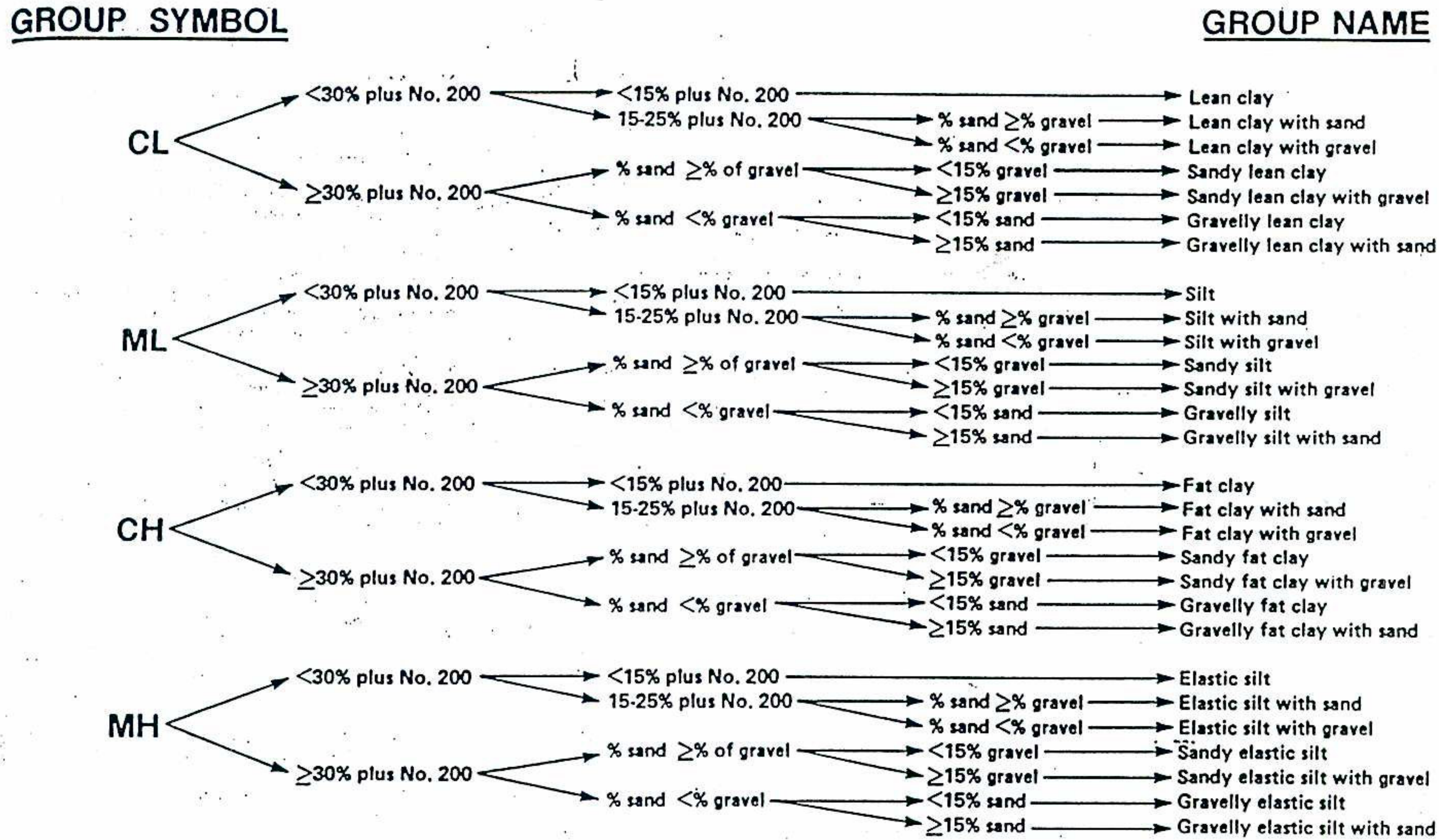
UNIFIED SOIL CLASSIFICATION SYSTEM

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-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^{o} C prior to analysis. Freezing the samples between -7 and -20^{o} 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^{o} C, to the lab in less than 48 hours or freeze (reagent water preserved samples to between -7 and -20^{o} 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

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.

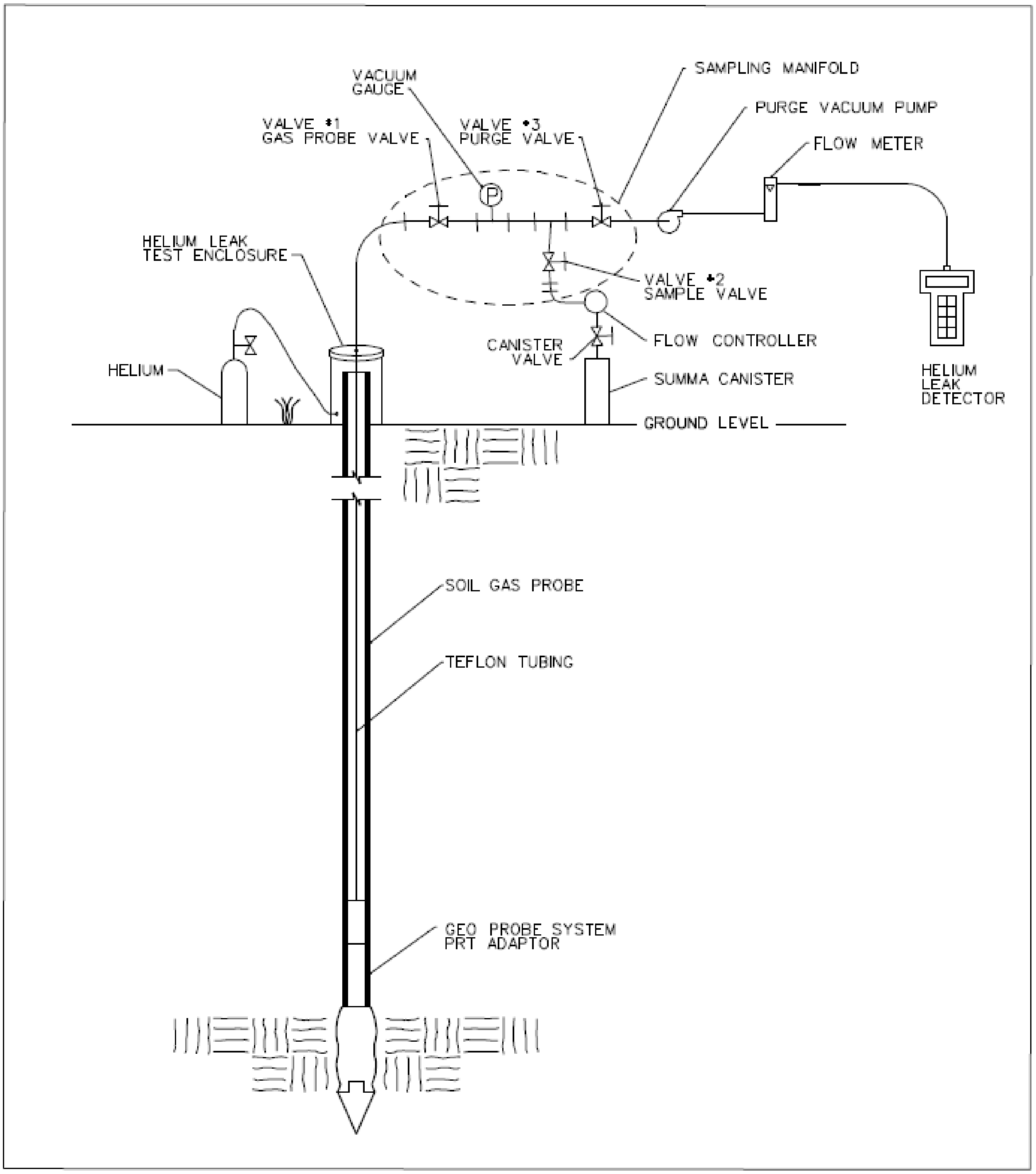
9.2. Flow controllers supplied by the laboratory must follow the performance criteria and QA prescribed in EPA Method TO-14/15 for flow controller cleaning and adjustment. SOPs are required.

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
Revised Management Protocol for Handling and Disposition of Displaced Site Material

Revised 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 (submitted with 90% Design); rev. 1 July 2015 (submitted as part of 90% Responses to Comments); rev. 2 November 2015 (submitted with Final Design)

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.

A draft of this protocol (dated October 3, 2012[2]) was included in the Soil Management Plan associated with the Basis of Design Report/Pre-Final (90%) Design Submittal and Construction/Remediation Action Work Plan (September 8, 2014). Subsequent to agency review of the design submittal, this protocol has been revised per comment from the U.S. Department of the Interior (DOI) (Comment #803, DOI-333 [see Attachment 1]). The October 3, 2012 draft of this protocol included a provision for the long-term storage of material that is determined to be non-hazardous waste but unsuitable for a final disposition decision on-site because contaminants are present above the interim screening level. The 90% design submittal identified an area (located on federal land) for the long-term storage of material that is generated during construction of the final groundwater remedy and is characterized to meet this profile; however, the DOI comment indicates that based on discussions with San Bernardino County, the adjacent lessee of Moabi Regional Park, and internal discussions between the U.S. Bureau of Land Management (BLM) and the DOI, PG&E must find an alternate location for storage. Based on further clarifications from DOI and BLM, PG&E understood that storage of waste soil above screening levels would not be allowed anywhere on federal lands within the project area. The remaining potential storage locations are private properties owned by the Fort Mojave Indian Tribe (FMIT) and PG&E. Given the groundwater remedy facilities already planned to be located on the Topock Compressor Station (TCS) and the TCS's operational needs for the property for natural gas compressor operations, there is space on PG&E property only to temporarily store a small number of soil bins at a time while awaiting analysis prior to final disposition. There is no available space on PG&E property to store waste soil on a longer-term basis. The FMIT did not identify any locations on the Tribe's property within the project area for this purpose. PG&E also contacted treatment storage and disposal facilities (TSDFs) and was told that the TSDFs would accept the waste soil for disposal, but not storage.

[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] Responses to comments on the May 14, 2012 draft of this protocol (see Attachment 1) were incorporated in the October 2, 2012 draft of the protocol.

Given the above, PG&E determined that there was no available alternate location for the long-term storage of material with concentrations above the interim screening levels. Therefore, this protocol has been revised to exclude this provision.

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[3]. 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), 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 project area.

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*

[3] 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.

> *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, 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 be displaced during work including specific measures, such as field screening and material segregation strategies, to try and minimize the volume of material that requires disposal. .
- The anticipated location and methodology for final on- or off-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 final disposition (see Section 3.4).

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).
- 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 3.4).

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 Screening Level (HERO's *Human Health Risk Assessment Note 3 – DTSC-modified Screening Levels*)[4] or the ecological comparison value is used. If a DTSC residential screening level 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.

[4] California Department of Toxic Substances Control's Human and Ecological Office (HERO). 2015. *Human Health Risk Note 3–DTSC-Modified Screening Levels*. May 3.

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 or project-specific cleanup goal (once established) is suitable for return, reuse, or replacement on-site. Material that has a representative concentration that is greater than the interim screening level or project-specific cleanup goal (once established), or is characterized as hazardous waste will be disposed of off-site in accordance with applicable laws and regulations.

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 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 interim screening level or project-specific cleanup goal (once established) 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. 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 (rev. July 2015)

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	4.8		EPA Residential RSL	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	4.8		EPA Residential RSL	See Table 2
	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		DTSC HHRA Note 2	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 2
	Arsenic	11	*	Background Level	See Table 2
	Barium	410	*	Background Level	See Table 2
	Beryllium	0.672		Background Level	See Table 2
	Cadmium	1.1	*	Background Level	See Table 2
	Calcium	66,500		Background Level	NE
	Chromium, Hexavalent	0.83	*	Background Level	See Table 2
	Chromium, total	39.8	*	Background Level	See Table 2
	Cobalt	12.7	*	Background Level	See Table 2
	Copper	16.8		Background Level	See Table 2
	Cyanide	0.9		Soil Ecological Comparison Value (ECV)	NE
	Iron	55,000		EPA Residential RSL	NE
	Lead	8.39	*	Background Level	See Table 2
	Magnesium	12,100		Background Level	NE
	Manganese	402	*	Background Level	NE
	Mercury	0.0125		Soil Ecological Comparison Value (ECV)	See Table 2
	Molybdenum	1.37	*	Background Level	See Table 2
	Nickel	27.3	*	Background Level	See Table 2
	Potassium	4,400		Background Level	NE
	Selenium	1.47	*	Background Level	See Table 2
	Silver	5.15		Soil Ecological Comparison Value (ECV)	See Table 2
	Sodium	2,070		Background Level	NE
	Thallium	0.78		EPA Residential RSL	See Table 2
	Vanadium	52.2	*	Background Level	See Table 2
	Zinc	58	*	Background Level	See Table 2

TABLE 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
Pesticides (µg/kg)				
	4,4-DDD	2.1	Soil Ecological Comparison Value (ECV)	See Table 2
	4,4-DDE	2	EPA Residential RSL	See Table 2
	4,4-DDT	1.9	EPA Residential RSL	See Table 2
	Aldrin	39	EPA Residential RSL	See Table 2
	alpha-BHC	86	EPA Residential RSL	NE
	alpha-Chlordane	470	Soil Ecological Comparison Value (ECV)	See Table 2
	beta-BHC	300	EPA Residential RSL	NE
	delta-BHC	300	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table 2
	Endo sulfan I	470,000	EPA Residential RSL	NE
	Endo sulfan II	470,000	EPA Residential RSL	NE
	Endosulfan sulfate	470,000	EPA Residential RSL	NE
	Endrin	19,000	EPA Residential RSL	See Table 2
	Endrin aldehyde	19,000	EPA Residential RSL	NE
	Endrin ketone	19,000	EPA Residential RSL	NE
	gamma-BHC (Lindane)	570	EPA Residential RSL	See Table 2
	gamma-Chlordane	0.43	DTSC-Residential SLs	See Table 2
	Heptachlor	130	EPA Residential RSL	See Table 2
	Heptachlor Epoxide	70	EPA Residential RSL	See Table 2
	Methoxychlor	320,000	EPA Residential RSL	See Table 2
	Toxaphene	490	EPA Residential RSL	See Table 2
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	18,000	EPA Residential RSL	NE
	2-Methyl naphthalene	240,000	EPA Residential RSL	NE
	Acenaphthene	3,600,000	EPA Residential RSL	NE
	Acenaphthylene	3,600,000	EPA Residential RSL	NE
	Anthracene	18,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	16	EPA Residential RSL	NE
	Benzo (a) anthracene	160	EPA Residential RSL	NE
	Benzo (a) pyrene	16	EPA Residential RSL	NE
	Benzo (b) fluoranthene	160	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,800,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	0.39	DTSC-Residential SLs	NE
	Chrysene	3.9	DTSC-Residential SLs	NE
	Dibenzo (a,h) anthracene	16	EPA Residential RSL	NE
	Fluoranthene	2,400,000	EPA Residential RSL	NE
	Fluorene	2,400,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	160	EPA Residential RSL	NE
	Naphthalene	3,800	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	1,800,000	EPA Residential RSL	NE
	Pyrene	1,800,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	0.23	DTSC-Residential SLs	See Table 2
	Aroclor 1221	170	EPA Residential RSL	See Table 2

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)

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	170	EPA Residential RSL	See Table 2
	Aroclor 1242	230	EPA Residential RSL	See Table 2
	Aroclor 1248	230	EPA Residential RSL	See Table 2
	Aroclor 1254	240	EPA Residential RSL	See Table 2
	Aroclor 1260	240	EPA Residential RSL	See Table 2
	Aroclor 1262	240	EPA Residential RSL	See Table 2
	Aroclor 1268	240	EPA Residential RSL	See Table 2
	Total PCBs	204	Soil Ecological Comparison Value (ECV)	See Table 2
Semivolatile Organic Compounds (µg/kg)				
	1,1´-Biphenyl	47,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	23,000	EPA Residential RSL	NE
	1,4-Dioxane	5,300	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,900,000	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,300,000	EPA Residential RSL	See Table 2
	2,4,6-Trichlorophenol	7.5	DTSC-Residential SLs	See Table 2
	2,4-Dichlorophenol	190,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,300,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	130,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,700	EPA Residential RSL	See Table 2
	2,6-Dinitrotoluene	360	EPA Residential RSL	NE
	2-Chloro naphthalene	4,800,000	EPA Residential RSL	NE
	2-Chlorophenol	390,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,200,000	EPA Residential RSL	See Table 2
	2-Nitroaniline	630,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,200	EPA Residential RSL	NE
	3-Nitroaniline	630,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	5,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,300,000	EPA Residential RSL	NE
	4-Chloroaniline	2,700	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table 2
	4-Nitroaniline	27,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,400	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	250,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,300,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	190,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	290,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	1,600,000	EPA Residential RSL	NE
	Dibenzofuran	73,000	EPA Residential RSL	NE
	Diethyl phthalate	51,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	51,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	630,000	EPA Residential RSL	NE
	Hexachlorobenzene	210	EPA Residential RSL	See Table 2

TABLE 1
Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)
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)				
	Hexachloroethane	1,800	EPA Residential RSL	See Table 2
	N-Nitroso-di-n-propylamine	78	EPA Residential RSL	NE
	N-nitrosodiphenylamine	110,000	EPA Residential RSL	NE
	Pentachlorophenol	1,000	EPA Residential RSL	See Table 2
	Phenol	19,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	240	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as gasoline	770	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as motor oil	10,000	SF RWQCB ESL for direct exposure (2013)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	550	DTSC-Residential SLs	NE
	1,1,1-Trichloroethane	1,700	DTSC-Residential SLs	NE
	1,1,2,2-Tetrachloroethane	600	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	40,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	1,600	DTSC-Residential SLs	NE
	1,1-Dichloroethene	230,000	EPA Residential RSL	See Table 2
	1,1-Dichloropropene	1,800	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	63,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5.1	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	24,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	58,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.3	EPA Residential RSL	NE
	1,2-Dibromoethane	7.2	DTSC-Residential SLs	NE
	1,2-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,2-Dichloroethane	460	EPA Residential RSL	See Table 2
	1,2-Dichloropropane	1,000	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	210	DTSC-Residential SLs	NE
	1,3-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,3-Dichloropropane	420	DTSC-Residential SLs	NE
	1,4-Dichlorobenzene	2,600	EPA Residential RSL	See Table 2
	2,2-Dichloropropane	1,600,000	EPA Residential RSL	NE
	2-Chlorotoluene	480	DTSC-Residential SLs	NE
	2-Hexanone	200,000	EPA Residential RSL	NE
	4-Isopropyltoluene	1,900,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	140	EPA Residential RSL	NE
	Acrylonitrile	0.068	DTSC-Residential SLs	NE
	Benzene	0.33	DTSC-Residential SLs	See Table 2
	Bis (2-chloroethyl) ether	230	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,900	EPA Residential RSL	NE
	Bromobenzene	290,000	EPA Residential RSL	NE
	Bromochloromethane	150,000	EPA Residential RSL	NE
	Bromodichloromethane	280	DTSC-Residential SLs	NE
	Bromoform	19,000	EPA Residential RSL	NE
	Bromomethane	6,800	EPA Residential RSL	NE

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)

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	770,000	EPA Residential RSL	NE
	Carbon tetrachloride	0.099	DTSC-Residential SLs	See Table 2
	Chlorobenzene	280,000	EPA Residential RSL	See Table 2
	Chloroethane	3.1	DTSC-Residential SLs	NE
	Chloroform	320	EPA Residential RSL	See Table 2
	Chloromethane	110,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	19	DTSC-Residential SLs	NE
	cis-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Cyclohexane	6,500,000	EPA Residential RSL	NE
	Dibromochloromethane	750	EPA Residential RSL	NE
	Dibromomethane	23,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	87,000	EPA Residential RSL	NE
	Ethylbenzene	5,800	EPA Residential RSL	NE
	Hexachlorobutadiene	1,200	EPA Residential RSL	See Table 2
	Hexachlorocyclopentadiene	1,800	EPA Residential RSL	NE
	Isophorone	570,000	EPA Residential RSL	NE
	Isopropylbenzene	1,900,000	EPA Residential RSL	NE
	m,p-Xylenes	550,000	EPA Residential RSL	NE
	Methyl acetate	24,000	DTSC-Residential SLs	NE
	Methyl ethyl ketone	27,000,000	EPA Residential RSL	See Table 2
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	47,000	EPA Residential RSL	NE
	Methylcyclohexane	6,500,000	EPA Residential RSL	NE
	Methylene chloride	5.5	DTSC-Residential SLs	NE
	N-Butylbenzene	1,200	DTSC-Residential SLs	NE
	Nitrobenzene	5,100	EPA Residential RSL	See Table 2
	N-Propylbenzene	3,800,000	EPA Residential RSL	NE
	o-Xylene	650,000	EPA Residential RSL	NE
	p-Chlorotoluene	440	DTSC-Residential SLs	NE
	sec-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Styrene	6,000,000	EPA Residential RSL	NE
	tert-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Tetrachloroethene	0.6	DTSC-Residential SLs	See Table 2
	Toluene	1,100	DTSC-Residential SLs	NE
	trans-1,2-Dichloroethene	190	DTSC-Residential SLs	NE
	trans-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Trichloroethene	940	EPA Residential RSL	See Table 2
	Trichlorofluoromethane (Freon 11)	730,000	EPA Residential RSL	NE
	Vinyl chloride	59	EPA Residential RSL	See Table 2
	Xylenes, total	650,000	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 HHRA Note 3 Residential Screening Levels (DTSC Residential SL) or the ecological comparison value is used. If a DTSC Residential SL 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-Residential SLs	Human Health Risk Assessment Note 3 – DTSC-Modified Screening Levels, May 2015.
EPA Residential RSL	United States Environmental Protection Agency Residential Soil Regional Screening Level (THQ=1.0), June 2015.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis 2008)
HHRA Note 2	DTSC Human Health Risk Assessment (HHRA) Note 2: Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Sites – Interim (May 2009).
SF RWQCB ESL	San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels for residential direct exposure (2013)
*	One or more screening levels (EPA Residential RSL, DTSC-Residential SLs, 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

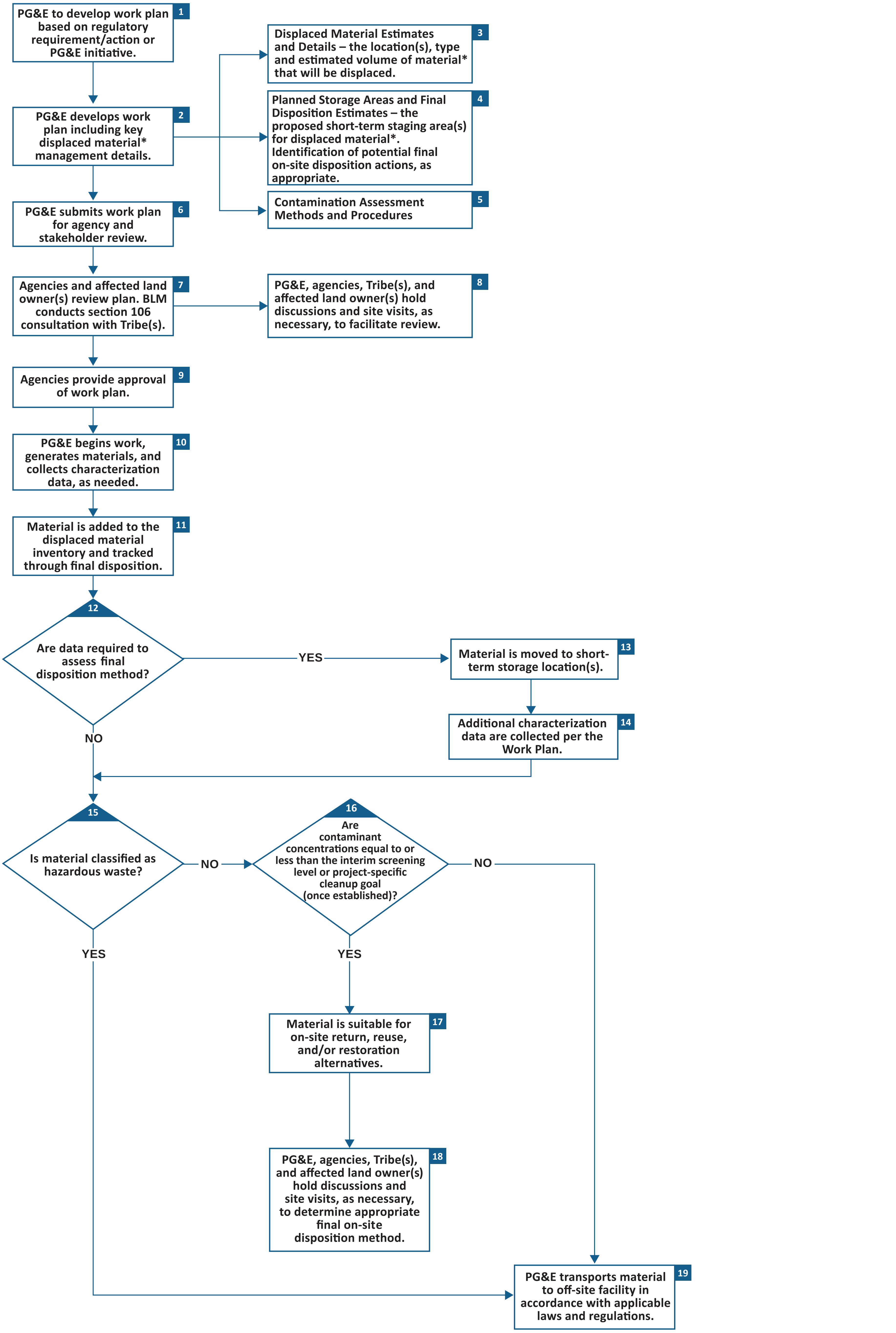
Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Polychlorinated Biphenyls							
	Total PCBs	50	50	NE	5	NE	NE
Semivolatile Organic Compounds							
	2,4-Dinitrotoluene	NE	NE	2.6	NE	0.13	D030
g	2-Methylphenol (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

Attachment 1: Responses to Comments

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 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

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.)

Matthew Rodriquez
Secretary for
Environmental Protection

Department of Toxic Substances Control

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 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,

Jmarcos

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

Response to DOI Comment #803 on the 90% Design
Topock Groundwater Remediation Project
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
803	DOI-333	Design	Infrastructures	2.1.3/2-6	The soil storage area, also comprising approximately 1.55 acres, will serve as the primary storage area for excavated soils…	Based on discussions with San Bernardino County, the adjacent lessee of Park Moabi Regional Park, and internal discussions between the Bureau of Land Management and the Department of the Interior, PG&E must find an alternate location for storage of waste soil above screening levels.	Based on further clarifications from DOI and BLM, PG&E understands that storage of waste soil above screening levels will not be allowed on federal lands. The remaining potential storage locations are private properties owned by FMIT and PG&E. Given the remedy facilities already planned to be located on the TCS and the Station's own operational needs for the property for its natural gas compressor operations, there is only space on PG&E property to temporarily store soil bins while awaiting analysis prior to final disposition. There is not adequate space on PG&E property to store waste soil on a long term basis. PG&E also contacted local TSDFs and was told that the TSDFs would accept the waste soil for disposal, not for storage. Given the above, at this time, PG&E has not been able to identify an alternate location for storing the waste soil. PG&E defers to the FMIT regarding its views on potential use of the Tribe's property within the project area for this purpose. In the meantime, in response to this comment, PG&E will eliminate the proposed soil storage area at Moabi Regional Park and move the proposed CHQ into that area. Note that displaced soils that are below screening levels may still be stored at the currently proposed soil processing area and the CHQ (subject to space availability). The management protocol for handling and disposition of displaced site materials (Appendix C to the CIMP, Appendix B to the Soil Management Plan) was revised to reflect that the materials above screening levels will be disposed of offsite. The revised protocol was provided in this 90% RTC period and included in **Attachment Q** of the final RTC table.		Resolved.		This RTC was discussed at the July 23, August 19, and August 26 TWG meetings. Comment resolved.

Source: Final Basis of Design Report (Appendix I – Response to Comments on the 90% Design Documents [Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan]).

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 Topock Site Operations 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 soil storage area located at Moabi Regional Park. It should be noted that during construction, temporary storage (or staging) of displaced soils will also occur in staging areas near the primary work zones (i.e., construction zones).

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

[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.

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.

Preservation of Existing Vegetation – Existing vegetation will be preserved whenever feasible. Preservation of existing vegetation will 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 will be identified by a qualified biologist and marked with temporary fencing. All employees and subcontractors will be informed on the limits of disturbance within the construction site and will 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 will be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. 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, the bags will be placed two bags high. When used to anchor stockpiles, they will 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 will 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-RCRA Hazardous Soil. It is anticipated that non-RCRA hazardous soil will be placed in roll-off bins or similar containers. If it is necessary to temporarily stockpile non-RCRA hazardous soil 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 if the stockpile is on a foundation, or minimum 60-mil polyethylene sheeting or equivalent will be used if the stockpile is not on a foundation.
- 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 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 and at the end of each workday and as necessary to prevent wind dispersion or runoff from precipitation events.
- Only soil that does not contain free liquids will be stockpiled.
- 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.
- The stockpile will be inspected weekly and after storms to verify that controls for windblown dispersion and prevention of runoff and run-on are functioning properly.
- After the stockpile has been removed, the area will be inspected and all residual material will be removed from the underlying and surrounding areas.

The stockpile location will be certified by a California-registered professional engineer for compliance with these requirements, consistent with California Health and Safety Code Section 25123.3(b)(4)(B).

Non-Hazardous Soil Above Interim Screening Levels or Project-Specific Cleanup Goals (once established). It is anticipated that all soil that is above soil screening levels or project-specific cleanup goals will not be stockpiled and will be placed in roll-off bins or similar containers. If it is necessary to temporarily 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 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 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 final volume of stockpiled soil has been removed, the area will be inspected for visual contamination due to stockpiling activities, and any remaining residual contaminated material will be removed.

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 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 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 will 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 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 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 will also be curtailed under high wind conditions (winds greater than 25 miles per hour).

1.5 Tracking Control BMPs

<u>Stabilized Construction Entrance/Exit</u> – 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 project-specific BMPs, and will 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 at the Compressor Station and/or the Transwestern Bench and disposed of within 90 days of generation. If needed, 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 or project-specific cleanup goals, will be staged for offsite transportation 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 will 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.

Rain event inspections will occur during working hours when it is safe to do so. In the event of rain over a weekend or during a long holiday the inspection can occur prior to or after the weekend. 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:

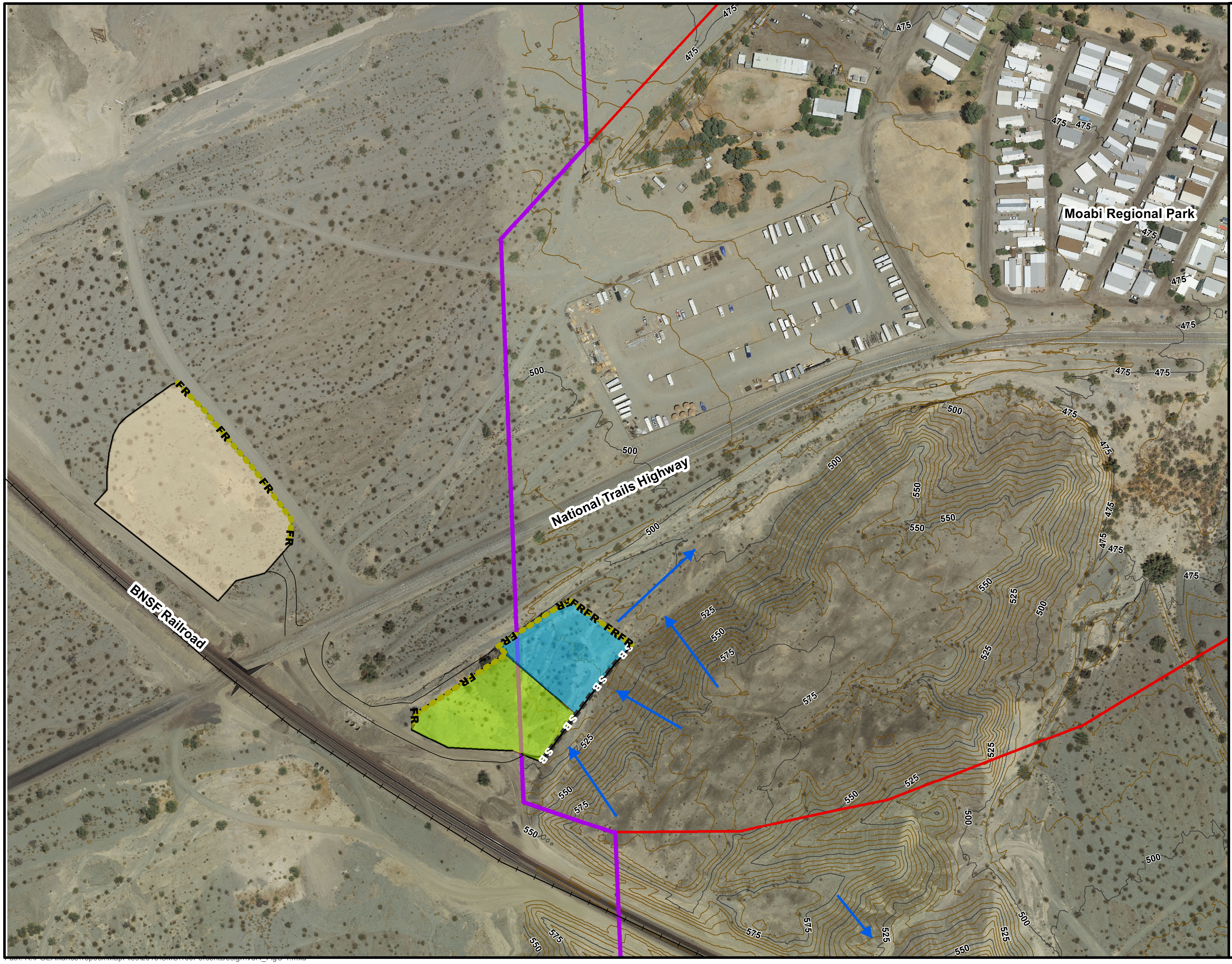
- This BMPs Plan and any updates necessary to reflect current conditions and to maintain accuracy.
- Copies of relevant documents that would affect the provisions or implementation of the BMPs Plan.
- Descriptions and dates of any incidences of significant spills, leaks, or other releases pertaining 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 will 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

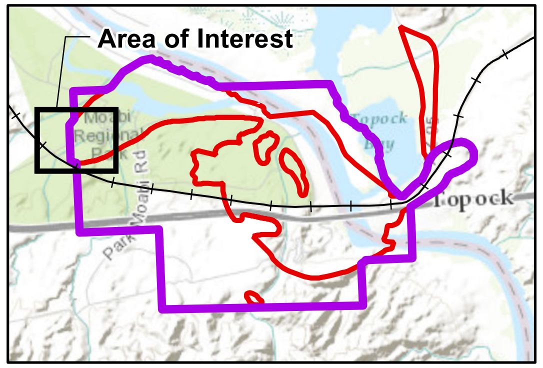
The BMPs Project Team members include:

- PG&E Site Operations Manager, Curt Russell
- PG&E Environmental Inspector, Chris Smith
- PG&E Construction Project Manager, Danielle Starring – 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
- Construction Contractors, 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

The BMPs Project team as defined above represents the current project organization. PG&E may reorganize and/or assign other parties to these roles over the course of the construction and O&M of the groundwater remedy to ensure project success.



VICINITY MAP



LEGEND

- Long-term Remedy Support Area (0.8 Acres Approximate)
- Soil Storage/Processing Area (2.56 Acres)
- Temporary Construction Laydown Area (1.05 Acres Approximate)
- Area of Potential Effects (APE)
- EIR Project Area
- Estimated Flow Direction
- Sand Bags (SB)
- Fiber rolls/sediment wattles/ straw bales/silt fence (FR)

Notes:

1. This is a conceptual layout. Locations are approximate. BMPs are not drawn to scale.
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 the BOD, and the O&M Manual.

N

0 90 180 360 Feet

FIGURE C-1
SOIL STORAGE AREAS AND PROPOSED BEST MANAGEMENT PRACTICES

CONSTRUCTION AND OPERATIONS
BEST MANAGEMENT PRACTICES
PLAN FOR SOIL STORAGE
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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.

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.

ADEQ Arizona Department of Environmental Quality

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 D
Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil

Pacific Gas and Electric Company

Yvonne Meeks
Manager

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May 28, 2008

Dr. J. Michael Eichelberger
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Ms. Carrie Marr
Environmental Contaminants Specialist
United States Fish and Wildlife Service
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Phoenix, Arizona 85021

Subject: Topock Compressor Station – Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil

Dear Dr. Eichelberger and Ms. Marr:

Enclosed is a technical memorandum prepared as part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) process to support the soil investigation and site characterization at the Pacific Gas and Electric (PG&E) Topock Compressor Station. This technical memorandum describes the methods used to develop soil ecological comparison values (ECVs) for the currently defined chemicals of potential ecological concern (COPECs) potentially associated with activities at the Topock site. The currently identified COPECs are metals and polycyclic aromatic hydrocarbons (PAHs). 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. This technical memorandum provides the background and objectives for this effort, the approach used to develop the ECVs, and the recommended ECVs for the current COPECs. Note that the COPEC list may be expanded or contracted based on the results of planned site investigation activities, including the development of soil background levels.

If you have any questions regarding this technical memorandum, please call me at (805) 546-5243.

Sincerely,

Yvonne Meeks
Topock Project Manager

Enclosures: Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil.

cc: Aaron Yue, DTSC
Karen Baker, DTSC
Kris Doebbler, DOI

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MEMO

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From:
Mala Pattanayek
Kim Walsh

Date:
May 23, 2008

ARCADIS Project No.:
RC000689.0002.00005

Subject:
Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil

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The purpose of this technical memorandum is to describe the methods used to develop soil ecological comparison values (ECVs) for the currently defined chemicals of potential ecological concern (COPECs) potentially associated with activities at the Pacific Gas and Electric (PG&E) Topock Compressor Station, located in San Bernardino County, California, 15 miles southeast of Needles (site). The currently identified COPECs are metals and polycyclic aromatic hydrocarbons (PAHs). 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. The following sections provide the background and objectives for this effort, the approach used to develop the ECVs, and the recommended ECVs for the current COPECs. Note that the COPEC list may be expanded or contracted based on the results of planned site investigation activities, including the development of soil background levels.

Background and Objectives

The Topock Compressor Station began operations in December 1951, compressing natural gas supplied from the southwest United States for transport through pipelines to PG&E's service territory in central and northern California. This site is currently active and will continue operating into the foreseeable future.

PG&E is currently conducting investigative and remedial activities at the site. Historically, chromium was added to cooling water, and from 1951 to 1964, untreated wastewater was discharged to Bat Cave Wash. In 1996, PG&E entered into a Corrective Action Consent Agreement with the California Department of Toxic Substances Control (DTSC) to govern the investigation and remediation of the site. In July 2005, a Consent Agreement was executed with U.S. Department of Interior agencies that outlined the process by which PG&E would comply with the Comprehensive Environmental Response, Compensation, and Liability Act requirements for remediation of the site.

As part of the remedial investigation, soil data are being collected and analyzed for site characterization. The primary objective of soil ECVs, along with background data and Preliminary Remediation Goals (PRGs), is to assist in evaluating the adequacy of the site characterization. The ECVs, PRGs, and background concentrations will be used to evaluate the data collected for the Part A Phase I soil investigation and assist in identifying data gaps that may require Phase II soil sampling. As explained by CH2M HILL (2006a), developing soil ECVs can provide a tool for (1) confirming data adequacy and quality; and (2) evaluating the need for, and designing the sampling and analysis program for, the Part A Phase 2 soil investigation. Procedures for field sampling, chain of custody, laboratory analysis, reporting, and data validation are designed to provide an accurate measure of site characterization. However, technical issues exist that may impair the sampling and analysis process (e.g., typical laboratory-proposed detection limits may be elevated relative to risk-based comparison values). The soil ECVs developed herein can be used for additional soil data quality assessment such as to evaluate the use of appropriate method detection limits. The soil ECVs can also be used to evaluate the data collected to define the extent of the site-related constituents in soil and assess the need for additional site characterization data. Furthermore, the soil ECVs can also be used to optimize the selection of sampling locations to limit disturbing the existing habitat and evaluate the program for additional sampling, if deemed necessary.

The soil ECVs, which are risk-based values, were developed based on conservative exposure and effects assumptions using the standard hazard quotient (HQ) model for assessing risk to ecological receptors (USEPA,1997). The soil ECVs are not strictly site-specific but are relevant to the site. The approach is generic ecological assessment to the extent that off-the-shelf exposure parameters and toxicity values were used. The exposure assumptions and effect levels or toxicity values used in the model were obtained from guidance documents and widely accepted literature sources. The exposure assumptions were based on representative species likely present at the site based on species observation records, habitat, and feeding guilds. The toxicity values were based on endpoints measuring survival, growth, and reproduction to meet the assessment endpoint such as protection of ecological receptor populations. Details of the model are described below.

Approach

In this technical memorandum, soil ECVs were developed for metals and PAHs identified as preliminary COPECs in the *Human Health and Ecological Risk Assessment Work Plan* (RAWP) (ARCADIS, 2008).

The preliminary COPECs include Title 22 metals, hexavalent chromium, manganese, total petroleum hydrocarbons (TPH), and PAHs. Toxicity values are not available for TPH, and therefore, soil ECVs were not developed for TPH. The Title 22 metals include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc. The PAHs include total low molecular weight (LMW) PAHs and total high molecular weight (HMW) PAHs. The National Oceanic and Atmospheric Administration (NOAA) defines LMW PAHs as PAHs with less than or equal to 3 rings and with molecular weight less than or equal to 192 atomic mass units (amu) (NOAA, 2000). Parent LMW PAHs include naphthalene, acenaphthylene, acenaphthene, fluorene, anthracene, and phenanthrene. HMW PAHs are defined as PAHs with greater than or equal to 4 rings and with molecular weight greater than or equal to 202 amu (NOAA, 2000). Parent HMW PAHs include pyrene, fluoranthene, benz(a)anthracene, chrysene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene.

For the objectives of this memorandum, soil ECVs were calculated for metals and PAHs using both lowest observed adverse effect levels or concentrations (LOAELs or LOAECs) and no-adverse effect levels or concentrations (NOAELs or NOAECs). The soil ECVs selected were based on the target toxicity values (i.e., values below which no unacceptable risk is expected; NOAELs or NOAECs) for the protection of the ecological receptors based on the representative receptors selected for the ecological risk assessment (ARCADIS, 2008) and include:

- Plants
- Invertebrates
- Birds
  - Gambel's Quail (granivore)
  - Cactus Wren (insectivore)
  - Red-Tailed Hawk (carnivore)
- Mammals
  - Desert Shrew (insectivore)
  - Merriam's Kangaroo Rat (granivore)
  - Desert Kit Fox (carnivore).

Soil Ecological Comparison Values Based on Plants and Invertebrates

For plants and invertebrates, although more than one exposure pathway is considered complete, generally route-specific doses are not quantified for plants and invertebrates. Exposures to soil are expressed in milligrams per kilogram (mg/kg), rather than doses, and generally encompass all potential exposure pathways for plants and invertebrates. Therefore, the screening values for the protection of plants and invertebrates discussed in the RAWP (ARCADIS, 2008) were used as soil ECVs, as presented in Table 1. The sources of screening values for plants and soil invertebrates used to develop soil ECVs are listed in order of preference:

- *Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs)* (USEPA, 2008b)

- Oak Ridge National Laboratory (ORNL) documents (Efroymson et al., 1997a,b).

Confidence in certain screening values presented in the ORNL documents is low, as indicated in Table 1. Confidence in plant screening values for antimony, barium, beryllium, hexavalent chromium, mercury, molybdenum, thallium, and vanadium is low due to the low number of studies on which the screening values are based or other factors (Efroymson et al., 1997a). The soil type and test species (typically agricultural) may also vary significantly from site-specific conditions, or the toxic effects may be unspecified in the source study. There may be significant variability in the toxic responses noted. Similarly, confidence in the invertebrate screening values is low for arsenic, hexavalent chromium, and mercury because of the low number of studies on which they are based or other factors (Efroymson et al., 1997b).

In the RAWP, screening values were developed only for metals as presented in Table 1. These values were obtained from the sources listed above and are not discussed in this memorandum. To calculate soil ECVs for PAHs, screening values for plants and invertebrates were developed as described below.

Polycyclic Aromatic Hydrocarbon Screening Values for Plants

Plant screening values are not readily available for PAHs from literature sources, except for acenaphthene (Efroymson et al., 1997a), an LMW PAH, and benzo(a)pyrene (USEPA, 1999), an HMW PAH. Empirical toxicity data for naphthalene, another LMW PAH, are available in the U.S. Environmental Protection Agency (USEPA) ECOTOX database (USEPA, 2008a). A study reporting ecologically relevant adverse effects at the lowest concentration was used to develop plant screening values for naphthalene. Hulzebos et al. (1993) reported a 7-day EC50 of 100 mg/kg for reduced biomass in lettuce. This study tested nearly 40 organic contaminants in both soil and a nutrient solution to determine the relationship between toxicity thresholds in both matrices. In this study, an EC50 (i.e., concentration of a chemical causing an effect to 50 percent of the population) of 100 mg/kg was conservatively assumed to be equivalent to a lowest-observed adverse effects concentration (LOAEC) for more serious adverse effects. Following California Environmental Protection Agency (CalEPA) DTSC guidance (CalEPA, 1996), an uncertainty factor (UF) of

10 was applied to extrapolate to a no-observed adverse effects concentration (NOAEC) resulting in a value of 10 mg/kg, which was used as the plant screening value for naphthalene.

As naphthalene is a more common LMW PAH than acenapthene, the comparison value for total LMW PAHs for protection of plants was based on the NOAEC-based screening value of 10 mg/kg for naphthalene, and the comparison value for total HMW PAHs was based on the screening value of 1.2 mg/kg for benzo(a)pyrene (USEPA, 1999).

Polycyclic Aromatic Hydrocarbon Screening Values for Soil Invertebrates

PAH screening values for soil invertebrates are available in the USEPA's *Guidance for Developing Ecological Soil Screening Levels (EcoSSL)* (USEPA, 2008b). The EcoSSL for LMW PAH is 29 mg/kg and the EcoSSL for HMW PAH is 18 mg/kg (Table 1); these values were selected as comparison values for protection of soil invertebrates.

Soil Ecological Comparison Values Based on Wildlife Protection

For wildlife, soil ECVs were developed using a risk-based approach incorporating exposure pathways for food and soil ingestion, which are considered the most significant pathways for most sites (USEPA, 2008b). The wildlife indicator receptors were selected to represent a cross-section of feeding guilds for each assessment endpoint so that sufficient rates of survival, growth, and reproduction for their representative populations could be evaluated.

For each wildlife receptor (i.e., bird and mammal) listed above, soil ECVs were developed following USEPA guidance (USEPA, 1997; USEPA, 2008b) and were based on a food-web model integrating ecological receptor exposures and effects. The exposure assumptions and effects levels for wildlife described in the RAWP (ARCADIS, 2008) were used to develop soil ECVs. The exposure assumptions that were used to estimate exposure dose for the indicator species such as body weights, food ingestion rates, composition of diet, and bioaccumulation factors (BAFs) were obtained from guidance documents or widely accepted literature sources as described in the RAWP (ARCADIS, 2008). The exposure assumptions used in the soil ECV model for each wildlife receptor are presented in Attachment 1. The effects levels or toxicity reference values (TRVs) that were used in the soil ECV model were also obtained from guidance documents or widely accepted literature sources. A TRV is defined as a daily dose of a chemical expressed in milligrams of chemical per kilogram of body weight per day (mg/kg bw-day) and represents a dose associated with no-effect or lowest-effect at the population level of ecological organization, even if exposure occurs over an extended duration. The TRVs used in the model are presented in Tables 2 and 3 and the details are explained below.

Soil ECVs were developed by re-arranging the standard USEPA (1997) HQ model (Equation 1) to solve for a target HQ of 1, which is considered to be protective of ecological receptors. The model used to solve for ECVs is as follows:

$$HQ = \frac{Dose}{TRV} = \frac{(C_{soil} \times SIR) + (C_{tissue} \times FIR) \times SUF}{TRV \times BW} = \frac{(C_{soil} \times SIR) + (C_{soil} \times BAF \times FIR) \times SUF}{TRV \times BW} = 1$$

Equation 1

Or:

$$ECV = C_{soil} = \frac{HQ \times TRV \times BW}{(SIR + [FIR \times BAF]) \times SUF}$$

Equation 2

Where:

Dose	*= exposure dose (mg/kgBW-day)*
HQ	*= hazard quotient (unitless); set at a target value of 1*
TRV	*= toxicity reference value (milligrams per kilogram body weight per day [mg/kgBW-day])*
C_{soil}	*= concentration of constituent in soil (mg/kg soil)*
SIR	*= soil ingestion rate (kilogram soil per day [kg soil/day])*
C_{tissue}	*= concentration of constituent in biota or tissue (mg/kg tissue)*
FIR	*= food or biota ingestion rate (kilograms tissue per day [kg tissue/day])*
BW	*= body weight of receptor (kilograms [kgBW])*
BAF	*= bioaccumulation factor or regression for media-to-biota uptake (kilogram tissue per kilogram soil [kg soil/kg tissue])*
SUF	*= site use factor (unitless); represents the fraction of the exposure area for the receptor represented by the area of contamination generally calculated by dividing the area of contamination by the home or foraging range of the receptor.*

ECV = *ecological comparison value (mg/kg soil)*

Depending on the chemical, tissue concentrations (C_{tissue}) were calculated using different combinations of uptake regressions or uptake factors (referred to as soil-to-biota BAFs in the RAWP [ARCADIS, 2008]). Uptake regressions are linear exponential equations, while UFs are simple multipliers, as shown in Equation 3.

$$C_{tissue} = e^{a} \times \left(C_{soil}\right)^{b} \quad or \quad \ln\left(C_{tissue}\right) = a + b \times \ln\left(C_{soil}\right) \qquad \text{Equation 3}$$

Alternatively:

$$C_{tissue} = UF_{tissue} \times C_{soil}$$

Where:

C_{tissue} = *tissue concentration (mg/kg of tissue)*

C_{soil} = *soil concentration (mg/kg of soil)*

a = *compound specific regression equation constant (unitless)*

b = *compound specific regression equation constant (unitless)*

UF_{tissue} = *uptake factor from soil to tissue (unitless)*

Incorporating uptake regressions in lieu of a simple UF in the dose equation (Equation 2) significantly complicates the overall dose calculation. As the bioaccumulation regression places C_{soil} subject to an exponential term, solving for C_{soil} becomes extremely cumbersome. Because of the challenges associated with back-calculating ECVs with dose equations that rely on exponential regressions for modeling tissue concentrations, a forward-calculation methodology was developed to simplify the calculation steps and reduce the potential for mathematical error. An automated, iterative calculation algorithm was used to combine the dose equation and tissue regression equation(s) into a single forward calculation by using the Microsoft® Solver™ software. Solver™ is an add-on to Microsoft® Excel that finds a solution by iterative trial-and-error that satisfies calculation constraints introduced by having interdependent mathematical equations. In this case, the interdependent equations are the tissue uptake equation(s), which rely on a media concentration and a dose equation that rely on the same media concentration (as the tissue uptake equation) and the solution of the uptake equation(s). The media uptake regression(s) and dose equation were combined using Solver™ and used to calculate ECVs. Figure 1 depicts (as an example) a flowchart of the iterative process that was followed, and the associated equations that were used to calculate ECV for the desert shrew.

An added benefit of using Solver^{TM} to determine ECV is that it allows instant confirmation of accuracy. The spreadsheet cell representing C_{soil} (the results output from Solver^{TM}) is instantaneously fed back through the tissue uptake, dose, and HQ equations to calculate an HQ. As long as the resulting HQ value equals 1 (dose/TRV), it can be confidently concluded that the Solver^{TM}-based model performed the calculations correctly and that the resulting C_{soil} is the accurate ECV.

In the RAWP (ARCADIS, 2008), wildlife TRVs and BAFs were developed only for metals. To calculate soil ECVs for PAHs, wildlife TRVs and BAFs for PAHs were also developed as described below.

Bioaccumulation Factors for Polycyclic Aromatic Hydrocarbons

Bioaccumulation in animal tissue or uptake in plants is the process where COPECs in the surrounding media are accumulated within the tissues of ecological receptors, especially to concentrations higher than in the surrounding media. Any COPEC that is excreted or metabolized at a slower rate than its uptake through absorption and ingestion will increase in tissues over time, resulting in bioaccumulation. Constituents with high octanol-water partitioning coefficient (log K_{ow}) are more likely to bioaccumulate in tissues of prey (plants, invertebrates, and mammals) due to their lipophilic nature (USEPA, 2000). Additionally, some metals that are not readily excreted are also known to bioaccumulate (e.g., lead). COPECs that bioaccumulate have the potential to be passed up the food chain.

BAFs are multipliers that are used to estimate concentrations of constituents that can accumulate in tissues through any route of exposure (USEPA, 2000). For plants, the BAF is sometimes referred to as a plant uptake factor. In this memorandum, BAFs were used to estimate concentrations of COPECs in biota and food item tissue (i.e., prey) from soil.

The approach used to develop BAFs for metals in the RAWP (ARCADIS, 2008) was also used to develop soil-to-biota BAFs for PAHs. BAFs for soil-to-plants and soil-to-invertebrates for LMW and HMW PAHs are available in USEPA's EcoSSL guidance (USEPA, 2008b) and are not discussed in this memorandum. According to USEPA EcoSSL guidance, semivolatile organic compounds, including PAHs tend to metabolize rapidly in birds and mammals, and therefore, uptake of these constituents from soil-to-mammal were assumed to be zero (USEPA, 2008b). The BAFs for metals and PAHs used to develop soil ECVs are presented in Table 4.

Toxicity Reference Values

In the RAWP (ARCADIS, 2008), two sets of wildlife TRVs for metals were presented as shown in Tables 2 and 3, and these were:

- Proposed TRVs: these were primarily based on the TRVs used to develop USEPA's EcoSSLs (USEPA, 2008b); other sources included ORNL: Toxicological Benchmarks for Wildlife (Sample et al., 1996) and other published sources (e.g., USEPA Region 6 ERA Guidance [USEPA, 1999]).

- DTSC-recommended TRVs: these were preferably based on the Region 9 Biological Technical Assistance Group (BTAG) TRVs (CalEPA, 2002).

For each set of wildlife TRVs, a range of TRVs were developed to estimate a range of potential risks to wildlife (ARCADIS, 2008). The low TRVs were preferably based on chronic no observable adverse effects levels (NOAELs) and the high TRVs were preferably based on the lowest observed adverse effects levels (LOAELs). In the case of DTSC-recommended TRVs, the low BTAG TRVs are NOAEL-based and the high BTAG TRVs are based on a midpoint of a variety of adverse effects and are not necessarily LOAEL-based (CalEPA, 2002). Some of the TRVs were allometrically adjusted for account for significant difference in body weights between the test species and the representative indicator species based on CalEPA guidance (CalEPA, 1999). For the calculation of soil ECVs, the allometrically adjusted TRVs listed in Table 2 and 3 were used for the representative receptors.

Similarly, following the approach described in the RAWP (ARCADIS, 2008), a range of wildlife TRVs for PAHs were developed as described below.

Bird Toxicity Reference Values for Polycyclic Aromatic Hydrocarbons

The bird TRVs for PAHs used to develop soil ECVs are presented in Table 2 and 3. For birds, there are no TRVs for PAHs reported in the EcoSSL guidance (USEPA, 2007). Published TRVs are available in USEPA Region 6 guidance (USEPA, 1999). However, the study (Brunstrom et al., 1991) was based on egg injection tests that are not considered appropriate for developing TRVs (USEPA, 2008b). Several studies were reviewed, and the most appropriate study was selected to develop bird TRVs for PAHs.

For LMW PAHs, Patton and Dieter's study (1980) evaluating the effect of PAH mixtures on hepatic function in mallard duck livers using a mixture of paraffins and aromatic hydrocarbons was selected. There were visible signs of toxicity, indicated by significant increase in liver weight for the group that were administered 4,000 mg/kg PAH mixture, but livers appeared normal in texture and color. No effects were observed for the 400 mg/kg treatment group. Therefore, 400 mg/kg was selected as the NOAEC and the 4,000 mg/kg was selected as the LOAEC. The NOAEC and the LOAEC were then converted to a NOAEL-based TRV and a LOAEL-based TRV, respectively, using the standard dose equations shown below:

$$TRV_{NOAEL} = \frac{NOAEC \times IR}{BW} = \frac{400\ mg/kg \times 0.059\,kg/day}{1.04\,kgBW} = 22.8\,mg/kgBW - day$$

Equation 4

$$TRV_{LOAEL} = \frac{LOAEC \times IR}{BW} = \frac{4000\, mg/kg \times 0.059\, kg/day}{1.04\, kgBW} = 228\, mg/kgBW - day$$

Equation 5

Where:

TRV_{NOAEL}	*= no-observed adverse effects level based toxicity reference value (milligrams per kilogram body weight per day [mg/kgBW-day])*
TRV_{LOAEL}	*= lowest-observed adverse effects level based toxicity reference value (milligrams per kilogram body weight per day [mg/kgBW-day])*
IR	*= ingestion rate (kilogram soil per day [kg soil/day]); calculated from allometric equation for food ingestion rate in dry weight for all birds (USEPA,1993)*
BW	*= body weight of receptor (kilograms [kgBW]); assuming approximately 1.04 kg for the mallard ducks (from USEPA, 1993)*

For HMW PAHs, a study by Trust et al. (1994) reporting a NOAEL of 10 mg/kg bw-day and a LOAEL of 100 mg/kg bw-day for overt signs of toxicity, such as decreased body mass in European starlings exposed to 7,12-dimethylbenz(a)anthracene, was selected to develop TRVs. Immunosuppression was observed at higher doses. The exposures were via oral gavage, and the study was conducted on nestlings, a sensitive life-stage. No UFs were applied, and therefore, an avian low TRV of 10 mg/kg bw-day and an avian high TRV of 100 mg/kg bw-day were used for HMW PAHs.

There are no BTAG PAH TRVs for birds. Therefore, there are no separate DTSC-recommended PAH TRVs for birds.

Mammal Toxicity Reference Values for Polycyclic Aromatic Hydrocarbons

Mammal TRVs for PAHs are available in the EcoSSL guidance (USEPA, 2007). The NOAEL of 65.6 mg/kg bw-day was selected as the low TRV for LMW PAHs and the LOAEL of 0.6 mg/kg bw-day was selected as the low TRV for HMW PAHs. The EcoSSL guidance (USEPA, 2007; USEPA, 2008b) does not report LOAELs; therefore, LOAELs for PAHs were developed following the approach described in the RAWP (ARCADIS, 2008). For LMW and HMW PAHs, bounded NOAELs were reported as TRVs; therefore, the LOAELs from the same study and endpoint was selected.

BTAG TRVs are available for mammals (CalEPA, 2002). The BTAG TRVs for naphthalene was used for LMW PAHs and the BTAG TRVs for benzo(a)pyrene was used for HMW PAHs.

The mammal TRVs for metals and PAHs used to develop soil ECVs are presented in Table 3 and 4.

Selection of Soil Ecological Comparison Values

The soil ECVs based on plants and invertebrates are presented in Table 1. For wildlife, a range of soil ECVs were developed following the approach described above and presented in tables in Attachment 1. A summary of the soil ECVs developed, based on the proposed wildlife TRVs and the DTSC-recommended TRVs, is presented in Table 5. As discussed earlier, the purpose of this technical memorandum is to develop soil ECVs for data quality assessment and use in evaluating the Part A Phase 1 data and making further site characterization decisions. The ECVs are conservative values but are not intended to be used to screen out COPECs. ECVs are also specifically not intended to be used as cleanup goals.

In order to select the most appropriate soil ECVs for each constituent, the most conservative of all the ecological receptor-based soil ECVs was selected as the final soil ECV unless the screening value or TRVs used to calculate that soil ECV was low in confidence. In such cases, the next less conservative soil ECV was selected as the final (e.g., soil ECV for mercury). The minimum of all the soil ECVs from Table 1 (plants and invertebrates) and Table 5 (wildlife) for each constituent and the selected soil ECVs are presented in Table 6. It should be noted that certain ECVs (e.g. antimony, cadmium, lead, mercury, and selenium) are below the standard reporting limits defined in the *Quality Assurance Project Plan, PG&E Topock Program (*QAPP; CH2M HILL, 2004, 2006b, 2008). Additionally, certain ECVs will likely be lower than final background soil concentrations. In that case, background concentrations would be used to set analytical detection limits and to consider the need for additional characterization.

Tables

Figure

Attachment

1 Derivation of Wildlife Based Soil ECVs

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Tables

Table 1
Soil Ecological Comparison Values
Based on Plant and Invertebrate Screening Values

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Constituents	Plant (mg/kg)	Invertebrate (mg/kg)
Antimony	5*	78
Arsenic	18	60**
Barium	500*	330
Beryllium	10*	40
Cadmium	32	140
Chromium, trivalent	NA	NA
Chromium, hexavalent	1*	0.4**
Chromium, total	NA	NA
Cobalt	13	NA
Copper	70	80
Lead	120	1700
Manganese	220	450
Mercury	0.3*	0.1**
Molybdenum	2*	NA
Nickel	38	280
Selenium	0.52	4.1
Silver	560	NA
Thallium	1*	NA
Vanadium	2*	NA
Zinc	160	120
LMW PAHs	10	29
HMW PAHs	1.2	18

Notes:
*Confidence in this benchmark is low due to the low number of studies on which it is based or other factors. The soil type and test species (typically agricultural) may also vary significantly from site-specific conditions, or the toxic effects may be uncertain.
**Confidence in this benchmark is low due to the low number of studies on which it is based or other factors. The tests were conducted with earthworms.

Indicates USEPA EcoSSL
Indicates ORNL Screening Benchmark
Primary sources (see text).

LMW PAHs - low molecular weight polycyclic aromatic hydrocarbons
HMW PAHs - high molecular weight polycyclic aromatic hydrocarbons
mg/kg = milligrams per kilograms
ORNL - Oak Ridge National Laboratory
USEPA - U.S. Environmental Protection Agency

Sources:
Efroymson, R.A., M.E. Will, G.W. Suter II, and A.C. Wooten. 1997a. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision*. Prepared for the Oak Ridge Laboratory. November 1997.

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Table 2
Proposed Toxicity Reference Values

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Constituent	Wildlife TRVs (mg/kgBW-day)							
	Birds				Mammals			
	Low TRV (NOAEL)	Source	High TRV (LOAEL)	Source	Low TRV (NOAEL)	Source	High TRV (LOAEL)	Source
Antimony	NA	--	NA	--	0.059	USEPA, 2005	0.59	USEPA, 2005
Arsenic	2.24	USEPA, 2005	3.55	USEPA, 2005	1.04	USEPA, 2005	1.66	USEPA, 2005
Arsenic (allom adj)[a]	--	--	--	--	1.53	for desert shrew[a]	2.44	for desert shrew[a]
	--	--	--	--	1.46	for kangaroo rat[a]	2.33	for kangaroo rat[a]
Barium	NA	--	NA	--	51.8	USEPA, 2005	82.6	USEPA, 2005
Beryllium	NA	--	NA	--	0.532	USEPA, 2005	0.630	USEPA, 2005
Cadmium	1.47	USEPA, 2005	6.35	USEPA, 2005	0.770	USEPA, 2005	7.7	USEPA, 2005
Chromium	2.66	USEPA, 2005	15.6	USEPA, 2005	2.40	USEPA, 2005	9.62	USEPA, 2005
Hexavalent Chromium	NA	--	NA	--	9.24	USEPA, 2008	38.8	USEPA, 2008
Cobalt	7.61	USEPA, 2005	18.3	USEPA, 2005	7.33	USEPA, 2005	18.8	USEPA, 2005
Copper	4.05	USEPA, 2007	12.1	USEPA, 2007	5.60	USEPA, 2007	9.34	USEPA, 2007
Copper (allom adj)[a]	--	--	--	--	9.43	for desert shrew[a]	15.73	for desert shrew[a]
	--	--	--	--	9.04	for kangaroo rat[a]	15.07	for kangaroo rat[a]
Lead	1.63	USEPA, 2005	3.26	USEPA, 2005	4.70	USEPA, 2005	8.90	USEPA, 2005
Mercury	0.039	CalEPA BTAG, 2002	0.2	CalEPA BTAG, 2002	0.25	CalEPA BTAG,	4	CalEPA BTAG,
Molybdenum	3.5	Sample et al., 1996	35.3	Sample et al., 1996	0.26	Sample et al., 1996	2.6	Sample et al., 1996
Nickel	6.71	USEPA, 2007	18.6	USEPA, 2007	1.70	USEPA, 2007	3.40	USEPA, 2007
Selenium	0.290	USEPA, 2007	0.579	USEPA, 2007	0.143	USEPA, 2007	0.215	USEPA, 2007
Selenium (allom adj)[a]	--	--	--	--	0.23	for desert shrew[a]	0.35	for desert shrew[a]
	--	--	--	--	0.21	for kangaroo rat[a]	0.31	for kangaroo rat[a]
Silver	2.02	USEPA, 2006	20.2	USEPA, 2006	6.02	USEPA, 2006	60.2	USEPA, 2006
Silver (allom adj)[a]	--	--	--	--	8.77	for desert shrew[a]	87.68	for desert shrew[a]
	--	--	--	--	8.40	for kangaroo rat[a]	84.01	for kangaroo rat[a]
Thallium	0.35	USEPA, 1999	3.5	USEPA, 1999	0.48	CalEPA BTAG,	1.43	CalEPA BTAG,
Vanadium	0.344	USEPA, 2005	0.688	USEPA, 2005	4.16	USEPA, 2005	8.31	USEPA, 2005
Zinc	66.1	USEPA, 2007	171	USEPA, 2007	75.4	USEPA, 2007	298	USEPA, 2007
Total LMW PAHs	22.8	1980	228	1980	65.6	USEPA, 2007	328	USEPA, 2007
Total HMW PAHs	10	Trust et al., 1994	100	Trust et al., 1994	0.6	USEPA, 2007	3	USEPA, 2007

Table 2
Proposed Toxicity Reference Values

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Notes:
TRVs for metals presented in the *Human Health and Ecological Risk Assessment Work Plan* (RAWP; ARCADIS, 2008).
TRVs updated in guidance since the RAWP was submitted.
TRVs developed for this technical memorandum.

a. TRVs allometrically adjusted significant difference in body weights using the following equation (Sample and Arenal, 1999):

Aw - At * (BWt/BWw)^1-b

where:

Aw - toxicity value of wildlife species
At - toxicity value of test species (TRV)
BWt - body weight of test species
BWw - body weight of wildlife species
b - allometric scaling factor (1.2 for birds, 0.94 for mammals)

-- - not applicable
BTAG - Biological Technical Assistance Group
CalEPA - California Environmental Protection Agency
LOAEL - lowest observed adverse effects level
mg/kgBW-day - milligrams per kilogram of body weight per day
NA - not available
NOAEL - no observed adverse effects level
TRV - toxicity reference value
USEPA - U.S. Environmental Protection Agency

Sources:

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Table 3
DTSC-Recommended Toxicity Reference Values

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

	Wildlife TRVs (mg/kgBW-day)							
	Birds				Mammals			
Constituent	**Low TRV (NOAEL)**	**Source**	**High TRV (LOAEL)**	**Source**	**Low TRV (NOAEL)**	**Source**	**High TRV (LOAEL)**	**Source**
Antimony	NA	--	NA	--	0.059	USEPA, 2005	0.59	USEPA, 2005
Arsenic	5.5	CalEPA BTAG, 2002	22.0	CalEPA BTAG, 2002	0.32	CalEPA BTAG, 2002	4.7	CalEPA BTAG, 2002
Barium	NA	--	NA	--	51.8	USEPA, 2005	82.6	USEPA, 2005
Beryllium	NA	--	NA	--	0.532	USEPA, 2005	0.630	USEPA, 2005
Cadmium	0.08	CalEPA BTAG, 2002	10.4	CalEPA BTAG, 2002	0.060	CalEPA BTAG, 2002	2.64	CalEPA BTAG, 2002
Chromium	2.66	USEPA, 2005	15.6	USEPA, 2005	2.40	USEPA, 2005	9.62	USEPA, 2005
Hexavalent Chromium	NA	--	NA	--	9.24	USEPA, 2008	38.8	USEPA, 2008
Cobalt	7.61	USEPA, 2005	18.3	USEPA, 2005	1.2	CalEPA BTAG, 2002	20	CalEPA BTAG, 2002
Copper	2.30	CalEPA BTAG, 2002	52.3	CalEPA BTAG, 2002	2.67	CalEPA BTAG, 2002	632	CalEPA BTAG, 2002
Lead	0.014	CalEPA BTAG, 2002	8.75	CalEPA BTAG, 2002	1.0	CalEPA BTAG, 2002	241	CalEPA BTAG, 2002
Mercury	0.039	2002	0.18	CalEPA BTAG, 2002	0.25	CalEPA BTAG, 2002	4	2002
Molybdenum	3.5	Sample et al., 1996	35.3	Sample et al., 1996	0.26	Sample et al., 1996	2.6	Sample et al., 1996
Nickel	1.38	CalEPA BTAG, 2002	56.3	CalEPA BTAG, 2002	0.133	CalEPA BTAG, 2002	31.6	CalEPA BTAG, 2002
Selenium	0.23	2002	0.93	CalEPA BTAG, 2002	0.05	CalEPA BTAG, 2002	1.21	2002
Silver	2.02	USEPA, 2006	20.2	USEPA, 2006	6.02	USEPA, 2006	60.2	USEPA, 2006
Silver (allom adj)[a]	--	--	--	--	8.77	for desert shrew[a]	87.68	for desert shrew[a]
	--	--	--	--	8.40	for kangaroo rat[a]	84.01	for kangaroo rat[a]
Thallium	0.35	USEPA, 1999b	3.5	USEPA, 1999b	0.48	CalEPA BTAG, 2002	1.43	2002
Vanadium	0.344	USEPA, 2005	0.688	USEPA, 2005	4.16	USEPA, 2005	8.31	USEPA, 2005
Zinc	17.2	2002	172	CalEPA BTAG, 2002	9.60	CalEPA BTAG, 2002	411	2002
LMW PAHs	NA	--	NA	--	50	CalEPA BTAG, 2002	150	2002
HMW PAHs	NA	--	NA	--	1.31	CalEPA BTAG, 2002	32.8	CalEPA BTAG,

Table 3
DTSC-Recommended Toxicity Reference Values

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Notes:

TRVs for metals presented in the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).

(pink shading) TRVs updated in guidance since the RAWP was submitted.

(green shading) TRVs developed for this technical memorandum.

a. TRVs allometrically adjusted significant difference in body weights using the following equation (Sample and Arenal, 1999):

Aw - At * (BWt/BWw)^1-b

where:

Aw - toxicity value of wildlife species

At - toxicity value of test species (TRV)

BWt - body weight of test species

BWw - body weight of wildlife species

b - allometric scaling factor (1.2 for birds, 0.94 for mammals)

-- - not applicable

BTAG - Biological Technical Assistance Group

CalEPA - California Environmental Protection Agency

DTSC - Department of Toxic Substances Control

kg - kilograms

LOAEL - lowest observable adverse effects level

mg/kgBW-day - milligram(s) per kilogram body weight per day

NA - not available

NOAEL - no observable adverse effects level

TRV - toxicity reference value

UF - uncertainty factor

USEPA - U.S. Environmental Protection Agency

Sources:

CalEPA 2002. *Currently Recommended U.S. Environmental Protection Agency Region 9 Biological Technical Assistance Group (BTAG) Mammalian and Avian Toxicity Reference Values (TRVs)* . Department of Toxic Substances Control: Human and Ecological Risk Division.

Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision* . Oak Ridge National Laboratory, Oak Ridge, TN. 227 pp. ES/ER/TM-86/R3.

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Table 4
Bioaccumulation Factors

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Constituent	Soil-to-Biota Bioaccumulation Factors[a] BAF_{plant} (dw) (kg soil/kg tissue)	BAF_{invert} (dw) (kg soil/kg tissue)	BAF_{mammal} (dw) (kg soil/kg tissue)
Antimony	$\ln(C_p) = 0.938 * \ln(C_s) - 3.233$	1.00	$0.05 * C_d$
Arsenic	0.03752	$\ln(C_i) = 0.706 * \ln(C_s) - 1.421$	$\ln(C_m) = 0.8188 * \ln(C_s) -4.8471$
Barium	0.156	0.091	$0.0075 * C_d$
Beryllium	$\ln(C_p) = 0.7345 * \ln(C_s) - 0.5361$	0.045	$0.05 * C_d$
Cadmium	$\ln(C_p) = 0.546 * \ln(C_s) - 0.475$	$\ln(C_i) = 0.795 * \ln(C_s) + 2.114$	$\ln(C_m) = 0.4723 * \ln(C_s) - 1.2571$
Chromium, total	0.041	0.306	$\ln(C_m) = 0.7338 * \ln(C_s) - 1.4599$
Chromium, hexavalent	0.041	0.306	$\ln(C_m) = 0.7338 * \ln(C_s) - 1.4599$
Cobalt	0.0075	0.122	$\ln(C_m) = 1.307 * \ln(C_s) - 4.4669$
Copper	$\ln(C_p) = 0.394 * \ln(C_s) + 0.668$	0.515	$\ln(C_m) = 0.1444 * \ln(C_s) + 2.042$
Lead	$\ln(C_p) = 0.561 * \ln(C_s) - 1.328$	$\ln(C_i) = 0.807 * \ln(C_s) - 0.218$	$\ln(C_m) = 0.4422 * \ln(C_s) + 0.0761$
Mercury	$\ln(C_p) = 0.544 * \ln(C_s) - 0.996$	$\ln(C_i) = 0.3369 * \ln(C_s) - 0.078$	0.192
Molybdenum	0.25	5.50E-01	$\ln(C_m) = 0.006 * 50 * C_d$[b]
Nickel	$\ln(C_p) = 0.748 * \ln(C_s) - 2.223$	1.059	$\ln(C_m) = 0.4658 * \ln(C_s) - 0.2462$
Selenium	$\ln(C_p) = 1.104 * \ln(C_s) - 0.677$	$\ln(C_i) = 0.733 * \ln(C_s) - 0.075$	$\ln(C_m) = 0.3764 * \ln(C_s) - 0.4158$
Silver	0.014	2.045	0.004
Thallium	0.004	5.50E-01	0.112
Vanadium	0.00485	0.042	0.0123
Zinc	$\ln(C_p) = 0.554 * \ln(C_s) + 1.575$	$\ln(C_i) = 0.328 * \ln(C_s) + 4.449$	$\ln(C_m) = 0.0706 * \ln(C_s) + 4.3632$
Total LMW PAH	ln(Cp) = 0.4544 * ln(Cs)-1.3205	3.04	0.0
Total HMW PAH	ln(Cp) = 0.9469 * ln(Cs)-1.7026	2.6	0.0

Notes:
BAFs for metals presented in the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
BAFs developed for this technical memorandum.

a. All BAFs from USEPA's Guidance for Developing Ecological Soil Screening Levels (EcoSSLs). U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington D.C. 2005 Revision, updated December 2006. 85 pp. http://www.epa.gov/ecotox/ecossl., except as otherwise noted.

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BAF - bioaccumulation factor
BAF_{invert} - soil-to-invertebrate uptake bioaccumulation factor (unitless)
BAF_{plant} - soil-to-plant uptake bioaccumulation factor (unitless)
C_p - constituent concentration in plants
C_i - constituent concentration in invertebrates
C_s - constituent concentration in soil
C_m - constituent concentration in mammals
C_d - concentration in diet
dw - dry weight
HMW PAHs - high molecular weight polycyclic aromatic hydrocarbons
In - natural log
LMW PAHs - low molecular weight polycyclic aromatic hydrocarbons
USEPA - U.S. Environmental Protection Agency

Table 5
Summary of Soil Ecological Comparison Values
Based on Wildlife

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

		Antimony		Arsenic		Arsenic (Allometrically Adjusted)[e]		Barium		Beryllium		Cadmium	
		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)	
Ecological Receptor	**Based on:**	**Low[c]**	**High[d]**	**Low[c]**	**High[d]**	**High[d]**	**Low[c]**	**Low[c]**	**High[d]**	**High[d]**	**Low[c]**	**Low[c]**	**High[d]**
Gambel's Quail	**Proposed TRVs[a]**	NA	NA	4.13E+02	6.54E+02	NA	NA	NA	NA	NA	NA	2.48E+02	1.29E+03
Cactus Wren		NA	NA	7.61E+01	1.28E+02	NA	NA	NA	NA	NA	NA	9.47E-01	5.93E+00
Red-tailed Hawk		NA	NA	1.76E+03	2.82E+03	NA	NA	NA	NA	NA	NA	8.37E+02	4.63E+03
Desert Shrew		2.85E-01	2.85E+00	NA	NA	8.90E+01	1.62E+02	2.30E+03	3.67E+03	4.03E+01	4.77E+01	3.74E-01	6.75E+00
Merriam's Kangaroo Rat		1.24E+01	1.35E+02	NA	NA	2.89E+02	4.62E+02	3.50E+03	5.58E+03	2.33E+01	2.91E+01	8.93E+01	2.18E+03
Desert Kit Fox		2.14E+01	2.14E+02	9.72E+02	1.56E+03	NA	NA	5.11E+04	8.14E+04	4.97E+02	5.89E+02	5.74E+02	7.11E+03
Gambel's Quail	**DTSC-Recommended TRVs[b]**	NA	NA	1.01E+03	4.06E+03	NA	NA	NA	NA	NA	NA	5.26E+00	2.21E+03
Cactus Wren		NA	NA	2.10E+02	9.60E+02	NA	NA	NA	NA	NA	NA	2.45E-02	1.10E+01
Red-tailed Hawk		NA	NA	4.41E+03	1.81E+04	NA	NA	NA	NA	NA	NA	1.05E+01	7.96E+03
Desert Shrew		2.85E-01	2.85E+00	1.14E+01	3.71E+02	NA	NA	2.30E+03	3.67E+03	4.03E+01	4.77E+01	1.51E-02	1.76E+00
Merriam's Kangaroo Rat		1.24E+01	1.35E+02	6.33E+01	9.29E+02	NA	NA	3.50E+03	5.58E+03	2.33E+01	2.92E+01	1.24E+00	5.37E+02
Desert Kit Fox		2.14E+01	2.14E+02	2.94E+02	4.47E+03	NA	NA	4.13E+04	6.58E+04	1.93E+02	2.28E+02	1.94E+01	2.27E+03

Table 5
Summary of Soil Ecological Comparison Values
Based on Wildlife

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

		Total Chromium		Hexavalent Chromium		Cobalt		Copper		Copper (Allometrically Adjusted)[e]		Lead	
		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)	
Ecological Receptor	**Based on:**	High[d]	Low[c]	Low[c]	High[d]	High[d]	Low[c]	Low[c]	High[d]	High[d]	Low[c]	Low[c]	High[d]
Gambel's Quail	Proposed TRVs[a]	4.79E+02	2.81E+03	NA	NA	1.78E+03	4.28E+03	7.60E+02	2.62E+03	NA	NA	3.42E+02	7.16E+02
Cactus Wren		3.64E+01	2.13E+02	NA	NA	1.93E+02	4.64E+02	3.63E+01	1.09E+02	NA	NA	1.57E+01	3.59E+01
Red-tailed Hawk		5.95E+02	5.21E+03	NA	NA	9.00E+02	1.80E+03	2.00E+03	8.86E+03	NA	NA	3.90E+02	1.18E+03
Desert Shrew		3.63E+01	1.45E+02	1.40E+02	5.86E+02	2.54E+02	6.52E+02	NA	NA	8.69E+01	1.45E+02	6.02E+01	1.31E+02
Merriam's Kangaroo Rat		4.49E+02	1.80E+03	1.73E+03	7.26E+03	2.83E+03	7.26E+03	NA	NA	2.74E+03	5.26E+03	1.67E+03	3.45E+03
Desert Kit Fox		1.05E+03	5.26E+03	5.02E+03	2.51E+04	1.52E+03	3.22E+03	4.72E+03	8.42E+03	NA	NA	3.35E+03	7.05E+03
Gambel's Quail	DTSC-Recommended TRVs[b]	4.79E+02	2.81E+03	NA	NA	1.78E+03	4.28E+03	3.82E+02	1.24E+04	NA	NA	9.85E-01	2.01E+03
Cactus Wren		3.64E+01	2.13E+02	NA	NA	1.93E+02	4.64E+02	2.06E+01	4.69E+02	NA	NA	5.00E-02	1.15E+02
Red-tailed Hawk		5.95E+02	5.21E+03	NA	NA	9.00E+02	1.80E+03	6.65E+02	4.45E+04	NA	NA	1.66E-02	4.66E+03
Desert Shrew		3.63E+01	1.45E+02	1.40E+02	5.86E+02	4.16E+01	6.94E+02	2.46E+01	5.82E+03	NA	NA	9.02E+00	7.20E+03
Merriam's Kangaroo Rat		4.49E+02	1.80E+03	1.73E+03	7.26E+03	4.63E+02	7.72E+03	4.51E+02	3.08E+05	NA	NA	2.58E+02	1.15E+05
Desert Kit Fox		1.05E+03	5.26E+03	5.02E+03	2.51E+04	3.49E+02	3.38E+03	1.88E+03	6.36E+05	NA	NA	4.41E+02	2.34E+05

Table 5
Summary of Soil Ecological Comparison Values
Based on Wildlife

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Ecological Receptor	Based on:	Mercury Soil ECVs (mg/kg dw) High[d]	Mercury Soil ECVs (mg/kg dw) Low[c]	Molybdenum Soil ECVs (mg/kg dw) Low[c]	Molybdenum Soil ECVs (mg/kg dw) High[d]	Nickel Soil ECVs (mg/kg dw) High[d]	Nickel Soil ECVs (mg/kg dw) Low[c]	Selenium Soil ECVs (mg/kg dw) Low[c]	Selenium Soil ECVs (mg/kg dw) High[d]	Selenium (Allomterically Adjusted)[e] Soil ECVs (mg/kg dw) High[d]	Selenium (Allomterically Adjusted)[e] Soil ECVs (mg/kg dw) Low[c]	Silver Soil ECVs (mg/kg dw) Low[c]	Silver Soil ECVs (mg/kg dw) High[d]
Gambel's Quail	Proposed TRVs[a]	3.15E+00	2.48E+01	2.58E+02	2.60E+03	1.44E+03	4.14E+03	1.01E+01	1.90E+01	NA	NA	4.47E+02	4.47E+03
Cactus Wren		1.25E-02	9.13E-01	2.97E+01	3.00E+02	3.18E+01	8.81E+01	1.78E+00	4.40E+00	NA	NA	5.15E+00	5.15E+01
Red-tailed Hawk		2.39E+00	1.10E+01	2.47E+02	2.49E+03	3.54E+03	1.23E+04	5.23E+01	1.85E+02	NA	NA	1.42E+03	1.42E+04
Desert Shrew		2.11E+00	5.89E+02	2.25E+00	2.25E+01	7.76E+00	1.55E+01	NA	NA	1.29E+00	2.17E+00	NA	NA
Merriam's Kangaroo Rat		2.96E+01	1.27E+03	1.15E+01	1.15E+02	4.36E+02	9.57E+02	NA	NA	4.13E+00	5.98E+00	NA	NA
Desert Kit Fox		3.21E+01	5.14E+02	3.81E+01	3.81E+02	1.01E+03	2.39E+03	4.54E+01	8.93E+01	NA	NA	5.32E+03	5.32E+04
Gambel's Quail	DTSC-Recommended TRVs[b]	3.15E+00	2.48E+01	2.58E+02	2.60E+03	2.76E+02	1.29E+04	8.15E+00	2.94E+01	NA	NA	4.47E+02	4.47E+03
Cactus Wren		1.25E-02	9.13E-01	2.97E+01	3.00E+02	6.54E+00	2.67E+02	1.31E+00	8.15E+00	NA	NA	5.15E+00	5.15E+01
Red-tailed Hawk		2.39E+00	1.10E+01	1.41E+02	1.42E+03	3.68E+02	4.27E+04	3.25E+01	3.92E+02	NA	NA	1.42E+03	1.42E+04
Desert Shrew		2.11E+00	5.89E+02	2.25E+00	2.25E+01	6.07E-01	1.44E+02	1.77E-01	1.06E+01	NA	NA	1.44E+01	1.44E+02
Merriam's Kangaroo Rat		2.96E+01	1.27E+03	1.15E+01	1.15E+02	2.19E+01	1.12E+04	1.13E+00	2.05E+01	NA	NA	1.93E+03	1.93E+04
Desert Kit Fox		3.21E+01	5.14E+02	2.24E+01	2.24E+02	2.04E+01	2.86E+04	5.56E+00	9.15E+02	NA	NA	5.32E+03	5.32E+04

Table 5
Summary of Soil Ecological Comparison Values
Based on Wildlife

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

		Silver (Allomterically Adjusted)[e]		Thallium		Vanadium		Zinc		LMW PAHs		HMW PAHs	
		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)		Soil ECVs (mg/kg dw)	
Ecological Receptor	**Based on:**	**High[d]**	**Low[c]**	**Low[c]**	**High[d]**	**High[d]**	**Low[c]**	**Low[c]**	**High[d]**	**High[d]**	**Low[c]**	**Low[c]**	**High[d]**
Gambel's Quail	**Proposed TRVs[a]**	NA	NA	8.45E+01	8.45E+02	8.24E+01	1.65E+02	9.26E+03	2.92E+04	5.59E+03	5.68E+04	1.14E+03	1.22E+04
Cactus Wren		NA	NA	2.97E+00	2.97E+01	1.39E+01	2.78E+01	7.57E+01	1.05E+03	3.97E+01	3.97E+02	2.03E+01	2.03E+02
Red-tailed Hawk		NA	NA	3.50E+01	3.50E+02	1.65E+02	3.30E+02	4.76E+04	1.42E+05	2.05E+04	2.05E+05	9.01E+03	9.01E+04
Desert Shrew		2.09E+01	2.09E+02	2.32E+00	6.91E+00	3.31E+02	6.60E+02	8.67E+01	4.72E+03	1.06E+02	5.28E+02	1.16E+00	5.77E+00
Merriam's Kangaroo Rat		2.69E+03	2.69E+04	2.09E+02	6.21E+02	1.75E+03	3.50E+03	8.32E+03	6.08E+04	3.20E+04	1.64E+05	4.32E+01	2.33E+02
Desert Kit Fox		NA	NA	9.69E+01	2.89E+02	2.92E+03	5.83E+03	7.00E+04	2.94E+05	6.62E+04	3.31E+05	6.21E+02	3.10E+03
Gambel's Quail	**DTSC-Recommended TRVs[b]**	NA	NA	8.45E+01	8.45E+02	8.24E+01	1.65E+02	1.57E+03	2.93E+04	5.59E+03	5.68E+04	1.14E+03	1.22E+04
Cactus Wren		NA	NA	2.97E+00	2.97E+01	1.39E+01	2.78E+01	1.32E+00	1.06E+03	3.97E+01	3.97E+02	2.03E+01	2.03E+02
Red-tailed Hawk		NA	NA	3.50E+01	3.50E+02	1.65E+02	3.30E+02	5.23E+03	1.42E+05	2.05E+04	2.05E+05	9.01E+03	9.01E+04
Desert Shrew		2.09E+01	2.09E+02	4.15E+00	1.24E+01	3.31E+02	6.60E+02	1.64E-01	1.09E+04	8.05E+01	2.41E+02	2.46E+00	6.17E+01
Merriam's Kangaroo Rat		2.69E+03	2.69E+04	2.09E+02	6.21E+02	1.75E+03	3.50E+03	2.82E+02	9.39E+04	2.42E+04	7.42E+04	9.54E+01	2.78E+03
Desert Kit Fox		NA	NA	9.69E+01	2.89E+02	2.92E+03	5.83E+03	4.61E+03	4.08E+05	5.05E+04	1.51E+05	1.32E+03	3.31E+04

Notes:

Selected Final Soil ECV (see Table 6).

[1] Proposed TRVs based primarily on USEPA's EcoSSLs (USEPA, 2008b); from the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
[2] DTSC-recommended TRVs based primarily on Region 9 Biological Technical Assistance Group (BTAG) TRVs (CalEPA, 2002); from the Risk Assessment Work Plan (ARCADIS, 2008).
[3] Low ECVs based on low TRVs or no-observed adverse effects level (NOAEL) TRVs.
[4] High ECVs based on high TRVs or lowest-observed adverse effects level (LOAEL) TRVs.
[5] TRVs allometrically adjusted for representative receptors (ARCADIS, 2008).

CalEPA - California Environmental Protection Agency
DTSC - Department of Toxic Substance Control
ECV - ecological comparison value
HMW PAHs - high molecular weight polycyclic aromatic hydrocarbons
LMW PAHs - low molecular weight polycyclic aromatic hydrocarbons
mg/kg dw - milligrams per kilogram dry weight
NA - not available
TRV - toxocity reference values
USEPA - U.S. Environmental Protection Agency

Table 6
Summary of Selected Soil Ecological Comparison Values

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Constituent	Lowest Wildlife ECV (mg/kg)	Based On	Lowest Plant/Invertebrate ECV (mg/kg)	Based On	Selected Final Soil ECV[a] (mg/kg)	Based On
Antimony	0.285	Desert Shrew	5	Plant*	0.285	Desert Shrew
Arsenic	11.4	Desert Shrew	18	Plant	11.4	Desert Shrew
Barium	2,299	Desert Shrew	330	Invertebrate	330	Invertebrate
Beryllium	23.3	Merriam's Kangaroo Rat	10	Plant*	23.3	Merriam's Kangaroo Rat
Cadmium	0.0151	Desert Shrew	32	Plant	0.0151	Desert Shrew
Trivalent Chromium	NA	NA	NA	NA	NA	NA
Hexavalent Chromiu	139.6	Desert Shrew	0.4	Invertebrate**	139.6	Desert Shrew
Total Chromium	36.3	Desert Shrew	NA	NA	36.3	Desert Shrew
Cobalt	41.6	Desert Shrew	13	Plant	13	Plant
Copper	20.6	Cactus Wren	70	Plant	20.6	Cactus Wren
Lead	0.0166	Red-tailed Hawk	120	Plant	0.0166	Red-tailed Hawk
Manganese	NA	NA	220	Plant	220	Plant
Mercury	0.0125	Cactus Wren	0.1	Invertebrate**	0.0125	Cactus Wren
Molybdenum	2.25	Desert Shrew	2	Plant*	2.25	Desert Shrew
Nickel	0.607	Desert Shrew	38	Plant	0.607	Desert Shrew
Selenium	0.177	Desert Shrew	0.52	Plant	0.177	Desert Shrew
Silver	5.15	Cactus Wren	560	Plant	5.15	Cactus Wren
Thallium	2.32	Desert Shrew	1	Plant*	2.32	Desert Shrew
Vanadium	13.9	Cactus Wren	2	Plant	13.9	Cactus Wren
Zinc	0.164	Desert Shrew	120	Invertebrate	0.164	Desert Shrew
LMW PAHs	39.7	Cactus Wren	10	Plant	10	Plant
HMW PAHs	1.16	Desert Shrew	1.2	Plant	1.16	Desert Shrew

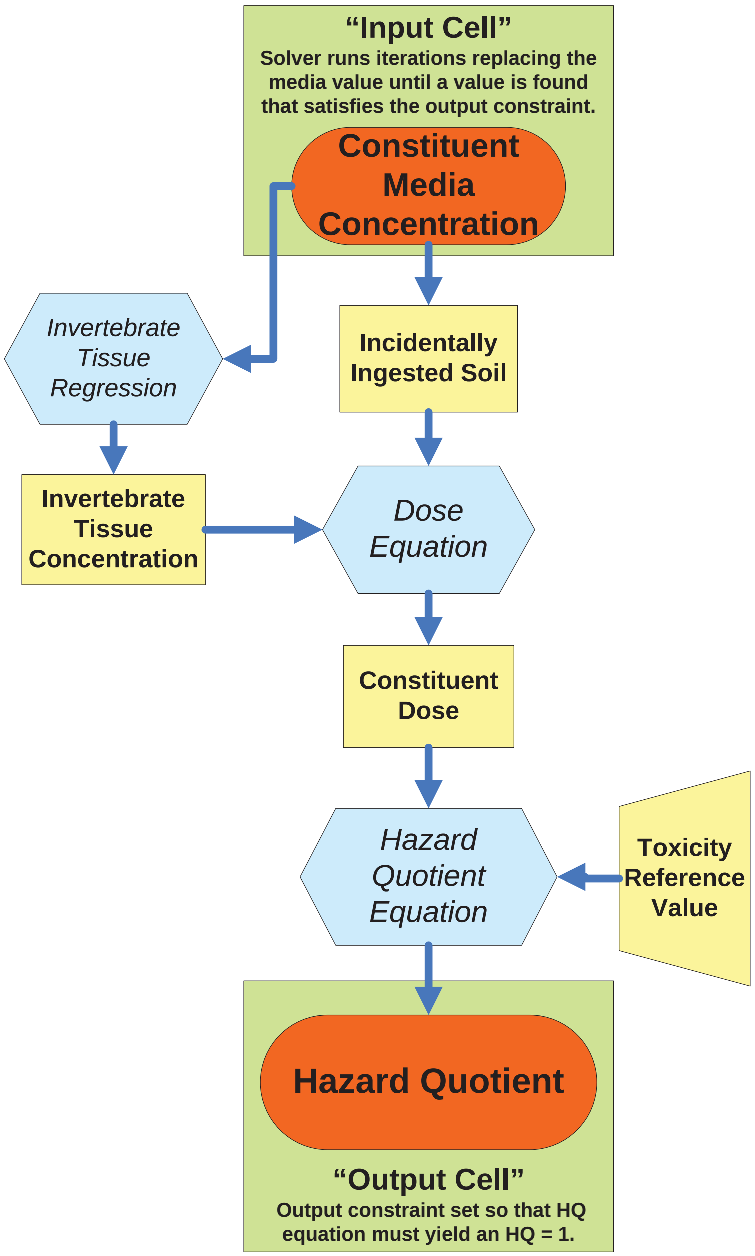
Notes:
*Confidence in this benchmark is low due to the low number of studies on which it is based or other factors. The soil type and test species (typically agricultural) may also vary significantly from site-specific conditions, or the toxic effects may be uncertain.
**Confidence in this benchmark is low due to the low number of studies on which it is based or other factors. The tests were conducted with earthworms.
a. The final soil ECV selected based on minimum of soil ECVs based on plants and invertebrates and wildlife. If the minimum soil ECV was based toxicity valu low confidence, then the next minimum soil ECV was selected.

ECV - ecological comparison value
HMW PAHs - high molecular weight polycyclic aromatic hydrocarbons
LMW PAHs - low molecular weight polycyclic aromatic hydrocarbons
mg/kg dw - miligrams per kilogram dry weight
NA - not available

ARCADIS

Figures

Figure 1. Diagram Depicting ECV Derivation Methodology for the Desert Shrew



Formulae and Variables Description

Invertebrate Tissue Regression Equation

$$\ln(C_{tissue}) = a + b[\ln(C_{soil})] \;\therefore\; C_{tissue} = e^{a} \times (C_{soil})^{b}$$

Dose Equation

$$Dose = \frac{((C_{soil} \times SIR) + (C_{soil} \times BAF \times FIR)) \times SUF}{BW}$$

Hazard Quotient Equation

$$HQ = \frac{Dose}{TRV}$$

ECV Equation

$$ECV = C_{Soil} = \frac{HQ \times TRV \times BW}{(SIR + [FIR \times BAF]) \times SUF}$$

Where:

C_{tissue}	= concentration of constituent in biota or tissue (milligrams of constituent per kilogram tissue [mg/kg tissue])
a	= compound specific regression equation constant (unitless)
b	= compound specific regression equation constant (unitless)
C_{soil}	= concentration of constituent in exposure soil (mg/kg soil)
Dose	= daily exposure dose of constituent resulting from ingestion of media and invertebrates (milligrams per kilogram body weight per day [mg/kgBW-day])
SIR	= soil ingestion rate (kilograms soil per day [kg soil/day])
BAF	= bioaccumulation factor (kg soil/kg tissue)
FIR	= food or biota ingestion rate (kilograms tissue per day [kg tissue/ day])
SUF	= site use factor (unitless)
BW	= body weight of receptor (kilograms [kgBW])
HQ	= hazard quotient (unitless); set at target of 1
TRV	= toxicity reference value (milligrams per kilogram body weight per day)
ECV	= ecological comparison value (mg/kg soil)

Attachment 1

Table A-1
Ecological Comparison Values Based on Gambel's Quail and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	**Antimony mg/kg (dw)**		**Arsenic mg/kg (dw)**		**Barium mg/kg (dw)**		**Beryllium mg/kg (dw)**		**Cadmium mg/kg (dw)**		**Chromium mg/kg (dw)**		**Hexavalent Chromium mg/kg (dw)**	
	Low[4]	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**
Sitewide ECVs														
Soil	NA	NA	4.1E+02	6.5E+02	NA	NA	NA	NA	2.5E+02	1.3E+03	4.8E+02	2.8E+03	NA	NA
Plant tissue	NA	NA	1.5E+01	2.5E+01	NA	NA	NA	NA	1.3E+01	3.1E+01	2.0E+01	1.2E+02	NA	NA
Invertebrate tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Prey (mammal) tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	ln(Cp) = 0.938 * ln(Cs) - 3.233		3.8E-02		1.6E-01		ln(Cp) = 0.7345 * ln(Cs) - 0.5361		ln(Cp) = 0.546 * ln(Cs) - 0.475		4.1E-02		4.1E-02	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	NA	NA	2.2E+00	3.5E+00	NA	NA	NA	NA	1.5E+00	6.4E+00	2.7E+00	1.6E+01	NA	NA
HQ	NA	NA	1.0E+00	1.0E+00	NA	NA	NA	NA	1.0E+00	1.0E+00	1.0E+00	1.0E+00	NA	NA

Exposure Paramater[3]	**value**	**units**
Food Ingestion Rate (FIR	0.00649	kg tissue/day
Soil Ingestion Rate (SIR)	0.0006750	kg soil/day
Plant Ingestion Fraction (F_{food})	100%	Percent
Invertebrate Ingestion Fraction (F_{food})	0%	Percent
Mammal Ingestion Fraction (F_{food})	0%	Percent
Home Range	35.7	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	0.1693	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(yellow highlight) soil ECV.

1 bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2 exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3 dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4 Low and High ECVs based on low and high TRVs (from Table 3), respectively.

ECV	ecological comparison value for soil.
dw	dry weight.
High	lowest-observed adverse effects level (LOAEL).
HMW PAHs	high molecular weight polycyclic aromatic hydrocarbons.
kg	kilograms.
kg/day	kilograms per day.
LMW PAHs	low molecular weight polycyclic aromatic hydrocarbons.
Low	no-observed adverse effects level (NOAEL).
mg/kg	milligrams per kilogram.
mg/kgBW-day	milligrams per kilogram body weight per day.
NA	not available or not applicable.

Table A-1
Ecological Comparison Values Based on Gambel's Quail and Proposed TRVs

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Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	1.8E+03	4.3E+03	7.6E+02	2.6E+03	3.4E+02	7.2E+02	3.2E+00	2.5E+01	2.6E+02	2.6E+03	1.4E+03	4.1E+03	1.0E+01	1.9E+01
Plant tissue	1.3E+01	3.2E+01	2.7E+01	4.3E+01	7.0E+00	1.1E+01	6.9E-01	2.1E+00	6.4E+01	6.5E+02	2.5E+01	5.5E+01	6.5E+00	1.3E+01
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	7.5E-03		ln(Cp) = 0.394 * ln(Cs) + 0.668		ln(Cp) = 0.561 * ln(Cs) - 1.328		ln(Cp) = 0.544 * ln(Cs) - 0.996		2.5E-01		ln(Cp) = 0.748 * ln(Cs) - 2.223		ln(Cp) = 1.104 * ln(Cs) - 0.677	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	7.6E+00	1.8E+01	4.1E+00	1.2E+01	1.6E+00	3.3E+00	3.9E-02	1.8E-01	3.5E+00	3.5E+01	6.7E+00	1.9E+01	2.9E-01	5.8E-01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-1
Ecological Comparison Values Based on Gambel's Quail and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs												
Soil	4.5E+02	4.5E+03	8.5E+01	8.5E+02	8.2E+01	1.6E+02	9.3E+03	2.9E+04	5.6E+03	5.7E+04	1.1E+03	1.2E+04
Plant tissue	6.3E+00	6.3E+01	3.4E-01	3.4E+00	4.0E-01	8.0E-01	7.6E+02	1.4E+03	1.3E+01	3.9E+01	1.4E+02	1.3E+03
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	1.4E-02		4.0E-03		4.9E-03		ln(Cp) = 0.554 * ln(Cs) + 1.575		ln(Cp) = 0.4544 * ln(Cs)-1.3205		ln(Cp) = 0.9469 * ln(Cs)-1.7026	
Soil-to-Invertebrates	--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	2.0E+00	2.0E+01	3.5E-01	3.5E+00	3.4E-01	6.9E-01	6.6E+01	1.7E+02	2.3E+01	2.3E+02	1.0E+01	1.0E+02
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-2
Ecological Comparison Values Based on the Cactus Wren and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Antimony mg/kg (dw)		Arsenic mg/kg (dw)		Barium mg/kg (dw)		Beryllium mg/kg (dw)		Cadmium mg/kg (dw)		Chromium mg/kg (dw)		Hexavalent Chromium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	NA	NA	7.6E+01	1.3E+02	NA	NA	NA	NA	9.5E-01	5.9E+00	3.6E+01	2.1E+02	NA	NA
Plant tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Invertebrate tissue	NA	NA	5.1E+00	7.4E+00	NA	NA	NA	NA	7.9E+00	3.4E+01	1.1E+01	6.5E+01	NA	NA
Prey (mammal) tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	1.0E+00		ln(Ci) = 0.706 * ln(Cs) - 1.421		9.1E-02		4.5E-02		ln(Ci) = 0.795 * ln(Cs) + 2.114		3.1E-01		3.1E-01	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	NA	NA	2.2E+00	3.6E+00	NA	NA	NA	NA	1.5E+00	6.4E+00	2.7E+00	1.6E+01	NA	NA
HQ	NA	NA	1.0E+00	1.0E+00	NA	NA	NA	NA	1.0E+00	1.0E+00	1.0E+00	1.0E+00	NA	NA

Exposure Paramater[3]	value	units
Food Ingestion Rate (FIR	0.00713	kg tissue/day
Soil Ingestion Rate (SIR)	0.0006631	kg soil/day
Plant Ingestion Fraction (F_{food})	0%	Percent
Invertebrate Ingestion Fraction (F_{food})	100%	Percent
Mammal Ingestion Fraction (F_{food})	0%	Percent
Home Range	4.8	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	0.0389	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(highlighted) soil ECV.

1 bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2 exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3 dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4 Low and High ECVs based on low and high TRVs (from Table 3), respectively.

ECV ecological comparison value for soil.
dw dry weight.
High lowest-observed adverse effects level (LOAEL).
HMW PAHs high molecular weight polycyclic aromatic hydrocarbons.
kg kilograms.
kg/day kilograms per day.
LMW PAHs low molecular weight polycyclic aromatic hydrocarbons.
Low no-observed adverse effects level (NOAEL).
mg/kg milligrams per kilogram.
mg/kgBW-day milligrams per kilogram body weight per day.
NA not available or not applicable.

Table A-2
Ecological Comparison Values Based on the Cactus Wren and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	1.9E+02	4.6E+02	3.6E+01	1.1E+02	1.6E+01	3.6E+01	1.3E-02	9.1E-01	3.0E+01	3.0E+02	3.2E+01	8.8E+01	1.8E+00	4.4E+00
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	2.4E+01	5.7E+01	1.9E+01	5.6E+01	7.4E+00	1.4E+01	2.1E-01	9.0E-01	1.6E+01	1.6E+02	3.4E+01	9.3E+01	1.4E+00	2.7E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	1.2E-01		5.2E-01		ln(Ci) = 0.807 * ln(Cs) - 0.218		ln(Ci) = 0.3369 * ln(Cs) - 0.078		5.5E-01		1.1E+00		ln(Ci) = 0.733 * ln(Cs) - 0.075	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	7.6E+00	1.8E+01	4.0E+00	1.2E+01	1.6E+00	3.3E+00	3.9E-02	1.8E-01	3.5E+00	3.5E+01	6.7E+00	1.9E+01	2.9E-01	5.8E-01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-2
Ecological Comparison Values Based on the Cactus Wren and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs												
Soil	5.2E+00	5.2E+01	3.0E+00	3.0E+01	1.4E+01	2.8E+01	7.6E+01	1.0E+03	4.0E+01	4.0E+02	2.0E+01	2.0E+02
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	1.1E+01	1.1E+02	1.6E+00	1.6E+01	5.8E-01	1.2E+00	3.5E+02	8.4E+02	1.2E+02	1.2E+03	5.3E+01	5.3E+02
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	--		--		--		--		--		--	
Soil-to-Invertebrates	2.0E+00		5.5E-01		4.2E-02		ln(Ci) = 0.328 * ln(Cs) + 4.449		3.0E+00		2.6E+00	
Soil-to-Mammals	--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	2.0E+00	2.0E+01	3.5E-01	3.5E+00	3.4E-01	6.9E-01	6.6E+01	1.7E+02	2.3E+01	2.3E+02	1.0E+01	1.0E+02
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-3
Ecological Comparison Values Based on Red Tailed Hawk and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	**Antimony mg/kg (dw)**		**Arsenic mg/kg (dw)**		**Barium mg/kg (dw)**		**Beryllium mg/kg (dw)**		**Cadmium mg/kg (dw)**		**Chromium mg/kg (dw)**		**Hexavalent Chromium mg/kg (dw)**	
	Low[5]	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**
Sitewide ECVs														
Soil	NA	NA	1.8E+03	2.8E+03	NA	NA	NA	NA	8.4E+02	4.6E+03	5.9E+02	5.2E+03	NA	NA
Plant tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Invertebrate tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Prey (mammal) tissue	NA	NA	3.6E+00	5.3E+00	NA	NA	NA	NA	6.8E+00	1.5E+01	2.5E+01	1.2E+02	NA	NA
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	0.05 * Cd		ln(Cm) = 0.8188 * ln(Cs) -4.8471		0.0075 * Cd		0.05 * Cd		ln(Cm) = 0.4723 * ln(Cs) - 1.2571		ln(Cm) = 0.7338 * ln(Cs) - 1.4599		ln(Cm) = 0.7338 * ln(Cs) - 1.4599	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	NA	NA	2.2E+00	3.6E+00	NA	NA	NA	NA	1.5E+00	6.4E+00	2.7E+00	1.6E+01	NA	NA
HQ	NA	NA	1.0E+00	1.0E+00	NA	NA	NA	NA	1.0E+00	1.0E+00	1.0E+00	1.0E+00	NA	NA

Exposure Paramater[3]	**value**	**units**
Food Ingestion Rate (FIR	0.08990	kg tissue/day
Soil Ingestion Rate (SIR)	0.0012586	kg soil/day
Plant Ingestion Fraction (F_{food})	0%	Percent
Invertebrate Ingestion Fraction (F_{food})	0%	Percent
Mammal Ingestion Fraction (F_{food})	100%	Percent
Home Range	2471	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	1.134	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(yellow highlight) soil ECV.

1 bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2 exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3 dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4 Low and High ECVs based on low and high TRVs (from Table 3), respectively.

ECV	ecological comparison value for soil.
dw	dry weight.
High	lowest-observed adverse effects level (LOAEL).
HMW PAHs	high molecular weight polycyclic aromatic hydrocarbons.
kg	kilograms.
kg/day	kilograms per day.
LMW PAHs	low molecular weight polycyclic aromatic hydrocarbons.
Low	no-observed adverse effects level (NOAEL).
mg/kg	milligrams per kilogram.
mg/kgBW-day	milligrams per kilogram body weight per day.
NA	not available or not applicable.

Table A-3
Ecological Comparison Values Based on Red Tailed Hawk and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum[4] mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]
Sitewide ECVs														
Soil	9.0E+02	1.8E+03	2.0E+03	8.9E+03	3.9E+02	1.2E+03	2.4E+00	1.1E+01	2.5E+02	2.5E+03	3.5E+03	1.2E+04	5.2E+01	1.9E+02
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	8.3E+01	2.1E+02	2.3E+01	2.9E+01	1.5E+01	2.5E+01	4.6E-01	2.1E+00	4.1E+01	4.1E+02	3.5E+01	6.3E+01	2.9E+00	4.7E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	ln(Cm) = 1.307 * ln(Cs) - 4.4669		ln(Cm) = 0.1444 * ln(Cs) + 2.042		ln(Cm) = 0.4422 * ln(Cs) + 0.0761		1.9E-01		0.006 * 50 * Cd		ln(Cm) = 0.4658 * ln(Cs) - 0.2462		n(Cm) = 0.3764 * ln(Cs) - 0.415	
Dose Calulations for Target Hazard Quotients (HQs)[2]					**0.0E+00**									
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	7.6E+00	1.8E+01	4.1E+00	1.2E+01	1.6E+00	3.3E+00	3.9E-02	1.8E-01	3.5E+00	3.5E+01	6.7E+00	1.9E+01	2.9E-01	5.8E-01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-3
Ecological Comparison Values Based on Red Tailed Hawk and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]
Sitewide ECVs												
Soil	1.4E+03	1.4E+04	3.5E+01	3.5E+02	1.6E+02	3.3E+02	4.8E+04	1.4E+05	2.1E+04	2.1E+05	9.0E+03	9.0E+04
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	5.7E+00	5.7E+01	3.9E+00	3.9E+01	2.0E+00	4.1E+00	1.7E+02	1.8E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--	
Soil-to-Mammals	4.0E-03		1.1E-01		1.2E-02		ln(Cm) = 0.0706 * ln(Cs) + 4.3632		0.0E+00		0.0E+00	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	2.0E+00	2.0E+01	3.5E-01	3.5E+00	3.4E-01	6.9E-01	6.6E+01	1.7E+02	2.3E+01	2.3E+02	1.0E+01	1.0E+02
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-4
Ecological Comparison Values Based on Desert Shrew and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Antimony mg/kg (dw)		Arsenic mg/kg (dw)		Barium mg/kg (dw)		Beryllium mg/kg (dw)		Cadmium mg/kg (dw)		Chromium mg/kg (dw)		Hexavalent Chromium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	2.8E-01	2.8E+00	8.9E+01	1.6E+02	2.3E+03	3.7E+03	4.0E+01	4.8E+01	3.7E-01	6.8E+00	3.6E+01	1.5E+02	1.4E+02	5.9E+02
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	2.8E-01	2.8E+00	5.7E+00	8.8E+00	2.1E+02	3.3E+02	1.8E+00	2.1E+00	3.8E+00	3.8E+01	1.1E+01	4.4E+01	42.724563	1.8E+02
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	1.0E+00		ln(Ci) = 0.706 * ln(Cs) - 1.421		9.1E-02		4.5E-02		ln(Ci) = 0.795 * ln(Cs) + 2.114		3.1E-01		3.1E-01	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	5.9E-02	5.9E-01	1.5E+00	2.4E+00	5.2E+01	8.3E+01	5.3E-01	6.3E-01	7.7E-01	7.7E+00	2.4E+00	9.6E+00	9.2E+00	3.9E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Exposure Paramater[3]	value	units
Food Ingestion Rate (FIR)	0.00102	kg tissue/day
Soil Ingestion Rate (SIR)	0.0000203	kg soil/day
Plant Ingestion Fraction (F_{food})	0%	Percent
Invertebrate Ingestion Fraction (F_{food})	100%	Percent
Mammal Ingestion Fraction (F_{food})	0%	Percent
Home Range	0.1	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	0.005	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(highlighted) soil ECV.

1 bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2 exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3 dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4 Low and High ECVs based on low and high TRVs (from Table 3), respectively.

ECV	ecological comparison value for soil.
dw	dry weight.
High	lowest-observed adverse effects level (LOAEL).
HMW PAHs	high molecular weight polycyclic aromatic hydrocarbons.
kg	kilograms.
kg/day	kilograms per day.
LMW PAHs	low molecular weight polycyclic aromatic hydrocarbons.
Low	no-observed adverse effects level (NOAEL).
mg/kg	milligrams per kilogram.
mg/kgBW-day	milligrams per kilogram body weight per day.
NA	not available or not applicable.

Table A-4
Ecological Comparison Values Based on Desert Shrew and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum mg/kg (dw)		Nickel mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs												
Soil	2.5E+02	6.5E+02	8.7E+01	1.4E+02	6.0E+01	1.3E+02	2.1E+00	5.9E+02	2.2E+00	2.2E+01	7.8E+00	1.6E+01
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	3.1E+01	8.0E+01	4.5E+01	7.5E+01	2.2E+01	4.1E+01	1.2E+00	7.9E+00	1.2E+00	1.2E+01	8.2E+00	1.6E+01
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	--		--		--		--		--		--	
Soil-to-Invertebrates	1.2E-01		5.2E-01		ln(Ci) = 0.807 * ln(Cs) - 0.218		ln(Ci) = 0.3369 * ln(Cs) - 0.078		5.5E-01		1.1E+00	
Soil-to-Mammals	--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	7.3E+00	1.9E+01	9.4E+00	1.6E+01	4.7E+00	8.9E+00	2.5E-01	4.0E+00	2.6E-01	2.6E+00	1.7E+00	3.4E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-4
Ecological Comparison Values Based on Desert Shrew and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Selenium mg/kg (dw)		Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	1.3E+00	2.2E+00	2.1E+01	2.1E+02	2.3E+00	6.9E+00	3.3E+02	6.6E+02	8.7E+01	4.7E+03	1.1E+02	5.3E+02	1.2E+00	5.8E+00
Plant tissue	6.7E-01	1.2E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-01	9.6E-01
Invertebrate tissue	1.1E+00	1.7E+00	4.3E+01	4.3E+02	2.3E+00	6.9E+00	1.4E+01	2.8E+01	3.7E+02	1.4E+03	3.2E+02	1.6E+03	3.0E+00	1.5E+01
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	ln(Ci) = 0.733 * ln(Cs) - 0.075		2.0E+00		5.5E-01		4.2E-02		ln(Ci) = 0.328 * ln(Cs) + 4.449		3.0E+00		2.6E+00	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	2.3E-01	3.5E-01	8.8E+00	8.8E+01	4.8E-01	1.4E+00	4.2E+00	8.3E+00	7.5E+01	3.0E+02	6.6E+01	3.3E+02	6.1E-01	3.1E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-5
Ecological Comparison Values Based on Kangaroo Rat and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Antimony mg/kg (dw)		Arsenic mg/kg (dw)		Barium mg/kg (dw)		Beryllium mg/kg (dw)		Cadmium mg/kg (dw)		Chromium mg/kg (dw)		Hexavalent Chromium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	1.2E+01	1.4E+02	2.9E+02	4.6E+02	3.5E+03	5.6E+03	2.3E+01	2.9E+01	8.9E+01	2.2E+03	4.5E+02	1.8E+03	1.7E+03	7.3E+03
Plant tissue	4.2E-01	3.9E+00	1.1E+01	1.7E+01	5.5E+02	8.7E+02	5.9E+00	7.0E+00	7.2E+00	4.1E+01	1.8E+01	7.4E+01	7.1E+01	3.0E+02
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	ln(Cp) = 0.938 * ln(Cs) - 3.233		3.8E-02		1.6E-01		ln(Cp) = 0.7345 * ln(Cs) - 0.5361		ln(Cp) = 0.546 * ln(Cs) - 0.475		4.1E-02		4.1E-02	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	5.9E-02	5.9E-01	1.5E+00	2.3E+00	5.2E+01	8.3E+01	5.3E-01	6.3E-01	7.7E-01	7.7E+00	2.4E+00	9.6E+00	9.2E+00	3.9E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Exposure Paramater[3]	value	units
Food Ingestion Rate (FIR	0.00282	kg tissue/day
Soil Ingestion Rate (SIR)	0.0000677	kg soil/day
Plant Ingestion Fraction (F_{food})	100%	Percent
Invertebrate Ingestion Fraction (F_{food})	0%	Percent
Mammal Ingestion Fraction (F_{food})	0%	Percent
Home Range	0.13	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	0.0343	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

soil ECV.

1 bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2 exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3 dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4 Low and High ECVs based on low and high TRVs (from Table 3), respectively.

ECV ecological comparison value for soil.
dw dry weight.
High lowest-observed adverse effects level (LOAEL).

HMW PAHs high molecular weight polycyclic aromatic hydrocarbons.
kg kilograms.
kg/day kilograms per day.
LMW PAHs low molecular weight polycyclic aromatic hydrocarbons.
Low no-observed adverse effects level (NOAEL).
mg/kg milligrams per kilogram.
mg/kgBW-day milligrams per kilogram body weight per day.
NA not available or not applicable.

Table A-5
Ecological Comparison Values Based on Kangaroo Rat and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum mg/kg (dw)		Nickel mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs												
Soil	2.8E+03	7.3E+03	2.7E+03	5.3E+03	1.7E+03	3.4E+03	3.0E+01	1.3E+03	1.2E+01	1.2E+02	4.4E+02	9.6E+02
Plant tissue	2.1E+01	5.4E+01	4.4E+01	5.7E+01	1.7E+01	2.6E+01	2.3E+00	1.8E+01	2.9E+00	2.9E+01	1.0E+01	1.8E+01
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	7.5E-03		ln(Cp) = 0.394 * ln(Cs) + 0.668		ln(Cp) = 0.561 * ln(Cs) - 1.328		ln(Cp) = 0.544 * ln(Cs) - 0.996		2.5E-01		ln(Cp) = 0.748 * ln(Cs) - 2.223	
Soil-to-Invertebrates	--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	7.3E+00	1.9E+01	9.0E+00	1.5E+01	4.7E+00	8.9E+00	2.5E-01	4.0E+00	2.6E-01	2.6E+00	1.7E+00	3.4E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-5
Ecological Comparison Values Based on Kangaroo Rat and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Selenium mg/kg (dw)		Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	4.1E+00	6.0E+00	2.7E+03	2.7E+04	2.1E+02	6.2E+02	1.8E+03	3.5E+03	8.3E+03	6.1E+04	3.2E+04	1.6E+05	4.3E+01	2.3E+02
Plant tissue	2.4E+00	3.7E+00	3.8E+01	3.8E+02	8.3E-01	2.5E+00	8.5E+00	1.7E+01	7.2E+02	2.2E+03	3.0E+01	6.2E+01	6.4E+00	3.2E+01
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	ln(Cp) = 1.104 * ln(Cs) - 0.677		1.4E-02		4.0E-03		4.9E-03		ln(Cp) = 0.554 * ln(Cs) + 1.575		ln(Cp) = 0.4544 * ln(Cs)-1.3205		ln(Cp) = 0.9469 * ln(Cs)-1.7026	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	2.1E-01	3.1E-01	8.4E+00	8.4E+01	4.8E-01	1.4E+00	4.2E+00	8.3E+00	7.5E+01	3.0E+02	6.6E+01	3.3E+02	6.2E-01	3.1E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-6
Ecological Comparison Values Based on Desert Kit Fox and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	**Antimony[4] mg/kg (dw)**		**Arsenic mg/kg (dw)**		**Barium[4] mg/kg (dw)**		**Beryllium[4] mg/kg (dw)**		**Cadmium mg/kg (dw)**		**Chromium mg/kg (dw)**		**Hexavalent Chromium mg/kg (dw)**	
	Low[5]	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**
Sitewide ECVs														
Soil	2.1E+01	2.1E+02	9.7E+02	1.6E+03	5.1E+04	8.1E+04	5.0E+02	5.9E+02	5.7E+02	7.1E+03	1.1E+03	5.3E+03	5.0E+03	2.5E+04
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	1.1E+00	1.1E+01	2.2E+00	3.2E+00	3.5E+01	5.6E+01	1.1E+00	1.3E+00	5.7E+00	1.9E+01	3.8E+01	1.2E+02	1.2E+02	3.9E+02
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	0.05 * Cd		ln(Cm) = 0.8188 * ln(Cs) -4.8471		0.0075 * Cd		0.05 * Cd		ln(Cm) = 0.4723 * ln(Cs) - 1.2571		n(Cm) = 0.7338 * ln(Cs) - 1.459		ln(Cm) = 0.7338 * ln(Cs) - 1.4599	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	5.9E-02	5.9E-01	1.0E+00	1.7E+00	5.2E+01	8.3E+01	5.3E-01	6.3E-01	7.7E-01	7.7E+00	2.4E+00	9.6E+00	9.2E+00	3.9E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Exposure Paramater[3]	**value**	**units**
Food Ingestion Rate (FIR	0.07020	kg tissue/day
Soil Ingestion Rate (SIR)	0.0019656	kg soil/day
Plant Ingestion Fraction (F_{food})	0%	Percent
Invertebrate Ingestion Fraction (F_{food})	0%	Percent
Mammal Ingestion Fraction (F_{food})	100%	Percent
Home Range	3039	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	1.985	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(highlighted) soil ECV.

1 bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2 exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3 dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4 Low and High ECVs based on low and high TRVs (from Table 3), respectively.

ECV ecological comparison value for soil.
dw dry weight.
High lowest-observed adverse effects level (LOAEL).
HMW PAHs high molecular weight polycyclic aromatic hydrocarbons.
kg kilograms.
kg/day kilograms per day.
LMW PAHs low molecular weight polycyclic aromatic hydrocarbons.
Low no-observed adverse effects level (NOAEL).
mg/kg milligrams per kilogram.
mg/kgBW-day milligrams per kilogram body weight per day.
NA not available or not applicable.

Table A-6
Ecological Comparison Values Based on Desert Kit Fox and Proposed TRVs

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PG&E Topock
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Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum[4] mg/kg (dw)		Nickel mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]
Sitewide ECVs												
Soil	1.5E+03	3.2E+03	4.7E+03	8.4E+03	3.4E+03	7.0E+03	3.2E+01	5.1E+02	3.8E+01	3.8E+02	1.0E+03	2.4E+03
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	1.6E+02	4.4E+02	2.6E+01	2.8E+01	3.9E+01	5.4E+01	6.2E+00	9.9E+01	6.3E+00	6.3E+01	2.0E+01	2.9E+01
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--	
Soil-to-Mammals	ln(Cm) = 1.307 * ln(Cs) - 4.4669		ln(Cm) = 0.1444 * ln(Cs) + 2.042		ln(Cm) = 0.4422 * ln(Cs) + 0.0761		1.9E-01		0.006 * 50 * Cd		ln(Cm) = 0.4658 * ln(Cs) - 0.2462	
Dose Calulations for Target Hazard Quotients (HQs)[2]					**0.0E+00**							
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	7.3E+00	1.9E+01	5.6E+00	9.3E+00	4.7E+00	8.9E+00	2.5E-01	4.0E+00	2.6E-01	2.6E+00	1.7E+00	3.4E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-6
Ecological Comparison Values Based on Desert Kit Fox and Proposed TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
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Protective Media Concentrations (mg/kg)	Selenium mg/kg (dw)		Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]
Sitewide ECVs														
Soil	4.5E+01	8.9E+01	5.3E+03	5.3E+04	9.7E+01	2.9E+02	2.9E+03	5.8E+03	7.0E+04	2.9E+05	6.6E+04	3.3E+05	6.2E+02	3.1E+03
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	2.8E+00	3.6E+00	2.1E+01	2.1E+02	1.1E+01	3.2E+01	3.6E+01	7.2E+01	1.7E+02	1.9E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	ln(Cm) = 0.3764 * ln(Cs) - 0.4158		4.0E-03		1.1E-01		1.2E-02		ln(Cm) = 0.0706 * ln(Cs) + 4.3632		0.0E+00		0.0E+00	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Dose = TRV	1.4E-01	2.2E-01	6.0E+00	6.0E+01	4.8E-01	1.4E+00	4.2E+00	8.3E+00	7.5E+01	3.0E+02	6.6E+01	3.3E+02	6.2E-01	3.1E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-7
Ecological Comparison Values Based on the Gambel's Quail and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Antimony mg/kg (dw)		Arsenic mg/kg (dw)		Barium mg/kg (dw)		Beryllium mg/kg (dw)		Cadmium mg/kg (dw)		Chromium mg/kg (dw)		Hexavalent Chromium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	NA	NA	1.0E+03	4.1E+03	NA	NA	NA	NA	5.3E+00	2.2E+03	4.8E+02	2.8E+03	NA	NA
Plant tissue	NA	NA	3.8E+01	1.5E+02	NA	NA	NA	NA	1.5E+00	4.2E+01	2.0E+01	1.2E+02	NA	NA
Invertebrate tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Prey (mammal) tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	ln(Cp) = 0.938 * ln(Cs) - 3.233		3.8E-02		1.6E-01		ln(Cp) = 0.7345 * ln(Cs) - 0.5361		ln(Cp) = 0.546 * ln(Cs) - 0.475		4.1E-02		4.1E-02	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	NA	NA	5.5E+00	2.2E+01	NA	NA	NA	NA	8.0E-02	1.0E+01	2.7E+00	1.6E+01	NA	NA
HQ	NA	NA	1.0E+00	1.0E+00	NA	NA	NA	NA	1.0E+00	1.0E+00	1.0E+00	1.0E+00	NA	NA

Exposure Paramater[3]	value	units
Food Ingestion Rate (FIR	0.00649	kg tissue/day
Soil Ingestion Rate (SIR)	0.0006750	kg soil/day
Plant Ingestion Fraction (F_{food})	100%	Percent
Invertebrate Ingestion Fraction (F_{food})	0%	Percent
Mammal Ingestion Fraction (F_{food})	0%	Percent
Home Range	35.7	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	0.1693	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(highlighted)	soil ECV.
1	bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2	exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3	dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4	Low and High ECVs based on low and high TRVs (from Table 4), respectively.
ECV	ecological comparison value for soil.
DTSC	Department of Toxic Substances Control.
dw	dry weight.
High	lowest-observed adverse effects level (LOAEL).
HMW PAHs	high molecular weight polycyclic aromatic hydrocarbons.
kg	kilograms.
kg/day	kilograms per day.
LMW PAHs	low molecular weight polycyclic aromatic hydrocarbons.
Low	no-observed adverse effects level (NOAEL).
mg/kg	milligrams per kilogram.
mg/kg-bw/day	milligrams per kilogram body weight per day.
NA	not available or not applicable.

Table A-7
Ecological Comparison Values Based on the Gambel's Quail and DTSC-Recommended TRVs

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Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	1.8E+03	4.3E+03	3.8E+02	1.2E+04	9.8E-01	2.0E+03	3.2E+00	2.5E+01	2.6E+02	2.6E+03	2.8E+02	1.3E+04	8.2E+00	2.9E+01
Plant tissue	1.3E+01	3.2E+01	2.0E+01	8.0E+01	2.6E-01	1.9E+01	6.9E-01	2.1E+00	6.4E+01	6.5E+02	7.3E+00	1.3E+02	5.2E+00	2.1E+01
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	7.5E-03		ln(Cp) = 0.394 * ln(Cs) + 0.668		ln(Cp) = 0.561 * ln(Cs) - 1.328		ln(Cp) = 0.544 * ln(Cs) - 0.996		2.5E-01		ln(Cp) = 0.748 * ln(Cs) - 2.223		ln(Cp) = 1.104 * ln(Cs) - 0.677	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	7.6E+00	1.8E+01	2.3E+00	5.2E+01	1.4E-02	8.8E+00	3.9E-02	1.8E-01	3.5E+00	3.5E+01	1.4E+00	5.6E+01	2.3E-01	9.3E-01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-7
Ecological Comparison Values Based on the Gambel's Quail and DTSC-Recommended TRVs

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Protective Media Concentrations (mg/kg)	Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs												
Soil	4.5E+02	4.5E+03	8.5E+01	8.5E+02	8.2E+01	1.6E+02	1.6E+03	2.9E+04	5.6E+03	5.7E+04	1.1E+03	1.2E+04
Plant tissue	6.3E+00	6.3E+01	3.4E-01	3.4E+00	4.0E-01	8.0E-01	2.9E+02	1.4E+03	1.3E+01	3.9E+01	1.4E+02	1.3E+03
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	1.4E-02		4.0E-03		4.9E-03		ln(Cp) = 0.554 * ln(Cs) + 1.575		ln(Cp) = 0.4544 * ln(Cs)-1.3205		ln(Cp) = 0.9469 * ln(Cs)-1.7026	
Soil-to-Invertebrates	--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	2.0E+00	2.0E+01	3.5E-01	3.5E+00	3.4E-01	6.9E-01	1.7E+01	1.7E+02	2.3E+01	2.3E+02	1.0E+01	1.0E+02
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-8
Ecological Comparison Values Based on the Cactus Wren and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	**Antimony mg/kg (dw)**		**Arsenic mg/kg (dw)**		**Barium mg/kg (dw)**		**Beryllium mg/kg (dw)**		**Cadmium mg/kg (dw)**		**Chromium mg/kg (dw)**		**Hexavalent Chromium mg/kg (dw)**	
	Low[4]	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**
Sitewide ECVs														
Soil	NA	NA	2.1E+02	9.6E+02	NA	NA	NA	NA	2.5E-02	1.1E+01	3.6E+01	2.1E+02	NA	NA
Plant tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Invertebrate tissue	NA	NA	1.1E+01	3.1E+01	NA	NA	NA	NA	4.3E-01	5.6E+01	1.1E+01	6.5E+01	NA	NA
Prey (mammal) tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	1.0E+00		ln(Ci) = 0.706 * ln(Cs) - 1.421		9.1E-02		4.5E-02		ln(Ci) = 0.795 * ln(Cs) + 2.114		3.1E-01		3.1E-01	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	NA	NA	5.5E+00	2.2E+01	NA	NA	NA	NA	8.0E-02	1.0E+01	2.7E+00	1.6E+01	NA	NA
HQ	NA	NA	1.0E+00	1.0E+00	NA	NA	NA	NA	1.0E+00	1.0E+00	1.0E+00	1.0E+00	NA	NA

Exposure Paramater[3]	**value**	**units**
Food Ingestion Rate (FIR	0.00713	kg tissue/day
Soil Ingestion Rate (SIR)	0.0006631	kg soil/day
Plant Ingestion Fraction (F_{food})	0%	Percent
Invertebrate Ingestion Fraction (F_{food})	100%	Percent
Mammal Ingestion Fraction (F_{food})	0%	Percent
Home Range	4.8	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	0.0389	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(highlighted) soil ECV.

[1] bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
[2] exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
[3] dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
[4] Low and High ECVs based on low and high TRVs (from Table 4), respectively.

ECV ecological comparison value for soil.
DTSC Department of Toxic Substances Control.
dw dry weight.
High lowest-observed adverse effects level (LOAEL).
HMW PAHs high molecular weight polycyclic aromatic hydrocarbons.
kg kilograms.
kg/day kilograms per day.
LMW PAHs low molecular weight polycyclic aromatic hydrocarbons.
Low no-observed adverse effects level (NOAEL).
mg/kg milligrams per kilogram.
mg/kg-bw/day milligrams per kilogram body weight per day.
NA not available or not applicable.

Table A-8
Ecological Comparison Values Based on the Cactus Wren and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	1.9E+02	4.6E+02	2.1E+01	4.7E+02	5.0E-02	1.2E+02	1.3E-02	9.1E-01	3.0E+01	3.0E+02	6.5E+00	2.7E+02	1.3E+00	8.1E+00
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	2.4E+01	5.7E+01	1.1E+01	2.4E+02	7.2E-02	3.7E+01	2.1E-01	9.0E-01	1.6E+01	1.6E+02	6.9E+00	2.8E+02	1.1E+00	4.3E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	1.2E-01		5.2E-01		ln(Ci) = 0.807 * ln(Cs) - 0.218		ln(Ci) = 0.3369 * ln(Cs) - 0.078		5.5E-01		1.1E+00		ln(Ci) = 0.733 * ln(Cs) - 0.075	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	7.6E+00	1.8E+01	2.3E+00	5.2E+01	1.4E-02	8.8E+00	3.9E-02	1.8E-01	3.5E+00	3.5E+01	1.4E+00	5.6E+01	2.3E-01	9.3E-01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-8
Ecological Comparison Values Based on the Cactus Wren and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	**Silver mg/kg (dw)**		**Thallium mg/kg (dw)**		**Vanadium mg/kg (dw)**		**Zinc mg/kg (dw)**		**LMW PAHs mg/kg (dw)**		**HMW PAHs mg/kg (dw)**	
	Low[4]	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**	**Low[4]**	**High[4]**
Sitewide ECVs												
Soil	5.2E+00	5.2E+01	3.0E+00	3.0E+01	1.4E+01	2.8E+01	1.3E+00	1.1E+03	4.0E+01	4.0E+02	2.0E+01	2.0E+02
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	1.1E+01	1.1E+02	1.6E+00	1.6E+01	5.8E-01	1.2E+00	9.4E+01	8.4E+02	1.2E+02	1.2E+03	5.3E+01	5.3E+02
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	--		--		--		--		--		--	
Soil-to-Invertebrates	2.0E+00		5.5E-01		4.2E-02		ln(Ci) = 0.328 * ln(Cs) + 4.449		3.0E+00		2.6E+00	
Soil-to-Mammals	--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	2.0E+00	2.0E+01	3.5E-01	3.5E+00	3.4E-01	6.9E-01	1.7E+01	1.7E+02	2.3E+01	2.3E+02	1.0E+01	1.0E+02
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-9
Ecological Comparison Values Based on the Red-Tailed Hawk and on DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Antimony mg/kg (dw)		Arsenic mg/kg (dw)		Barium mg/kg (dw)		Beryllium mg/kg (dw)		Cadmium mg/kg (dw)		Chromium mg/kg (dw)		Hexavalent Chromium mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]
Sitewide ECVs														
Soil	NA	NA	4.4E+03	1.8E+04	NA	NA	NA	NA	1.0E+01	8.0E+03	5.9E+02	5.2E+03	NA	NA
Plant tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Invertebrate tissue	NA	NA	0.0E+00	0.0E+00	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA
Prey (mammal) tissue	NA	NA	7.6E+00	2.4E+01	NA	NA	NA	NA	8.6E-01	2.0E+01	2.5E+01	1.2E+02	NA	NA
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	0.05 * Cd		ln(Cm) = 0.8188 * ln(Cs) -4.8471		0.0075 * Cd		0.05 * Cd		ln(Cm) = 0.4723 * ln(Cs) - 1.2571		ln(Cm) = 0.7338 * ln(Cs) - 1.4599		ln(Cm) = 0.7338 * ln(Cs) - 1.4599	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	NA	NA	5.5E+00	2.2E+01	NA	NA	NA	NA	8.0E-02	1.0E+01	2.7E+00	1.6E+01	NA	NA
HQ	NA	NA	1.0E+00	1.0E+00	NA	NA	NA	NA	1.0E+00	1.0E+00	1.0E+00	1.0E+00	NA	NA

Exposure Paramater[3]	value	units
Food Ingestion Rate (FIR)	0.08990	kg tissue/day
Soil Ingestion Rate (SIR)	0.0012586	kg soil/day
Plant Ingestion Fraction (F_{food})	0%	Percent
Invertebrate Ingestion Fraction (F_{food})	0%	Percent
Mammal Ingestion Fraction (F_{food})	100%	Percent
Home Range	2471	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	1.134	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF}\right)$$

Notes:

(yellow highlight) soil ECV.

1 bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2 exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3 dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4 Low and High ECVs based on low and high TRVs (from Table 4), respectively.

ECV ecological comparison value for soil.
DTSC Department of Toxic Substances Control.
dw dry weight.
High lowest-observed adverse effects level (LOAEL).
HMW PAHs high molecular weight polycyclic aromatic hydrocarbons.
kg kilograms.
kg/day kilograms per day.
LMW PAHs low molecular weight polycyclic aromatic hydrocarbons.
Low no-observed adverse effects level (NOAEL).
mg/kg milligrams per kilogram.
mg/kg-bw/day milligrams per kilogram body weight per day.
NA not available or not applicable.

Table A-9
Ecological Comparison Values Based on the Red-Tailed Hawk and on DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum[4] mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]
Sitewide ECVs														
Soil	9.0E+02	1.8E+03	6.7E+02	4.5E+04	1.7E-02	4.7E+03	2.4E+00	1.1E+01	1.4E+02	1.4E+03	3.7E+02	4.3E+04	3.3E+01	3.9E+02
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	8.3E+01	2.1E+02	2.0E+01	3.6E+01	1.8E-01	4.5E+01	4.6E-01	2.1E+00	2.3E+01	2.3E+02	1.2E+01	1.1E+02	2.4E+00	6.2E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	ln(Cm) = 1.307 * ln(Cs) - 4.4669		ln(Cm) = 0.1444 * ln(Cs) + 2.042		ln(Cm) = 0.4422 * ln(Cs) + 0.0761		1.9E-01		0.006 * 50 * Cd		ln(Cm) = 0.4658 * ln(Cs) - 0.2462		ln(Cm) = 0.3764 * ln(Cs) - 0.4158	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	7.6E+00	1.8E+01	2.3E+00	5.2E+01	1.4E-02	8.8E+00	3.9E-02	1.8E-01	2.0E+00	2.0E+01	1.4E+00	5.6E+01	2.3E-01	9.3E-01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	5.7E-01	5.7E-01	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-9
Ecological Comparison Values Based on the Red-Tailed Hawk and on DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]
Sitewide ECVs												
Soil	1.4E+03	1.4E+04	3.5E+01	3.5E+02	1.6E+02	3.3E+02	5.2E+03	1.4E+05	2.1E+04	2.1E+05	9.0E+03	9.0E+04
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	5.7E+00	5.7E+01	3.9E+00	3.9E+01	2.0E+00	4.1E+00	1.4E+02	1.8E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--	
Soil-to-Mammals	4.0E-03		1.1E-01		1.2E-02		ln(Cm) = 0.0706 * ln(Cs) + 4.3632		0.0E+00		0.0E+00	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	2.0E+00	2.0E+01	3.5E-01	3.5E+00	3.4E-01	6.9E-01	1.7E+01	1.7E+02	2.3E+01	2.3E+02	1.0E+01	1.0E+02
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-10
Ecological Comparison Values Based on the Desert Shrew and on DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Antimony mg/kg (dw)		Arsenic mg/kg (dw)		Barium mg/kg (dw)		Beryllium mg/kg (dw)		Cadmium mg/kg (dw)		Chromium mg/kg (dw)		Hexavalent Chromium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	2.8E-01	2.8E+00	1.1E+01	3.7E+02	2.3E+03	3.7E+03	4.0E+01	4.8E+01	1.5E-02	1.8E+00	3.6E+01	1.5E+02	1.4E+02	5.9E+02
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.5E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	2.8E-01	2.8E+00	1.3E+00	1.6E+01	2.1E+02	3.3E+02	1.8E+00	2.1E+00	3.0E-01	1.3E+01	1.1E+01	4.4E+01	4.27E+01	1.8E+02
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	1.0E+00		ln(Ci) = 0.706 * ln(Cs) - 1.421		9.1E-02		4.5E-02		ln(Ci) = 0.795 * ln(Cs) + 2.114		3.1E-01		3.1E-01	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	5.9E-02	5.9E-01	3.2E-01	4.7E+00	5.2E+01	8.3E+01	5.3E-01	6.3E-01	6.0E-02	2.6E+00	2.4E+00	9.6E+00	9.2E+00	3.9E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Exposure Paramater[3]	value	units
Food Ingestion Rate (FIR	0.00102	kg tissue/day
Soil Ingestion Rate (SIR)	0.0000203	kg soil/day
Plant Ingestion Fraction (F_{food})	0%	Percent
Invertebrate Ingestion Fraction (F_{food})	100%	Percent
Mammal Ingestion Fraction (F_{food})	0%	Percent
Home Range	0.1	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	0.005	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(highlighted)	soil ECV.
1	bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2	exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3	dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4	Low and High ECVs based on low and high TRVs (from Table 4), respectively.
ECV	ecological comparison value for soil.
DTSC	Department of Toxic Substances Control.
dw	dry weight.
High	lowest-observed adverse effects level (LOAEL).
HMW PAHs	high molecular weight polycyclic aromatic hydrocarbons.
kg	kilograms.
kg/day	kilograms per day.
LMW PAHs	low molecular weight polycyclic aromatic hydrocarbons.
Low	no-observed adverse effects level (NOAEL).
mg/kg	milligrams per kilogram.
mg/kg-bw/day	milligrams per kilogram body weight per day.
NA	not available or not applicable.

Table A-10
Ecological Comparison Values Based on the Desert Shrew and on DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	4.2E+01	6.9E+02	2.5E+01	5.8E+03	9.0E+00	7.2E+03	2.1E+00	5.9E+02	2.2E+00	2.2E+01	6.1E-01	1.4E+02	1.8E-01	1.1E+01
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	5.1E+00	8.5E+01	1.3E+01	3.0E+03	4.7E+00	1.0E+03	1.2E+00	7.9E+00	1.2E+00	1.2E+01	6.4E-01	1.5E+02	2.4E-01	5.7E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	1.2E-01		5.2E-01		ln(Ci) = 0.807 * ln(Cs) - 0.218		ln(Ci) = 0.3369 * ln(Cs) - 0.078		5.5E-01		1.1E+00		ln(Ci) = 0.733 * ln(Cs) - 0.075	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	1.2E+00	2.0E+01	2.7E+00	6.3E+02	1.0E+00	2.4E+02	2.5E-01	4.0E+00	2.6E-01	2.6E+00	1.3E-01	3.2E+01	5.0E-02	1.2E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-10
Ecological Comparison Values Based on the Desert Shrew and on DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs												
Soil	2.1E+01	2.1E+02	4.1E+00	1.2E+01	3.3E+02	6.6E+02	1.6E-01	1.1E+04	8.0E+01	2.4E+02	2.5E+00	6.2E+01
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.3E-01	9.0E+00
Invertebrate tissue	4.3E+01	4.3E+02	2.3E+00	6.8E+00	1.4E+01	2.8E+01	4.7E+01	1.8E+03	2.4E+02	7.3E+02	6.4E+00	1.6E+02
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	--		--		--		--		--		--	
Soil-to-Invertebrates	2.0E+00		5.5E-01		4.2E-02		ln(Ci) = 0.328 * ln(Cs) + 4.449		3.0E+00		2.6E+00	
Soil-to-Mammals	--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	8.8E+00	8.8E+01	4.8E-01	1.4E+00	4.2E+00	8.3E+00	9.6E+00	4.1E+02	5.0E+01	1.5E+02	1.3E+00	3.3E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-11
Ecological Comparison Values for Merriam's Kangaroo Rat and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Antimony mg/kg (dw)		Arsenic mg/kg (dw)		Barium mg/kg (dw)		Beryllium mg/kg (dw)		Cadmium mg/kg (dw)		Chromium mg/kg (dw)		Hexavalent Chromium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	1.2E+01	1.4E+02	6.3E+01	9.3E+02	3.5E+03	5.6E+03	2.3E+01	2.9E+01	1.2E+00	5.4E+02	4.5E+02	1.8E+03	1.7E+03	7.3E+03
Plant tissue	4.2E-01	3.9E+00	2.4E+00	3.5E+01	5.5E+02	8.7E+02	5.9E+00	7.0E+00	7.0E-01	1.9E+01	1.8E+01	7.4E+01	7.1E+01	3.0E+02
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.6E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	ln(Cp) = 0.938 * ln(Cs) - 3.233		3.8E-02		1.6E-01		ln(Cp) = 0.7345 * ln(Cs) - 0.5361		ln(Cp) = 0.546 * ln(Cs) - 0.475		4.1E-02		4.1E-02	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	5.9E-02	5.9E-01	3.2E-01	4.7E+00	5.2E+01	8.3E+01	5.3E-01	6.3E-01	6.0E-02	2.6E+00	2.4E+00	9.6E+00	9.2E+00	3.9E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Exposure Paramater[3]	value	units
Food Ingestion Rate (FIR	0.00282	kg tissue/day
Soil Ingestion Rate (SIR)	0.0000677	kg soil/day
Plant Ingestion Fraction (F_{food})	100%	Percent
Invertebrate Ingestion Fraction (F_{food})	0%	Percent
Mammal Ingestion Fraction (F_{food})	0%	Percent
Home Range	0.13	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	0.0343	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(yellow highlight) soil ECV.

[1] bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
[2] exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
[3] dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
[4] Low and High ECVs based on low and high TRVs (from Table 4), respectively.

ECV	ecological comparison value for soil.
DTSC	Department of Toxic Substances Control.
dw	dry weight.
High	lowest-observed adverse effects level (LOAEL).
HMW PAHs	high molecular weight polycyclic aromatic hydrocarbons.
kg	kilograms.
kg/day	kilograms per day.
LMW PAHs	low molecular weight polycyclic aromatic hydrocarbons.
Low	no-observed adverse effects level (NOAEL).
mg/kg	milligrams per kilogram.
mg/kg-bw/day	milligrams per kilogram body weight per day.
NA	not available or not applicable.

Table A-11
Ecological Comparison Values for Merriam's Kangaroo Rat and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs														
Soil	4.6E+02	7.7E+03	4.5E+02	3.1E+05	2.6E+02	1.1E+05	3.0E+01	1.3E+03	1.2E+01	1.2E+02	2.2E+01	1.1E+04	1.1E+00	2.0E+01
Plant tissue	3.5E+00	5.8E+01	2.2E+01	2.8E+02	6.0E+00	1.8E+02	2.3E+00	1.8E+01	2.9E+00	2.9E+01	1.1E+00	1.2E+02	5.8E-01	1.4E+01
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	7.5E-03		ln(Cp) = 0.394 * ln(Cs) + 0.668		ln(Cp) = 0.561 * ln(Cs) - 1.328		ln(Cp) = 0.544 * ln(Cs) - 0.996		2.5E-01		ln(Cp) = 0.748 * ln(Cs) - 2.223		ln(Cp) = 1.104 * ln(Cs) - 0.677	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	1.2E+00	2.0E+01	2.7E+00	6.3E+02	1.0E+00	2.4E+02	2.5E-01	4.0E+00	2.6E-01	2.6E+00	1.3E-01	3.2E+01	5.0E-02	1.2E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-11
Ecological Comparison Values for Merriam's Kangaroo Rat and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]	Low[4]	High[4]
Sitewide ECVs												
Soil	2.7E+03	2.7E+04	2.1E+02	6.2E+02	1.8E+03	3.5E+03	2.8E+02	9.4E+04	2.4E+04	7.4E+04	9.5E+01	2.8E+03
Plant tissue	3.8E+01	3.8E+02	8.3E-01	2.5E+00	8.5E+00	1.7E+01	1.1E+02	2.7E+03	2.6E+01	4.4E+01	1.4E+01	3.3E+02
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	1.4E-02		4.0E-03		4.9E-03		ln(Cp) = 0.554 * ln(Cs) + 1.575		ln(Cp) = 0.4544 * ln(Cs)-1.3205		ln(Cp) = 0.9469 * ln(Cs)-1.7026	
Soil-to-Invertebrates	--		--		--		--		--		--	
Soil-to-Mammals	--		--		--		--		--		--	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	8.4E+00	8.4E+01	4.8E-01	1.4E+00	4.2E+00	8.3E+00	9.6E+00	4.1E+02	5.0E+01	1.5E+02	1.3E+00	3.3E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-12
Ecological Comparison Values Based on the Desert Kit Fox and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Antimony[4] mg/kg (dw)		Arsenic mg/kg (dw)		Barium[4] mg/kg (dw)		Beryllium[4] mg/kg (dw)		Cadmium mg/kg (dw)		Chromium mg/kg (dw)		Hexavalent Chromium mg/kg (dw)	
	Low[5]	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**	**Low[5]**	**High[5]**
Sitewide ECVs														
Soil	2.1E+01	2.1E+02	2.9E+02	4.5E+03	4.1E+04	6.6E+04	1.9E+02	2.3E+02	1.9E+01	2.3E+03	1.1E+03	5.3E+03	5.0E+03	2.5E+04
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	1.1E+00	1.1E+01	8.2E-01	7.7E+00	2.8E+01	4.5E+01	4.3E-01	5.1E-01	1.2E+00	1.1E+01	3.8E+01	1.2E+02	1.2E+02	3.9E+02
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	0.05 * Cd		ln(Cm) = 0.8188 * ln(Cs) -4.8471		0.0075 * Cd		0.05 * Cd		ln(Cm) = 0.4723 * ln(Cs) - 1.2571		ln(Cm) = 0.7338 * ln(Cs) - 1.4599		ln(Cm) = 0.7338 * ln(Cs) - 1.4599	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	5.9E-02	5.9E-01	3.2E-01	4.7E+00	4.2E+01	6.7E+01	2.1E-01	2.4E-01	6.0E-02	2.6E+00	2.4E+00	9.6E+00	9.2E+00	3.9E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	8.1E-01	8.1E-01	3.9E-01	3.9E-01	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Exposure Paramater[3]	value	units
Food Ingestion Rate (FIR	0.07020	kg tissue/day
Soil Ingestion Rate (SIR)	0.0019656	kg soil/day
Plant Ingestion Fraction (F_{food})	0%	Percent
Invertebrate Ingestion Fraction (F_{food})	0%	Percent
Mammal Ingestion Fraction (F_{food})	100%	Percent
Home Range	3039	Acres
Site Use Factor (SUF)	1.00	Unitless
Body Weight (BW)	1.985	kgBW

Microsoft Solver used to calculate ECVs based one re-arranging the standard HQ equation (USEPA, 1997) below:

$$ECV = \frac{HQ \times TRV}{Dose} = \left(\frac{1 \times TRV \times BW}{SIR + (FIR \times BAF) \times SUF} \right)$$

Notes:

(highlighted) soil ECV.

1 bioaccumulation factors (BAFs; kilograms soil per kilogram tissue [kg soil/kg tissue]); from Table 2.
2 exposure parameters from Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (ARCADIS, 2008).
3 dose caluated for a target HQ of 1 (NOAEL and LOAEL based).
4 Low and High ECVs based on low and high TRVs (from Table 4), respectively.

ECV ecological comparison value for soil.
DTSC Department of Toxic Substances Control.
dw dry weight.
High lowest-observed adverse effects level (LOAEL).
HMW PAHs high molecular weight polycyclic aromatic hydrocarbons.
kg kilograms.
kg/day kilograms per day.
LMW PAHs low molecular weight polycyclic aromatic hydrocarbons.
Low no-observed adverse effects level (NOAEL).
mg/kg milligrams per kilogram.
mg/kg-bw/day milligrams per kilogram body weight per day.
NA not available or not applicable.

Table A-12
Ecological Comparison Values Based on the Desert Kit Fox and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Cobalt mg/kg (dw)		Copper mg/kg (dw)		Lead mg/kg (dw)		Mercury mg/kg (dw)		Molybdenum[4] mg/kg (dw)		Nickel mg/kg (dw)		Selenium mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]
Sitewide ECVs														
Soil	3.5E+02	3.4E+03	1.9E+03	6.4E+05	4.4E+02	2.3E+05	3.2E+01	5.1E+02	2.2E+01	2.2E+02	2.0E+01	2.9E+04	5.6E+00	9.2E+02
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	2.4E+01	4.7E+02	2.3E+01	5.3E+01	1.6E+01	2.6E+02	6.2E+00	9.9E+01	3.7E+00	3.7E+01	3.2E+00	9.3E+01	1.3E+00	8.6E+00
Bioaccumulation Factors (BAFs)[1]														
Soil-to-Plants	--		--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--		--	
Soil-to-Mammals	ln(Cm) = 1.307 * ln(Cs) - 4.4669		ln(Cm) = 0.1444 * ln(Cs) + 2.042		ln(Cm) = 0.4422 * ln(Cs) + 0.0761		1.9E-01		0.006 * 50 * Cd		ln(Cm) = 0.4658 * ln(Cs) - 0.2462		ln(Cm) = 0.3764 * ln(Cs) - 0.4158	
Dose Calulations for Target Hazard Quotients (HQs)[2]														
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	1.2E+00	2.0E+01	2.7E+00	6.3E+02	1.0E+00	2.4E+02	2.5E-01	4.0E+00	1.5E-01	1.5E+00	1.3E-01	3.2E+01	5.0E-02	1.2E+00
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	5.9E-01	5.9E-01	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Table A-12
Ecological Comparison Values Based on the Desert Kit Fox and DTSC-Recommended TRVs

Technical Memorandum 3: Ecological Comparison Values for Metals and PAHs in Soil
PG&E Topock
Needles, California

Protective Media Concentrations (mg/kg)	Silver mg/kg (dw)		Thallium mg/kg (dw)		Vanadium mg/kg (dw)		Zinc mg/kg (dw)		LMW PAHs mg/kg (dw)		HMW PAHs mg/kg (dw)	
	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low[5]	High[5]	Low	High
Sitewide ECVs												
Soil	5.3E+03	5.3E+04	9.7E+01	2.9E+02	2.9E+03	5.8E+03	4.6E+03	4.1E+05	5.0E+04	1.5E+05	1.3E+03	3.3E+04
Plant tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Invertebrate tissue	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Prey (mammal) tissue	2.1E+01	2.1E+02	1.1E+01	3.2E+01	3.6E+01	7.2E+01	1.4E+02	2.0E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Bioaccumulation Factors (BAFs)[1]												
Soil-to-Plants	--		--		--		--		--		--	
Soil-to-Invertebrates	--		--		--		--		--		--	
Soil-to-Mammals	4.0E-03		1.1E-01		1.2E-02		ln(Cm) = 0.0706 * ln(Cs) + 4.3632		0.0E+00		0.0E+00	
Dose Calulations for Target Hazard Quotients (HQs)[2]												
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Dose = TRV	6.0E+00	6.0E+01	4.8E-01	1.4E+00	4.2E+00	8.3E+00	9.6E+00	4.1E+02	5.0E+01	1.5E+02	1.3E+00	3.3E+01
HQ	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00

Appendix G
Construction Best Management Practices 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

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.

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

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.

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 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:

- 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.

Attachment 1
Inspection and Corrective Action Report Form

ADEQ Arizona Department of Environmental Quality

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.

ADEQ Arizona Department of Environmental Quality

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.

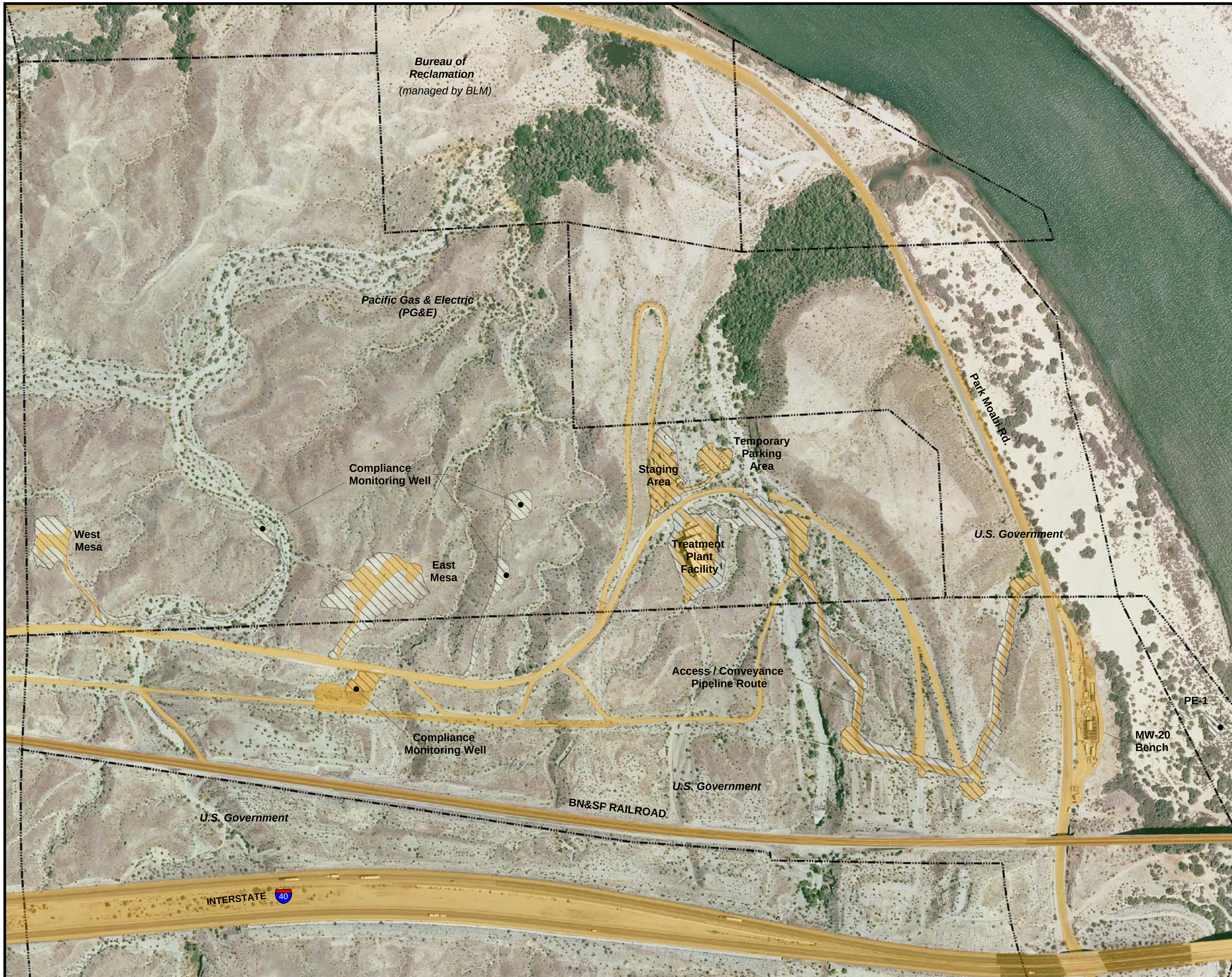
Conclusion

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

CH2MHILL

Appendix I
Perimeter Air Monitoring Plan

Perimeter Air Monitoring Plan for IM-3 Decommissioning and Removal

PG&E Topock Compressor Station, Needles, CA

Prepared for

Pacific Gas and Electric

November 2015

CH2MHILL®

155 Grand Avenue
Suite 800
Oakland, CA 94612

EN1019151055BAO

Contents

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.

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.

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* (CH2M HILL 2014a) contains a summary of the available soil data for the IM-3 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.

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. Monitoring parameters, action levels, and responses are summarized in Table 3-1.

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 3-1
Monitoring Parameters, Action Levels, and Responses

Monitoring Parameters	Monitoring Equipment	Tasks	Action Levels	Responses	Frequency[1]	Calibration
Wind speed and direction; average temperature; and precipitation	Meteorological Station – Wind[2]	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[3]	TSI 8530 DUSTRAK aerosol monitor or equivalent with environmental monitoring enclosure, e.g., the 8535 or 8537 and omni-directional sampling inlet	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
			$\geq$90 μg/m^3	Suspend work		

Notes:
[1] The exact frequency may be adjusted as determined by the AMO.
[2] 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.
[3] 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.

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.

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.

Appendix A
Available Soil Data

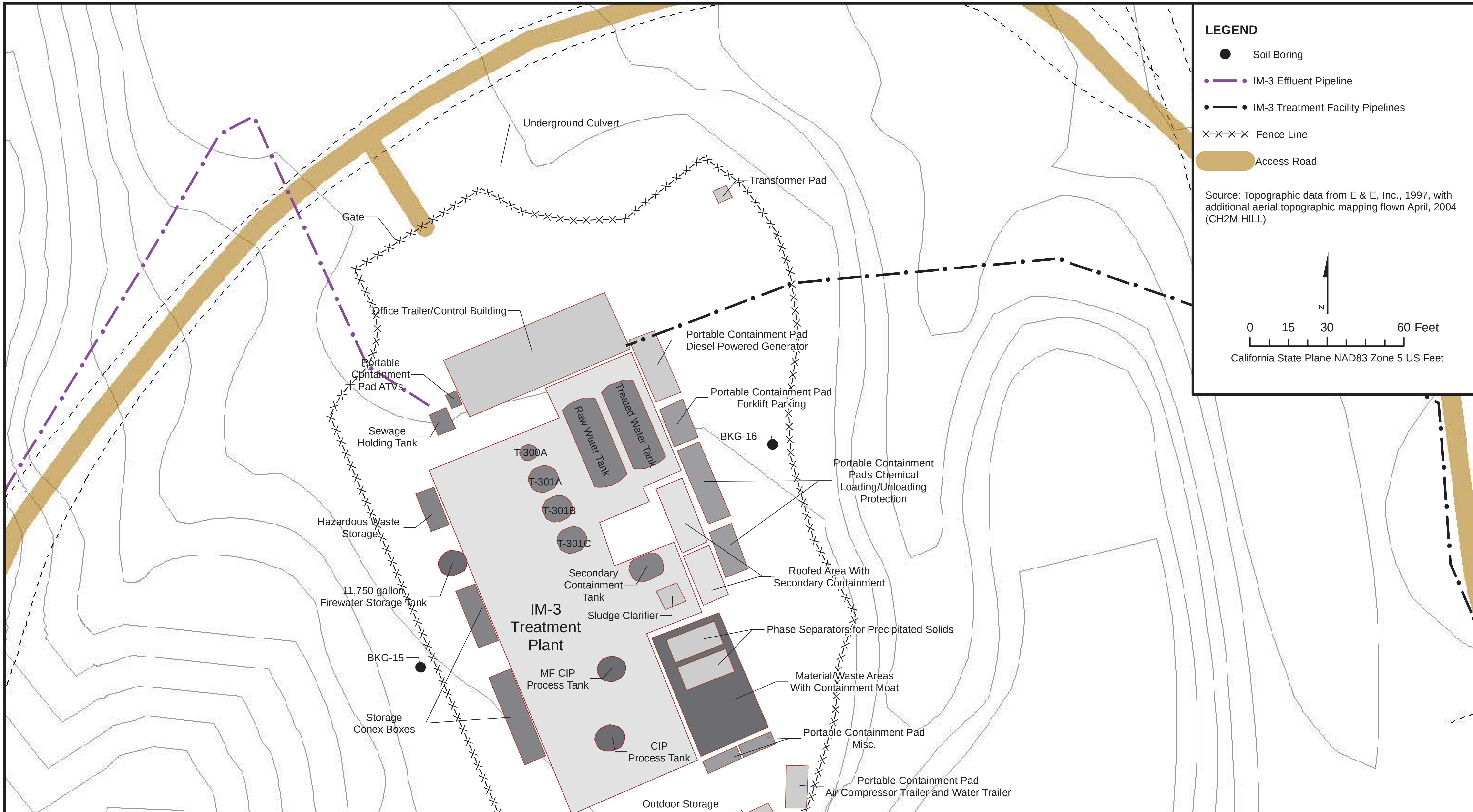


FIGURE 27
AREA OF CONCERN 29 – INTERIM MEASURES NO. 3 TREATMENT PLANT
ADDENDUM TO RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT VOLUME 1
PG&E NEEDLES TOPOCK COMPRESSOR STATION, NEEDLES, CA

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 [1]	Average Flow Rate

Sample Number	Start Time	Stop Time	Total Time	Sample Flow Rate	Sample Volume

Observations:

[1] (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.

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Appendix C

Displaced Soil Protocol

Revised 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 (submitted with 90% Design); rev. 1 July 2015 (submitted as part of 90% Responses to Comments); rev. 2 November 2015 (submitted with Final Design)

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.

A draft of this protocol (dated October 3, 2012[2]) was included in the Soil Management Plan associated with the Basis of Design Report/Pre-Final (90%) Design Submittal and Construction/Remediation Action Work Plan (September 8, 2014). Subsequent to agency review of the design submittal, this protocol has been revised per comment from the U.S. Department of the Interior (DOI) (Comment #803, DOI-333 [see Attachment 1]). The October 3, 2012 draft of this protocol included a provision for the long-term storage of material that is determined to be non-hazardous waste but unsuitable for a final disposition decision on-site because contaminants are present above the interim screening level. The 90% design submittal identified an area (located on federal land) for the long-term storage of material that is generated during construction of the final groundwater remedy and is characterized to meet this profile; however, the DOI comment indicates that based on discussions with San Bernardino County, the adjacent lessee of Moabi Regional Park, and internal discussions between the U.S. Bureau of Land Management (BLM) and the DOI, PG&E must find an alternate location for storage. Based on further clarifications from DOI and BLM, PG&E understood that storage of waste soil above screening levels would not be allowed anywhere on federal lands within the project area. The remaining potential storage locations are private properties owned by the Fort Mojave Indian Tribe (FMIT) and PG&E. Given the groundwater remedy facilities already planned to be located on the Topock Compressor Station (TCS) and the TCS's operational needs for the property for natural gas compressor operations, there is space on PG&E property only to temporarily store a small number of soil bins at a time while awaiting analysis prior to final disposition. There is no available space on PG&E property to store waste soil on a longer-term basis. The FMIT did not identify any locations on the Tribe's property within the project area for this purpose. PG&E also contacted treatment storage and disposal facilities (TSDFs) and was told that the TSDFs would accept the waste soil for disposal, but not storage.

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[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] Responses to comments on the May 14, 2012 draft of this protocol (see Attachment 1) were incorporated in the October 2, 2012 draft of the protocol.

Given the above, PG&E determined that there was no available alternate location for the long-term storage of material with concentrations above the interim screening levels. Therefore, this protocol has been revised to exclude this provision.

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[3]. 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), 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 project area.

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*

[3] 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.

> *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, 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 be displaced during work including specific measures, such as field screening and material segregation strategies, to try and minimize the volume of material that requires disposal. .
- The anticipated location and methodology for final on- or off-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 final disposition (see Section 3.4).

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).
- 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 3.4).

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 Screening Level (HERO's *Human Health Risk Assessment Note 3 – DTSC-modified Screening Levels*)[4] or the ecological comparison value is used. If a DTSC residential screening level 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.

[4] California Department of Toxic Substances Control's Human and Ecological Office (HERO). 2015. *Human Health Risk Note 3–DTSC-Modified Screening Levels*. May 3.

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 or project-specific cleanup goal (once established) is suitable for return, reuse, or replacement on-site. Material that has a representative concentration that is greater than the interim screening level or project-specific cleanup goal (once established), or is characterized as hazardous waste will be disposed of off-site in accordance with applicable laws and regulations.

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 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 interim screening level or project-specific cleanup goal (once established) 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. 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 (rev. July 2015)

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	4.8		EPA Residential RSL	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	4.8		EPA Residential RSL	See Table 2
	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		DTSC HHRA Note 2	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 2
	Arsenic	11	*	Background Level	See Table 2
	Barium	410	*	Background Level	See Table 2
	Beryllium	0.672		Background Level	See Table 2
	Cadmium	1.1	*	Background Level	See Table 2
	Calcium	66,500		Background Level	NE
	Chromium, Hexavalent	0.83	*	Background Level	See Table 2
	Chromium, total	39.8	*	Background Level	See Table 2
	Cobalt	12.7	*	Background Level	See Table 2
	Copper	16.8		Background Level	See Table 2
	Cyanide	0.9		Soil Ecological Comparison Value (ECV)	NE
	Iron	55,000		EPA Residential RSL	NE
	Lead	8.39	*	Background Level	See Table 2
	Magnesium	12,100		Background Level	NE
	Manganese	402	*	Background Level	NE
	Mercury	0.0125		Soil Ecological Comparison Value (ECV)	See Table 2
	Molybdenum	1.37	*	Background Level	See Table 2
	Nickel	27.3	*	Background Level	See Table 2
	Potassium	4,400		Background Level	NE
	Selenium	1.47	*	Background Level	See Table 2
	Silver	5.15		Soil Ecological Comparison Value (ECV)	See Table 2
	Sodium	2,070		Background Level	NE
	Thallium	0.78		EPA Residential RSL	See Table 2
	Vanadium	52.2	*	Background Level	See Table 2
	Zinc	58	*	Background Level	See Table 2

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)

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 2
	4,4-DDE	2	EPA Residential RSL	See Table 2
	4,4-DDT	1.9	EPA Residential RSL	See Table 2
	Aldrin	39	EPA Residential RSL	See Table 2
	alpha-BHC	86	EPA Residential RSL	NE
	alpha-Chlordane	470	Soil Ecological Comparison Value (ECV)	See Table 2
	beta-BHC	300	EPA Residential RSL	NE
	delta-BHC	300	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table 2
	Endo sulfan I	470,000	EPA Residential RSL	NE
	Endo sulfan II	470,000	EPA Residential RSL	NE
	Endosulfan sulfate	470,000	EPA Residential RSL	NE
	Endrin	19,000	EPA Residential RSL	See Table 2
	Endrin aldehyde	19,000	EPA Residential RSL	NE
	Endrin ketone	19,000	EPA Residential RSL	NE
	gamma-BHC (Lindane)	570	EPA Residential RSL	See Table 2
	gamma-Chlordane	0.43	DTSC-Residential SLs	See Table 2
	Heptachlor	130	EPA Residential RSL	See Table 2
	Heptachlor Epoxide	70	EPA Residential RSL	See Table 2
	Methoxychlor	320,000	EPA Residential RSL	See Table 2
	Toxaphene	490	EPA Residential RSL	See Table 2
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	18,000	EPA Residential RSL	NE
	2-Methyl naphthalene	240,000	EPA Residential RSL	NE
	Acenaphthene	3,600,000	EPA Residential RSL	NE
	Acenaphthylene	3,600,000	EPA Residential RSL	NE
	Anthracene	18,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	16	EPA Residential RSL	NE
	Benzo (a) anthracene	160	EPA Residential RSL	NE
	Benzo (a) pyrene	16	EPA Residential RSL	NE
	Benzo (b) fluoranthene	160	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,800,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	0.39	DTSC-Residential SLs	NE
	Chrysene	3.9	DTSC-Residential SLs	NE
	Dibenzo (a,h) anthracene	16	EPA Residential RSL	NE
	Fluoranthene	2,400,000	EPA Residential RSL	NE
	Fluorene	2,400,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	160	EPA Residential RSL	NE
	Naphthalene	3,800	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	1,800,000	EPA Residential RSL	NE
	Pyrene	1,800,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	0.23	DTSC-Residential SLs	See Table 2
	Aroclor 1221	170	EPA Residential RSL	See Table 2

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)

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	170	EPA Residential RSL	See Table 2
	Aroclor 1242	230	EPA Residential RSL	See Table 2
	Aroclor 1248	230	EPA Residential RSL	See Table 2
	Aroclor 1254	240	EPA Residential RSL	See Table 2
	Aroclor 1260	240	EPA Residential RSL	See Table 2
	Aroclor 1262	240	EPA Residential RSL	See Table 2
	Aroclor 1268	240	EPA Residential RSL	See Table 2
	Total PCBs	204	Soil Ecological Comparison Value (ECV)	See Table 2
Semivolatile Organic Compounds (µg/kg)				
	1,1´-Biphenyl	47,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	23,000	EPA Residential RSL	NE
	1,4-Dioxane	5,300	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,900,000	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,300,000	EPA Residential RSL	See Table 2
	2,4,6-Trichlorophenol	7.5	DTSC-Residential SLs	See Table 2
	2,4-Dichlorophenol	190,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,300,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	130,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,700	EPA Residential RSL	See Table 2
	2,6-Dinitrotoluene	360	EPA Residential RSL	NE
	2-Chloro naphthalene	4,800,000	EPA Residential RSL	NE
	2-Chlorophenol	390,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,200,000	EPA Residential RSL	See Table 2
	2-Nitroaniline	630,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,200	EPA Residential RSL	NE
	3-Nitroaniline	630,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	5,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,300,000	EPA Residential RSL	NE
	4-Chloroaniline	2,700	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table 2
	4-Nitroaniline	27,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,400	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	250,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,300,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	190,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	290,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	1,600,000	EPA Residential RSL	NE
	Dibenzofuran	73,000	EPA Residential RSL	NE
	Diethyl phthalate	51,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	51,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	630,000	EPA Residential RSL	NE
	Hexachlorobenzene	210	EPA Residential RSL	See Table 2

TABLE 1
Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)
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)				
	Hexachloroethane	1,800	EPA Residential RSL	See Table 2
	N-Nitroso-di-n-propylamine	78	EPA Residential RSL	NE
	N-nitrosodiphenylamine	110,000	EPA Residential RSL	NE
	Pentachlorophenol	1,000	EPA Residential RSL	See Table 2
	Phenol	19,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	240	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as gasoline	770	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as motor oil	10,000	SF RWQCB ESL for direct exposure (2013)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	550	DTSC-Residential SLs	NE
	1,1,1-Trichloroethane	1,700	DTSC-Residential SLs	NE
	1,1,2,2-Tetrachloroethane	600	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	40,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	1,600	DTSC-Residential SLs	NE
	1,1-Dichloroethene	230,000	EPA Residential RSL	See Table 2
	1,1-Dichloropropene	1,800	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	63,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5.1	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	24,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	58,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.3	EPA Residential RSL	NE
	1,2-Dibromoethane	7.2	DTSC-Residential SLs	NE
	1,2-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,2-Dichloroethane	460	EPA Residential RSL	See Table 2
	1,2-Dichloropropane	1,000	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	210	DTSC-Residential SLs	NE
	1,3-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,3-Dichloropropane	420	DTSC-Residential SLs	NE
	1,4-Dichlorobenzene	2,600	EPA Residential RSL	See Table 2
	2,2-Dichloropropane	1,600,000	EPA Residential RSL	NE
	2-Chlorotoluene	480	DTSC-Residential SLs	NE
	2-Hexanone	200,000	EPA Residential RSL	NE
	4-Isopropyltoluene	1,900,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	140	EPA Residential RSL	NE
	Acrylonitrile	0.068	DTSC-Residential SLs	NE
	Benzene	0.33	DTSC-Residential SLs	See Table 2
	Bis (2-chloroethyl) ether	230	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,900	EPA Residential RSL	NE
	Bromobenzene	290,000	EPA Residential RSL	NE
	Bromochloromethane	150,000	EPA Residential RSL	NE
	Bromodichloromethane	280	DTSC-Residential SLs	NE
	Bromoform	19,000	EPA Residential RSL	NE
	Bromomethane	6,800	EPA Residential RSL	NE

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)

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	770,000	EPA Residential RSL	NE
	Carbon tetrachloride	0.099	DTSC-Residential SLs	See Table 2
	Chlorobenzene	280,000	EPA Residential RSL	See Table 2
	Chloroethane	3.1	DTSC-Residential SLs	NE
	Chloroform	320	EPA Residential RSL	See Table 2
	Chloromethane	110,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	19	DTSC-Residential SLs	NE
	cis-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Cyclohexane	6,500,000	EPA Residential RSL	NE
	Dibromochloromethane	750	EPA Residential RSL	NE
	Dibromomethane	23,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	87,000	EPA Residential RSL	NE
	Ethylbenzene	5,800	EPA Residential RSL	NE
	Hexachlorobutadiene	1,200	EPA Residential RSL	See Table 2
	Hexachlorocyclopentadiene	1,800	EPA Residential RSL	NE
	Isophorone	570,000	EPA Residential RSL	NE
	Isopropylbenzene	1,900,000	EPA Residential RSL	NE
	m,p-Xylenes	550,000	EPA Residential RSL	NE
	Methyl acetate	24,000	DTSC-Residential SLs	NE
	Methyl ethyl ketone	27,000,000	EPA Residential RSL	See Table 2
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	47,000	EPA Residential RSL	NE
	Methylcyclohexane	6,500,000	EPA Residential RSL	NE
	Methylene chloride	5.5	DTSC-Residential SLs	NE
	N-Butylbenzene	1,200	DTSC-Residential SLs	NE
	Nitrobenzene	5,100	EPA Residential RSL	See Table 2
	N-Propylbenzene	3,800,000	EPA Residential RSL	NE
	o-Xylene	650,000	EPA Residential RSL	NE
	p-Chlorotoluene	440	DTSC-Residential SLs	NE
	sec-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Styrene	6,000,000	EPA Residential RSL	NE
	tert-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Tetrachloroethene	0.6	DTSC-Residential SLs	See Table 2
	Toluene	1,100	DTSC-Residential SLs	NE
	trans-1,2-Dichloroethene	190	DTSC-Residential SLs	NE
	trans-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Trichloroethene	940	EPA Residential RSL	See Table 2
	Trichlorofluoromethane (Freon 11)	730,000	EPA Residential RSL	NE
	Vinyl chloride	59	EPA Residential RSL	See Table 2
	Xylenes, total	650,000	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 HHRA Note 3 Residential Screening Levels (DTSC Residential SL) or the ecological comparison value is used. If a DTSC Residential SL 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-Residential SLs	Human Health Risk Assessment Note 3 – DTSC-Modified Screening Levels, May 2015.
EPA Residential RSL	United States Environmental Protection Agency Residential Soil Regional Screening Level (THQ=1.0), June 2015.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis 2008)
HHRA Note 2	DTSC Human Health Risk Assessment (HHRA) Note 2: Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Sites – Interim (May 2009).
SF RWQCB ESL	San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels for residential direct exposure (2013)
*	One or more screening levels (EPA Residential RSL, DTSC-Residential SLs, 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.

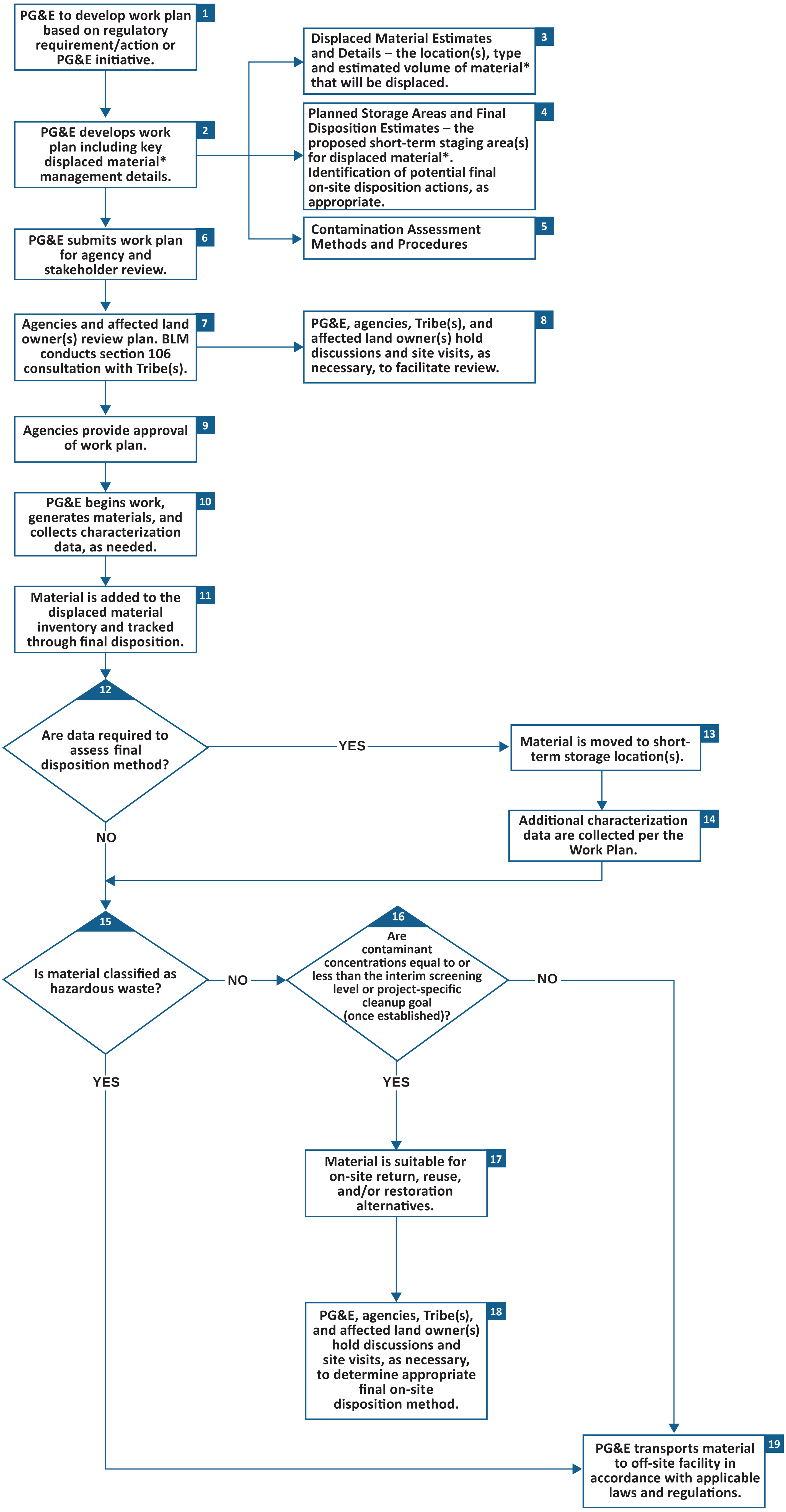
h This footnote letter skipped intentionally.

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

Attachment 1: Responses to Comments

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.

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
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.	

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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 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

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 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,

JMarcos

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

Response to DOI Comment #803 on the 90% Design
Topock Groundwater Remediation Project
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
803	DOI-333	Design	Infrastructures	2.1.3/2-6	The soil storage area, also comprising approximately 1.55 acres, will serve as the primary storage area for excavated soils…	Based on discussions with San Bernardino County, the adjacent lessee of Park Moabi Regional Park, and internal discussions between the Bureau of Land Management and the Department of the Interior, PG&E must find an alternate location for storage of waste soil above screening levels.	Based on further clarifications from DOI and BLM, PG&E understands that storage of waste soil above screening levels will not be allowed on federal lands. The remaining potential storage locations are private properties owned by FMIT and PG&E. Given the remedy facilities already planned to be located on the TCS and the Station's own operational needs for the property for its natural gas compressor operations, there is only space on PG&E property to temporarily store soil bins while awaiting analysis prior to final disposition. There is not adequate space on PG&E property to store waste soil on a long term basis. PG&E also contacted local TSDFs and was told that the TSDFs would accept the waste soil for disposal, not for storage. Given the above, at this time, PG&E has not been able to identify an alternate location for storing the waste soil. PG&E defers to the FMIT regarding its views on potential use of the Tribe's property within the project area for this purpose. In the meantime, in response to this comment, PG&E will eliminate the proposed soil storage area at Moabi Regional Park and move the proposed CHQ into that area. Note that displaced soils that are below screening levels may still be stored at the currently proposed soil processing area and the CHQ (subject to space availability). The management protocol for handling and disposition of displaced site materials (Appendix C to the CIMP, Appendix B to the Soil Management Plan) was revised to reflect that the materials above screening levels will be disposed of offsite. The revised protocol was provided in this 90% RTC period and included in **Attachment Q** of the final RTC table.		Resolved.		This RTC was discussed at the July 23, August 19, and August 26 TWG meetings. Comment resolved.

Source: Final Basis of Design Report (Appendix I – Response to Comments on the 90% Design Documents [Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan]).