PG&E Topock Compressor Station, Needles, California

Work Plan for Soil Non-Time-Critical Removal Action

Final

June 2022

Pacific Gas and Electric Company

PG&E Topock Compressor Station, Needles, California

Project No:	D31084AS.A.CS.EV.TM.02
Document Title:	Work Plan for Soil Non-Time-Critical Removal Action
Document No.:	FES0726211631BAO
Revision:	Final
Date:	June 2022
Client Name:	Pacific Gas and Electric Company
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File Name:	Topock_NTCRA_WP_Final_20220616

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Acronyms and Abbreviations

Acronyms	Description
μg/m³	microgram(s) per cubic meter
μg/kg	microgram(s) per kilogram
95UCL	95% upper confidence limit on the mean
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
AE	Applied Earthworks
AIRFA	American Indian Religious Freedom Act
AMM	avoidance and minimization measure
AOC	area of concern
APE	area of potential effects
ARAR	applicable or relevant and appropriate requirement
ARS	Arizona Revised Statue
AT&SF	Atchison, Topeka and Santa Fe Railway
BCW	Bat Cave Wash
bgs	below ground surface
BIAMP	Bird Impacts Avoidance and Minimization Plan
BLM	U.S. Bureau of Land Management
BMP	best management practice
BNSF	BNSF Railway
CalEPA	California Environmental Protection Agency
Cal/OSHA	California Division of Occupational Safety and Health
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR	Code of Federal Regulations

Acronyms	Description
CHPMP	Cultural and Historic Property Management Plan
CHPTP	Cultural and Historical Property Treatment Plan
CHQ	Construction Headquarters
CIMP	Cultural Impact Minimization Program
CMS/FS	Corrective Measures Study and Feasibility Study
COC	constituent of concern
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
Cr(VI)	hexavalent chromium
CRZ	contamination reduction zone
D/F	dioxins and furans
DOI	U.S. Department of the Interior
DTSC	California Department of Toxic Substances Control
EB	equipment blank
EE/CA	Engineering Evaluation/Cost Analysis
ECV	ecological comparison value
EO	Executive Order
ERTC	Environmental Release to Construction
ESA	federal Endangered Species Act
ESL	environmental screening level
EZ	exclusion zone
FD	field duplicate
FLPMA	Federal Land Policy and Management Act
ft^2	square foot (feet)
GPS	global positioning system
HAER	Historic American Engineering Record
HAZWOPER	hazardous waste operations and emergency response

Acronyms	Description
HERO	Human and Ecological Risk Office
HHERA	Human Health and Ecological Risk Assessment
HNWR	Havasu National Wildlife Refuge
hp	horsepower
I-40	Interstate 40
IUR	inhalation unit risk
LF	linear foot (feet)
LOAEL	lowest observed adverse effect level
LOC	level of concern
m	meter(s)
MDAQMD	Mojave Desert Air Quality Management District
mg/kg	milligram(s) per kilogram
mph	mile(s) per hour
MS/MSD	matrix spike and matrix spike duplicate
NAGPRA	Native American Graves Protection and Repatriation Act
NCP	National Contingency Plan
ng/kg	nanogram(s) per kilogram
NOx	nitrogen oxides
NOTH	National Old Trails Highway
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NTCRA	Non-Time-Critical Removal Action
OEHHA	California Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement and Amendment
PAA	potential action area

Acronyms	Description
PAH	polycyclic aromatic hydrocarbon
PEL	permissible exposure limit
PG&E	Pacific Gas and Electric Company
PHSEP	Project Health, Safety, and Environment Plan
PM	particulate matter
PPE	personal protective equipment
PSO	Project Safety Officer
QA	quality assurance
QC	quality control
RAG	removal action goal
RAO	removal action objective
RAWP	Removal Action Work Plan
RBC	risk-based concentration
RBRG	risk-based remedial goal
RCRA	Resource Conservation and Recovery Act
RFI/RI	Facility Investigation/Remedial Investigation
RFRA	Religious Freedom Restoration Act
ROD	Record of Decision
ROW	right-of-way
ROWD	Report of Waste Discharge
SEIR	Subsequent Environmental Impact Report
SF RWQCB	San Francisco Regional Water Quality Control Board
SHPO	State Historic Preservation Office
SL	Safety Liaison
SMP	Soil Management Plan
SPY	Soil Processing Yard
SWMU	solid waste management unit

Acronyms	Description
SWPPP	Stormwater Pollution Prevention Plan
TAA	target action area
TBC	to be considered
TCP	Traditional Cultural Property
TCS	Topock Compressor Station
TEQ	toxicity equivalent
U.S.	United States
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Services
WDR	Waste Discharge Requirement
WEAT	Worker Environmental Awareness Training
XRF	X-ray fluorescence
yd^3	cubic yard(s)

1. Introduction

The U.S. Department of the Interior (DOI) issued an Action Memorandum entitled "Request for a Non-Time-Critical Soil Removal Action at Areas of Concern and Solid Waste Management Units, Pacific Gas and Electric Topock Compressor Station" (DOI 2021a). The DOI's Action Memorandum and the corresponding e-mail sent on October 12, 2021 (DOI 2021b) directed Pacific Gas and Electric Company (PG&E) to develop this Work Plan and initiate activities necessary to implement a Soil Non-Time-Critical Removal Action (NTCRA) and perform the actions specified in Section V of the memorandum.

The Soil NTCRA, which is being conducted in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), is intended to address the release or substantial threat of a release of hazardous substances from the PG&E Topock Compressor Station (TCS) to the Havasu National Wildlife Refuge (HNWR) or adjacent areas. As identified in Section V of the Action Memorandum, the selected removal action is Alternative 3 (Excavation, Mechanical Separation, Offsite Disposal of Fines, and Reuse of Coarse Material), as described in the *Final Soil Engineering Evaluation/Cost Analysis, PG&E Topock Compressor Station, Needles, California* (Jacobs 2021a).

This Work Plan has been prepared in response to DOI's Action Memorandum and describes the following for this removal action:

- Objectives
- Construction approach and rationale
- Field screening methods
- Administrative approvals
- Proposed schedule
- Reporting plans

1.1 Site Background

The TCS is located adjacent to the Colorado River in eastern San Bernardino County, California, approximately 12 miles southeast of Needles, California, north and south of Interstate 40 (I-40) (Figure 1-1; figures are presented at the end of this document). The TCS is an active facility that began operations in 1951. The TCS compresses 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 (CH2M 2007a).

The surrounding area includes land owned or managed by a number of private and government entities, including the following (Figure 1-2):

- PG&E
- BNSF Railway (BNSF)
- San Bernardino County (County)
- The U.S. Bureau of Land Management (BLM)
- The Fort Mojave Indian Tribe
- The Metropolitan Water District of Southern California
- The U.S. Bureau of Reclamation (USBR)
- The U.S. Fish and Wildlife Service (USFWS) (which manages the HNWR)

In addition, several other entities have easements or rights-of-way (ROWs) in the area, including the following:

- PG&E
- California Department of Transportation (Caltrans)
- City of Needles Electric
- Frontier Communications
- Kinder Morgan, Inc
- Mojave Pipeline Company
- Southern California Gas Company

- Southwest Gas Corporation
- Transwestern Pipeline Company

The Colorado River, located approximately 1,500 feet to the east of the TCS, is a recreational, economic, and cultural resource. The HNWR is a sensitive ecosystem established to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people (Jacobs 2021a).

The Colorado River, HNWR, and the adjacent Topock area are an important part of the sacred ancestral territory for many native peoples. There are nine Native American Tribes with ancestral ties to the Topock area, hereinafter, "the Tribes," as follows (BLM 2010, 2017):

1) Chemehuevi Indian Tribe
2) Cocopah Tribe
3) Colorado River Indian Tribes
4) Fort Mojave Indian Tribe
5) Fort Yuma Quechan Tribe
6) Hualapai Tribe
7) Havasupai Tribe
8) Twenty-nine Palms Band of Mission Indians
9) Yavapai-Prescott Indian Tribe

1.1.1 Previous Investigation Summary

The TCS and the surrounding land has been the subject of numerous environmental investigations since 1997. The nature and extent of soil contamination associated with the TCS was evaluated as part of a Resource Conservation and Recovery Act (RCRA) Facility Investigation and Remedial Investigation (RFI/RI). As directed by California Department of Toxic Substances Control (DTSC) (DTSC 2006), reporting of RFI/RI activities and results was separated into three volumes, as follows:

- RFI/RI Report Volume 1, *Revised Final RCRA Facility Investigation/Remedial Investigation Report, Volume 1 – Site Background and History* (CH2M 2007a): Detailed site background and history. Additional units were identified after the RFI/RI Report Volume 1 in the *Revised Final Addendum to the RFI/RI, Volume 1* (CH2M 2014a).
- RFI/RI Volume 2, *Revised Final RCRA Facility Investigation/Remedial Investigation Report, PG&E Topock Compressor Station Needles, California, Volume 2 – Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigation* (CH2M 2009a), detailed hydrogeologic characterization and groundwater and surface water investigation results.
- RFI/RI Report Volume 3, Revised Draft RCRA Facility Investigation/Remedial Investigation Report, Volume 3 – Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California. December (Jacobs 2021b), presents the results of soil investigations and data collection conducted at the PG&E Topock site from 2008 through 2020. PG&E conducted the soil RFI/RI to identify and evaluate the nature and extent of soil contamination at the site, and assess the extent to which the release poses a potential threat to human health and the environment. Volume 3 presents the following information:
  - Site and unit histories
  - A summary of soil investigations
  - A data summary and description of data quality objectives
  - Field investigation summaries, including updated conceptual site models for each investigation unit
  - A soil risk assessment summary
  - Conclusions and recommendations for those units and areas to be carried forward into a Corrective Measures Study and Feasibility Study (CMS/FS)

Concurrent with evaluation of the RFI/RI soil investigation data, the USFWS and DOI determined that there are specific areas outside of the TCS where concentrations of constituents in soil significantly exceeded background values or ecological and residential screening levels on federal land or in locations where constituents have the potential to migrate to federal land. On October 30, 2018, DOI directed PG&E to conduct an Engineering Evaluation/Cost Analysis (EE/CA) for a potential NTCRA to address contaminated soil on land adjacent to the TCS. A draft EE/CA report was made available for public, agency, and stakeholder review and comment, and Tribal consultation on May 29, 2020. The public review period ended on August 5, 2020. Tribal consultation on the draft EE/CA ended on April 8, 2020. DOI reviewed and considered stakeholder comments on the draft EE/CA and directed PG&E to prepare a final EE/CA.

The EE/CA evaluated and selected technologies and remedial alternatives to address contaminated soil. Several removal action alternatives were identified. A recommended alternative was proposed based on a comparative analysis of the removal action alternatives against the criteria of effectiveness, implementability, and cost.

1.2 Regulatory Framework

PG&E is conducting investigative and remedial activities at the TCS under RCRA and CERCLA. The DTSC and the DOI are the lead regulatory agencies providing oversight of the environmental investigation and cleanup at the site. The soil medium, which is the focus of this Soil NTCRA, is currently in the RCRA RFI/RI phase of the cleanup process. RFI/RI activities have been conducted both within the TCS fence line and at adjacent land outside the TCS fence line.

During the RFI/RI soil investigation and after receipt of the Soil Investigation Data Package, the USFWS and DOI evaluated the RFI/RI soil investigation data and determined that there are specific areas outside of the TCS where concentrations of constituents of potential concern (COPCs) to humans and constituents of potential ecological concern (COPECs) significantly exceed background values or ecological and human health screening levels. These areas, referred to as potential action areas (PAAs) in the EE/CA, are located within or adjacent to active desert washes subject to potential scouring during rain events that could move contamination toward the Colorado River or spread the contamination footprint over a larger area. Because of this potential threat to public health and the environment, DOI has directed PG&E via the 2021 Action Memorandum to conduct this Soil NTCRA to address contaminated soil in these PAAs, hereafter identified as target action areas (TAAs) (DOI 2021a).

The Soil NTCRA is authorized pursuant to the response action authority of CERCLA Section 104(a) as amended, 42 United States Code (USC) Section 9604(a). Pursuant to Executive Order (EO) 12580, as amended, Section 104 authority is delegated to the Secretary of the Interior to address the release or substantial threat of release of hazardous substances on or from a property under DOI's jurisdiction, custody, or control.

1.3 Objectives and Numerical Goals for Soil NTCRA

Section V of DOI's Action Memorandum (DOI 2021a) states the intent and objectives of the Soil NTCRA as follows:

> *"This non-time-critical removal action is intended to stabilize and mitigate the threat of release of contaminated material surrounding and within the Refuge and reduce the overall threat to human health and the environment. This action may not be the final remedy for the AOCs/SWMUs. The soil remedial investigation process will continue for the Site."*

To comply with the stated intent and objectives of the Action Memorandum, the Soil NTCRA will implement the alternative recommended in the EE/CA: Alternative 3 – Excavation, Mechanical Separation, Offsite Disposal of Fines, and Reuse of Coarse Material.

The scope of the removal action in accordance with Alternative 3 will be limited to soil and other solid phase matrices, including white powder, black sandy material, and debris (for example, wood, cans, machine parts, rebar, concrete, asphalt, railroad ties, piping, etc.) on federal land or in locations where constituents have the potential to migrate to federal land. The removal action will be limited to the following areas detailed in the EE/CA and identified in the Action Memorandum: Solid Waste Management Unit (SWMU) 1, Area of Concern (AOC) 1, AOC 9, AOC 10, AOC 11, AOC 14, AOC 16, and AOC 27. Reuse of coarse material will be limited to material that does not pass the 3/8-inch sieve (that is, material greater than 3/8-inch diameter).

The EE/CA evaluated site-specific applicable or relevant and appropriate requirements (ARARs), to be considered (TBC) criteria, and National Contingency Plan (NCP) factors, and established three removal action objectives (RAOs) (Table 1-1) and a list of numerical removal action goals (RAGs) (Table 1-2) to support achievement of the RAOs.

Table 1-1. Removal Action Objectives

Soil NTCRA Work Plan

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Removal Action Objective	Removal Action Goal
RAO 1: Reduce human and ecological risk related to the COCs in soil up to 10 ft bgs on or adjacent to federal land by removing soil at locations identified as driving risk in the HHERA.	To meet RAO 1, the HHERA recommendations will be followed; that is, removal action alternatives will include removal of soil at the following locations identified in the HHERA: • Protection of potential human recreators (four total locations for the 0- to 3-ft-bgs depth interval): – Dioxin-TEQ: SWMU1-25 – Cr(VI): AOC 10-20, #10, and MW-58BR_S • Protection of desert shrew (up to seven total locations for the 0- to 0.5-ft bgs depth interval): – D/F TEQ (based on RBRG of 190 ng/kg): SWMU1-25, PA-20, AOC 10-23, PA-21, and AOC 10c-4 – Total chromium: AOC 10-20 – Copper: AOC 10-21 Following the Soil NTCRA, risk will be recalculated for the relevant exposure areas and compared to numerical RAGs, specifically RBRGs defined in the HHERA. Risk calculations will be performed during implementation of the removal action and will include existing soil concentration data for sample locations not removed in the Soil NTCRA and new data from confirmation samples. RAO 1 will be met when the residual 95UCL of the mean concentration for the potential exposure area is less than or equal to the RBRG. Where human health drives risk, the RBRG protective of risk at 1 x 10^{-6} will be used. Relevant RBRGs are presented in Table 1-2.
RAO 2: Address elevated concentrations of contaminants in soil up to 10 ft bgs outside the TCS, in or adjacent to wash areas that are within, or have the potential to migrate to, the HNWR during storm events.	To meet RAO 2, removal action alternatives will address direct contact with soil up to 10 ft bgs within the HNWR or that may migrate to the HNWR; soil that contains elevated contaminant concentrations (specifically, Cr(VI), total chromium, copper, lead, mercury, molybdenum, zinc, or D/F, or some combination of these). Identification of areas with elevated concentrations was conducted in the EE/CA by comparing individual soil concentration results (from existing RFI/RI data) to the numerical RAGs (Table 1-2) and identifying the factor of exceedance of 10 times the numerical RAG. Removing highly contaminated soils and wastes that contain mobile contaminants, i.e., hexavalent chromium, also minimizes the potential for further degradation of the groundwater aquifer. Confirmation samples will be collected during the Soil NTCRA and compared to numerical RAGs to confirm the completeness of removal actions.
RAO 3: Remove debris, burnt material, and/or discolored soil associated with elevated hazardous substances as identified during the RFI/RI within SWMUs and AOCs up to 10 ft bgs.	To meet RAO 3, the Soil NTCRA will address visually identified debris, burnt material, and discolored soil from 0 to 10 ft bgs. RAO 3 will rely on visual identification of material rather than comparison of soil concentrations to numerical RAGs. Areas with observed debris, burnt material, sandblast grit, or discolored soil were preliminarily identified for to evaluate removal action alternatives and costing, and will be refined based on visual observation during the Soil NTCRA. The completeness of the Soil NTCRA will be confirmed through visual observation and confirmation sampling for COCs.

Notes:

*Final Soil Human Health and Ecological Risk Assessment Report, Topock Compressor Station, Needles, California (*Arcadis 2019).

*Soil Human Health and Ecological Risk Assessment – Errata, Topock Compressor Station, Needles, California (*Arcadis 2020)

95UCL = 95% upper confidence limit on the mean

bgs = below ground surface

COC = constituent of concern

Cr(VI) = hexavalent chromium

D/F = dioxins and furans

ft bgs = feet below ground surface

HHERA = Human Health and Ecological Risk Assessment (Arcadis 2019 and 2020)

ng/kg = nanogram(s) per kilogram

RBRG = risk-based remedial goal

TEQ = toxicity equivalent

Table 1-2. Numerical Removal Action Goals
Soil NTCRA Work Plan
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Contaminant	Numerical RAG	Basis	Source	Applicable RAO
Chromium, hexavalent	3.1 mg/kg (surface to 2 ft bgs) 31 mg/kg (2 to 10 ft bgs)	Off-highway vehicle rider at 1 x 10^{-6} risk Off-highway vehicle rider at 1 x 10^{-5} risk	RBRG calculated in HHERA	RAO 1[a] and RAO 2[b]
Chromium, total	145 mg/kg	Desert shrew	RBRG calculated in HHERA	RAO 1[a] and RAO 2[b]
Copper	145 mg/kg	Desert shrew	RBRG calculated in HHERA	RAO 1[a] and RAO 2[b]
D/F TEQ[c]	100 ng/kg (surface to 2 ft bgs) 190 ng/kg (2 to 10 ft bgs)	Hiker at 1 x 10^{-6} risk Desert shrew	RBRG calculated in HHERA	RAO 1[a] and RAO 2[b]
Lead	36 mg/kg	Cactus wren	RBC calculated in HHERA Appendix RBC	RAOs 2[b]
Mercury	1 mg/kg	Cactus wren	RBC calculated in HHERA Appendix RBC	RAOs 2[b]
Molybdenum	22 mg/kg	Desert shrew	RBC calculated in HHERA Appendix RBC	RAOs 2[b]
Zinc	1,050 mg/kg	Cactus wren	RBC calculated in HHERA Appendix RBC	RAOs 2[b]

[a] For RAO 1, the residual 95UCL of the mean concentration for the potential exposure area will be compared to the RBRG.

[b] For RAO 2, individual soil samples are and will be compared directly to the RBRG to identify significant exceedances.

[c] D/F toxicity equivalents (TEQs) for humans and mammals are calculated using the same toxic equivalency factors. The D/F RAGs are protective of both human recreators and the desert shrew. The RBC for protection of the desert shrew is 190 ng/kg. The RBC for human recreators from 2 to 10 ft bgs is 1,000 ng/kg based on a hiker at 1 x 10^{-5} risk.

Notes:

D/F = dioxins and furans

ft bgs = feet below ground surface

mg/kg = milligram(s) per kilogram

RBC = risk-based concentration

1.4 Areas of the Site to be Addressed During Soil NTCRA

This Work Plan describes the Soil NTCRA activities at the locations identified in the DOI Action Memorandum, which are located within the following areas:

- SWMU 1 – Former Percolation Bed (3 TAAs)
- AOC 1 – Area Around Former Percolation Bed (3 TAAs)
- AOC 9 – Southeast Fence Line (1 TAA)
- AOC 10 – East Ravine (4 TAAs)
- AOC 11 – Topographic Low Areas (1 TAA)
- AOC 14 – Railroad Debris Site (1 TAA)
- AOC 16 – Former Sandblast Shelter
- AOC 27 – MW-24 Bench (1 TAA)

With the exception of AOC 16, these TAAs are outside the TCS fence line on federal lands or at locations where constituents have the potential to migrate to federal land, including the HNWR. AOC 16 is located within the western TCS fence line and above SWMU 1 and AOC 1 (Figure 1-3). While AOC 16 was not designated as a PAA in the EE/CA, it was included in the DOI Action Memorandum and will be addressed as part of this Soil NTCRA. TAA removal actions described in this Soil NTCRA Work Plan also apply to AOC 16.

The source, nature, and extent of the contamination in soil in SWMU 1, AOC 1, AOC 9, AOC 10, AOC 11, AOC 14, AOC 16, and AOC 27 are presented in the draft RFI/RI Report Volume 3 (Jacobs 2021b). Tables and figures presenting the detailed screening of data for individual constituents against each of the numerical RAGs is presented in Appendix E of the EE/CA (Jacobs 2021a). Historical soil sample results from these AOCs are presented in Appendix A. The following subsections provide a brief summary of the AOCs and the contamination identified therein.

1.4.1 SWMU 1 – Former Percolation Bed and AOC 1 – Area Around Former Percolation Bed

AOC 1 and SWMU 1 are located west and north of the TCS within Bat Cave Wash (BCW) (Figure 1-4 and Figure 1-5). AOC 1 comprises a portion of BCW adjacent to the station, including SWMU 1, as well as the portion of BCW extending north of SWMU 1 toward the Colorado River. SWMU 1 is the former percolation bed for TCS.

From about 1951 to approximately 1971, the facility discharged wastewater from the cooling towers to the percolation bed (SWMU 1) and allowed it to percolate into the ground or evaporate. Historical aerial photo review indicates that, prior to the establishment of the bermed percolation bed, discharges to BCW may have extended as far downstream as the railroad tracks (CH2M 2007a).

Further north, near the mouth of BCW, thick vegetation, widening of the channel, and blockage of flow by National Old Trails Highway (NOTH) greatly reduces the energy of flow during runoff events, resulting in deposition of entrained soil within the vegetated area at the lower end of BCW. Sediment sampling was performed at the mouth of BCW where it meets the Colorado River, on both sides of NOTH. No exceedances of interim screening levels were detected in samples collected on the eastern side of NOTH. However, exceedances of interim screening levels were detected in several soil and sediment samples on the western side of NOTH (Jacobs 2021b).

Removal of significant sources upstream of this vegetated area will further protect the river as a source of drinking water. The area is heavily vegetated, predominantly with salt cedar (also known as tamarisk), which is an invasive, exotic plant species. This heavily vegetated portion of BCW is a long-term depositional area that existed before the TCS was built. Depositional history and patterns within this area are not known with certainty. AOC 1 is located partially on property owned by PG&E, USBR (managed by BLM), BNSF, and Fort Mojave Indian Tribe, as well as the HNWR (managed by USFWS), with PG&E as the easement holder (CH2M 2007a).

A historical exploratory well that was likely used for water supply and disposal in the 1960s, TCS-4, is located within AOC 1, just north of the SWMU 1 boundary (CH2M 2018). Soil samples collected near the TCS-4 well head contained the following COCs at concentrations well exceeding background concentrations:

- Hexavalent chromium (Cr[VI])
- Dioxins and furans (D/F) toxicity equivalent (TEQ)
- Molybdenum
- Total chromium
- Zinc

Sampling of pipe wrap material collected from the pipe connected to TCS-4 also contained exceedances for TEQ D/F, as well as asbestos-containing material (ACM) (CH2M 2015b). Well TCS-4 was decommissioned in 2016 (CH2M 2016).

1.4.2 AOC 9 – Southeastern Fence Line

AOC 9 is located in the southeastern portion of the facility, just south of the visitor parking lot and immediately east of (outside) the facility fence line (Figure 1-6). A small amount of discolored surface soil was encountered just outside the fence line on an extremely steep slope in 2000. About 1.5 cubic yards (yd^3) of the stained soil was removed and shipped offsite for disposal. Site conditions (the steepness and stability of the slope) limited the feasible extent of excavation at that time (CH2M 2007a). AOC 9 is located entirely on property owned by PG&E.

1.4.3 AOC 10 – East Ravine

AOC 10 is located southeast of the TCS in a small ravine known as East Ravine. The ravine runs eastward toward the Colorado River. AOC 10 generally includes all of East Ravine as well as the specific areas shown on Figures 1-6 and 1-7. The ravine is approximately 1,600 feet long and is bisected by three constructed berms. Due to the berms, surface flow within the ravine does not typically reach the Colorado River.

AOC 10 received fluids and waste discharge from the TCS, including discharge from stormwater drainpipes, surface debris disposed of on the slopes of the ravine, and incidental overflows of wastewater via the former trench drain at the top of the station access road. Historical aerial photographs document a large impoundment area where well MW-58R is now located that was filled with liquids in the 1960s and 1970s (CH2M 2007a, 2007b). A greenish-gray layer also occurs here and is associated with elevated chromium contamination. Thin white powdery waste layers were also identified on the floor of the East Ravine (CH2M 2009b). AOC 10 is located on both PG&E property and the HNWR.

1.4.4 AOC 11 – Topographic Low Areas

AOC 11 consists of topographic low areas on the northeastern side of the TCS (Figure 1-6). While the principal drainage pathways leading away from the TCS have been identified, certain channels and storm drains drain into topographic low points or depressions. Runoff from the facility can collect at these low points and infiltrate or evaporate. AOC 11 is internally draining, so runoff into AOC 11 cannot reach the Colorado River due to topographic constraints. A stormwater pipe that captures runoff from I-40 also discharges into AOC 11 north of AOC 11a, immediately south of the I-40 crossing. AOC 11 is located on both PG&E property and the HNWR.

1.4.5 AOC 14 – Railroad Debris Site

AOC 14 is located outside the facility fence line approximately 1,000 feet north of the TCS and is currently bounded by the BNSF railroad tracks to the north, I-40 to the south, BCW to the west, and a former access road (Historic Route 66) to the east (Figure 1-5). AOC 14 currently contains miscellaneous construction debris related to construction of the railroad, including chunks of asphalt, railroad ties, and piping. ACM and burnt material from PG&E operations have also been disposed of within AOC 14. In addition to waste burning activities in the area, former TCS employees reported that water softening (lime) sludge was also disposed of in this area. A thin white layer assumed to be water softening material can be observed in the I-40 freeway cut. Employee reports suggest that a removal action for some of the debris and white powdery material was conducted in the mid-1990s; however, no documentation regarding the removal has been found (CH2M 2006).

The contours of the site suggest that some excavation may have occurred in the southern portion of the area. PG&E also completed a cleanup action in AOC 14 in 1999 to address asbestos (CH2M 2007a). Surface water runoff along the western side of AOC 14 flows into BCW (AOC 1). AOC 14 is located on property owned by BNSF, HNWR, and Caltrans.

1.4.6 AOC 16 – Former Sandblast Shelter

AOC 16, the Former Sandblast Shelter, is located above SWMU 1 and AOC 1 in the lower yard of the TCS (Figure 1-4). The sandblast shelter is constructed of four supports and a roof with open sides. The area immediately surrounding the shelter is currently and has historically been unpaved, except for the concrete driveway between the eastern edge of the shelter and the paved roadway. The sandblast shelter was installed in the late 1980s and was used to prepare metal items at the facility for protective coating. Some sandblasting historically occurred in this area before the sandblast shelter was constructed. The shelter in its current configuration was used by PG&E until the early 1990s (CH2M 2007a).

Two different colors of apparent abrasive material (sandblast grit) are present on the ground in the immediate vicinity of the sandblast shelter. Samples collected from the sandblast grit indicated elevated levels of copper and molybdenum. Due to the proximity of AOC 16 to SWMU 1 and AOC 1, high levels of copper, and the potential of surficial materials to migrate into BCW, removal of surficial sandblast grit is included in this Soil NTCRA.

1.4.7 AOC 27 – MW-24 Bench

AOC 27 is located outside the facility fence line north of the TCS, south of I-40, and east of BCW (AOC 1), as shown on Figure 1-5. A former TCS employee indicated that AOC 27, informally known as the MW-24 bench, was formerly used as a waste disposal area. Prior to construction of I-40, this area was contiguous with AOC 14 to the north.

Miscellaneous construction debris and burnt materials are present in AOC 27. Burnt debris was observed in the eastern edge of the road cut on the road from AOC 27 to BCW (AOC 1). Runoff from AOC 27 flows into BCW (AOC 1). AOC 27 is located on property owned by PG&E, HNWR, and Caltrans. The MW-24 bench area is located on HNWR property.

1.5 Pre-Work Plan Site Evaluation Activities

Pursuant to the DOI's Action Memorandum (DOI 2021a) and prior to the preparation of this Soil NTCRA Work Plan, additional site evaluation activities were conducted at TCS to aid in the development of the Work Plan. A summary of the pre-Work Plan site evaluation activities is provided in the next subsection.

1.6 Work Plan Organization

The Work Plan is organized as follows:

- Section 1 presents the following information:
  - Site background
  - Regulatory framework
  - Objectives and goals
  - Areas to be addressed by the Work Plan
  - Pre-Work Plan site evaluation activities for the Soil NTCRA
- Section 2 presents construction activities and methods, as well as air monitoring and screening activities to be used during the Soil NTCRA.
- Section 3 presents the anticipated removal approach at the individual TAAs.
- Section 4 presents anticipated approvals and authorizations for the Work Plan activities.
- Section 5 presents the anticipated project schedule and reporting.
- Section 6 provides a list of references used during Work Plan preparation.

The appendices include:

- Appendix A - Historical Soil Sample Results
- Appendix B - Project Health, Safety, and Environment Plan
- Appendix C - Transportation Plan
- Appendix D - Best Management Practices Plan
- Appendix E - Air Monitoring Plan
- Appendix F - Waste Management Plan
- Appendix G - Fill and Backfill Specification
- Appendix H - Standard Operating Procedures
- Appendix I - Avoidance and Minimization Measures
- Appendix J - Applied Earthworks Cultural Resources Summary Memorandum
- Appendix K - Addendum to Soil Management Plan
- Appendix L – Quality Assurance Project Plan

2. Construction Activities and Methods

This section presents the activities, methods, and processes that will be used to implement the Soil NTCRA Work Plan. Section 3 presents the anticipated progression of work at each TAA using the methods in this section. PG&E will follow strict quality assurance (QA) and quality control (QC) measures throughout the project to monitor, document, and adjust procedures, and record changes to improve the removal process. Inspections and review of the Work Plan requirements will be carried out by PG&E and their subcontractors with frequent and regular documentation and review. Areas subject to QA/QC review will include the following:

- Health and safety
- Runoff control
- Spill prevention
- Waste handling and transport
- Air monitoring
- Sample collection

2.1 Preconstruction Activities, Site Access, and Preparation

This section describes activities that will be conducted prior to intrusive activities.

2.1.1 Project Initiation Meeting

Consistent with other phases of work conducted at the Topock site, PG&E will invite agency representatives, Tribes, and interested stakeholders to the site for a project initiation meeting. This meeting will be scheduled to occur prior to the start of intrusive removal activities; however, it is anticipated that various site preparation activities will be conducted prior to this meeting.

PG&E will discuss the following topics during the meeting:

- An overview of the activities that will be conducted as part of this Work Plan
- Protection measures for sensitive resources
- Key project team members (including subcontractors)
- Applicable site safety and communication protocols
- Plans for project communications during work

2.1.2 Worker Environmental Awareness Training

Consistent with current site practice, all PG&E personnel, consultants, and subcontractors will be required to attend Worker Environmental Awareness Training (WEAT). WEAT covers rules, requirements, and expectations for conducting work at the Topock site. Training topics include the following:

- PG&E's internal Environmental Release to Construction (ERTC) process
- Avoidance and minimization measures for biological resources, including endangered species
- Protocols for avoidance and protection of cultural resources
- Measures to control fugitive dusts and reduce construction air emissions
- Best management practices (BMPs) for erosion control, soil and waste management, and fueling and refueling practices
- A video created with Tribes, sharing their perspective on the cultural value of the Topock area

All attendees are required to sign and date the training roster after completing WEAT.

2.1.3 Preconstruction Field Verifications

An onsite biological monitor will conduct preconstruction surveys for protected species in work areas immediately prior to initiation of ground-disturbing activities. In addition, consistent with current site practice, preconstruction field verifications or informal walk-downs will be conducted with Archaeological Monitors, Tribal Monitors, and onsite personnel prior to the start of ground-disturbing activities.

2.1.4 Aboveground and Underground Utility Survey

A survey of aboveground and underground utilities will be conducted within the work area boundary during site preparation activities in accordance with S*tandard Operating Procedure (SOP)-B11 Site Clearance and Permitting* (Appendix H). This survey will include the following activities:

- Site-specific reconnaissance, which will include a visual inspection of the work area and review of available site utility plans and as-built documentation
- Notification to Underground Service Alert or Dig Alert, which is the on-call notification center that supports the Southern California area
- Geophysical survey using various nonintrusive remote-sensing tools to identify underground features

Prior to intrusive work and as determined necessary, all known or suspected utilities in proximity to the TAAs that are identified through these activities will be exposed by hand or with nondestructive excavation equipment. The appropriate exposure method will be selected in consultation with the owner of the feature (as appropriate) and may be dependent upon the type of feature being investigated. Figures 1-4 through 1-7 show known underground and aboveground utilities near the TAAs.

Special care will be given to high-pressure gas lines throughout the work area. Steel plates may be installed as necessary over shallow lines where heavy equipment is expected to travel. Concrete jersey barriers or similar will be placed around aboveground gas valves that are near work areas.

2.1.5 Land Surveying

Topographic data from aerial surveys have been used to provide an understanding of the surface contours throughout the site and in preparation of site figures (Figures 1-4 through 1-7). Prior to the start of removal actions, PG&E will conduct a topographic survey of the individual TAAs. This pre-excavation survey will provide a baseline for comparison to the post-excavation survey to confirm excavation quantities. Topographic surveys may also be used for post-removal contouring and site restoration.

2.1.6 Site Setup and Mobilization

Site setup and mobilization activities will be conducted to ready the site and PG&E equipment for intrusive removal actions, including to the following:

- Mobilization and staging of field command trailer, PG&E tool trailer, and excavation equipment into the support zone
- Preparation of approved staging areas and access routes (Section 2.1.7)
- Preparation of the temporary water supply system for dust control and decontamination processes (Section 2.1.8)
- Preparation of runon and runoff control measures and other BMPs (Section 2.1.9)
- Biological Resource Protection (Section 2.1.10)
- Initial dust control measures prior to the mobilization of equipment on unpaved roads (Section 2.1.11)

2.1.7 Site Access and Demarcation

Access to the Soil NTCRA Work Area, staging areas, and TAAs will be via existing access routes, as shown on Figures 2-1 and 2-2. Construction activities will typically be conducted between 7 a.m. and 5 p.m., except weekends and holidays. As is typical, preconstruction activities, such as daily tailboard meetings, site clearance, and field surveys, as well as office work, will likely occur outside of this time window.

In the unlikely event that noisy construction activities are anticipated to occur during night-time (between 7 p.m. and 7 a.m.), on Sundays, or on federal holidays, PG&E will develop and implement a noise control plan that addresses compliance with the applicable requirements of San Bernardino County Development Code – Noise Standards 83.01.080.

Prior to the start of intrusive activities, the Soil NTCRA work area will be segregated into one of three primary work zones, such that work is conducted in accordance with California Division of Occupational Safety and Health (Cal/OSHA) regulations set forth in Title 8, *California Code of Regulations* (CCR) Section 5192. The primary work zones include the support zone, contamination reduction zone (CRZ), and exclusion zone (EZ). The Soil NTCRA activities to be conducted in each zone and the requirements of each zone are discussed in the following subsections.

While the equipment staging, mechanical separation and stockpiling area, waste management areas, and associated transportation routes are discussed separately in the subsections, they also fall under the requirements of one of the three primary work zones. The certifications required for personnel to enter or conduct work within each zone are defined in the site-specific Project Health, Safety, and Environment Plan (PHSEP) (Appendix B).

An EZ and associated CRZ will be established when active excavation activities begin or when potentially contaminated or hazardous materials/soils are being managed or staged in an accessible manner. The extent and status (active or inactive) of the EZ and CRZ will be adjusted as work progresses and will continue until the excavation is backfilled with clean material or confirmation samples indicate contaminants within the excavation are less than numerical RAGs. Additionally, excavations with an entrapment, fall, or other hazard will remain an active EZ until such hazards are removed.

2.1.7.1 Support Zone

The support zone includes areas outside the EZ and CRZ of each active TAA or waste management area. The support zone will include clean equipment parking, personal vehicle parking, temporary shade structures and worktables. Sanitary facilities will be established in or near support zone.

2.1.7.2 Contamination Reduction Zone

The CRZ will serve as a buffer between the EZ and the support zone to prevent the migration of contaminants outside of the EZ. The extent of the CRZ will be adjusted as needed based on the size of the EZ it surrounds and the work being conducted in the EZ. The CRZ will be composed of personnel decontamination areas and equipment decontamination areas, as described in Section 2.5. Separate CRZs will be established as determined necessary to access the waste management areas and to minimize traffic through the areas where removal work is occurring.

2.1.7.3 Exclusion Zone

The EZ will encompass the area where removal actions are actively being performed (TAAs); where contaminated material is actively being handled; and where contaminated material is staged uncovered or is otherwise accessible (Figures 2-1 and 2-2). The location and extent of the EZs will be continuously adjusted as work progresses and as dictated by field air monitoring results. Criteria for the reconfiguration of the EZs are presented in the PHSEP.

The EZ will be accessed through the CRZ. Worker personnel requiring access to the EZ must be 40-hour Occupational Safety and Health Administration (OSHA) hazardous waste operations and emergency response (HAZWOPER) certified, must be qualified and trained for the appropriate personal protective equipment (PPE) as determined by the PHSEP, and must have reviewed the PHSEP.

The Cal/OSHA HAZWOPER standard located in 8 CCR 5192 (Federal OSHA 29 *Code of Federal Regulations* [CFR] 1910.120) in Section (g) 1 A states that engineering controls and work practices will be instituted to reduce and maintain employee exposure to or less than the permissible exposure limits (PELs) of substances regulated by 8 CCR 5155, except to the extent that such controls and practices are not feasible. Work practices that may be feasible include removing all nonessential employees from potential exposure.

Therefore, access to the EZ will be limited to those essential for the safe completion of project goals and who wear the required PPE to enter the EZ. Construction activities can be paused to allow monitors to enter the EZ area to safely view the excavations, upon request.

2.1.7.4 Equipment Staging Areas

Equipment staging areas will be located in support zones and will be used for the staging of clean equipment and clean empty waste containers arriving onsite. Equipment staging areas will also be the location for routine equipment maintenance (including fueling and greasing) at the end of each shift. Equipment refueling will be conducted in accordance with *SOP-B19 Remote Equipment Refueling* (Appendix H). In accordance with standard site procedures, all idling or parked powered equipment (for example, loaders, dump trucks, excavators, etc.) will be staged over containment devices to prevent the release of leaked fluids to the environment.

The following staging areas are proposed for use during the Soil NTCRA:

- Soil Processing Yard (SPY) – Located to the northwest of the main work area (Figure 2-1), the SPY will be the largest staging area to be used during the Soil NTCRA. Portions of the SPY are expected to be used for other purposes in addition to equipment staging (Section 2.1.7.5 and Section 2.1.7.6).
- Staging Area North of I-40 – Located immediately off the 1-40 Park Moabi Road exit (Figure 2-1), this staging area is expected to be used for loading and unloading of construction equipment, and vehicle parking.
- Transwestern Bench – Located on PG&E property immediately outside of the TCS fence line (Figure 2-2), this staging area is expected to be used for construction equipment and vehicle parking, sanitary facilities, and tool and supply staging.
- Construction Headquarters (CHQ) – Located south of NOTH across from the SPY (Figure 2-1), this staging area is expected to be used for storage of construction equipment and clean materials (for example, unused erosion control materials, unused plastic sheeting, K-rails, steel plates, etc.).
- Floodplain Staging Area – Located east of NOTH, between the mouth of BCW and the MW-20 Bench (Figure 2-1), this staging area is expected to be used for loading and unloading of construction equipment, vehicle parking, and other nonobtrusive temporary staging.

2.1.7.5 Administrative Offices

Temporary field office trailer(s) will be installed at the SPY or the CHQ area south of the SPY (Figure 2-1). The field office trailers will be connected to electric service and will have dedicated sanitary facilities. These offices and associated support facilities will serve as the Soil NTCRA command center for direction of site operations, a controlled environment for computer equipment, and a point of contact location.

2.1.7.6 Waste Management Areas

Waste management areas will be used for stockpiling of excavated material, mechanical separation, and stockpiling of separated materials in accordance with Section 2.3. Waste management areas will be located in an EZ when active material separation operations are underway and when there is access to uncovered potentially contaminated wastes (for example, mechanically separated soil less than 3/8-inch diameter, stained soil, and debris). When potentially contaminated wastes are containerized or otherwise inaccessible and no other unacceptable hazards exists (for example, mechanical separation operations) then the extent of the associated EZ and CRZ may be reduced. The following waste management areas are proposed for use during the Soil NTCRA:

- SPY – The primary waste management area will be at the SPY, north of NOTH (Figure 2-1). Excavated soil and debris will be stockpiled at the SPY prior to mechanical separation and final disposition. The SPY Waste Management Area is large enough for stockpiling multiple types of material, operation of mechanical separation equipment, and for the load-out of wastes into on-highway haul trucks. The security fence surrounding the SPY will provide for restricted access to the area. The topographic features of the SPY will aid in preventing runoff from leaving the waste management area. Coning and flagging will be employed to deter off-highway vehicle use in the area. Perimeter air and dust monitoring will be implemented around the SPY, as specified in the Air Monitoring Plan (Appendix E), with increased monitoring during weather events. Wind erosion controls and dust suppression controls will be employed, as described in the Best Management Practices Plan (Appendix D).

- Transwestern Bench – The secondary waste management area will be at the Transwestern Bench (Figure 2-2). Excavated soil and debris from TAAs located east of the TCS may be temporary staged at the Transwestern Bench prior to disposal. Staged materials will be placed on the concrete pad or containerized in roll-off bins or covered haul trucks parked on the concrete pad. Perimeter air and dust monitoring will be implemented around the Transwestern Bench as specified in the Air Monitoring Plan (Appendix E), if staged materials are not containerized. Wind erosion controls and dust suppression controls will be employed, as described in the Best Management Practices Plan (Appendix D).

Soil temporarily stockpiled within an AOC during excavation is not yet considered a waste; therefore, the AOC is not classified as a waste management area. However, the open excavation and stockpiled material will be located within the EZ due to the presence of contamination.

2.1.7.7 Transportation Routes

Transportation routes throughout the work area will be located in the support zone (Figures 2-1 and 2-2). Contaminated material hauled along transportation routes will be covered and secured to prevent the release of contamination. The Transportation Plan provides additional transportation route details (Appendix C).

2.1.8 Water Supply

Water supply sources will be established in the work area to provide adequate water resources for use with dust control and equipment decontamination. A temporary storage and distribution system will be established such that the existing TCS water supply can be used for Soil NTCRA activities without interfering with compressor station operations. The water supply valves located along NOTH and within the lower yard of the TCS will be used to fill temporary freshwater storage tanks (estimated capacity of up to 21,000 gallons each). The tanks will be used to fill water trucks for dust suppression along dirt roads, at excavations, or during mechanical separation (Figure 2-2). The water supply valve located on the TCS will be plumbed to a temporary network of aboveground distribution lines to convey water from the TCS to BCW, as necessary (Figure 2-2).

2.1.9 Runon, Runoff, and Track-out Controls

As part of site setup and mobilization, establishment of soil erosion and sediment, as well as track-out controls, will be conducted as necessary in the equipment staging areas, excavation areas, and along access routes so that soil removal activities do not adversely impact downgradient surface water bodies and floodplains or cause track-out onto paved roads. Appropriate runon and runoff controls and other BMPs will be implemented and maintained in accordance with the BMP Plan (Appendix D).

2.1.10 Biological Resource Protection

Protection of biological resources including plants starts with the ERTC planning process. As part of the ERTC planning, a PG&E biologist performs a desk-top review of the requested work area in relation to the sensitive resources and specifies any needed measures to protect the resources. In addition, during the "Last Look," any inputs from Tribal Monitors on plant protection will be discussed and incorporated into the construction planning as appropriate.

Methods to be employed for the protection of plants include high visibility fencing, traffic cones, and/or flagging around plants, along with other methods as identified by the project biologists.

2.1.11 Fugitive Dust Control

Engineering controls for the abatement of airborne particles during dust-generating activities (for example, excavation, soil processing, soil staging, and travel on dirt roads) will be strictly applied. This section presents the primary types of engineering controls that will be employed to control dust given the variety of material types that will be encountered and the variety of removal methods that may be implemented. Section 2.2 describes air and dust monitoring procedures and risk-based action levels.

2.1.11.1 Wetting

Ground surface and targeted wetting will be the primary dust suppression method during removal activities. The spray can be applied by either equipment (for example, a water truck) or handheld hose lines. A water truck will be used in the loading area and on haul roads at the perimeter of the site and where trucks enter and exit the edge of the EZ. Typically, water is applied at the minimum amount needed to moisten the ground surface and to prevent dust lifting into the air such that excess runoff is not generated. Water may be applied as a pre-wetting step in addition to use during removal and excavation activities. Handheld hose lines with high-pressure emitters will be used to emit a mist or fog for suppression of dust from mechanical removal activities.

Water application rates will be optimized to the greatest practical extent while still maintaining dust control but reducing runoff from affected material. BMPs will be established prior to the removal action to minimize transportation of excess dust suppression water and contamination.

Application of dust suppression water will be closely monitored to minimize ponding or runoff. If needed, additional runoff control measures (including waddles, temporary berms, or silt fencing) will be employed.

2.1.11.2 Application of Commercial Dust Control Products

Surface application of commercial dust control products will be used to provide dust control where removal is either temporarily halted or completed. These are typically polymer- or guar-based slurries. Products selected for the project will be environmentally low-impact, organic-based stabilization materials, such as Soil-Tac or similar products. Potentially a surfactant (wetting agent) will be mixed with water in some dust control applications to improve water penetration below the surface.

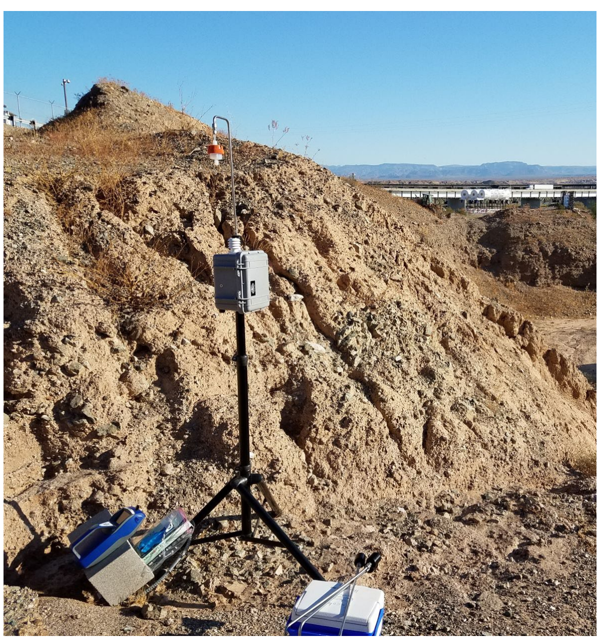
2.2 Perimeter Air Monitoring

Air monitoring will be conducted during the removal action to evaluate the ongoing effectiveness of the dust control program; to guide modifications to field activities and engineering control measures, if necessary; and to document that removal action activities do not result in the migration of soil contaminants beyond the work area boundaries.

The Air Monitoring Plan in Appendix E describes the program and procedures to be implemented during Soil NTCRA activities at the Topock site. Perimeter air monitoring will be performed during the Soil NTCRA activities that have the potential to generate visible dust (for example, excavation, mechanical screening, backfilling, material loading, etc.) and/or during periods of high winds (refer to ARAR #17, Mojave Desert Air Quality Management District [MDAQMD] Rule 403, Fugitive Dust, in Table 4-1 in Section 4). Perimeter air monitoring does not need to be performed during Soil NTCRA activities that are not dust-generating (for example, biological and cultural surveying, land surveying, underground utility surveying, etc.). The air monitoring program will consist of both real-time fugitive dust monitoring and perimeter air sampling for select soil contaminants.

Real-time fugitive dust monitoring will be conducted with a handheld dust monitor:

Perimeter air sampling will be conducted with a stand-mounted sampler:



2.2.1 Air Monitoring Risk-based Levels of Concern

Risk-based levels of concern (LOCs) have been developed as a basis for project-specific action levels for the protection of receptors outside the work area. The work area boundary is defined herein as the EZ perimeter of a TAA or active waste management area. The LOCs, which represent conservative concentrations of compounds that receptors outside the work area could be safely exposed to during construction, have been evaluated for all compounds that have been detected in soil samples collected at the site during prior investigations.

The LOCs have been developed using these assumptions:

- Receptors are present outside the perimeter of the work areas.
- Exposure via inhalation is 10 hours per day, 5 days per week.
- Duration of the Soil NTCRA is estimated to be 5 months.

The LOCs were developed using standard U.S. Environmental Protection Agency (USEPA) and DTSC risk assessment methodology, toxicology data, and exposure assumptions (USEPA 2009, 2021; DTSC 2020). Both cancer and noncancer health effects were considered. For each type of health effect, the LOC was calculated from an established target or from acceptable cancer risk or noncancer hazard when USEPA or DTSC toxicity values are available. These compounds include the following:

- Cr(VI)
- Mercury
- D/F

There are no human health toxicity values for total chromium, copper, lead, molybdenum, and zinc. The LOCs for cancer effects are based on a target excess cancer risk of one in a million (1×10^{-6}). The LOCs for noncancer effects are based on a target hazard quotient of 1.

LOCs for compounds detected in soil samples are presented in the Air Monitoring Plan (Appendix E) and used to determine the action levels described in the next subsection.

2.2.2 Action Levels

The project-specific action levels (Sections 2.2.2.1, 2.2.2.2, and 2.2.2.3) were developed as an indicator to determine whether additional dust control measures are necessary. If fugitive dust levels cannot be controlled to less than action levels with implementation of the measures, work will stop or be modified until additional controls can be implemented to reduce dust generation from the work area. The project-specific action levels are discussed in more detail in the Air Monitoring Plan (Appendix E).

2.2.2.1 Fugitive Dust

The fugitive dust monitoring action level is 100 micrograms per cubic meter (µg/m^3) for a net (downwind minus upwind) dust concentration. This action level is based on MDAQMD Rule 403, Part C. A 10-hour time-weighted average of readings collected periodically during the workday will be used to document compliance with Rule 403. Water application during dust-generating activities will be the primary BMP to reduce the potential for fugitive dust (Appendix D).

2.2.2.2 Analytes Detected in Soil

Soil data from a prior site investigation were evaluated to calculate an airborne particulate action level (Appendix E). All compounds had allowable airborne particulate action levels greater than 100 µg/m^3, except for Cr(VI) at several locations. Therefore, keeping fugitive dust to less than 100 µg/m^3 will result in airborne particulate contaminant concentrations, other than Cr(VI), remaining less than their respective LOCs. Work areas where Cr(VI) concentrations in soil are greater than 37,000 micrograms per kilogram (µg/kg) could potentially exceed the LOC with fugitive dust concentrations less than 100 µg/m^3. Air sampling for Cr(VI) analysis will be conducted in these areas (that is, SWMU 1, AOC 1, AOC 9, and AOC 10) to confirm the LOCs are not exceeded. Air sampling details are provided in the Air Monitoring Plan (Appendix E).

2.2.2.3 Asbestos

The asbestos action levels were calculated based on both USEPA and California Office of Environmental Health Hazard Assessment (OEHHA) inhalation unit risk (IUR) factors. The action levels assume target risk values of 10^{-6} and 10^{-5} for USEPA and OEHHA, respectively. The target risk values were selected because the resulting action levels are greater than the detection limit for the proposed sampling procedures. The asbestos action levels are described in more detail in the Air Monitoring Plan (Appendix E).

2.2.3 Constituents to be Monitored and Sampled

The air monitoring program includes the following components:

- Real-time monitoring using handheld instruments:
  - Fugitive dust
  - Wind speed and direction
- Air sampling using portable air samplers (comprising pumps and cartridges):
  - Cr(VI)
  - Mercury
  - D/F
  - Asbestos

2.2.4 Locations to be Monitored and Sampled

The following work areas will be monitored, sampled, or both during soil removal related activities at the site (Appendix E provides more details). Monitoring will only occur in these areas when there is a potential to generate visible dust. Depending on the field schedule, some work areas may be combined and monitored together.

Locations to be monitored and sampled are as follows:

- Real-time fugitive dust monitoring will be performed around all TAAs during activities that have the potential to generate visible dust, as well as the mechanical separation area and the SPY.
- Air sampling will be performed in at least one TAA per soil investigation area. The compounds that will be sampled will vary by TAA, with a sampling strategy that targets the locations with the greatest reported concentrations of those compounds in soil.
- Air sampling for Cr(VI), lead, mercury, and D/F in the mechanical separation area within the SPY will be performed periodically.
- Air sampling for asbestos will be limited to TAAs where ACM has been observed in prior field investigations, including AOC 1 TAA 2, AOC 14 TAA 1, and AOC 27 TAA 1. Perimeter air monitoring may also be performed at other TAAs at the site if ACM is discovered during construction activities.

2.2.5 Personal Monitoring

Workers within the EZ will be monitored in accordance with the PHSEP (Appendix B) to assess the exposure of airborne contaminants. Action levels for EZ monitoring will be based on OSHA PELs.

Direct reading instrumentation for total dust will be used as a screening tool to estimate anticipated amounts of specific compounds. These data can be used to modify the level of PPE protection, if necessary.

2.3 Soil Removal, Management, and Final Disposition

This section describes the primary removal methods that will be employed to remove contaminated soil and debris from the TAAs. Additionally, the processes for management and disposition of displaced materials are also summarized. The Transportation Plan provides details for the movement of material within the site and offsite disposal (Appendix C). The Waste Management Plan provides details about the characterization and disposal of wastes generated during the Soil NTCRA (Appendix F).

It is anticipated that a variety of techniques and equipment will be employed at different TAAs to maintain the safety of site workers and to minimize the overall footprint of the removal action to the extent practicable. As is typical, preconstruction activities, such as daily tailboard meetings, site clearance, and field surveys, as well as office work, will likely occur outside of this time window. PG&E will propose details regarding specific removal equipment and methods selected for individual TAAs. PG&E will be responsible for the effectiveness and safety of each removal technique and will determine whether modifications are required.

2.3.1 Manual Collection and Excavation

Field personnel will work on foot to collect soil and debris in areas where the use of mechanical equipment is infeasible or unsafe. Manual collection is only planned for soil and debris within the top 6 inches of the ground surface. Typically, materials will be gathered either by hand or with hand tools and will be carried to a waiting haul truck or mobile container for transport to a waste management area. Field personnel working on slopes will be secured using OSHA-approved methods and equipment, as detailed in the PHSEP (Appendix B).

2.3.2 Mechanical Excavation

Mechanical excavation will be the primary removal method during the Soil NTCRA. Standard-reach and long-reach excavators will be employed where practical to perform soil and debris removal. Actual equipment and excavation methods will be provided by PG&E prior to removal actions. The approach for mechanical excavation will differ slightly at each TAA based on the depth and type of contamination and the location and physical features of the excavation area. Progression of the excavation activities, confirmation soil sample collection, and subsequent decision making is detailed in Section 2.4. Section 3 provides a proposed approach for excavation activities at the individual TAAs using the logic and process described in Section 2.4.

Mechanical excavation will be conducted in a precise manner that minimizes disturbance to native material surrounding the target soil and debris, and to prevent the spread of contaminated material outside of the TAA. Equipment will remain outside of the TAA excavation, where possible, and the equipment bucket will not be overloaded such that material falls from the bucket during placement in haul trucks. Dust control techniques will be used during removal activities to control fugitive dust (Section 2.1.11 provides dust control details).

Excavated soil and debris may be temporarily stockpiled within the TAA or transferred directly to haul trucks for transport to a waste management area. Significant stockpiling at individual TAAs is not anticipated; but if required, individual stockpiles will follow the requirements summarized in Section 2.3.3 and detailed in the BMP Plan (Appendix D). However, no bottom liner will be required if the stockpile is located within the extent of the TAA on potentially contaminated soil that is slated for removal. If sufficient space is not available for temporary stockpiling within the extent of the TAA, then soil will be loaded directly to haul trucks.

Prior to beginning intrusive operation, PG&E will prepare an excavation plan to detail the planned methods to ensure excavation safety. Worker safety related to activities to be conducted near the excavation, including excavation access, will be managed in accordance with the PHSEP (Appendix B). Open excavations will be secured at the end of each day to minimize the potential for human or wildlife falls or entrapment. Egress ramps will be constructed to allow for safe entry and exit from excavations.

2.3.3 Stockpile Construction and Management

Stockpiling of excavated material will be required prior to mechanical separation and final disposition of the separated materials. Construction and management of stockpiles will be conducted in accordance with the BMP Plan (Appendix D). In summary, stockpile areas will be adequately delineated with fencing, concrete jersey barriers, or similar and labeled to indicate the material present within the area. Runon and runoff control measures and BMPs will be implemented and inspected weekly and at least daily during inclement weather and the day before forecasted inclement weather. Temporary stockpiling within a TAA will not be planned to occur during times when staff are not onsite. Stockpiles are expected to be required for the following materials:

- Excavated soil and debris – Soil and debris from the individual SWMU 1 and AOC 1 will be hauled to the SPY and stockpiled near the receiving end of the mechanical separator. Temporary staging of excavated soil and debris may also be required at individual TAAs prior to transport to the SPY. Excavated soil and debris that does not require mechanical separation will be stockpiled separately at the SPY or Transwestern Bench staging area.
- Coarse materials – Screened material larger than 3/8-inch diameter will be stockpiled in the SPY near the discharge end of the mechanical separator for later reuse. As space allows, temporary staging of 6-inch-plus material may occur in the BCW prior to reuse.
- Fine materials – Screened material smaller than 3/8-inch diameter will be stockpiled in the SPY near the discharge end of the mechanical separator. The fine material will be stockpiled pending characterization and transport for offsite disposal.
- Visibly contaminated materials – Debris, burnt material, and discolored soil will be stockpiled separately in the SPY for offsite disposal without mechanical separation. Containers or tarps may be used at the SPY for hard-to-manage wastes such as white powder or grossly contaminated material. Characterization and disposal of these wastes will be expedited. Soil from AOC 10 TAA 1 is expected to be segregated from material from other TAAs. The Transwestern Bench Soil Management Area and/or TCS may be used to temporarily stage visibly contaminated material prior to off-site disposal.

2.3.3.1 Post-Stockpile Confirmation Soil Sampling

Upon completion of stockpiling activities, soil samples will be collected from locations of former stockpiles. Sampling will be conducted to confirm that stockpile contents have been removed and that soils beneath the former stockpiles are not impacted by Soil NTCRA activities.

Post-stockpile confirmation soil sampling is only anticipated to be required at the SPY. Post-stockpile confirmation soil sampling is not anticipated within TAAs because temporary stockpiles will be placed on soil slated to be excavated. Furthermore, post-stockpile confirmation soil sampling is not anticipated at the Transwestern Bench soil staging area because the ground surface in this area is concrete.

A five-point composite sample will be collected for every 10,000 square feet (ft^2) of former stockpile base. Sample collection will be performed in accordance with *SOP-B14 Standard Operating Procedures for Sample Collection* (Appendix H). After collection, the sample will be homogenized in accordance with *SOP-B7, Homogenization of Sediment and Soil Samples* (Appendix H). The sample preparation will be performed in appropriate PPE at a dedicated workstation set up within the EZ. Sample container exteriors will be decontaminated before leaving the EZ. Actual sample locations will be documented in the Soil NTCRA Completion Report.

Post-stockpile confirmation sample analyses will include:

- Metals:
  - USEPA SW-6010B – Chromium, Copper, Lead, Molybdenum, and Zinc
  - USEPA SW-7471A – Mercury
  - USEPA SW-7199/SW-3060A – Hexavalent Chromium
- D/F by USEPA SW-8290 (expressed as tetrachlorodibenzo-p-dioxin toxic equivalents)

Confirmation analysis will follow standard method protocols and will be validated according to the *Quality Assurance Project Plan Addendum for the RCRA Facility Investigation/Remedial Investigation for Soil at the Topock Compressor Station* (Jacobs 2019; presented in Appendix L).

Post-stockpile confirmation soil sample results will be compared to results from baseline samples collected in 2018 prior to PG&E use of the SPY.

2.3.4 Mechanical Separation

Excavated soil and debris will be mechanically separated onsite using a sequential combination of equipment, such as a bar screen, hopper, trommel, or vibratory screening tables (or some combination of these). Mechanical separation operations will be conducted to separate coarse materials (larger than 3/8-inch diameter) from fine materials (smaller than 3/8-inch diameter). An initial screening to remove material larger than 6 inches may also be implemented for materials excavated from TAAs within BCW. The removal of material larger than 6 inches will significantly reduce the weight and volume of material requiring transportation out of BCW and to the SPY for the final 3/8-inch separation. Coarse grained materials in soil to be excavated from AOCs 9, 10, and 11 is expected to be limited, as is the total volume to be removed; therefore, this material will not undergo mechanical separation. All excavated soil from AOCs 9, 10, and 11 will be transported offsite for disposal. Additionally, due to the presence of extensive entrained debris, the mechanical separation of excavated soil from AOC 14, AOC 16, and AOC 27 is not anticipated.

Mechanical separation equipment for the final 3/8-inch separation will be located at the SPY (Figure 2-1). During the contracting and procurement process, PG&E will provide equipment specifications, layout, and process details. Temporary engineering controls, such as fencing, k-rails, or jersey barriers, may be installed around mechanical separation equipment and associated stockpiles in accordance with the BMP Plan (Appendix D). Dust suppression measures, such as water addition, will be implemented during mechanical separation as determined necessary by site conditions and established BMPs (Section 2.1.11 and Appendix D).

Coarse particles larger than 3/8 inch will be separated, stockpiled, and returned to the TAA excavations as backfill. Coarse material with significant residual staining and fine material (material smaller than 3/8 inch) will be collected for offsite disposal, as described in Section 2.3.6. Debris, burnt material, and discolored soil will be stockpiled separately for offsite disposal without mechanical separation.

2.3.5 Coarse Material Reuse

Coarse material (larger than 3/8-inch diameter) resulting from mechanical separation will be temporarily stockpiled and managed in accordance with the BMP Plan (Appendix D) prior to reuse. Once TAA soil sample results have confirmed that the RAOs have been achieved, stockpiled coarse material may be loaded into haul trucks and transported back to TAA excavations for reuse as backfill. Coarse material will be placed in the bottom of open TAA excavations. Material larger than 6-inch diameter generated during the initial screening in BCW may be placed on the surface of steeply sloped TAAs to reduce erosion. Section 2.3.7 provides additional details.

2.3.6 Waste Management and Fine Material Disposal

For this Work Plan, waste is defined as materials that will be hauled offsite. Coarse material destined for onsite reuse following mechanical separation will not be considered a waste. Waste management is intended to provide procedures for the proper collection, staging, characterization, transportation, and disposal of waste generated during the Soil NTCRA.

Wastes generated during the Soil NTCRA will be managed in accordance with the Waste Management Plan (Appendix F) and are expected to include:

- Mechanically separated fine material smaller than 3/8-inch diameter
- Stained soil (including coarse material with significant residual staining)
- Debris and fill material, including wood, metal (such as cans, machine parts, and rebar), concrete, burnt debris, and white powder

- ACM (broken transite panels, pipe wrap)
- Decontamination waste and wastewater, used PPE, and refuse

These wastes will be segregated, containerized, or stockpiled in the SPY (Figure 2-1). Characterization of the wastes will be conducted in accordance with the Waste Management Plan (Appendix F) and subsequently profiled for offsite disposal. Soil that is determined to be unsuitable for onsite reuse in accordance with the Soil Management Plan will be transported to a PG&E-approved RCRA Subtitle D landfill for disposal. Waste classified as hazardous will be transported to a RCRA Subtitle C landfill for disposal. Consistent with current site practice, PG&E will request DOI's approval of a RCRA Subtitle C landfill prior to first shipment of waste.

The Transportation Plan (Appendix C) provides additional details about waste transportation and disposal facility information.

2.3.7 Postconstruction Backfill, Cleanup, Site Stabilization, and Erosion Control

Backfill of TAA excavations will be completed upon confirmation that removal actions have met the RAOs. TAA excavations may be backfilled with coarse material resulting from mechanical separation of excavated material or excess site material from other projects at the TCS deemed acceptable for reuse currently staged at the SPY. Coarse materials from mechanical separation will be placed in the bottom of TAA excavations. Excess site soil will be used to complete the TAA excavations up to the original surface grade and in locations where well-graded soils will be beneficial to meet compaction and slope stability requirements. Soil used for excavation backfill will be placed in 8-inch-thick loose lifts and compacted to 90% of the maximum dry density in accordance with the Fill and Backfill Specification provided in Appendix G.

The following TAAs are located on steeply sloped ground and may require additional compaction and slope stability considerations:

- SWMU 1 TAA 3
- AOC 1 TAA 1
- AOC 9 TAA 1
- AOC 10 TAA 1
- AOC 27 TAA 1

In addition, all unused material, equipment, and Stormwater Pollution Prevention Plan (SWPPP) BMPs will be removed; and the work area will be returned to its preconstruction condition to the extent practicable. Consistent with current site practice, PG&E will invite DOI, the land manager, the land owner, and Tribes to a site walk for a final inspection of each work site prior to project closeout.

2.4 Sample Collection, Screening, and Confirmation Analysis

This section presents the approach to soil sample collection, screening, and confirmation analysis during removal activities. The extent of removal activities will be guided by a phased approach to screening and confirmation laboratory analysis. Screening level and confirmation level data obtained during this process will be compared to the numerical RAGs referenced in the DOI Action Memorandum and presented in Table 1-2 of this Work Plan.

A diagram of the decision process for the screening and confirmation analysis of material encountered during removal is presented on Figure 2-3 and summarized as follows:

1) Excavation within the extent of the TAA boundaries will be conducted to remove soil contamination as specified in Section 3.
2) Soil samples will then be collected for screening and confirmation laboratory analysis. Sample collection methods and frequency are described in Section 2.4.1.

3) A portion of the sample will be segregated for field screening of metals using a field-portable X-ray fluorescence (XRF) analyzer (Section 2.4.2). If screening level results indicate metal concentrations exceed the numerical RAGs, then removal will continue in accordance with the removal approach detailed in Section 3.
4) When field screening level results indicate metals concentrations are less than the numerical RAGs, a portion of the sample will then be segregated for confirmation laboratory analysis of metals and D/F. If confirmation results indicate metals and D/F concentrations exceed the numerical RAGs, then removal will continue in accordance with the removal approach detailed in Section 3.
5) Removal is complete when numerical RAGs have been achieved or when further excavation is deemed unsafe or undesirable based on TAA-specific limiting criteria presented in Section 3.
6) Upon completion of the soil removal, the final confirmation sample results will be used to recalculate the post-removal action risk at the site.

If additional removal activities are required for a given area based on this process, the screening process will restart with the collection of a new soil sample from the freshly exposed surface. Additional details associated with this process are provided in the following subsections.

The confirmation laboratory analysis described in Item 4 will include quantitative analytical screening for D/F using method SW4025. Method SW4025 is an immunoassay process capable of providing accurate quantitative results for TEQ (the D/F toxicity equivalent value used in the numerical RAGs, Table 1-2). The method, however, does not provide the individual D/F compound concentrations required for risk calculations and is not approved in California for confirmation sampling and decision-making. The use of SW4025 as a quantitative screening step will allow for results in 48 hours, whereas the SW8290 method will require a minimum of approximately 3 to 5 weeks before results are returned. Due to the concern of leaving excavations open for an extended period, excavations may be backfilled upon receipt of SW4025 results indicating D/F concentrations are less than the numerical RAGs. Samples identified by SW4025 as having D/F concentrations less than the numerical RAG will have their split samples analyzed for D/F using SW8290. If confirmation results using SW8290 confirm the SW4025 results, then the excavation will be considered complete. If confirmation results using SW8290 indicate that D/F concentrations in the excavation exceed the numerical RAG, then DOI will be consulted, and continued excavation may be required, including backfilled areas.

2.4.1 TAA Excavation Soil Sample Collection

Upon completion of initial removal activities, or when required due to sample results exceeding the numerical RAGs, one discrete soil sample will be collected for every 50 linear feet (LF) of excavation sidewall and for every 1,000 ft^2 of excavation base. For smaller excavations, a minimum of four sidewall samples and one excavation base sample will be collected. Enough volume will be collected from the sample locations to allow for screening and confirmation analysis, if needed.

Sample collection will be performed in accordance with *SOP-B14 Standard Operating Procedures for Sample Collection* (Appendix H). After collection, the sample will be homogenized in accordance with *SOP-B7, Homogenization of Sediment and Soil Samples* (Appendix H). The sample preparation will be performed in appropriate PPE at a dedicated workstation set up within the EZ. Sample container exteriors will be decontaminated before leaving the EZ. Actual sample locations will be documented in the Soil NTCRA Completion Report.

2.4.2 Field Screening for Metals

Soil samples will be screened for metals in the field using the XRF analyzer or equivalent. All XRF screening will be performed in accordance with *SOP-B16, Field-portable X-Ray Fluorescence Soil Sampling* (Appendix H). XRF results will be compared to the numerical RAGs on a point-by-point basis. XRF analyzer results will be correlated to analytical laboratory data as it becomes available.

If field screening results for metals exceed the numerical RAGs, then removal of soil and debris will continue in the areas where the exceedances occur.

If field screening results for metals are less than the numerical RAGs, then a portion of the soil sample will be submitted for laboratory metals and D/F analysis.

2.4.3 Confirmation Laboratory Analysis for Metals and Dioxins and Furans

Once field screening results for metals (via XRF) are less than numerical RAGs, then split soil samples will be submitted via express courier to analytical laboratories for confirmation analysis. Samples will be submitted to Cape Technologies in South Portland, Maine for analysis of D/F via immunoassay and Asset Laboratory in Las Vegas, Nevada for analysis of D/F and metals.

Cape Technologies quantitative analytical screening will include:

- D/F by USEPA SW-4025/Immunoassay (expressed as tetrachlorodibenzo-p-dioxin toxic equivalents)

Asset Laboratories confirmation analyses will include:

- Metals:
  - USEPA SW-6010B – Chromium, Copper, Lead, Molybdenum, and Zinc
  - USEPA SW-7471A – Mercury
  - USEPA SW-7199/SW-3060A – Hexavalent Chromium
- D/F by USEPA SW-8290 (expressed as tetrachlorodibenzo-p-dioxin toxic equivalents)

The laboratories will be instructed to first analyze the soil samples for metals and for D/F using SW4025, the immunoassay method. This initial D/F immunoassay analysis provides quantitative analytical screening results with an expedited turnaround time of approximately 48 hours. If metals and D/F results are less than the numerical RAG, then the sample will be analyzed for D/F using SW8290. While the sequential analysis will delay the start of the D/F analysis using SW8290 by approximately 2 days, it will prevent the costly, lengthy, and unnecessary D/F analysis of samples with metals that exceed the numerical RAGs.

Confirmation analysis will follow standard method protocols and will be validated according to the *Quality Assurance Project Plan Addendum for the RCRA Facility Investigation/Remedial Investigation for Soil at the Topock Compressor Station* (Appendix L).

The results of confirmation laboratory analysis of soil samples will be compared to the numerical RAGs. Initially, the comparison will be done on a point-by-point basis. If confirmation results are less than the numerical RAGs, then no further removal is necessary from the TAA. If confirmation results exceed the numerical RAGs on a point-by-point basis, and if 8 to 10 samples have been analyzed from the same TAA, then average concentrations for the contaminants that exceed the numerical RAG may be calculated as the 95UCL of the mean, using ProUCL Version 4.0 software (USEPA 2007). Average concentrations will not be calculated at TAAs with less than 8 confirmation soil samples.

If average contaminant concentrations are less than the numerical RAGs, then no further removal is necessary from the TAA. If average contaminant concentrations exceed the numerical RAGs, then removal will continue from the portion of the TAA where contaminant concentrations exceed the numerical RAGs. Upon completion of the additional soil removal, a new confirmation soil sample(s) will be collected and analyzed for the full suite of parameters (Section 2.4.3). The 95UCL will be recalculated with the new data, excluding the results which represented the soil excavated during the additional removal. Removal actions will continue until the average concentration is less than the numerical RAG or as specified in Section 3.

2.4.4 Quality Control

Field QC samples will be collected during the Soil NTCRA in accordance with the *Quality Assurance Project Plan Addendum* (Appendix L) and will include:

- Field duplicate (FD): An FD is a sample collected at the same time and location as a normal sample to monitor the precision of the field sampling process and the laboratory analytical process. FDs for soil will be collected at a frequency of 10%.
- Matrix spike and matrix spike duplicate (MS/MSD): An MS is a normal sample that is spiked by the laboratory with a known concentration of target analytes and then carried through the entire preparatory and analytical procedure. The MSD is an intralaboratory split of the same sample that is also spiked in the same manner. MS/MSDs are used to monitor bias for an analytical method in a given matrix and the precision and accuracy of the laboratory analytical procedure. Additional sample material will be collected as needed to allow the laboratory to analyze the MS/MSDs. MS/MSD for soil will be collected at a frequency of 5%.
- Equipment blank (EB): After the sampling equipment is fully decontaminated, it is rinsed with deionized water, and a subsample of this rinsate is collected as the EB. The EB is preserved and handled in the same manner as the normal field samples and analyzed for the same analytical parameters as the normal samples collected with that equipment that day. The EB is used to monitor potential cross-contamination that could be caused by improper equipment decontamination. EBs will be collected at a rate of one per day for samples that do not involve dedicated or disposable sampling equipment so are at risk for cross-contamination due to improper equipment decontamination.

2.5 Decontamination

2.5.1 Equipment Decontamination Facility

A portable equipment decontamination facility will be constructed to properly decontaminate equipment by mechanical means as well as with the use of high-pressure, low-volume hot water when necessary. Equipment that has entered the EZ and has been affected by contaminated materials will be decontaminated in the CRZ upon exiting the EZ. An inspection record of equipment entering and exiting the EZ will be maintained onsite.

Decontamination rinse water will be captured and routed to temporary storage tanks and will be disposed offsite. Sediments collected from the decontamination facility will be transferred to the waste management area and will be combined with the appropriate waste stream for offsite disposal.

2.5.2 Personnel Decontamination Facility

The personnel decontamination area will be located in the CRZ and provide the facilities for personnel and visitors to put on and take off their PPE as they enter and exit the EZ. The decontamination area will have an entrance from the support zone where personnel will remove and store their clean street clothing and personal items and put on clean PPE. An entrance to and from the EZ will be located at the opposite end of the decontamination area, where personnel will remove their PPE as they exit the remediation area. The personnel decontamination facility will be equipped with the following facilities:

- Potable water
- Emergency shower
- Sanitary facilities
- Boot wash and boot rack
- Appropriate storage facilities where spent PPE can be disposed

Decontamination rinse water will be captured and routed to temporary storage tanks and will be disposed offsite. Sediments collected from the decontamination facility will be transferred to the waste management area and will be combined with the appropriate waste stream for offsite disposal.

2.6 Health and Safety Approach

The health and safety of all personnel, contractors, observers, and visitors is of the utmost importance on this project. No task will be performed that cannot be performed safely. This will be accomplished by the preparation and implementation of a PHSEP. The PHSEP is a guide and will not take precedence over PG&E's site-specific PHSEP prepared for implementation of this Work Plan. The PHSEP provided in Appendix B is a draft and will be updated prior to the start of the Soil NTCRA. Additionally, a lane closure plan will be prepared and approved prior to removal actions at AOC 14 TAA 1 due to its location adjacent to I-40.

The purpose of the PHSEP is to provide a basic framework for the safe handling and removal of chemically affected soil during the Soil NTCRA. Each PG&E subcontractor will be required to prepare and submit for acceptance a PHSEP that addresses their operations on this project.

All personnel, visitors, and observers entering the EZ will be required to read and sign a signature sheet, acknowledging that they have read, understood, and will comply with the provisions of the PHSEP. PG&E personnel will be required to acknowledge understanding and conformance with their PHSEP.

The Cal/OSHA HAZWOPER standard located in 8 CCR 5192 (Federal OSHA 29 CFR 1910.120) in Section (g) 1 A states that engineering controls and work practices will be instituted to reduce and maintain employee exposure to or less than the PELs of substances regulated by 8 CCR 5155, except to the extent that such controls and practices are not feasible. Work practices that may be feasible include removing all nonessential employees from potential exposure.

The designated Project Safety Officer (PSO) will coordinate aspects of the site health and safety activities under the direction of the Project Manager. The PSO will be responsible for the overall health and safety of PG&E and visitors and observers assigned to the project and for advising each subcontractor of the potential hazards and the minimum general requirements of the PHSEP. Specific site duties will include to the following:

- Reviewing and accepting subcontractors for conformance with the PHSEP (Appendix B)
- Providing guidance to subcontractors regarding air monitoring
- Notifying the proper response agency in the event of an emergency
- Leading investigations of any health and safety-related incidents that may occur on the project

Each subcontractor onsite must have a Safety Liaison (SL). The SL will be responsible for the implementation of their PHSEP. The SL will also be responsible for the following activities:

- Providing field supervision
- Establishing and maintaining restricted work areas
- Enforcing safe work and hygiene practices
- Requiring proper use of PPE
- Communicating approved modified safety requirements to site personnel

Specific site duties will include the following:

- Conducting health and safety field meetings
- Conducting daily safety inspections
- Maintaining a first aid kit
- Providing first aid as necessary
- Conducting site-specific employee training and information sessions
- Conducting air monitoring as directed
- Completing the necessary recordkeeping
- Maintaining, inspecting, and controlling an adequate inventory of safety equipment at the site
- Monitoring site decontamination procedures

PG&E will also be required to submit a detailed Job Safety Analysis on each method.

Site visitors and observers will be required to comply with the provisions of the PHSEP, including training, PPE, and decontamination requirements. Every effort will be made to provide a safe area from which to observe site activities. However, the safety of the visitors, observers, PG&E, and subcontractor personnel is the primary concern; and visitors and observers must comply with direction from the PSO or subcontractor SL whenever there is a safety concern on the site.

3. Anticipated Progression of Work

This section presents details associated with the initial approach to the implementation of the Soil NTCRA at the individual TAAs. The described approaches are intended to meet the RAOs identified in the Action Memorandum based on the current understanding of the TAA. However, because the nature and extent of contaminants may vary at the TAAs, it may be necessary to modify the approach during the removal action as additional data are collected. Regardless of modifications to the approach, methods, equipment, and processes identified in Section 2 will be used.

Prior to beginning work, and throughout implementation of the Soil NTCRA, close coordination and regular communication with TCS staff and groundwater remedy construction engineers will occur to ensure Soil NCTRA does not interfere with other site projects and to allow for possible efficiencies in work were Soil NTCRA excavation areas intersect with other projects, including groundwater remedy construction.

The anticipated workflow at each individual TAA is as follows:

1) Survey TAA location, establish extent and boundaries of the initial excavation, confirm site access and safety, and establish work zones.
2) The TAA will be initially examined for evidence of debris or other materials that must be removed prior to excavation and mechanical separation. Debris will be removed and transported to the SPY Waste Management Area. Soil within the TAA will then be excavated based on the initial assessment provided in Section 3.1. If the TAA's contamination is evident based on the presence of stained soil, powders, debris, etc. (RAO 3 is not met), then excavation will continue until evidence of stained soil has been removed. If the TAA's contamination is not visually evident, then excavation will continue until the soil is removed within the lateral extent of the TAA and to the initial depth identified in Section 3.1 subsections.
3) Once the initial TAA excavation is complete, soil samples will be collected for screening level and confirmation level analysis, as described in Section 2.4.
4) If confirmation level analysis indicates contaminant concentrations at the extent of the excavation are less than the numerical RAGs or the average concentration is less than the numerical RAGs (as described in Section 2.4.3), then removal will be considered complete.
5) If screening level or confirmation level analyses indicate contaminant concentrations at the extent of the excavation exceed the numerical RAGs and the average concentration exceeds the numerical RAG, then removal will continue in the portion of the excavation where the exceedance is present.
6) Upon completion of the additional soil removal, a new confirmation soil sample(s) will be collected and analyzed for the full suite of parameters (Section 2.4.3). The 95UCL will be recalculated with the new data, excluding the results which represented the soil excavated during the additional removal.
7) Removal actions will continue until the average concentration is less than the numerical RAG. If further excavation would encroach upon biologically or culturally sensitive areas, undermine utilities, be deemed unsafe, or extend beyond 10 feet deep, then work will stop in that area, and the DOI and USFWS, as well as other involved parties (e.g., Tribes, PG&E operations, etc.) will be notified.
8) Postconstruction Backfill, Cleanup, Site Stabilization, and Erosion Control activities (Section 2.3.7) can be conducted once removal actions are complete at a TAA.

3.1 Location-specific Removal Action Approach Details

The removal actions conducted during the Soil NTCRA will be limited to the TAAs identified in the Action Memorandum (DOI 2021a). It is important to note that the extent of the TAAs identified in the Action Memorandum (and shown on Figures 1-4 through 1-7) are approximate and were developed during the EE/CA to estimate the removal volumes and costs. Table 3-1 (Exhibit 3-3 of the EE/CA), presented at the end of Section 3, provides the EE/CA estimated extent and depths of the TAAs to be addressed during this Soil NTCRA. Table 3-2 at the end of Section 3 provides a summary of the contaminant concentrations exceeding the numerical RAGs and the maximum depth of exceedances at each TAA.

The initial excavation depths presented in the following subsections are based on the results of historical soil samples and intended to provide a starting point to remove the majority of the soil and debris exceeding the numerical RAGs. The actual removal area extent and depth will be guided by the phased approach of field screening and confirmatory sampling described in Section 2.4. The following subsections describe the initial removal action approach for each TAA and include:

- Accessibility as determined by paved and unpaved roads, site topography, or other site features
- Anticipated waste types and contaminants that may be encountered
- Initial approach to excavating, staging, and loading of soil and debris from the TAA

3.1.1 SWMU 1 – Former Percolation Bed – TAA 1

SWMU 1 TAA 1 is located in BCW west of the TCS and is primarily on PG&E property (Figure 1-4 and Photograph 3-1). The southwestern corner of the TAA extends onto HNWR property. The TAA is readily accessible to construction vehicles from the west via the unimproved access road in BCW.

The excavation area is flat, sparsely vegetated, and covered with depositional sands and gravels from BCW. The area to the east of the TAA is steeply sloped and will limit excavation in that direction. The area to the west of the TAA and outside of the main channel of BCW is HNWR land and will be avoided. Monitoring well MW-09 is located immediately to the south of the TAA and will be protected during the removal action.

Chromium and D/F contaminated soil and discolored soil is present within the TAA. Historical soil sample results (Appendix A) indicate the largest contaminant concentrations are located at depths up to 15 feet bgs. The initial excavation will remove discolored soil within the TAA up to a depth of 10 feet bgs prior to the collection of confirmation soil samples. Removal of contaminated soil at depths greater than 10 feet is beyond the limits of the RAOs. Excavation is expected to occur from the west of the TAA. An initial screening of 6-inch-plus material may be conducted at the BCW Waste Management Area (immediately to the north of the TAA) prior to load-out and transportation of the material to the SPY. The pipe connected to TCS-4 is present within TAA1 and will be removed per RAO 3. Additionally, the TCS-4 pipe coating contained D/F.

Postconstruction backfill, cleanup, stabilization, and erosion control described in Section 2.3.7 will be implemented.

Photograph 3-1. SWMU 1 TAA 1 Facing Northwest

3.1.2 SWMU 1 – Former Percolation Bed – TAA 2

SWMU 1 TAA 2 is located in BCW west of the TCS and straddles HNWR property to the west and PG&E property to the east (Figure 1-4 and Photograph 3-2). The TAA is readily accessible to construction vehicles from the west via the unimproved access road in BCW.

The excavation area is along the toe of the steep slope up to TCS, is sparsely vegetated, and consists of a mixture of depositional sands and gravels and fill material sloughing down the slope. Care must be taken when excavating the toe of the slope. Due to slope stability issues, excavation to the east will be limited to prevent undermining the hillside.

Chromium contaminated soil and discolored soil is present within the TAA. White powdery material is present due to historical impoundment of cooling tower water for percolation; the white powder will be removed from the TAA in accordance with RAO 2 and RAO 3. Historical soil sample results (Appendix A) indicate the greatest contaminant concentrations are primarily associated with whiter powder material located on the surface; however, natural sloughing and erosion through BCW has buried contaminants. The initial excavation will remove discolored soil within the TAA along the toe of the slope within approximately 3 feet of the surface prior to the collection of confirmation soil samples. Excavation is expected to occur from the west of the TAA. An initial screening of 6-inch-plus material may be conducted at the BCW Waste Management Area (immediately to the north of the TAA) prior to load-out and transportation of the material to the SPY.

Due to the continued sloughing of the hillside and potential for erosion that could undercut the hillside, the excavation surface may be backfilled with 6-inch-plus material.

Photograph 3-2. SWMU 1 TAA 2 Facing South

3.1.3 SWMU 1 – Former Percolation Bed – TAA 3

SWMU 1 TAA 3 is located on PG&E property at the top of the hillside above BCW, just outside the TCS fence line (Figure 1-4 and Photograph 3-3). Access to the TAA will be limited and is expected to be from east from the top of the slope. Temporary removal of the TCS fence may be required. Close coordination with the TCS staff will be required.

The excavation area is along the top of the steep slope, sparsely vegetated, and consists of fill material from construction of the TCS.

D/F and chromium contaminated soil is present within the TAA. Historical soil sample results (Appendix A) indicate contaminant concentrations are located on the surface. While deeper sample results are not available, extensive contamination is not expected at this TAA. The initial excavation will remove soil to the lateral extent of the TAA and to a depth of 1 feet bgs prior to the collection of confirmation soil samples. Excavation is expected to occur from the east of the TAA on TCS property. Due to the location and small size of the TAA, no initial screening of 6-inch-plus material will be conducted. Excavated soil will be hauled directly to the SPY for processing. Excavation may be by hand or vacuum extraction.

Site stabilization, erosion control, and backfill beyond surficial grading is not expected to be required due to the shallow depth of the excavation. If backfill is required, then the procedures described in Section 2.3.7 will be followed.

Photograph 3-3. SWMU 1 TAA 3 Facing East

3.1.4 AOC 1 – Area Around Former Percolation Bed – TAA 1

AOC 1 TAA 1 is located northwest of the TCS on Caltrans ROW (Figure 1-5 and Photograph 3-4). The TAA is located in BCW near the inlet to the culverts beneath I-40. The TAA is readily accessible to construction vehicles from the south via the unimproved access road in BCW. The excavation area is flat, sparsely vegetated, and covered with depositional sands and gravels from BCW. Steeply sloped hillsides are present to the east and west but are not expected to impact the removal actions. Monitoring well MW-11 is located near the TAA and will be protected during the removal action.

D/F contaminated soil is present within the TAA. Historical sample results (Appendix A) indicate the greatest contaminant concentrations are located 2 to 3 feet bgs. The initial excavation will remove soil to the lateral extent of the TAA and to a depth of 3 feet bgs prior to the collection of confirmation soil samples. Excavation is expected to occur from the south of the TAA. An initial screening of 6-inch-plus material may be conducted at the BCW Waste Management Area prior to load-out and transportation of the material to the SPY.

Postconstruction backfill, site cleanup, and stabilization described in Section 2.3.7 will be implemented.

Photograph 3-4. AOC 1 TAA 1 Facing North

3.1.5 AOC 1 – Area Around Former Percolation Bed – TAA 2

AOC 1 TAA 2 is located in BCW west of the TCS on PG&E property (Figure 1-4 and Photograph 3-5). The TAA surrounds former injection well TCS-4 and its associated contamination. The TAA is readily accessible to construction vehicles from the south via the unimproved access road in BCW.

The excavation area is flat, sparsely vegetated, and covered with depositional sands and gravels from BCW. Several underground gas pipelines and aboveground valves are present in the area, but outside of the TAA boundaries, and will be protected with steel plates and barricades during removal actions. PG&E will coordinate with the local utility companies on protection measures for the underground pipelines.

Metals and D/F contaminated soil is present within the TAA. Additionally, pipe wrap material collected from the pipe formerly connected to TCS-4 contained ACM and was identified as a source of D/F (CH2M 2015b). Historical soil sample results (Appendix A) indicate the greatest contaminant concentrations are located between 5 and 10 feet bgs. The initial excavation will remove discolored soil within the TAA up to a depth of 10 feet bgs prior to the collection of confirmation soil samples. The pipe will be removed per RAO 3. Excavation is expected to occur from the south of the TAA. An initial screening of 6-inch-plus material may be conducted at the BCW Waste Management Area (immediately to the south of the TAA) prior to load-out and transportation of the material to the SPY.

Postconstruction backfill, site cleanup, and stabilization described in Section 2.3.7 will be implemented.

Photograph 3-5. AOC 1 TAA 2 Facing North

3.1.6 AOC 1 – Area Around Former Percolation Bed – TAA 3

AOC 1 TAA 3 is located on the eastern slope of BCW just west of the TCS on PG&E property (Figure 1-4 and Photograph 3-6). The TAA is readily accessible to construction vehicles from the west via the unimproved access road in BCW. The access road to the east of the TAA is only expected to be passable via 4-wheel drive truck.

The excavation area gently slopes to the west, is sparsely vegetated, and is covered with sands and gravels. Fill material from construction of the TCS and adjacent access road may also be present in the TAA.

Chromium and D/F contaminated soil is present within the TAA. Historical soil sample results (Appendix A) indicate the greatest contaminant concentrations are within 3 feet of the surface. The initial excavation will remove soil to the lateral extent of the TAA and to a depth of 3 feet bgs prior to the collection of confirmation soil samples. Excavation is expected to occur from the west of the TAA. An initial screening of 6-inch-plus material may be conducted at the BCW Waste Management Area prior to load-out and transportation of the material to the SPY.

Postconstruction backfill, site cleanup, and stabilization, as well as erosion control described in Section 2.3.7, will be implemented.

Photograph 3-6. AOC 1 TAA 3 Facing South

3.1.7 AOC 9 – Southeast Fence Line – TAA 1

AOC 9 TAA 1 is located immediately southeast of the TCS fence line on PG&E property (Figure 1-6 and Photograph 3-7). Access to the TAA is expected to be from the area adjacent to the air compressor building at the top of the slope. The area may also be accessed from the lower access road south of the area. Temporary removal of the TCS fence may be required if accessing from the upper portion of the slope. Close coordination with the TCS staff will be required.

The excavation area is along the top of the steep slope, sparsely vegetated, and consists of fill material from construction of the TCS.

A small amount of discolored surface soil (1.5 yd^3) was removed in 2000, but site conditions (the steepness and stability of the slope) limited the feasible extent of excavation at that time (CH2M 2007). Historical soil sample results (Appendix A) indicate metals and D/F contaminated soil is located within 3 feet of the surface. The initial excavation will remove soil to the lateral extent of the TAA and to a depth of 3 feet bgs prior to the collection of confirmation soil samples. Excavation is expected to occur from the top or bottom of the slope with a long-reach excavator. Due to the location and small size of the TAA, soil from AOC 9 will not be processed to segregate 3/8-inch and smaller materials. Excavated soil will be hauled directly to the SPY or Transwestern Bench staging areas for stockpiling prior to disposal.

Postconstruction site stabilization and erosion control of this TAA will require additional efforts to maintain slope stability. Backfill of the TAA excavation will be completed with well-graded soil to within approximately 1 to 2 feet of the existing site grade. The remaining excavation surface will be backfilled with riprap or similar material to provide erosion control.

Photograph 3-7. AOC 9 TAA 1 Facing West

3.1.8 AOC 10 – East Ravine – TAA 1

AOC 10 TAA 1 is located immediately southeast of the TCS fence line on PG&E property (Figure 1-6 and Photograph 3-8). Access to the TAA is expected to be from the improved dirt road that parallels NOTH to the south. This route provides access to the bottom of the slope. Access to the TAA will also be from the upper paved parking lot at the top of the slope. The parking shade structure may need to be temporary dismantled to allow access. Temporary removal of the TCS fence may also be required if accessing from the upper slope. Close coordination with the TCS staff will be required.

The excavation area is along the top of the steep slope, sparsely vegetated, and consists of fill material from construction of the TCS.

D/F and metals contaminated soil and discolored soil is present within the TAA. Historical soil sample results (Appendix A) indicate metals and D/F contaminated soil is present within approximately 2 to 3 feet of the surface. The initial excavation will remove discolored soil within the TAA to a depth of 3 feet bgs prior to the collection of confirmation soil samples. Excavation is expected to occur from the top and bottom of the slope with a long-reach excavator. Due to the grain size of the material and highly elevated concentrations in the TAA, soil from AOC 10 will not be processed to segregate 3/8-inch and smaller materials. Excavated soil will be hauled directly to the SPY or Transwestern Bench staging areas for stockpiling prior to disposal.

Postconstruction site stabilization and erosion control of this TAA will require additional efforts to maintain slope stability. Backfill of the TAA excavation will be completed with well-graded soil to within approximately 1 to 2 feet of the existing site grade. The remaining excavation surface will be backfilled with riprap or similar material to provide erosion control.

Photograph 3-8. AOC 10 TAA 1 Facing Northwest

3.1.9 AOC 10 – East Ravine – TAA 2

AOC 10 TAA 2 is located east of the TCS and straddles HNWR property to the east and PG&E property to the west (Figure 1-7 and Photograph 3-9). The TAA is readily accessible to construction vehicles from the northeast via the partially improved access road in the East Ravine.

Soils within the TAA are primarily depositional silts and sands. Excavation beyond the initial extent of the TAA is not expected, as topography controls the extent of impacts. A cluster of mesquite trees resides within the center of the TAA. Care will be taken to attempt to preserve the trees. Confirmation samples will be collected from the root balls of the trees. The trees will be removed if contamination appears to extend to beneath the trees. Monitoring well MW-58BR_S is located within the TAA and will be protected during the removal action.

The TAA was historically an impoundment for TCS discharge. Greenish-gray material associated with elevated chromium contamination and thin white powdery waste layers are present at the base of the East Ravine and within the TAA (CH2M 2009b). Historical soil sample results (Appendix A) indicate metals and D/F contaminated soil is present within approximately 3 feet of the surface. The initial excavation will remove discolored soil within the TAA to a depth of 3 feet bgs prior to the collection of confirmation soil samples. Excavation is expected to occur from the east. Due to the grain size of the material and highly elevated concentrations in the TAA, soil from AOC 10 will not be processed to segregate 3/8-inch and smaller materials. Excavated soil will be hauled directly to the SPY or Transwestern Bench staging areas for stockpiling prior to disposal.

Postconstruction backfill, site cleanup, and stabilization described in Section 2.3.7 will be implemented.

Photograph 3-9. AOC 10 TAA 2 Facing Southwest

3.1.10 AOC 10 – East Ravine – TAA 3

AOC 10 TAA 3 is located east of the TCS on HNWR property (Figure 1-7 and Photograph 3-10). The TAA is readily accessible to construction vehicles from the northeast via the newly paved access road that intersects the TCS access road.

Small electrical pull boxes and vaults to the north of the TAA will be protected with steel plates during the removal action.

The TAA consists of a small pile of D/F and metal contaminated soil that appears to have been dumped. It is expected that contamination is limited to the material above the surrounding surface grade. Historical soil sample results (Appendix A) indicate contaminated soil is limited to the top 1 foot of soil. The initial excavation will remove the pile and approximately 1 foot of soil beneath the pile prior to the collection of confirmation soil samples. Due to the grain size of the material and highly elevated concentrations in the TAA, soil from AOC 10 will not be processed to segregate 3/8-inch and smaller materials. Excavated soil will be hauled directly to the SPY or Transwestern Bench staging areas for stockpiling prior to disposal.

Postconstruction site cleanup and stabilization as described in Section 2.3.7 will be implemented. Erosion control and backfill beyond surficial grading is not expected to be required due to the shallow depth of the excavation.

Photograph 3-10. AOC 10 TAA 3 Facing Southeast

3.1.11 AOC 10 – East Ravine – TAA 4

AOC 10 TAA 4 is located east of the TCS on HNWR property (Figure 1-7 and Photograph 3-11). The TAA is readily accessible to construction vehicles from the northeast via the newly paved access road that intersects the TCS access road.

Soils within the TAA are primarily depositional silts and sands. A cluster of mesquite trees resides to the southwest of the TAA. While excavation near the root structure will be required during the removal action, care will be taken to preserve the trees.

The TAA consists of a small area of chromium and D/F contaminated soil that is likely the result of natural impoundment of TCS discharge water in the East Ravine. A thin white powder layer was observed at approximately 2 to 3 feet beneath the surface that coincides with the greatest contaminant concentrations (CH2M 2007). The initial excavation will remove discolored soil within the TAA to a depth of 3 feet bgs prior to the collection of confirmation soil samples. In addition to the excavation within the extent of AOC 10 TAA 4; soil will be removed from historical sample location L-3-2 (approximately 50 feet to the west) (Figure 1-7). Chromium contaminated soil was previously identified at L-3-2 in a surface soil sample (0-0.5 foot bgs) (Appendix A). Therefore, an initial excavation will remove soil in an approximately 100 ft^2 area around L-3-2 to a depth of 1 foot bgs prior to the collection of confirmation soil samples. Due to the grain size of the material and highly elevated concentrations in the TAA, soil from AOC 10 and L-3-2 will not be processed to segregate 3/8-inch and smaller materials. Excavated soil will be hauled directly to the SPY or Transwestern Bench staging areas for stockpiling prior to disposal.

Postconstruction backfill, site cleanup, and stabilization described in Section 2.3.7 will be implemented.

Photograph 3-11. AOC 10 TAA 4 Facing South

3.1.12 AOC 11 – Topographic Low Areas – TAA 1

AOC 11 TAA 1 is a topographic low area on the northeastern side of the TCS on HNWR property (Figure 1-6 and Photograph 3-12). Access to the TAA is via the improved dirt road that intersects NOTH near the TCS gate. However, the final 250 feet from the improved dirt road to the TAA is rough and likely only accessible to tracked vehicles or large rubber-tired heavy equipment.

Soil within the TAA is a mixture of depositional sands and gravel and possibly fill material from construction of the TCS.

Historical soil sample results (Appendix A) indicate Cr(VI) and D/F contaminated soil is present primarily within approximately 5 to 6 feet of the surface. However, contamination may also be present at depths up to 10 feet bgs. The initial excavation will remove soil to the lateral extent of the TAA and to a depth of 5 to 6 feet bgs prior to the collection of confirmation soil samples. Excavation is expected to occur from the north. Due to the grain size of the material and highly elevated concentrations in the TAA, soil from AOC 11 will not be processed to segregate 3/8-inch and smaller materials. Excavated soil will be hauled directly to the SPY or Transwestern Bench staging areas for stockpiling prior to disposal.

Postconstruction cleanup and site stabilization as described in Section 2.3.7 will be implemented. Backfill beyond surficial grading is not expected to be required due to the remote location and existing rough terrain.

Photograph 3-12. AOC 11 TAA 1 Facing South

3.1.13 AOC 14 – Railroad Debris Site – TAA 1

AOC 14 TAA 1 is located on the slope above BCW immediately north of I-40 on the Caltrans ROW (Figure 1-5 and Photograph 3-13). Access to the TAA will be directly from I-40. A traffic control plan will be submitted to Caltrans for the required lane closures.

The TAA contains miscellaneous debris including chunks of asphalt, railroad ties, and piping. ACM and burnt material from PG&E operations have also been disposed of within the TAA (CH2M 2007a). Burnt debris is located approximately 4 feet bgs and is the target of the removal action. Historical soil sample results (Appendix A) indicate metals and D/F contaminated soil is present primarily within approximately 5 to 6 feet of the surface. While the soil sample data indicate that contaminants in the middle portion of the TAA are less than the numerical RAGs, this portion of the TAA also contains debris and does not meet RAO 3.

The initial excavation will remove discolored soil and debris within the TAA to a depth of 5 to 6 feet bgs prior to the collection of confirmation soil samples. Soil and debris within the TAA will be excavated and loaded into haul trucks along I-40. Excavated material will be hauled directly to the SPY for processing. However, due to the presence of significant debris, mechanical separation of the material will not be conducted.

Although postconstruction cleanup and backfill beyond surficial grading for drainage away from I-40 is not expected to be required at the time of report preparation, the actual requirements will be determined in coordination with Caltrans.

Photograph 3-13. AOC 14 TAA 1 Facing North

3.1.14 AOC 16 – Former Sandblast Shelter

AOC 16 is located within the lower yard of the TCS on PG&E property (Figure 1-4 and Photograph 3-14). Access to the TAA will be through the TCS.

The TAA is flat and currently unpaved. Two different colors of apparent abrasive material (sandblast grit) are present on the ground. Samples collected from the sandblast grit (Appendix A) detected elevated levels of copper and molybdenum. The initial excavation will be conducted to remove sandblast grit within the TAA to a depth of 6 inches bgs prior to the collection of confirmation soil samples. Due to the small quantity of sandblast grit, hand tools are expected to be used to load grit into a waiting truck for transport directly to the SPY for processing. However, due to the nature of the debris, mechanical separation of the material will not be conducted.

Postconstruction cleanup and stabilization as discussed in Section 2.3.7 will be implemented. Erosion control and backfill beyond surficial grading is not expected to be required due to the shallow depth of the excavation.

Photograph 3-14. AOC 16 Facing North

3.1.15 AOC 27 – MW-24 Bench – TAA 1

AOC 27 TAA 1 is located along the eastern slope of BCW north of the TCS on PG&E property (Figure 1-5 and Photograph 3-15). The TAA is readily accessible to construction vehicles from the south via the unimproved access road in BCW. The access road to the north of the TAA is only expected to be passable via 4-wheel drive truck.

The TAA gently slopes to the southwest, is sparsely vegetated, and is covered with a mixture of depositional sands and gravels and fill material containing miscellaneous construction debris and burnt material.

Metals and D/F contaminated soil is present within the TAA. Historical soil sample results (Appendix A) indicate the greatest contaminant concentrations are within 3 feet of the surface. The initial excavation will be conducted to remove discolored soil and debris within the TAA to a depth of 3 feet bgs prior to the collection of confirmation soil samples Excavation is expected to occur from the west of the TAA. Excavated material will be hauled directly to the SPY for processing. However, due to the presence of debris, mechanical separation of the material will not be conducted. Additionally, the initial screening of 6-inch-plus material will not be conducted.

Postconstruction, backfill, cleanup, and stabilization described in Section 2.3.7 will be implemented.

Photograph 3-15. AOC 27 TAA 1 Facing South

Table 3-1. Target Action Areas: Surface Areas and Volumes
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

Investigation Area	Target Action Area Identified in EE/CA Approval Memorandum	Existing Condition [a]	Surface Area [b] (ft^2)	Assumed Excavation Depth [b] (ft)	Volume [b] (yd^3)
SWMU 1 – Former Percolation Bed	SWMU 1 TAA 1	• Existing conditions within this TAA do not meet RAOs 1, 2, and 3. • Includes SWMU1-25, which is associated with unacceptable risk to ecological receptors and human health risks above de minimis levels (does not meet RAO 1). • Soil data collected at several locations significantly exceed numerical RAG(s) for RAO 2. This area is vulnerable to weather-related soil migration and is partially within the HNWR. • Discolored soil is present in the shallow soil between boring locations SWMU1-25 and SWMU1-1 (does not meet RAO 3).	6,886	10	2,550
SWMU 1 – Former Percolation Bed	SWMU 1 TAA 2	• Existing conditions within this TAA do not meet RAOs 2 and 3. • Soil data collected at several locations significantly exceed numerical RAG(s) for RAO 2. This area is vulnerable to weather-related soil migration and is partially within the HNWR. • White powder is present in soil within this TAA (does not meet RAO 3).	2,380	5	441
SWMU 1 – Former Percolation Bed	SWMU 1 TAA 3	• Existing conditions within this TAA do not meet RAO 2. • Soil data collected at one location significantly exceed numerical RAG(s) for RAO 2. This area is vulnerable to weather-related soil migration.	114	5	21
AOC 1 – Area Around Former Percolation Bed	AOC 1 TAA 1	• Existing conditions within this TAA do not meet RAO 2. • Soil data collected at one location significantly exceed numerical RAG(s) for RAO 2. This area is vulnerable to weather-related soil migration.	351	5	65
AOC 1 – Area Around Former Percolation Bed	AOC 1 TAA 2	• Existing conditions within this TAA do not meet RAOs 2 and 3. • Soil data collected at several locations significantly exceed numerical RAG(s) for RAOs 2. This area is vulnerable to weather-related soil migration. • Discolored soil is present in the area around former well TCS-4 (does not meet RAO 3).	1,912	10	708
AOC 1 – Area Around Former Percolation Bed	AOC 1 TAA 3	• Existing conditions within this TAA do not meet RAO 2. • Soil data collected at several locations exceed numerical RAG(s) for RAOs 2. This area is vulnerable to weather-related soil migration.	473	5	88

Investigation Area	Target Action Area Identified in EE/CA Approval Memorandum	Existing Condition [a]	Surface Area [b] (ft^2)	Assumed Excavation Depth [b] (ft)	Volume [b] (yd^3)
AOC 9 – Southeast Fence Line	AOC 9 TAA 1	• Existing conditions within this TAA do not meet RAOs 1 and 2. • Includes #10, which is associated with unacceptable risk to ecological receptors and human health risks above de minimis levels (does not meet RAO 1). • Soil data collected at several locations significantly exceed numerical RAG(s) for RAO 2. This area is vulnerable to weather-related soil migration.	210	5	39
AOC 10 – East Ravine	AOC 10 TAA 1	• Existing conditions within this TAA do not meet RAOs 1, 2, and 3. • Includes AOC 10-20, AOC 10-21, AOC 10-23, PA-20, and PA-21, which are associated with unacceptable risk to ecological receptors, or human health risks exceeding de minimis levels, or both (does not meet RAO 1). • Soil data collected at several locations significantly exceed numerical RAGs for RAO 2. This area is vulnerable to weather-related soil migration. • White powder may be present within AOC 10 (does not meet RAO 3).	6,472	5	1,199
AOC 10 – East Ravine	AOC 10 TAA 2	• Existing conditions within this TAA do not meet RAOs 1, 2, and 3. • Includes MW-58BR_S and AOC 10c-4, which are associated with unacceptable risk to ecological receptors, or human health risks exceeding de minimis levels, or both (does not meet RAO 1). • Soil data collected at several locations significantly exceed numerical RAGs for RAO 2. This area is vulnerable to weather-related soil migration and is partially within the HNWR. • White powder may be present within AOC 10 (does not meet RAO 3).	6,650	5	1,231
AOC 10 – East Ravine	AOC 10 TAA 3	• Existing conditions within this TAA do not meet RAOs 2 and 3. • Soil data collected at one location exceed one numerical RAG for RAO 2. This area is within the HNWR. • Discolored and stained soil and debris are present.	379	5	70
AOC 10 – East Ravine	AOC 10 TAA 4	• Existing conditions within this TAA do not meet RAOs 2 and 3. • Soil data collected at several locations exceed numerical RAGs for RAOs 2. This area is within the HNWR. • White powder may be present within AOC 10 (does not meet RAO 3).	265	5	49
AOC 11 – Topographic Low Areas	AOC 11 TAA 1	• Existing conditions within this TAA do not meet RAO 2. • Soil data collected at several locations significantly exceed numerical RAGs for RAO 2. This area is vulnerable to weather-related soil migration and is within the HNWR.	1,917	5	355

Investigation Area	Target Action Area Identified in EE/CA Approval Memorandum	Existing Condition [a]	Surface Area [b] (ft^2)	Assumed Excavation Depth [b] (ft)	Volume [b] (yd^3)
AOC 14 – Railroad Debris Site	AOC 14 TAA 1	• Existing conditions within this TAA do not meet RAOs 2 and 3. • Soil data collected at several locations significantly exceed numerical RAGs for RAO 2. This area is vulnerable to weather-related soil migration. • Burnt material and debris are present (does not meet RAO 3). Trenching in the areas between AOC 14-16W and AOC 14-14W encountered debris.	1,513	5	280
AOC 16 – Former Sandblast Shelter	AOC 16[c]	• Existing conditions within this TAA do not meet RAO 3. • Two different colors of apparent abrasive material (sandblast grit) are present. Samples indicate elevated levels of copper and molybdenum. • This area is vulnerable to weather-related soil migration and is located on TCS upgradient of the HNWR.	200	0.5	4
AOC 27 – MW-24 Bench	AOC 27 TAA 1	• Existing conditions within this TAA do not meet RAOs 2 and 3. • Soil data collected at several locations significantly exceed numerical RAGs for RAO 2. This area is vulnerable to weather-related soil migration. • Burnt material and debris are present (does not meet RAO 3).	828	5	153
Total			**30,550**	--	**7,254**

[a] Existing Condition details are from Exhibit 3-3 of the EE/CA (Jacobs 2021a). Data considered were for soil samples collected between 0 and 10 feet bgs (or the deepest depth sampled, if less than 10 feet bgs). Some locations where data do not significantly exceed the numerical RAGs but are adjacent to or bounded by locations with significant exceedances were included. There were two primary reasons for this: (1) it would not be practical to address the significant exceedances during a removal action without addressing the adjacent or nearby locations, and (2) soil at the site has likely been redistributed since RFI/RI soil samples were collected (especially in BCW). TAA lateral extent refinement also considered relevant site features, such as topography, that impact the practical extent of removal activities.

[b] Surface Area, Assumed Excavation Depth, and Volume values are from Exhibit 3-3 of the EE/CA (Jacobs 2021a). For simplicity, volume calculations do not include cut slope volumes.

[c] Due to the minimal volume, a TAA was not defined for the AOC 16 materials. However, the material will be removed during this Soil NTCRA using the same procedures as for the TAAs.

Notes:

\- = not applicable
ft = feet; ft^2 = square feet; yd^3 = cubic yards

Table 3-2. Target Action Areas: Contaminants Exceeding Numerical RAGs

Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

Target Action Area	Contaminants Exceeding Numerical RAG	Maximum Concentration	Depth to which TAA Contaminants Exceed a Numerical RAG (ft bgs)
SWMU 1 TAA 1	Chromium, Total Chromium, Hexavalent D/F	3,200 mg/kg 42 mg/kg 12,000 ng/kg	9-10
SWMU 1 TAA 2	Chromium, Total Chromium, Hexavalent	2,600 mg/kg 47.5 mg/kg	9-10
SWMU 1 TAA 3	D/F	1,300 ng/kg	0-1
AOC 1 TAA 1	D/F	1,100 ng/kg	2-3
AOC 1 TAA 2	Chromium, Total Chromium, Hexavalent D/F	4,400 mg/kg 80 mg/kg 870 ng/mg	9-10
AOC 1 TAA 3	Chromium, Total Chromium, Hexavalent D/F	410 mg/kg 14 mg/kg 330 ng/kg	2-3
AOC 9 TAA 1	Chromium, Total Chromium, Hexavalent Lead	398 mg/kg 114 mg/kg 59 mg/kg	2-3
AOC 10 TAA 1	Chromium, Total Chromium, Hexavalent Copper Lead Mercury D/F	2,800 mg/kg 2,700 mg/kg 3,100 mg/kg 920 mg/kg 35 mg/kg 1,600 ng/kg	2-3
AOC 10 TAA 2	Chromium, Total Chromium, Hexavalent Copper Lead D/F	4,000 mg/kg 150 mg/kg 300 mg/kg 160 mg/kg 360 ng/kg	2-3
AOC 10 TAA 3	D/F	290 ng/kg	0-1
AOC 10 TAA 4	Chromium, Total D/F	340 mg/kg 410 ng/mg	2-3
AOC 11 TAA 1	D/F	3,200 ng/kg	9-10
AOC 14 TAA 1	Chromium, Total Copper Lead Mercury Zinc D/F	420 mg/kg 1,800 mg/kg 1,600 J mg/kg 180 mg/kg 2,000 J mg/kg 480 ng/kg	7-8
AOC 16	Copper Molybdenum	1,500 mg/kg 79 mg/kg	0-0.5
AOC 27 TAA 1	Chromium, Total Copper Lead Molybdenum Zinc D/F	290 mg/kg 1,000 mg/kg 630 mg/kg 26 mg/kg 1,300 mg/kg 230 ng/kg	5-6

Notes:
Data summarized from historical soil sample results within 10 feet of the ground surface (Appendix A).
Maximum concentrations may not be at the maximum depth.

4. Compliance with ARARs and Other Advisories, Criteria, or Guidance To Be Considered

This section provides a summary of activities to be performed for compliance with the identified ARARs and other advisories, criteria, or guidance TBCs during implementation of the Soil NTCRA. In addition, this section identifies the anticipated approvals, agreements, and permits required to implement the Soil NTCRA.

4.1 Summary of Compliance with Identified ARARs

Fourteen location-specific and ten action-specific federal and California laws and regulations have been identified as ARARs for the Soil NTCRA. Table 4-1 provides a summary of the actions taken or that will be taken to comply with the identified ARARs.

The ARARs address several resource areas, including the following:

- Biological
- Air quality
- Cultural
- Hazardous materials
- Waterways
- Noise

There are no chemical-specific ARARs because the ARARs are usually health- or risk-based numerical values or methodologies, which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. In the case of the Topock site, a site-specific Soil HHERA has been completed (Arcadis 2019). The results of the Topock site-specific risk assessment were used in developing cleanup goals for this Soil NTCRA.

It is noted that PG&E is currently conducting an informal consultation with USFWS and the HNWR under the federal Endangered Species Act (ESA). It is anticipated that USFWS will issue a Biological Opinion at the conclusion of the consultation process. The resulted management measures to protect endangered species will be implemented for this Soil NTCRA.

4.2 Summary of Compliance with Other Advisories, Criteria, or Guidance To Be Considered

The TBCs include 9 chemical-specific, 2 action-specific, and 17 location-specific advisories, EOs, or guidance TBCs.

The approved Soil HHERA is considered a TBC and was used for setting chemical-specific cleanup goals for this Soil NTCRA. Other chemical-specific TBCs include the following:

- Ambient or background soil concentrations at the Topock site
- Recommended screening levels from the DTSC Human and Ecological Risk Office (HERO)
- USEPA regional screening levels for chemical contaminants
- San Francisco Regional Water Quality Control Board (SF RWQCB) residential screening levels
- OSHA standards for workers engaged in remediation activities

Table 4-1 provides a summary of the actions that will be taken to comply with the chemical-specific TBCs.

At the Topock site, the site-specific Programmatic Agreement and Amendment (PA; BLM 2010, 2017), the *Cultural and Historic Properties Management Plan* (CHPMP) (BLM 2012), and the *Treatment Plan*

(BLM 2018) are TBCs and will be implemented during the Soil NTCRA. Tables 4-2, 4-3, and 4-4 provide a summary of the actions that were taken or will be taken to comply with these TBCs, respectively.

The action-specific TBCs are EOs related to the protection of migratory birds and the management of invasive specifics. At the Topock site, PG&E will implement measures to protect migratory birds as specified in the *Bird Impact Avoidance and Minimization Plan* (BIAMP) (CH2M 2014b) (Table 4-5).

The 14 location-specific TBCs comprises management plans, policies, and guidance for federal agencies to consider in conducting activities affecting human health and the environment, as follows:

- Two TBCs are related to EOs and policies related to the management and appropriate or compatible use of the HNWR.
- Eight TBCs are related to the protection of cultural resources and consultation with Tribes.
- Two TBCs are related to the management of floodplain and protection of wetlands.
- One TBC is related to a policy to promote conservation.
- One TBC is related to environmental justice.

4.3 Anticipated Approvals, Permits, and Agreements

In general, implementation of the Soil NTCRA will require DOI approval of this Soil NTCRA Work Plan pursuant to DOI's authority under CERCLA. It is PG&E's understanding that the DOI's approval of the Work Plan constitutes permission to implement the selected soil removal action and authorization to access federal property, including the HNWR. No other permit applications or approvals for access to federal lands or the HNWR will be required before field implementation. In addition, the process required for compliance with ARARs is addressed in this report, and there is not a separate process for compliance required for access to federal lands or the HNWR.

Per discussions with Caltrans, bat mitigation measures are required during the bat maternity season (March 15 through August 31) at AOC 1 TAA 1 and AOC 14 TAA 1 due to the presence of maternity bat roosts in the BCW culverts beneath I-40. Therefore, Soil NTCRA activities are not scheduled to occur at these locations during the bat maternity season. In the event that unscheduled Soil NTRCA activities are required, then the following measures will be implemented during the maternity season:

- High- and low-frequency noise disturbance shall be minimized by establishing avoidance buffers around the maternity roost located in the BCW culverts beneath I-40.
- To minimize effects of noise from construction trucks and heavy equipment, a 90-foot buffer shall be maintained between roost and construction trucks and heavy equipment. Construction trucks and heavy equipment includes, but is not limited to, water trucks, loaders, dump trucks, and transport trucks.
- To minimize effects of noise from trenching and light equipment, a 150-foot buffer shall be maintained between roost and trenching and light equipment. Trenching and light equipment includes, but is not limited to, excavators, backhoes, bulldozers, GradeAlls, and graders.
- To minimize potential effects to bats during nighttime activities, the project must reduce or eliminate light levels at night. If artificial lighting at night is needed, floodlights shall be adjusted so that the angle of the beam is less than 70 degrees and directed away from roost sites. All nighttime lights shall be directed downward if possible. If lighting is required for minimum safety and security purposes, light barriers shall be used to reduce the potential for light to reach roosts. For example, if lights are needed to ensure safety of a work area, the light could be positioned so that a hillside blocks the light reaching the roost sites. Smaller barriers, such as plywood sheeting, can be used, but lighting shall not surround a roost within the given buffer zones. Lights with high blue-white or ultraviolet content shall be avoided. When using nighttime lighting a buffer of 250 feet shall be maintained.

- To minimize effects of increased human activities, pedestrians and small vehicles shall not approach active roosts during the maternity season, and a 65-foot buffer shall be maintained between roost and foot and small vehicle traffic.
- To minimize air quality degradation near roosts, stationary heavy equipment vehicles, large generators, and large idling trucks producing diesel exhaust shall not operate for more than 2 minutes within 250 feet of a bat roost.
- A biological monitor shall be on-site during ground disturbing activities within proximity of a roost to ensure avoidance and minimization measures (including avoidance buffers) are properly implemented.

Pursuant to CERCLA Section 121(e), activities conducted onsite are exempt from obtaining federal, state, or local permits or complying with other procedural requirements. However, PG&E is still required to comply with the substantive requirements of the identified location- and action-specific ARARs. The following list includes approvals, permits and agreements that PG&E anticipates obtaining for the project:

- Traffic Control Plan to conduct closure of the westbound lane of I-40 to access AOC 14 TAA 1 between the BNSF railroad track and I-40
- Consent to common use agreements or other appropriate notification requirements with utility companies for remedial infrastructure on their lands or within their easements and ROWs

Table 4-1. Summary of Compliance with Identified Applicable, Relevant, and Appropriate Requirements and Other Advisories, Criteria, or Guidance To Be Considered
Soil Non-Time Critical Removal Action Work Plan
PG&E Topock Compressor Station, Needles, California

Item No. [a]	Category [a]	Citation [a]	Determination [a]	Description in Soil EE/CA [a]	Triggering Event	Compliance Responsibility	Which Existing or Future Documents Will Demonstrate Continued Compliance with this ARAR or TBC? [b]	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
1	Federal Chemical-Specific	RBRGs for Risk Drivers in Soil at Topock site [c]	TBC	Final Human Health and Ecological RBRGs were estimated for four significant contributors to soil risks at the Topock site, namely total chromium, Cr(VI), copper, and D/F TEQ.	Soil NTCRA Implementation	PG&E	Soil NTCRA Completion Report	Soil sampling and analysis will be used to track attainment of the RBRGs for total chromium, Cr(VI), copper, and D/F TEQ. Data will be reported in the Soil NTCRA Completion Report to be submitted to DOI.
2	Federal Chemical-Specific	RBCs for Soil Management Purposes [c]	TBC	Final Human Health and Ecological RBCs were estimated for soil management at the Topock site.	Soil NTCRA Implementation	PG&E	Soil NTCRA Completion Report	Soil sampling and analysis will be used to track attainment of the RBCs for lead, mercury, aluminum, and zinc. Data will be reported in the Soil NTCRA Completion Report to be submitted to DOI.
3	Federal Chemical-Specific	Soil ECVs [d]	TBC	Soil ECVs were developed for Topock site COPCs (metals and PAHs) using both LOAEL or concentrations and no-adverse effect levels or concentrations based on target toxicity values (i.e., no unacceptable risk is expected at less than these values) for the protection of the ecological receptors at the Topock site based on the representative receptors selected for the ecological risk assessment.	Soil NTCRA Implementation	PG&E	Groundwater Remedy SMP, Addendum No. 2	For this Work Plan, the Soil ECVs will be used for soil management in accordance with the Groundwater Remedy SMP, Addendum No. 2. Soil sampling and analysis will be used to track attainment of this TBC.
4	California Chemical-Specific	Ambient or Background Soil Concentrations at Topock site [e], [f], [g]	TBC	Ambient or background levels of inorganic chemicals in soils in or around the Topock site were calculated to assist in remedial planning, risk assessment, and remedial and soil management decision making.	Soil NTCRA Implementation	PG&E	Groundwater Remedy SMP, Addendum No. 2	For this Work Plan, the ambient or background levels will be used for soil management in accordance with the Groundwater Remedy SMP, Addendum No. 2. Soil sampling and analysis will be used to track attainment of this TBC.
5	California Chemical-Specific	DTSC HHRA Note No. 2, Dioxin-TEQ Soil Remediation Goals for Sites in California [h]	TBC	HERO recommends the following remedial goal for soils contaminated by dioxins and dioxin like-compounds: D/F TEQ Humans – 50 ng/kg	Soil NTCRA Implementation	PG&E	Groundwater Remedy SMP, Addendum No. 2	For this Work Plan, the DTSC HERO Notes 2 and 3 will be used for soil management in accordance with the Groundwater Remedy SMP, Addendum No. 2. Soil sampling and analysis will be used to track attainment of this TBC.
6	California Chemical-Specific	DTSC HHRA Note No. 3, DTSC-modified Screening Levels [i]	TBC	The DTSC HERO HHRA Note No. 3 presents recommended screening levels for constituents in soil, tap water, and ambient air.	Soil NTCRA Implementation	PG&E	Groundwater Remedy SMP, Addendum No. 2	For this Work Plan, the DTSC HERO Notes 2 and 3 will be used for soil management in accordance with the Groundwater Remedy SMP, Addendum No. 2. Soil sampling and analysis will be used to track attainment of this TBC.
7	Federal Chemical-Specific	USEPA "Regional Screening Levels for Chemical Contaminants at Superfund Sites" [j]	TBC	Establishes comparison values for residential and commercial/industrial exposures to soil, air, and tap water for screening chemicals at Superfund sites.	Soil NTCRA Implementation	PG&E	Groundwater Remedy SMP, Addendum No. 2	For this Work Plan, the USEPA RSLs will be used for soil management in accordance with the Groundwater Remedy SMP, Addendum No. 2. Soil sampling and analysis will be used to track attainment of this TBC.
8	California Chemical-Specific	SF RWQCB ESLs for residential direct exposure	TBC	Conservative screening levels for chemicals found at sites with contaminated soil and groundwater. These levels are intended to help expedite the identification and evaluation of potential environmental concerns at contaminated sites. ESLs address a range of media (soil, groundwater, soil gas, and indoor air) and a range of concerns (e.g., impacts to drinking water, vapor intrusion, and impacts to aquatic habitat).	Soil NTCRA Implementation	PG&E	Groundwater Remedy SMP, Addendum No. 2	For this Work Plan, the SF RWQCB ESL will be used for purposes of soil management in accordance with the Groundwater Remedy SMP, Addendum 2. Soil sampling and analysis will be used to track attainment of this TBC.
9	Federal Chemical-Specific	Occupational Safety and Health Act (29 USC 651, et seq.; 29 CFR 1910.1026)	TBC	Sets standards for workers engaged in activities associated with remedial actions under the NCP, including occupational exposure to Cr(VI). Pursuant to the NCP preamble, Occupational Safety and Health Act standards are not ARARs but may be included as TBCs.	Soil NTCRA Implementation	PG&E	Soil NTCRA PHSEP	The Soil NTCRA PHSEP will be implemented and complied with during the removal action. PG&E will be required to implement their own PHSEPs.
10	Federal Action-Specific	Clean Water Act. Stormwater Management (33 USC 1342, 40 CFR 122, 40 CFR 125)	Relevant and appropriate	These regulations define the necessary requirements with respect to the discharge of stormwater under the NPDES program. These regulations will apply if proposed removal actions disturb more than 1 acre of soil and result in stormwater runoff that comes in contact with any removal activity, or if proposed removal actions involve specified industrial activities. NPDES requirements regulate discharges of pollutants from any point source into waters of the United States.	Soil NTCRA Implementation	PG&E	BMPs Plan of this Work Plan	The Soil NTCRA will not involve any point source discharge of waters of the United States (e.g., Colorado River, BCW). It is anticipated the total acreage of disturbance will be 1 acre or more. Therefore, measures to control stormwater runoff and erosion during construction will be implemented as specified in the BMPs Plan.

Item No. [a]	Category [a]	Citation [a]	Determination [a]	Description in Soil EE/CA [a]	Triggering Event	Compliance Responsibility	Which Existing or Future Documents Will Demonstrate Continued Compliance with this ARAR or TBC? [b]	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
11	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) (33 USC 1344, 40 CFR 230.10)	Applicable	This section of the Clean Water Act prohibits certain activities with respect to onsite wetlands and waterways. No discharge of dredged or fill material will be permitted if there is a practicable alternative to the proposed activity that would have less adverse impact to the aquatic ecosystem. Minimization measures will be implemented to minimize impacts to wetland and non-wetland waters of the United States within the TAAs. All efforts will be taken to avoid jurisdictional resources to the extent practicable. Although the USACE did not provide a list of measures that may be taken to reduce impacts to jurisdictional waters and wetlands for the Topock site groundwater remedy, PG&E developed standard BMPs to use in lieu of measures that would have been included in a Section 404 Clean Water Act permit. Any soil removal action in Section 404 jurisdictional washes will comply with the same BMPs.	Soil NTCRA Implementation	PG&E	This Work Plan	The ARARs will be implemented as directed. A copy of the BMPs is included in Appendix I of this Work Plan.
12	Federal Action-Specific	Fish and Game Code Section 1602 Lake and Streambed Alteration	Applicable	Fish and Game Code 1602 requires an entity to notify California Department of Fish and Wildlife before commencing an activity that will substantially divert or obstruct the natural flow, or substantially change or use any material from the bed, channel or bank or any river, stream, or lake. The CDFW[k] requires compliance with avoidance and minimization measures previously agreed upon with PG&E for project implementation in lieu of a Lake or Streambed Alteration Agreement pursuant to CERCLA Section 121(e) for all work conducted in CDFW jurisdictional washes. Any soil removal action in CDFW jurisdictional washes will comply with the same avoidance and mitigation measures.	Soil NTCRA Implementation	PG&E	This Work Plan	The ARARs will be implemented as directed. A copy of the CDFW AMMs is included in Appendix I of this Work Plan.
13	Federal Action-Specific	ESA (16 USC 1531, et seq., 50 CFR 402)	Applicable	The ESA and its implementing regulations makes it unlawful to remove or “take” threatened and endangered plants and animals, and protects their habitats by prohibiting certain activities. Examples of endangered species in or around the Topock site may include southwestern willow flycatcher, desert tortoise, and Yuma Ridgway’s Rail. Removal actions selected for the 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 USFWS under ESA Section 7. Mitigation measures will be implemented in accordance with the Biological Assessment [l] and the BIAMP [m]) to avoid project-related risks to endangered species that could result from removal actions.	Soil NTCRA Implementation	PG&E	This Work Plan	PG&E is conducting an informal Section 7 consultation with USFWS. A concurrence letter on the Biological Assessment[l] is anticipated from USFWS at the conclusion of the consultation. Mitigation measures to protect endangered species will be implemented for this NTCRA. Also refer to **Table 4-5** (Compliance with the BIAMP).
14	Federal Action-Specific	Migratory Bird Treaty Act (16 USC 703-712)	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 HNWR, part of which makes up 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 removal activities. The BIAMP specifies measures to avoid project-related risks to avian wildlife that could result from project activities. The BIAMP will be implemented during removal action.	Soil NTCRA Implementation	PG&E	This Work Plan	The ARARs will be implemented as directed. Also refer to **Table 4-5** (Compliance with the BIAMP).
15	California Action-Specific	CCR Title 27, Environmental Protection	Applicable	Title 27 regulates discharges of wastewater to land, including evaporation ponds, percolation ponds, or subsurface leach fields. Any disposal of wastewater to the existing TCS evaporation ponds must meet the WDRs Order No. R7-2018-0022. If it becomes necessary to amend the WDRs for the ponds to accept wastewater from the proposed removal action, a revised ROWD would be required.	Soil NTCRA Implementation	PG&E	This Work Plan	Wastewater from soil remediation activities is currently not a permitted influent to the TCS ponds. Therefore, wastewater from the Soil NTCRA will not be disposed of at the ponds.

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16	California Action-Specific	Hazardous Waste Control Law and Regulations (22 CCR Division 4.5, Chapters 11, 12, 14, 18)	Applicable	The California Hazardous Waste Control Law and Regulations establish requirements for hazardous waste generators and operators of hazardous waste treatment, storage, or disposal units, and for corrective action taken in response to releases of hazardous waste from regulated units. Hazardous waste generators must complete the following actions: • Determine whether their waste is hazardous • Manage the waste in accordance with specified requirements for accumulation in tanks and containers • Use a hazardous waste manifest for offsite transportation of hazardous waste • Send hazardous waste to an appropriately permitted offsite treatment or disposal facility, and retain specified records These requirements will apply to all hazardous waste generated by onsite remedial activities. Units constructed to treat hazardous waste as part of the remediation must comply with additional operational and closure requirements. The management of excavated or displaced materials will be in accordance with the Groundwater Remedy SMP [n].	Soil NTCRA Implementation	PG&E	Waste Management Plan of This Work Plan Groundwater Remedy SMP along with Addenda 1 and 2.	The ARARs will be implemented as directed. Any excess soil will be managed in accordance with the Groundwater SMP, along with its Addenda 1 and 2.
17	California Action-Specific	MDAQMD, Rule 403 – Fugitive Dust	Applicable	This rule sets the standards to minimize fugitive dust emissions from remedial actions. For example, • Must take "every reasonable precaution" to minimize dust emissions from soil disturbing activities (e.g., excavation, grading, land clearing) • Must take "every reasonable precaution" to keep their operations from depositing visible particulate matter on public roadways (clean equipment prior to travel on paved streets, remove any deposited material promptly) • If peak winds are less than 25 mph and 15-minute average wind speed is less than 15 mph: – Must not conduct transport, handling, construction, or storage activities that cause fugitive dust that remains visible beyond the property line – Must not cause PM concentrations exceeding 100 μg/m^3, measured as the difference between upwind and downwind samples collected on high-volume samplers at the property line for a minimum of 5 hours	Soil NTCRA Implementation	PG&E	Air Monitoring Plan of this Work Plan	The ARARs will be implemented as directed. Example BMPs to control fugitive dust used at this Topock site include: • Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. • Use a water truck to maintain moist disturbed surfaces, and actively spread water during visible dusting episodes. • Cover loaded haul vehicles while operating on publicly maintained paved surfaces. • Stabilize (using soil binders) 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. • Clean up project-related track-out or spills on publicly maintained paved surfaces within 24 hours. • Curtail nonessential earthmoving activity under high wind conditions (more than 25 mph).
18	California Action-Specific	Requirement for Land Use Covenants (22 CCR 67391.1)	Relevant and Appropriate	This regulation requires appropriate restrictions on use of property if a proposed remedial alternative results in hazardous materials remaining at the property at levels that are not suitable for unrestricted use of the land. This is an ARAR with respect to privately owned land at the Topock Site. A Land Use Covenant and Agreement was made between PG&E and DTSC for PG&E property (APN 0650-161-08) at the site. Removal action selected for the site will be conducted in compliance with the Environmental Restrictions of the Covenant.	Soil NTCRA Implementation	PG&E	This Work Plan	The ARARs will be implemented as directed.

Item No. [a]	Category [a]	Citation [a]	Determination [a]	Description in Soil EE/CA [a]	Triggering Event	Compliance Responsibility	Which Existing or Future Documents Will Demonstrate Continued Compliance with this ARAR or TBC? [b]	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
19	Federal Action-Specific	Clean Air Act (42 USC 7401, et seq.) National Ambient Air Quality Standards (40 CFR 50)	Relevant and Appropriate	These ambient air quality standards define levels of air quality to protect the public health. National Ambient Air Quality Standards are not enforceable in and of themselves, but they may be used as guidance if removal activities create potential air quality impacts.	Soil NTCRA Implementation	PG&E	This Work Plan	Example BMPs to reduce construction-related emissions used at this Topock site include: 1. To the extent practicable, off-road equipment of more than 50 hp have USEPA certified Tier 4 interim engines or engines that are certified to meet or exceed the NO_X emission ratings for USEPA Tier 4 engines. This excludes specialty construction equipment where Tier 4 interim engines cannot currently be obtained within the industry, or older equipment that cannot be retrofitted to meet Tier 4 emissions standards. 2. PG&E will maintain a list of all operating equipment in use on the project site. The construction equipment list will state the makes, models, and numbers of construction equipment onsite. 3. Equipment will be properly serviced and maintained in accordance with the manufacturer's recommendations. 4. PG&E will also ensure that all nonessential idling of construction equipment is restricted to 5 minutes or less in compliance with California Air Resources Board's Rule 2449.
20	Federal Action-Specific	Federal Noxious Weed Act of 1974 Public Law 93-629 (7 USC 2801, et seq.)	Applicable	Requires the use of integrated management systems to control or contain undesirable plant species. Applicable to onsite response activities to control, eradicate, or prevent or retard the spread of such weeds.	Soil NTCRA Implementation	PG&E	This Work Plan	In restoration of areas affected by the Soil NTCRA, PG&E will coordinate with land owners and managers on activities to control, eradicate, or prevent or retard the spread of undesirable plant species.
21	Federal Action-Specific	EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds	TBC	This EO directs executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act, including supporting the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions.	Agency Approval of Soil NTCRA Action Memorandum and Work Plan	DOI, USFWS	This Work Plan	Refer to **Table 4-5 (Compliance with BIAMP).**
22	Federal Action-Specific	EO 13112 – Management of Invasive Species	TBC	Requires that each federal agency whose action may affect the status of invasive species take certain actions to prevent the introduction of invasive species and provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.	Agency Approval of Soil NTCRA Action Memorandum and Work Plan	DOI, USFWS	This Work Plan	In restoration of areas affected by the Soil NTCRA, PG&E will coordinate with land owners and managers on activities to control, eradicate, or prevent or retard the spread of undesirable plant species.
23	Federal Location-Specific	FLPMA (43 USC 1701, et seq.)	Applicable	In managing public lands, BLM is directed to take any action necessary to prevent unnecessary or undue degradation of the lands. Actions 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. Figure 2-1 shows property managed by BLM.	Activities on public lands	BLM	This Work Plan	PG&E will implement the Soil NTCRA as approved by DOI.
24	Federal Location-Specific	National Wildlife Refuge System Administration Act (16 USC 668dd-ee, 50 CFR 27)	Applicable	This Act governs the use and management of the HNWR portion of the Topock site. It requires that the USFWS evaluate ongoing and proposed activities and uses to ensure that such activities are appropriate and compatible with the mission of the National Wildlife Refuge System, as well as the specific purposes for which the HNWR was established. Prior to the selection of a removal action by DOI and USFWS, that removal 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. Any removal action proposed to be implemented on the HNWR that was not selected by DOI and USFWS would be subject to the formal appropriate use and compatibility determination process. Portions of the site are located in the HNWR (Figure 2-1).	Activities on the HNWR	USFWS and DOI	Soil NTCRA Action Memorandum	As stated in the Soil NTCRA Action Memorandum, actual or threatened releases of hazardous substances from AOC 1, AOC 9, AOC 10, AOC 14, AOC 27, and SWMU 1, if not addressed by implementing the selected response action, may present an imminent and substantial endangerment to public health or welfare or the environment. This removal action is necessary to abate, prevent, or eliminate the release or substantial threat of release of hazardous substances onto the refuge lands that are under federal jurisdiction. The Action Memorandum was approved by USFWS, which manages refuge lands. Therefore, the selected removal action has been determined to be an appropriate use of the HNWR and compatible with the mission of the HNWR and the Refuge System as a whole.
25	Federal Location-Specific	Fish and Wildlife Conservation Act (16 USC 2901-2911)	Relevant and Appropriate	Federal departments and agencies are encouraged to use their authority to conserve nongame fish and wildlife and their habitats and assist states in the development of their conservation plans.	Activities on the HNWR	USFWS	HNWR Habitat Restoration Plan	PG&E will implement the approved HNWR Habitat Restoration Plan [o].
26	Federal Location-Specific	Fish and Wildlife Coordination Act (16 USC 661-667e)	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 modification of a water body	PG&E		For activities to be conducted in CDFW jurisdictional washes, PG&E will comply with the avoidance and minimization measures specified in the CDFW letter dated March 6, 2013 (CDFW 2013), and any additional measures PG&E's biologist determines to be necessary. PG&E will also comply with avoidance, minimization and mitigation measures specified in the Clean Water Act Section 404 BMPs.

Item No. [a]	Category [a]	Citation [a]	Determination [a]	Description in Soil EE/CA [a]	Triggering Event	Compliance Responsibility	Which Existing or Future Documents Will Demonstrate Continued Compliance with this ARAR or TBC? [b]	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
27	Federal Location-Specific	NHPA (54 USC 300101, et seq., 36 CFR 800)	Applicable	This statute and the implementing regulations require that a federal agency undertaking a removal action at or near historic properties must consider the effects of such undertaking on the historic properties. The federal agency must determine, based on consultation, if an undertaking's effects would be adverse and seek ways that could avoid, mitigate, or minimize such adverse effects on a National Register 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. Measures to avoid or mitigate adverse effects of any selected removal action that are adopted by the agency through federal consultation must be implemented by the removal action to comply with the NHPA. Properties on and near the site that are eligible for or listed on the NRHP include Native American cultural resources and elements of the historic "built environment." In recognition of this, all removal activities will be conducted in ways that avoid, minimize, or mitigate adverse effects to cultural and historic properties within the APE in accordance with the Programmatic Agreement[p], the CHPMP[q], the CHPTP[r], and in consultation with the Tribes.	Soil NTCRA selected for the Topock site qualifies as an undertaking under NHPA	BLM, ACHP, California and Arizona SHPOs, USFWS, and PG&E are parties to the PA	PA, As Amended	Refer to **Table 4-2.**
28	Federal Location-Specific	National Archaeological and Historical Preservation Act (16 USC 469, et seq.)	Applicable	This statute requires the evaluation and preservation of historical and archaeological data that might otherwise be irreparably lost or destroyed through any alteration of terrain as a result of federal construction projects or a federally licensed activity.	Alteration of terrain that threatens significant scientific, historical, or archaeological data.	Federal agencies, PG&E	PA, CHPMP, Treatment Plan	Refer to **Tables 4-2, 4-3, and 4-4**.
29	Federal Location-Specific	Archaeological Resources Protection Act (16 USC 470aa-ii, et seq., 43 CFR 7)	Applicable	This statute provides for the protection of archaeological resources located on public and Tribal lands. The Act establishes criteria that must be met for the land manager's approval of any excavation or removal of archaeological resources if a proposed activity involves soil disturbances.	Disturbance of archaeological and historical sites	Federal agencies, PG&E	PA, CHPMP, Treatment Plan	Refer to **Tables 4-2, 4-3, and 4-4**.
30	Federal Location-Specific	Historic Sites Act (54 USC 320101 et seq., 36 CFR 65)	Applicable	Pursuant to this Act, federal agencies must consider the existence and location of historic sites, buildings, and objects of national significance, using information provided by the NPS, to avoid undesirable impacts upon such landmarks. There are no designated historic landmarks within the site, although Public Law 106-45, 113 Stat. 224 (1999) provides for a cooperative program "…for the preservation of the Route 66 corridor…" through grants and other measures.	Selection of Soil NTCRA	Federal agencies, PG&E	PA, CHPMP, Treatment Plan	Refer to **Tables 4-2, 4-3, and 4-4**.
31	Federal Location-Specific	Native American Graves Protection and Repatriation Act (25 USC 3001 et seq., 43 CFR 10)	Applicable	This Act regulates the removal and trafficking of human remains and cultural items, including funerary and sacred objects. If removal activities result in the discovery of Native American human remains or related objects, these requirements must be met. Portions of the site contain archaeological areas that may contain human remains.	Federal lands only - Discovery of human remains	PG&E	PA, CHPMP	Refer to **Tables 4-2 and 4-3.**
32	Federal Location-Specific	RFRA (42 USC 2000bb, et seq.)	Relevant and appropriate	Under this Act, the government will 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 compelling 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 removal 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.	Selection of Soil NTCRA	Federal agencies (BLM Lead), PG&E	Tribal Access Plan for lands under federal management Access Plan for lands not under federal management	Tribal access will be in accordance with the two access plans.
33	Federal Location-Specific	AIRFA (42 USC 1996, et seq.)	Relevant and appropriate	This Act requires that the United States protect and preserve for Native Americans their inherent right of freedom to believe, express, and exercise their traditional religions.	Implementation of Soil NTCRA	Federal agencies (BLM Lead), PG&E	Tribal Access Plan for lands under federal management Access Plan for lands not under federal management	Tribal access will be in accordance with the two access plans.
34	Federal Location-Specific	RCRA (42 USC 6901, et seq., 40 CFR 264.18)	Applicable	These regulations promulgated under RCRA establish seismic and floodplain considerations that 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.	Activities in 100-year floodplain or regulatory floodway	PG&E	This Work Plan	The Soil NTCRA work area boundary does not include the 100-year floodplain or regulatory floodway (Figure 1-2).

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35	Federal Location-Specific	Floodplain Management and Wetlands Protection (40 CFR 6.302(a), (b))	Applicable	Before undertaking an action, agencies are required to perform certain measures to avoid the long- and short- term impacts associated with the destruction of wetlands and the occupancy and modification of floodplains and wetlands. The regulation sets forth requirements as means of carrying out the provisions of EOs 11988 and 11990.	Activities in wetlands or floodplains	DOI, USFW	This Work Plan	The Soil NTCRA does not include activities in wetlands (Figure 1-2). The only activities proposed in the floodplain are related to staging of equipment and materials. The existing aggregate-based access road in the floodplain will be used. No new access road will be created. Precise locations for staging areas will be selected with inputs from biologists and archaeologists to avoid and minimize impacts to sensitive resources. Light grading and placement of stabilization mats may be required to set up the staging areas.
36	Federal Location-Specific	DOI, BLM, *Approved Resource Management Plan and Final Environmental Impact Statement*, May 2007	Applicable	The Resource Management Plan provides further direction on how FLPMA requirements will be satisfied.	Agency Approval of the Soil NTCRA Action Memorandum and Work Plan	BLM, DOI	This Work Plan	PG&E will implement the approved Soil NTCRA Work Plan.
37	Federal Location-Specific	EO 8647 (6 CFR 593)	Applicable	This EO establishes the HNWR for the primary purpose of providing migratory bird habitat. Any response action selected must be appropriate and compatible with this purpose, as determined by the Refuge Manager.	Selection of Soil NTCRA	USFWS	BIAMP	Refer to **Table 4-5.**
38	Federal Location-Specific	Appropriate Use Policy 603 FW 1	TBC	This policy elaborates on the appropriate uses of a National Wildlife Refuge, ensuring that such uses contribute to fulfilling the specific refuge's purposes and the National Refuge System's mission.	Agency Approval of the Soil NTCRA Action Memorandum	USFWS	Soil NTCRA Action Memorandum	As stated in the Soil NTCRA Action Memorandum, actual or threatened releases of hazardous substances from AOC 1, AOC 9, AOC 10, AOC 14, AOC 27, and SWMU 1, if not addressed by implementing the selected response action, may present an imminent and substantial endangerment to public health or welfare or the environment. This removal action is necessary to abate, prevent, or eliminate the release or substantial threat of release of hazardous substances onto the refuge lands that are under federal jurisdiction. The Action Memorandum was approved by USFWS which manages refuge lands. Therefore, the selected removal action has been determined to be an appropriate use of the HNWR and compatible with the mission of the HNWR and the Refuge System as a whole.
39	Federal Location-Specific	Compatibility Policy 603 FW 2	TBC	This policy specifies the guidelines for determining the compatibility of proposed uses of a National Wildlife Refuge. This determination is done once a proposed use is deemed appropriate.	Agency Approval of the Soil NTCRA Action Memorandum	USFWS	Soil NTCRA Action Memorandum	As stated in the Soil NTCRA Action Memorandum, actual or threatened releases of hazardous substances from AOC 1, AOC 9, AOC 10, AOC 14, AOC 27, and SWMU 1, if not addressed by implementing the selected response action, may present an imminent and substantial endangerment to public health or welfare or the environment. This removal action is necessary to abate, prevent, or eliminate the release or substantial threat of release of hazardous substances onto the refuge lands that are under federal jurisdiction. The Action Memorandum was approved by USFWS which manages refuge lands. Therefore, the selected removal action has been determined to be an appropriate use of the HNWR and compatible with the mission of the HNWR and the Refuge System as a whole.
40	Federal Location-Specific	Lower Colorado River National Wildlife Refuges, Comprehensive Management Plan (1994-2014) [a]	Applicable	The Comprehensive Management Plan provides further direction on how compliance with the National Wildlife Refuge System Administration Act, as amended, will be achieved.	Agency Approval of the Soil NTCRA Action Memorandum	USFWS	Soil NTCRA Action Memorandum	As stated in the Soil NTCRA Action Memorandum, actual or threatened releases of hazardous substances from AOC 1, AOC 9, AOC 10, AOC 14, AOC 27, and SWMU 1, if not addressed by implementing the selected response action, may present an imminent and substantial endangerment to public health, or welfare or the environment. This removal action is necessary to abate, prevent, or eliminate the release or substantial threat of release of hazardous substances onto the refuge lands that are under federal jurisdiction. The Action Memorandum was approved by USFWS which manages refuge lands. Therefore, the selected removal action has been determined to be an appropriate use of the HNWR and compatible with the mission of the HNWR and the Refuge System as a whole.

Item No. [a]	Category [a]	Citation [a]	Determination [a]	Description in Soil EE/CA [a]	Triggering Event	Compliance Responsibility	Which Existing or Future Documents Will Demonstrate Continued Compliance with this ARAR or TBC? [b]	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
41	Federal Location-Specific	Programmatic Agreement and Amendment among the BLM, Arizona Historic Preservation Officer, California State Historic Preservation Officer, and the ACHP for the Topock Remediation Project in San Bernardino County, California and Mohave County, Arizona [p]	TBC	The PA is a Topock-specific document that requires the federal agencies, in consultation with the Tribes, SHPOs of Arizona and California, ACHP, PG&E, and other interested parties to ensure that PG&E will conduct all removal activities in ways that avoid, minimize, or mitigate adverse effects to cultural and historic properties within the APE to the maximum extent practicable. In addition, the federal agencies will ensure that PG&E will restore the areas affected by all removal activities to the conditions existing prior to the removal to the extent practicable. During a removal action, the Discovery Protocol (Stipulations IX(A)-(D)) and the Monitoring Protocol (Appendix C) of the PA will be implemented. In addition, Tribal access to areas within the APE for religious, cultural, or spiritual purposes will be implemented in accordance with the Tribal Access Plan for lands under federal management and with the Access Plan for the lands not under federal management.	Soil NTCRA selected for the Topock site qualifies as an undertaking under NHPA	BLM, ACHP, California and Arizona SHPOs, USFWS, and PG&E are parties to the PA	PA, As Amended	Refer to **Table 4-2.**
42	Federal Location-Specific	Cultural and Historic Properties Management Plan, PG&E Topock Compressor Station, Needles, California [q]	TBC	The CHPMP is a Topock-specific document prepared under the PA that specifies measures to avoid or mitigate adverse effects to cultural and historic properties within the APE. PG&E will conduct all removal activities in compliance with these specified measures.	Implementation of Soil NTCRA	PG&E	CHPMP	Refer to **Table 4-3**.
43	Federal Location-Specific	Draft Cultural and Historic Property Treatment Plan for the Topock Compressor Station Groundwater Remediation Project, San Bernardino County, California and Mojave County, Arizona [r]	TBC	The Cultural and Historic Property Treatment Plan is a Topock-specific document prepared under the PA that identifies measures to avoid, minimize, or mitigate adverse effects to the maximum extent practicable on the Topock Maze, the TCP, and individual sites that have been determined eligible for listing on the NRHP, such as the trail site (CA-SBR-29943). PG&E will implement the Treatment Plan contemporaneously with all removal activities. All unevaluated sites are treated as eligible for the NRHP and will be avoided to the maximum extent practicable. In accordance with the PA, should unanticipated adverse effects occur as a result of a removal action, the Treatment Plan will be modified to include measures to minimize or mitigate the adverse effects.	Implementation of Soil NTCRA	PG&E	Treatment Plan	Refer to **Table 4-4.**
44	Federal Location-Specific	National Register Bulletin 38	TBC	Guidelines for evaluating and documenting traditional cultural properties.	Implementation of Soil NTCRA	PG&E	PA, CHPMP	Refer to **Tables 4-2 and 4-3.**
45	Federal Location-Specific	Preservation Brief 36	TBC	Guidelines for planning, treating, and managing historic landscapes.	Implementation of Soil NTCRA	PG&E	Treatment Plan	Refer to **Table 4-4.**
46	Federal Location-Specific	EO 11593	TBC	This EO directs the federal agencies to initiate measures for the protection and enhancement of the cultural environment. These measures include assuring that steps are taken to make records, drawings, and maps, and have such items deposited in the Library of Congress when, as the result of a federal action, a property listed on the NRHP is to be substantially altered.	Implementation of Soil NTCRA	Federal agencies, PG&E	PA, CHPMP, Treatment Plan	Refer to **Tables 4-2, 4-3, and 4-4.**
47	Federal Location-Specific	EO 13175	TBC	Federal agencies are to conduct regular and meaningful consultation and collaboration with Tribal Officials in the development and implementation of federal policies that have tribal implications.	Agency Approval of the Soil NTCRA Action Memorandum and Work Plan	BLM	Appendix B of PA (Consultation Protocol)	PG&E defers to BLM.
48	Federal Location-Specific	EO 12898	TBC	Federal agencies will conduct "…activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities, because of their race, color, or national origin."	Agency Approval of the Soil NTCRA Action Memorandum and Work Plan	Federal agencies	Public notice and fact sheets	PG&E defers to the federal agencies.
49	Federal Location-Specific	EO 13352	TBC	DOI will, to the extent permitted by law, "…implement laws relating to the environment and natural resources in a manner that promotes cooperative conservation."	EE/CA and Action Memorandum	Federal agencies	Responsiveness Summary	PG&E defers to DOI.

Item No. [a]	Category [a]	Citation [a]	Determination [a]	Description in Soil EE/CA [a]	Triggering Event	Compliance Responsibility	Which Existing or Future Documents Will Demonstrate Continued Compliance with this ARAR or TBC? [b]	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
50	Federal Location-Specific	Indian Sacred Sites (EO 13007)	TBC	In managing federal lands, the United States "…shall, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites."	Agency Approval of Soil NTCRA Work Plan	Federal agencies	PA, CHPMP, Tribal Access Plan	Tribal access to areas within the APE will be in accordance with the two access plans (one for lands under federal management and one for lands not under federal management).
51	Federal Location-Specific	EO 11988 – Floodplain Management	TBC	This EO requires evaluation of the potential effects of actions that take place in a floodplain to avoid, to the extent possible, adverse impacts.	Agency Approval of Soil NTCRA Action Memorandum and RAWP	Federal agencies	This Work Plan	The Soil NTCRA does not include activities in wetlands.
52	Federal Location-Specific	EO 11990 – Responsibilities of Federal Agencies to Protect Wetlands	TBC	This EO requires that potential impacts to wetlands be considered, and as practical, destruction, loss, or degradation of wetlands be avoided.	Agency Approval of Soil NTCRA Action Memorandum and RAWP	Federal agencies	This Work Plan	The only activities proposed in the floodplain are related to staging of equipment and materials. The existing aggregate-based access road in the floodplain will be used. No new access road will be created. Precise locations for staging areas will be selected with inputs from biologists and archaeologists to avoid and minimize impacts to sensitive resources. Light grading and placement of stabilization mats may be required to set up the staging areas.
53	California Location-Specific	San Bernardino County Development Code – Noise Standards 83.01.080	Applicable	This Code establishes acceptable sound levels based on receiving land use. Construction, maintenance, repair, or demolition activities are exempt if conducted between 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays.	Implementation of Soil NTCRA	PG&E	This Work Plan	It is anticipated that noise-generating construction activities, such as excavation and material processing, will be conducted between 7 a.m. and 7 p.m., excluding Sundays and federal holidays. In the unlikely event that noisy construction activities are anticipated to extend beyond these hours, PG&E will develop a noise control plan that addresses compliance with the applicable requirements. As is typical, preconstruction activities, such as daily tailboard meetings, site clearance, and field surveys, as well as office work, will likely occur outside of this time window.

[a] DOI (unpublished).
[b] The intent of this column is to identify what current or future documents are intended to satisfy this measure and be transparent in future documentation. This column is not intended to document compliance with ARARs or TBCs.
[c] Arcadis 2019
[d] Arcadis 2018
[e] CH2M 2009c
[f] CH2M 2017
[g] Jacobs 2021b
[h] DTSC 2017
[i] DTSC 2019
[j] USEPA 2019
[k] CDFW 2013
[l] CH2M 2007b
[m] CH2M 2014b
[n] CH2M 2015a
[o] CH2M and E2 2015
[p] BLM 2010, 2017
[q] BLM 2012
[r] BLM 2018
[s] USFWS 2015

Notes:
ACHP = Advisory Council on Historic Preservation
AIRFA = American Indian Religious Freedom Act
AMM = avoidance and minimization measure
APE = area of potential effects
CDFW = California Department of Fish and Wildlife
D/F = dioxins and furans
ECV = ecological comparison value
ESL = environmental screening level
FLPMA = Federal Land Policy and Management Act
hp = horsepower
LOAEL = lowest observed adverse effect levels

mph = mile(s) per hour
NCP = National Contingency Plan
NHPA = National Historic Preservation Act
NOx = nitrogen oxides
NPDES = National Pollutant Discharge Elimination System
NPS = National Park Service
NRHP = National Register of Historic Places
PAH = polycyclic aromatic hydrocarbon
PM = particulate matter
RAWP = Removal Action Work Plan
RFRA = Religious Freedom Restoration Act
ROWD = Report of Waste Discharge
RSL = regional screening level
SHPO = State Historic Preservation Office
SMP = Soil Management Plan
TCP = Traditional Cultural Property
TEQ = toxicity equivalent
USACE = U.S. Army Corps of Engineers
WDR = Waste Discharge Requirement

Table 4-2. Summary of Compliance with Applicable Programmatic Agreement (as Amended) Stipulations
Soil Non-Time Critical Removal Action Work Plan
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in PA Document [a], [b], [c]	Relevant Excerpt from Document	Triggering Event	Compliance Actions Taken, Underway, or To Be Taken
1	Stipulation I *(General Principles, Rows 272-315)*	The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to: A. Select and implement, or cause to be implemented, an alternative or combination of alternatives to remediate the groundwater and soil contamination in a maimer 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. B. Subject to I(A), 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. 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 (AIRF A). Additionally, the BLM, USFWS, USBR, and PG&E shall consult with the Tribes that attach cultural significance to the TCP within the APE to develop a plan to ensure Tribal access to areas within the -APE for 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. D. 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. E. Consult with the 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. F. Recognize that the environmental setting for the Topock Maze and its relationship and association to cultural and religious sites which are outside the APE relates to the historic and cultural significance of the Topock Maze. G. Recognize that on-going consultation between Signatories, Invited Signatories, and the Tribes will continue outside of this PA to further address mitigation of direct, indirect, and cumulative effects of the Topock Project.	Agency Approval of Soil NTCRA Action Memorandum and Work Plan Implementation of Soil NTCRA Work Plan Restoration of Areas Affected by Soil NTCRA	A. This measure will be fulfilled with DOI's approval of the Soil NTCRA Action Memorandum and RAWP. B. Refer to responses to Items 3-9 in this table and Tables 4-3 (Compliance with CHPMP) and 4-4 (Compliance with Treatment Plan). C. Two access plans will be implemented to provide Tribal access to areas within the APE during implementation of the Soil NTCRA: the Tribal Access Plan for lands under federal management and the Access Plan for lands not under federal management. D. Areas affected by the Soil NTCRA will be restored to their preconstruction conditions to the extent practicable. E, F, G. PG&E defers to the federal agencies.
2	Stipulation II (B) *(Area of Potential Effect [APE], Rows 397-410)*	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. Any Signatory or Invited Signatory to this PA may propose that the APE be modified. BLM shall notify all Signatories and Invited Signatories of the proposal and consult with the Tribes, PG&E, the AZ SHPO, and the CA SHPO for no more than thirty (30) days after such notification to attempt to reach agreement on the proposal according to guidance found at 36 CFR §800.4(a). If an agreement is reached, BLM will ensure that a description and map of the modification is provided to all Signatories and Invited Signatories. Agreement to amend the APE, by itself, will not require an amendment to the PA but will be subject to all other stipulations of this PA. If final agreement cannot be reached on a proposed modification to the APE, dispute resolution procedures as described in Stipulation XV will be followed.	Not applicable	PG&E does not propose any changes to the APE in this Soil NTCRA Work Plan.
3	Stipulation IV(A) *(Characterizing, Remediating, and Mitigating Soil Contamination, Rows 555-568)*	At the time of the execution of this PA, soil investigations are ongoing for the Topock Compressor Station and surrounding area. The Federal Agencies shall ensure that: 1. Consultation between the Signatories, Tribes, and Invited Signatories shall continue during development of the work plans for Soil Part A, Phase II Investigation, and Soil Part B Investigation. Should additional adverse effects be identified through consultation on future studies or work plans, the Federal Agencies will incorporate mitigation measures in the Treatment Plan included in the CHPMP as described in Stipulation VII (B) of this PA. 2. Every effort shall be made to avoid and/or minimize adverse effects to the maximum extent practicable, in accordance with the principles set forth in Stipulation I. Tribal and Archaeological Monitors shall he authorized to monitor all such related activities in accordance with Appendix C.	Implementation of the Soil NTCRA	The Soil NTCRA Work Plan was designed to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible. **Desktop Review** During the development of this Work Plan, AE and PG&E Archaeologists performed a desktop review of a preliminary draft of the work area boundary to confirm there were no major conflicts with locations of previously identified resources. Through this review, AE concluded that all areas within the work boundary have been surveyed multiple times within the past 20 years. Most of these areas have been surveyed as recently as 2021. There is only one area, the USBR rock quarry, that has not been surveyed since 2004. For details, refer to a memorandum from AE in Appendix J. Review of archaeological sites within 30 meters of proposed action areas revealed that only one isolate, 36-027735, is within 30 meters of a removal action area where actual ground excavations are proposed. A closer examination revealed that this isolate is not located within an excavation footprint; rather, it is in the planned material processing and staging area in BCW. **Field Review**

Item No.	Reference Location in PA Document [a], [b], [c]	Relevant Excerpt from Document	Triggering Event	Compliance Actions Taken, Underway, or To Be Taken
				Subsequently, a PG&E Archaeologist participated in a field review to walk the work area and discuss details, including work boundary and means and methods to protect sensitive resources (including the isolate in BCW). Inputs were provided and used to refine the work area boundary to protect resources. The refined work area is then included in this Work Plan for review and comment by DOI and DTSC, and for consultation with Tribes. A site visit will be scheduled with the agencies and Tribes to facilitate review of this Work Plan. Comments on the Work Plan will be reviewed, evaluated, and responded to, and incorporated into the final Work Plan where appropriate. Subsequent to DOI's approval of the final Work Plan, the following activities will be carried out prior to and during the removal action to protect resources: **a) Prior to Ground-disturbing Activities –ERTC, Preconstruction Field Verification, Installation of Protection Measures, and Worker Training** AE and PG&E Archaeologists will participate in the ERTC process for the Soil NTCRA. The purpose of the ERTC is to provide PG&E with the information necessary to comply with the protection measures and project requirements. In addition, **preconstruction field verification** site walks with Tribes and agencies will also be conducted when AE or PG&E Archaeologists identify sensitive sites within the 25-foot evaluation zone and the 25-foot buffer area (per DOI's Consultation during Construction protocol) and determine that ground-disturbance activities could cause an adverse effect that has not been previously evaluated. The purpose of these site walks is to obtain inputs on the protection measures for sensitive sites. Inputs received will be incorporated into the ERTC issued to PG&E. In addition, PG&E conducts a mandatory WEAT for its employees, subcontractors, and consultants who will be involved in the soil removal action. All new field personnel are required to have this mandatory training prior to field work. The WEAT covers the rules and requirements for working onsite, including cultural resources protection. A video showing Tribal perspective on the remediation project is also part of the WEAT. All attendees are required to sign and date the training roster after completing the WEAT. Educational brochures are also made available to workers. These brochures are intended to reinforce important topics and highlight the take-aways discussed during the classroom training. **b) During Ground-disturbing Activities – Monitoring** Cross-trained AE and PG&E archaeological and paleontological monitors observed all ground-disturbing activities during this reporting quarter. The monitors have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. Tribal monitors were also invited to observe ground-disturbing activities.
4	Stipulation IV(B)(1) *(Characterizing, Remediating, and Mitigating Soil Contamination, Rows 576-580)*	As a general rule, only soils that have been contaminated by human activity are to be remediated. Response actions to address contaminated soils will be selected in compliance with the requirements of CERCLA. No soils remediation or mitigation will proceed until consultation with all Signatories and Invited Signatories has been completed in accordance with guidelines in Appendix B.	Agency Approval of Soil NTCRA Action Memorandum and Work Plan	This measure will be implemented as directed.
5	Stipulation IV(B)(2) *(Characterizing, Remediating, and Mitigating Soil Contamination, Rows 582-583)*	Any and all projects to remove or otherwise remediate the contamination of soils are planned in accordance with the principles set forth in Stipulation I of this PA.	Implementation of the Soil NTCRA	This measure will be implemented as directed.
6	Stipulation IV(B)(3) *(Characterizing, Remediating, and Mitigating Soil Contamination, Rows 585-587)*	Tribal and Archaeological Monitors shall be authorized to monitor all soils characterization, remediation, and mitigation activities in accordance with Appendix C.	Implementation of the Soil NTCRA	Cross-trained archaeological and paleontological monitors will observe all ground-disturbing activities during the Soil NTCRA. The monitors have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. Tribal monitors will also be invited to observe ground-disturbing activities.
7	Stipulation IV(B)(4) *(Characterizing, Remediating, and Mitigating Soil Contamination, Rows 589-597)*	Because the final design of the selected remedy may differ from its conceptual design, the Federal Agencies agree to ensure that: • Consultation between the Signatories, Tribes, and Invited Signatories is initiated prior to final design of the selected remedy. • Every effort shall be made to avoid and minimize adverse effects to the maximum extent practicable, in accordance with the principles set forth in Stipulation I.	Implementation of the Soil NTCRA	Refer to responses to Item 1 in this table.

Item No.	Reference Location in PA Document [a], [b], [c]	Relevant Excerpt from Document	Triggering Event	Compliance Actions Taken, Underway, or To Be Taken
8	Stipulation IV(B)(5)(a) *(Characterizing, Remediating, and Mitigating Soil Contamination, Rows 605-612)*	Whatever the selected alternative, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the design activities to determine how to best restore the areas affected by the Topock Remediation Project. These areas include, but are not limited to, the site of the existing treatment plant and related facilities, but exclude the Topock Compressor Station and related facilities to 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 the Soil NTCRA	Areas affected by the Soil NTCRA will be stabilized and returned to their preconstruction conditions to the extent practicable. For areas with steep slopes, erosion control measures may be installed after soil removal.
9	Stipulation IV(B)(5)(b) *(Characterizing, Remediating, and Mitigating Soil Contamination, Rows 613-615)*	BLM will include the results of consultation as part of the Treatment Plan specified in the CHPMP and document specific consultation activities as part of the administrative record.	Implementation of the Soil NTCRA	PG&E defers to BLM.
10	Stipulation IX(A)-(D) *(Discoveries, Rows 755-806)*	A. If the Undertaking affects a previously unidentified cultural and/or historic resource, including human remains and/or associated funerary objects or graves, or affect such resources in a way not previously anticipated, or have greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the BLM, in consultation with Tribal and Archaeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger areas if warranted by specific circumstances) in which no further work is to take place until treatment of the discovery is resolved. At such point BLM will notify all Signatories, Tribes, and Invited Signatories of the nature and general location of the discovery. The BLM will implement appropriate measures, including stabilization or covering, to protect any discovery (human remains, funerary objects, sacred objects, or objects of cultural patrimony) from further disturbance in accordance with the principles set forth in Stipulation I. Ongoing work not within 50 meters (or a smaller area if determined appropriate by parties in the field) of the discovery may continue. If human remains and/or associated funerary objects compose all or part of the discovery, then BLM shall ensure the stipulations of the POA included in the CHPMP, as described in Stipulation VII (H) hereof, will be completed. Also, if human remains and/or funerary objects are encountered, all activities shall follow the procedures and direction provided in NAGPRA and California Public Resources Code sections 5097.98 and 5097.991. For Arizona, such activities shall follow the procedures and direction provided in NAGPRA and applicable state laws, including the Arizona Antiquities Act of 1927 (Arizona Revised Statue [ARS] § 41- 841 to 41-846), Burial Protection Law of 1990 (ARS §41- 865), and ARS §41-844 of 1990. **2016.** The BLM, in consultation with Signatories, Invited Signatories, and Tribes, 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 principles set forth in Stipulation I. **2016.** The Discovery Plan and/or Plan of Action (CHPMP, Appendices C and D) will be followed if previously unrecorded resources, human remains, or items of cultural patrimony are discovered. B. If the Tribes, PG&E, and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E, and BLM will use their best efforts to resolve treatment as quickly as possible. C. If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. D. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will utilize the dispute resolution process in Stipulation XV of this PA to resolve any objection.	Discovery of A Previously Unidentified Cultural or Historic Resource, or Unanticipated Adverse Effects Occur during Ground-disturbing Activities	This measure will be implemented as directed. In addition, the *Protocols for Handling and Disposition of Isolated Artifacts Exposed by Project Activities* (also known as the Isolate Protocol) will be followed in the handling of isolated artifacts discovered in disturbed contexts.
11	Appendix C Monitoring Protocol	Prior to execution of the PA for the Undertaking, PG&E sometimes invited the Tribes to be present on site during construction to monitor and observe non-maintenance grading, trenching, or other excavation for any facilities, new roads, or other project components related to the Undertaking which may have had the potential to adversely impact cultural and historic resources. The Tribal and Archaeological Monitors shall both be invited to monitor such field work.	Implementation of Ground-disturbing Activities in Support of the Soil NTCRA	Cross-trained AE and PG&E archaeological and paleontological monitors will observe all ground-disturbing activities. The monitors have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. Tribal monitors will also be invited to observe ground-disturbing activities.
12	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 Ground-disturbing Activities in Support of the Soil NTCRA	This measure will be implemented as directed.

Item No.	Reference Location in PA Document [a], [b], [c]	Relevant Excerpt from Document	Triggering Event	Compliance Actions Taken, Underway, or To Be Taken
13	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. **2016.** The archaeological and tribal monitors will comply with the PA requirements of Stipulation IX (Discoveries). Protocols to be followed are found in the Discovery Plan (Appendix C of the CHPMP).	Discovery of A Previously Unidentified Cultural or Historic Resource, or Unanticipated Adverse Effects Occur during Ground-disturbing Activities	This measure will be implemented as directed.
14	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.	Discovery of Previously Unidentified Human Remains or Associated Funerary Objects or Graves, or Unanticipated Adverse Effects Occur during Ground-disturbing Activities	This measure will be implemented as directed.
15	Appendix C Monitoring Protocol (Monitoring and Reporting Requirements)	Monitors shall check-in and out with the designated site supervisor and/or PG&E's site manager (or designee) each day. Each monitor shall complete a Daily Monitoring Log detailing monitoring activities. This log will provide the Tribe, BLM, and PG&E with details on the activities that took place during each day, any concerns or issues, and how those concerns or issues were resolved. The Daily Monitoring Log must be completed and signed by the monitor and the designated site supervisor and/or PG&E's onsite project manager (or designee), both, at the end of each day. PG&E will also provide copies of the Daily Monitoring Log to the BLM Topock Project Manager. This Log will provide details on the activities that took place ·during each day, any concerns or issues, and how those concerns or issues were resolved. In the event that the designated site supervisor and/or PG&E' s onsite project manager is not available to sign the log at the end of the day, the monitor will acquire their signature(s) the next time they meet. The Daily Monitoring Log will be the property of PG&E; and the company shall fax or email a copy to the Tribe, upon request. The Tribal and Archaeological Monitors may also maintain additional monitoring notes and photos, which will be the property of the Tribes and BLM, respectively. **2016**. Tribal Monitors will sign in with PG&E's designated site supervisor or onsite project manager (or designee) at the beginning of each workday or upon arrival. PG&E will maintain logs reflecting the names and tribal affiliation of all monitors who report to work. The use of Daily Monitoring Logs by Tribal Monitors is encouraged although each tribe is responsible for establishing reporting requirements for its monitors. All Daily Monitoring Logs submitted to PG&E shall be retained.	Implementation of Ground-disturbing Activities in Support of the Soil NTCRA	This measure will be implemented as directed.
16	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 Ground-disturbing Activities in Support of the Soil NTCRA	This measure will be implemented as directed.

[a] BLM et al. 2017

[b] Stipulations III (Remediating Groundwater Contamination) and V (Removal of Existing Treatment Plants and Other Remediation Facilities) are related to the selection and implementation of the groundwater remedy, unrelated to the Soil NTCRA; therefore, they are not included in this table.

[c] Stipulations IV (Interim Measures for Implementation of the Undertaking), VII (CHPMP), VIII (Identification of National Register of Historic Places Properties), X (Administrative Stipulations), XI (Standards), XII (Confidentiality), XIII (Curation), XIV (Amendments to the Agreement), XV (Dispute Resolution), XVI (Termination), XVII (Annual Report and Evaluation), XVIII (Appendices), XIX (Duration of this Agreement), XX (Effective Date), and XXI (Signatures) are related to the governance and administration of the PA. For brevity, these stipulations are not included in this table.

Notes:

AE = Applied Earthworks

ARS = Arizona Revised Statue

ROD = Record of Decision

Table 4-3. Summary of Compliance with Applicable Cultural and Historic Property Management Plan Provisions
Soil Non-Time Critical Removal Action Work Plan
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in CHPMP Document [a], [b]	Relevant Excerpt from Document	Triggering Event	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
1	Section 6.2	Measures and principles to avoid, minimize, or resolve adverse effects include the following: • Existing 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 NTCRA 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 PA Stipulation I(A) above, direct, indirect and cumulative impacts shall be considered and mitigated.	Implementation of Field Activities in Support of the Soil NTCRA	With regards to the first three bullets, PG&E will use existing facilities (including access routes) or work in previously disturbed areas during the Soil NTCRA. With respect to the last two bullets, refer to responses to Table 4-2, Item 1.
2	Section 6.3	“Environmental Restoration” refers to the restoration obligations in the Programmatic Agreement and the Consent Decree.	Restoration of Areas Affected by the Soil NTCRA	Refer to response to Table 4-2, Item 8.
3	Section 6.6.3	“Avoidance Measures/Management Thresholds” provides that: “The primary means for achieving avoidance will be through careful planning and placement of project facilities and installation of temporary barrier fences around significant cultural and historic properties. Metal fence posts and orange mesh all- weather fabric will be used, unless other appropriate materials are identified as preferable, for temporary fencing and will be regularly inspected and maintained. Permanent post-and double cable fencing may be required in high traffic areas. An archaeologist and/or Tribal representative(s) will clearly delineate the sensitive areas to be avoided by construction and supervise fence installation. Project personnel will be notified that fenced locations are to be completely avoided.”	Implementation of Field Activities in Support of the Soil NTCRA	The Soil NTCRA was designed to avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible. **Desktop Review** During the development of this Work Plan, AE and PG&E Archaeologists performed a desktop review of a preliminary draft of the work area boundary to confirm no conflicts with locations of previously identified resources. Through this review, AE concluded that all areas within the work boundary have been surveyed multiple times within the past 20 years. Most of these areas have been surveyed as recently as 2021. There is only one area, the USBR rock quarry, that has not been surveyed since 2004. For details, refer to a memorandum from AE in Appendix J. Review of archaeological sites within 30 meters of proposed action areas revealed that only one isolate, 36-027735, is within 30 meters of a removal action area where actual ground excavations are proposed. A closer examination revealed that this isolate is not located within an excavation footprint; rather, it is in the planned material processing and staging area in BCW. **Field Review** Subsequently, PG&E Archaeologists participated in a field review to walk the work area and discuss details, including work boundary and means and methods to protect sensitive resources (including the isolate in BCW). Inputs were provided and used to refine the work area boundary to protect resources. The refined work area was then included in this Work Plan for review and comment by DOI and DTSC, and for consultation with Tribes. A site visit will be scheduled with the agencies and Tribes to facilitate review of this Work Plan Comments on the Work Plan will be reviewed, evaluated, and responded to, and incorporated into the final Work Plan where appropriate. Subsequent to DOI’s approval of the final Work Plan, the following activities will be carried out prior to and during the removal action to ensure protection of resources: **a) Prior to Ground-disturbing Activities –ERTC, Preconstruction Field Verification, Installation of Protection Measures, and Worker Training** AE and PG&E Archaeologists will participate in the ERTC process for the Soil NTCRA. The purpose of the ERTC is to provide PG&E with the information necessary to comply with the protection measures and project requirements. In addition, preconstruction field verification site walks with Tribes and agencies will also be conducted when AE or PG&E Archaeologists identify sensitive sites within the 25-foot evaluation zone and the 25-foot buffer area (per DOI’s Consultation during Construction protocol) and determine that ground-disturbing activities could cause an adverse effect that has not been previously evaluated. The purpose of these site walks is to obtain inputs on the protection measures for sensitive sites. Inputs received are incorporated into the ERTC issued to subcontractors. In addition, PG&E conducts a mandatory WEAT for its employees, subcontractors, and consultants who will be involved in the soil removal action. All new field personnel are required to have this mandatory training prior to field work. The WEAT covers the rules and requirements for working onsite, including cultural resources protection. A video showing Tribal perspective on the remediation project is also part of the WEAT. All attendees are required to sign and date the training roster after completing the WEAT. Educational brochures are also made available to workers. These brochures are intended to reinforce important topics and highlight the take-aways discussed during the classroom training. **b) During Ground-disturbing Activities – Monitoring** Cross-trained AE and PG&E archaeological and paleontological monitors observed all ground-disturbing activities during this reporting quarter. The monitors have the authority to temporarily divert or halt any activities if previously unidentified potentially significant cultural resources are discovered. Tribal monitors were also invited to observe ground-disturbing activities.

Item No.	Reference Location in CHPMP Document [a], [b]	Relevant Excerpt from Document	Triggering Event	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
4	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). Due to safety considerations at the Project site, Tribal and Archaeological Monitors will comply with all safety requirements.	Implementation of Field Activities in Support of the Soil NTCRA	This measure will be implemented as directed.
5	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	Annual Site Condition Assessment	An annual site condition assessment has been and will continue to occur to monitor site conditions and disturbances pursuant to this measure.
6	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).	Implementation of Field Activities in Support of the Soil NTCRA	This measure will be implemented as directed.
7	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).	Identification of a Need to Revise the APE	This Work Plan does not propose extension beyond the APE; therefore, this measure does not apply.
8	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 National Register of Historic Places status. The primary means for accomplishing avoidance will be through careful planning and placement of proposed access routes and drilling sites and by the installation of barrier fences around significant historic properties. A pre- project archaeological survey field verification will be conducted prior to any ground-disturbing activities. Consistent with other phases of work conducted at the Topock Remediation Project site, agency representatives and other stakeholders (including representatives of Native American Indian Tribes involved with the Project) will be invited to the site for a project initiation meeting to discuss various cultural sensitivities associated with the Project. 3. Ensure that PG&E shall, to the extent practicable, restore the areas affected by the Topock Remediation Project within the APE, including but not limited to the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation and remediation related appurtenances and facilities per PA Stipulation I.D. 4. Remediation activities that propose the removal or introduction of vegetation on public lands shall be undertaken after coordination with Tribes to assess if culturally significant native plant species are being impacted and if there could be potential visual impacts to the Topock Traditional Cultural Property (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.	Implementation of Field Activities in Support of the Soil NTCRA	For Items 1 through 7, refer to responses to Table 4-2 Item 1. For Item 8 (Clay), a clay handling protocol was developed and implemented for the groundwater remedy. An addendum to the clay handling protocol was published in May 2019 and will be used for the Soil NTCRA. The addendum is included in Appendix K of this Work Plan.
9	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.	Request to Accommodate Tribal Activities and Ceremonies	Consistent with current site practice, any Tribes wishing to perform such a ceremony may contact PG&E’s Site Manager by telephone, email, or in writing to discuss the specific request. For this protocol, important Tribal ceremonies include any ceremonies or activities the Tribes choose to notify PG&E about or ask for assistance with. PG&E will consider the request and decide if the request can be accommodated as is, with modifications, or not at all, and will notify the requestor by phone or in person as soon as possible.
10	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.”	Implementation of Field Activities in Support of the Soil NTCRA	This measure will be implemented as directed.

Item No.	Reference Location in CHPMP Document [a], [b]	Relevant Excerpt from Document	Triggering Event	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
11	Section 8.1	Discoveries - Steps to be taken if previously unrecorded properties are found	Discovery of a Previously Unidentified Cultural or Historic Resource, or Unanticipated Adverse Effects Occur during Ground-disturbing Activities	Refer to response to Table 4-2, Item 10.
12	Section 8.2	Discoveries - Treatment of any human remains, funerary objections, ceremonial objects and items of cultural patrimony	Discovery of Associated Funerary Objects or Graves during Ground-disturbing Activities	This measure will be implemented as directed.
13	Section 8.3	Consultation Procedures Related to Unanticipated Discoveries • The BLM will notify all Signatories of the PA, Tribes and Invited Signatories of the nature and general location of any discovery. If the Tribes, PG&E and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E and BLM will use their best efforts to resolve treatment as quickly as possible. • If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will utilize the dispute resolution process in Stipulation XV of the PA to resolve any objection.	Discovery of a Previously Unidentified Cultural or Historic Resource, or Unanticipated Adverse Effects Occur during Ground-disturbing Activities	This measure will be implemented as directed. In addition, the *Protocols for Handling and Disposition of Isolated Artifacts Exposed by Project Activities* (also known as the Isolate Protocol) will be followed in the handling of isolated artifacts discovered in disturbed contexts.

[a] BLM 2012

[b] Section 6.2.3 is related to the decommissioning, removal, and restoration of the IM-3 facility and removal of groundwater remediation facilities that are unrelated to the Soil NTCRA; therefore, it is not included in this table.

Notes:

AT&SF = Atchison, Topeka, and Santa Fe Railway

Table 4-4. Summary of Compliance with the Cultural and Historical Property Treatment Plan
Soil Non-Time Critical Removal Action Work Plan
PG&E Topock Compressor Station, Needles, California

CHPTP [a] Section	Requirements	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
4.2.1	PG&E and its archaeological subcontractor will add the Tribes' cultural perspectives to site documentation through the use of a site form Continuation Sheet or other means. Section 13 of Form 523A (Primary Form) will reference the Continuation Form if available (BLM request). PG&E will also review and update all site forms not updated in the past 10 years and add Tribal perspective continuation sheets. Updates will be conducted in conjunction with annual monitoring or other monitoring events.	This measure will be implemented as directed.
4.2.1	In consultation with the Tribes, revisions to the Annual Monitoring and Site Condition Assessments strategy will be assessed, such as reviewing access routes to particular sites to reduce possible site disturbance and perhaps the removal of some sites from the monitoring target list based on concerns, including worker safety, legal access, and potential harm to sites form monitoring-associated foot traffic.	Annual site condition assessment has been and will continue to occur to monitor site conditions and disturbances pursuant to this measure.
4.2.1	PG&E will protect trail segment CA-SBR-29943 near Maze Locus A and monitoring well MW-15 by implementing specific measures to protect the trail from being physically impacted by well monitoring activities. Methods will entail physically preventing sampling hoses from touching the ground surface within 20 feet of either side of the trail (if sawhorses or similar equipment is used, it will be weighed down to function properly, such as weighing down the sawhorses or similar equipment with sandbags so they do not tip over). In addition, BLM suggests erecting a post-and-cable fence on top of the mesa to block unauthorized access to the sensitive area and MW-15 from that direction. PG&E will access the monitoring well by way of an existing defined vehicle path.	This measure will be implemented as directed.
4.2.1	PG&E will establish an Informational Outreach Trailer at Moabi Regional Park during the construction phase of the project to explain to visitors the nature of the project and the cultural sensitivity of the area, as deemed appropriate in coordination with Tribal representatives. PG&E will solicit input on design of a multiple panel, high-quality information kiosk from representatives from federal agencies, Tribes, and other interested parties, such as the California Historic Route 66 Association. Information panels will provide relevant information (e.g., Topock Maze and its meaning to Colorado River Indian Tribes) aimed at educating the public and stressing respect for the area's prehistoric and spiritual resources. Signage may include information on local history and natural resources of the Colorado River. Signage and infrastructure will compliment and be compatible with a proposed Route 66 kiosk and other agency requirements. PG&E will be responsible for long-term care and maintenance of the kiosk and replacement of panels as necessary due to extreme climate (i.e., usually every 5 years).	This measure has been and will continue to be implemented.
4.2.2.1	PG&E will minimize impacts to NOTH and Route 66 to the greatest extent practicable through careful placement of liquid conveyance pipeline trenches and drill locations, and limiting access of construction vehicles and equipment along road segments that retain historical integrity. To accomplish this goal, the following measures will be applied to all segments with integrity that may be affected by the project: a. A Qualified Cultural Resource Consultant will inspect each location of proposed project activity once identifiably marked on the ground prior to commencement of construction so that road segments and associated features are avoided to the greatest extent feasible. b. PG&E will minimize visual intrusions through methods consistent with Final SEIR Mitigation Measure AES-1[b], including minimizing impacts to mature plant specimens and use of matte paints in muted, earth-tone colors for aboveground and exterior project elements, that are consistent with the surrounding color palette. c. To prevent damage to the fabric of the roadways, portions of the roads may be closed to construction use, or other protective measures (e.g., dirt or gravel covering, metal or wood protective plates) may be placed over the existing road surfaces where they are needed for construction work. The road will remain covered with protective materials until all construction activities are completed, including IM-3 decommissioning. d. A Qualified Cultural Resource Consultant will monitor grading, trenching, installation of extraction or injection wells, pipelines, access roads, and other transportation facilities, or other ground-disturbing activities during construction. The purpose of the monitoring will be to confirm that construction does not inadvertently damage the integrity of NOTH and Route 66 roadway segments and associated features beyond what is anticipated. The Qualified Cultural Resource Consultant will work as part of the construction crew, will participate in all daily construction meetings, and will advise the project manager and construction site superintendent regarding impact avoidance and other historic resource issues. The Qualified Cultural Resource Consultant will have the authority to halt construction if unanticipated disturbances to significant road segments are observed. e. Upon completion of the groundwater remediation process, the historical setting will be restored to the extent practicable. f. All planned or inadvertent disturbances to erosion control structures or other road-related features of historical significance will be restored following completion of the work to the extent practicable. g. Establish selected photo points (with GPS coordinates) along those portions of the road segments that will be impacted to aid in restoration following the Soil NTCRA. h. Temporary barrier fences will be installed around work locations to aid in avoidance of inadvertent disturbance of the road features away from the immediate location of planned construction activity. Metal fence posts and orange mesh all-weather fabric will be used for temporary fencing unless other appropriate materials are identified as preferable, and will be regularly inspected and maintained. Permanent post and double-cable fencing may be required in sustained traffic areas. Project personnel will be notified that project activity is to not extend beyond the established barriers. i. As specified, during construction of the project, PG&E will establish the Informational Outreach Trailer at Moabi Regional Park. This temporary visitor center in a modular building will provide visitors with information about the nature of the project and the cultural sensitivity of the area, as deemed appropriate in coordination with Tribal representatives.	The Soil NTCRA will only use NOTH and Route 66 as established access routes. Therefore, this measure does not apply.
4.2.2.2(A)	PG&E will minimize impacts to individual segments of NOTH and Route 66 that will be affected by the project through the application of the following segment-specific measures:	The Soil NTCRA will only use NOTH and Route 66 as established access routes. There is no planned improvement to any segments as part of the Soil NTCRA. Therefore, this measure does not apply.
4.2.2.2(A)	**Segment A**: PG&E will perform a detailed condition assessment and develop a plan that will guide careful restoration of the existing circa-1935 Route 66 Welcome sign near the western terminus of Segment A, including such components as the terra cotta tiles on top of the sign. Restoration of the sign will be consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for Restoration. As lead agency, the BLM will seek plan approval from the HNWR, the land managing agency. Prior to construction to provide guidance for any needed restoration, PG&E also will complete HAER Level II documentation following NPS standards of the affected portions of the Segment A roadbed and associated character-defining features, such as the guardrail.	The Soil NTCRA will not involve Segment A.

CHPTP [a] Section	Requirements	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
4.2.2.2(J)	**Segment J**: To remedy the adverse effect on the Segment J roadway resulting from trenching to bury the liquid conveyance pipelines and conduits along the northern shoulder of Route 66, the disturbed surface area will be compacted and restored after placement of the pipe using materials that blend with the adjoining areas to the extent feasible. In addition, well sites will be similarly restored when the wells are removed at the conclusion of remediation efforts. To protect remaining undisturbed roadway surfaces, use of this segment by construction vehicles and equipment will be limited to the extent feasible. Prior to construction to provide guidance for any needed restoration, PG&E will complete HAER Level II documentation following NPS standards for the affected potions of the Segment J roadbed noted and the following associated character-defining features. Two small historic-era refuse scatters (Features 37 and 38), one cement highway marker (Feature 20), a wooden culvert (Feature 35), and a rock gutter (Feature 33) associated with Segment J also may be adversely affected by the project. The rock gutter is a long, linear feature made of flat stone slabs set in cement; it lines the roadway edge on some slopes to control erosion by channeling runoff away from the road. These features will be avoided and protected to the greatest extent feasible, but the precise nature and extent of effects cannot be determined until the field inspection is conducted immediately prior to construction. If the preconstruction field inspection determines that these features will be affected, PG&E will perform additional documentation of the rock and wooden culverts and historic highway marker prior to construction using appropriate recording procedures determined in consultation among the BLM, California State Historic Preservation Officer, and DTSC. Also, prior video recordings of Segment J should be used to produce a DVD of the road segment and its associated features. Additionally, if the highway marker (Feature 20) cannot be avoided and protected during construction, PG&E will remove the object prior to disturbance and determine its disposition in consultation with BLM and DTSC. Options for disposition may include replacement at its original location following project completion, placement in an alternative location to be determined, or use as part of an interpretative display. The refuse scatters (Features 37 and 38) represent discrete roadside dumping episodes. Each feature was recorded thoroughly during the previous field surveys; nonetheless, each will be revisited prior to construction to collect additional information not captured during the prior documentation to confirm the archaeological data potential of these features has been thoroughly captured.	The Soil NTCRA will only use Segment L as part of an established access route. There is no planned improvement to this segment as part of the Soil NTCRA.
4.2.2.2(L)	**Segment L:** To remedy the adverse effect on the short stretch of Segment L where the liquid conveyance pipeline and conduits will be buried and two wells (MW-1 and IRL-2) will be installed, disturbed areas will be restored and compacted using materials that blend with the adjoining roadway material to the extent feasible. Prior to commencement of construction activities, photo documentation will both capture the character-defining features of the roadway and provide guidance for restoration. To protect remaining undisturbed roadway surfaces, use of this segment by construction vehicles and equipment will be limited to the extent feasible. Prior to construction to provide guidance for needed restoration, PG&E will complete HAER Level II documentation following NPS standards for the affected potions of the Segment L roadbed and the associated character-defining features.	The Soil NTCRA will not involve Segment L.
4.2.2.2(X)	**Segment X**: PG&E anticipates installing approximately 35 wells along a 2,000-foot-long section of the eastern portion of Segment X and the underlying railway bed (CA-SBR-6693H). In addition, a liquid conveyance pipeline and conduits will be buried along the eastern shoulder of Route 66 and the railway bed. To prevent Soil NTCRA adverse effects on these features, PG&E will document any newly exposed road or railway historic materials identified during monitoring. Additionally, the trench along the eastern shoulder of Route 66 and railway bed will be compacted. For two buried pipeline trenches intersecting the roadway, Route 66 will be repaved to County standards. For the proposed well locations along the eastern side of the roadway at the road surface level, the disturbed surface will be restored using local materials to blend with the surrounding landscape to the extent feasible. For the numerous wells within the road or rail substructure itself, Route 66 will be repaved to County standards, as will the two pipeline crossings. Off-road access will be limited to the extent feasible for construction vehicles and equipment along this segment.	The Soil NTCRA will only use Segment X as part of an established access route. There is no planned improvement to this segment as part of the Soil NTCRA.
4.2.2.2(Y)	**Segment Y**: To remedy project impacts on Segment Y, the pipeline trench along the western shoulder of Route 66 will be compacted, and the portion of the pipeline trench under the railroad undercrossing and within Route 66 will be repaved to County standards.	The Soil NTCRA does not involve work in Arizona; therefore, this measure does not apply.
4.3	Periodic site monitoring and condition assessments are a critically important treatment measure to confirm known archaeological and historical sites within the project area and APE are adequately protected. PG&E will pursue the following actions in this regard: a. Continue implementing the periodic monitoring and condition assessments in a manner that considers all historic properties, as directed by Section 6.6.5 of the CHPMP and Final SEIR Mitigation Measure CUL-1a-3a. b. Prior to completing the construction phase, evaluate the monitoring program, and propose changes that consider ongoing site access problems; potential impacts to sensitive resources by the monitoring activities themselves; and site locations that pose safety hazards to employees, contractors, and monitors. c. The revised periodic monitoring strategies will consider monitoring at specific sites performed during the Soil NTCRA. The results of construction monitoring will be included in the next periodic monitoring event to avoid duplication in site visits and unnecessary site impacts. d. PG&E will continue monitoring those sites potentially vulnerable to future effects associated with the project on a periodic schedule determined in consultation with BLM and interested parties; the CHPMP anticipates that the frequency of periodic monitoring will decline over time. e. After each periodic monitoring event, PG&E and other interested parties will assess the effectiveness of the program and consider possible adjustments.	This measure will be implemented as directed.
4.4	Procedures for monitoring ground-disturbing construction activities are provided in CHPMP Section 6.6.4; the SEIR MM CUL-1b/c-4a; and CIMP Sections 2.10, 2.12, and 2.13. Protocols applicable to all are provided in Appendix C (Tribal and Archaeological Monitoring Protocol) of the PA. As with periodic site monitoring and condition assessments, construction monitoring is a critically important treatment measure to confirm protective measures are implemented effectively, and to identify and provide appropriate protection for previously undiscovered archaeological and historical sites encountered during construction. As stated in CHPMP Section 6.6.4, "The purpose of the monitoring will be to ensure that construction does not adversely affect the Topock Maze, the TCP within the APE, Route 66, or any other historic properties within the APE." Through implementation of this project guidance, PG&E will pursue the following actions:	Not applicable
4.4	Notify qualified archaeological and Tribal monitors at least 2 weeks in advance, and invite them to be onsite during 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 (CHPMP Section 6.6.4; CUL-1b/c-4a; CIMP Section 2.12).	Consistent with site practices, PG&E will publish a daily construction activities list and discuss the list at the morning tailboard meetings with Tribes and agency representatives. This daily list is intended to inform and facilitate observation by Tribes and agency representatives onsite on that day. These weekly and daily communication tools will be used to fulfill the requirements of the PA Appendix C Monitoring Protocol to keep Tribes and BLM well informed of project activities and outcomes.
4.4	Confirm Tribal and Archaeological Monitors comply with all safety requirements (CHPMP Section 6.6.4).	Consistent with site practices, archaeological monitors will attend the site safety training and daily tailboard meetings where safety topics will be discussed. Tribal monitors will also be invited.
4.4	Confirm monitors are qualified and perform their duties as specified in Appendix C of the PA.	This measure will be implemented as directed.
4.4	Monitor remediation facilities and staging areas during construction (CIMP Section 2.16).	This measure will be implemented as directed.

CHPTP [a] Section	Requirements	Actions Taken, Underway, or To Be Taken For Compliance With This Measure
4.4	Confirm monitors work as part of the construction crew, participating in all daily construction meetings and advising the Project Manager and Construction Site Superintendent regarding avoidance of effects and other cultural resource issues.	Archaeological monitors attended daily tailboard meetings where planned construction activities are discussed. Tribal monitors will also be invited.
4.4	Maintain Daily Monitoring Logs detailing results of the monitoring effort and follow these steps: 1. Keep Daily Monitoring Logs on file with PG&E's Archaeologist and the PG&E Topock Site Manager. 2. Forward copies of the Daily Monitoring Logs to BLM and, upon request, to any of the concerned Tribes (CHPMP Section 6.6.4).	Consistent with site practices, archaeological monitors will maintain Daily Monitoring Logs, and these logs will be on file with PG&E's Archaeologist and available to BLM immediately upon request.
4.4	During construction, PG&E will document monitoring activities in monthly reports (CUL-1b/c-4a).	This measure will be implemented as directed.
4.4	Tribal monitors will prepare and submit Daily Monitoring Logs (CIMP Section 2.12).	Not applicable to PG&E.
4.4	Confirm monitors record date- and time-stamped digital photos of cultural sites to document site conditions at the time of surface disturbance (CHPMP Section 6.6.4).	Archaeologists will record date and time-stamped digital photos of cultural sites to document site conditions at the time of surface disturbance.
4.4	After each monitoring event, assess the effectiveness of the construction monitoring program, and consider possible adjustments.	This measure will be implemented as directed.
4.4	If monitoring reveals previously unknown remains during grading, trenching, or other construction work, cease activities in the vicinity of the discovery until the archaeological or Tribal monitor have evaluated the discovery and a course of action is decided upon in accordance with the Discovery Plan (CHPMP Section 6.6.4; CHPMP, Appendix C; CIMP Section 2.15).	This measure will be implemented as directed.
4.4	Confirm the following treatment actions in the TCP are implemented prior to the initiation of ground-disturbing activities: 1. Temporary barriers are placed around sensitive locations near proposed actions (CIMP Section 2.15). 2. Tribal access for cultural activity purposes is provided to the extent feasible during construction (CIMP Section 2.11). 3. Cultural sensitivity training is provided to workers (PA, Appendix C; CUL-1a-13a). 4. Plant transplantation and monitoring is implemented according to protocols (CUL-1a-5; CIMP, Appendix A). 5. Clean soil cuttings are repatriated according to protocols (CUL- 1a-17). 6. The public education initiative is implemented, including the brochure (CUL-1a-3c).	This measure will be implemented as directed.
4.4	In regard to treatment actions proposed for NOTH and Route 66, confirm monitors conduct a preconstruction field verification to examine the proximity of flagged activity areas to resources.	Not related to Soil NTCRA.
4.4	Confirm appropriate paints are used to minimize visual intrusions and mature plants are placed where feasible for screening (CIMP Section 2.9).	Not related to Soil NTCRA.
4.4	Prior to completing the groundwater remedy construction phase: 1. Evaluate implications for the periodic monitoring program, and propose changes that consider ongoing site access problems; potential impacts to sensitive resources by the monitoring activities themselves; and site locations that pose safety hazards to employees, contractors, and monitors. 2. Provide results of construction monitoring during the next periodic monitoring event to avoid duplication in site visits and unnecessary site impacts.	Not related to Soil NTCRA.

[a] AE 2018

[b] DTSC 2018

Notes:

CHPTP = Cultural and Historical Property Treatment Plan

CIMP = Cultural Impact Minimization Program

County = San Bernardino County, California

GPS = global positioning system

HAER = Historic American Engineering Record

SEIR = Subsequent Environmental Impact Report

Table 4-5. Summary of Compliance with the Bird Impact Avoidance and Minimization Plan (BIAMP)
Soil Non-Time Critical Removal Action Work Plan
PG&E Topock Compressor Station, Needles, California

Item No.	Reference Location in BIAMP Document	Relevant Excerpt from Document [a]	Summary of Compliance Activities
1	Section 6.1	Prior to the initiation of any ground disturbing or noise generating project activities outside of the fenced areas of the Compressor Station between March 15 and September 30, a qualified biologist shall conduct a preconstruction survey in areas of potentially suitable habitat for nests and nesting bird behavior. The appropriate area to be surveyed and the timing of the survey may vary depending on the activity and species that could be affected.	This measure will be implemented as directed.
2	Section 6.1	The location of any active nest shall be flagged, mapped, and communicated to the project foreperson. For each identified active nest, the biologist will record species, nest location, behavior, site conditions, estimated date of nest establishment, and estimated fledge date.	This measure will be implemented as directed.
3	Section 6.1	To avoid impacts to nesting MBTA protected and California Fish and Game Code §3503 and 3503.5 species, a buffer of up to 400 feet will be established around all identified active nests, as recommended in Table 6-1. Buffer distances will be dependent on feasibility and practicability, and a biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, and the sensitivity and habituation of the birds, and the dissimilarity of the proposed activity with background activity) to minimize impacts to nesting birds. As discussed in Section 7.2, the biologist will assess the activity effect, ambient activities, site conditions, and bird behavior to determine the efficacy of activity-free areas.	This measure will be implemented as directed.
4	Section 6.1	To avoid impacts to other special-status bird species, a buffer of up to 500 feet will be established around identified active nests as recommended in Table 6-2. Riparian areas surrounding the proposed action site and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatcher according to the protocol established by the USFWS. Passive listening surveys for southwestern willow flycatcher will be completed by a biologist prior to activities beginning within Southwestern willow flycatcher habitat and the floodplain during nesting season (May 15 – July 17). Passive listening surveys shall follow the survey protocol previously established between PG&E and USFWS. Species-specific Avoidance and Minimization Measures (AMMs) in Section 6.2 include additional restrictions for southwestern willow flycatcher, Yuma clapper rail, and the western yellow-billed cuckoo.	This measure will be implemented as directed.
5	Section 6.1	Activity-free buffers should be designated around active nesting areas in conformance with the BIAMP. Project activities within the activity- free area will be prohibited until the nesting pair and young have vacated the nests. The biologist will use maps, flagging, signage, and tailboard meetings as needed to ensure that project crews are aware of the location and intent of the activity-free area.	This measure will be implemented as directed.
6	Section 6.1	The biologist will monitor bird behavior in relation to project activities. With approval from DOI, the activity-free area may be reduced if specific factors or additional protection measures (e.g., visual screening) will ensure the protection of the nest.	This measure will be implemented as directed.
7	Section 6.1	All PG&E employees and the contractors involved with the project shall be required to attend a worker education program prior to working on-site and outside of fenced areas (e.g., the compressor station). This program shall include information about protected bird species (and where they may occur in the project area) and the AMMs described in this Plan to ensure impacts on special-status birds are not significant. New employees shall receive training prior to working onsite.	This measure will be implemented as directed.
8	Section 6.1	Project activity footprints and access routes shall be confined to pre-determined areas. No vehicle travel off of established roads or approved access routes shall be permitted.	This measure will be implemented as directed.
9	Section 6.1	Any vertical pipes or small cavities on equipment or materials that may trap birds shall be capped or otherwise covered when work activity is not occurring at site.	This measure will be implemented as directed.
10	Section 6.1	Trash and food items shall be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as coyotes and feral animals.	This measure will be implemented as directed.
11	Section 6.1	Night-time project site lights outside of the compressor station shall be angled toward the ground and reduced in intensity to levels compatible with safety concerns and limited in duration of usage.	This measure will be implemented as directed.
12	Section 6.1	Upon project completion, all unused material and equipment shall be removed from the site. This condition does not apply to fenced sites.	This measure will be implemented as directed.
13	Section 6.1	Intentional harassment, killing or collection of any wildlife (including birds) at construction sites and surrounding areas shall be prohibited. Wildlife shall not be handled except in the case of entrapment, injury, or mortality, as described in AMM 15.	This measure will be implemented as directed.
14	Section 6.1	PG&E shall designate a field contact representative (FCR) who will be responsible for overseeing compliance with the AMMs during major ground disturbing (including vegetation removal) or loud noise generating (above ambient levels) project activities outside of the compressor station or fenced areas. The FCR must be onsite during all construction activities. The FCR shall have authority to halt activities that are in violation of the AMMs and/or pose a danger to protected bird species. The FCR will have a copy of the AMMs when work is being conducted on site. The FCR may be a project manager, PG&E representative, or a biologist.	This measure will be implemented as directed.
15	Section 6.1	Any dead or injured special status bird species found in the project area shall be reported to the PG&E project biologist, USFWS, CDFW, BLM and, as appropriate, AGFD. Upon locating an individual dead or injured special-status bird species, PG&E shall make initial notification to the BLM and USFWS within three working days of its finding. The notification must be made by telephone and writing to the Lake Havasu BLM Office (1785 Kiowa Avenue Lake Havasu City AZ 86403-2847, 928-505-1200) and the US Fish and Wildlife Service, Ecological Services Field Office (9828 North 31st Ave #C3, Phoenix, AZ 85051-2517, 602-242-0210). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities shall be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the USFWS, CDFW, BLM and, as appropriate, AGFD, shall be contacted for final disposition of the animal.	This measure will be implemented as directed.

Item No.	Reference Location in BIAMP Document	Relevant Excerpt from Document [a]	Summary of Compliance Activities
16	Section 6.2.1 (Southwestern Willow Flycatcher)	1. The intent of PG&E will be to minimize the net increase of disturbed habitat in the area of potential effect (APE). 2. Riparian areas surrounding the proposed action site and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatcher according to the protocol established by the USFWS. These surveys shall be completed every three years by a biologist permitted by the USFWS to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office. 3. Construction and development activities that use heavy equipment should occur between July 18 and May 14. The use of any heavy equipment in or near southwestern willow flycatcher habitat after May 15 will require passive listening surveys for southwestern willow flycatcher to be completed by a biologist prior to activities beginning. 4. Minimization measures outlined in the BIAMP for southwestern willow flycatcher will be implemented including preconstruction surveys during the nesting season, awareness training, pre-activity surveys, compliance monitoring, and reporting during field activities.	This measure will be implemented as directed.
18	Section 6.2.3. (Yuma Clapper Rail)	1. The intent of PG&E will be to avoid investigative or response actions in or near marshes or wetlands, if at all possible. 2. If future actions are proposed to occur within 300 feet of wetlands or marshes (specifically the eastern boundary of the APE on the Arizona floodplain), project specific review will occur to ensure compliance with the PBA and associated USFWS consultation. 3. Where feasible, actions should not be proposed within the tamarisk habitat under the Interstate 40 and BNSF railway bridges that occur on the HNWR unless otherwise agreed to by the USFWS.	This measure will be implemented as directed.

Note:

[a] *Final Bird Impact Avoidance and Minimization Plan Topock Groundwater Remediation Project*, CH2M HILL, April 30, 2014.

5. Project Schedule and Reporting

Figure 5-1 shows the estimated project implementation schedule.

A Final Soil NTCRA Completion Report will be completed 12 weeks after completion of the removal action. This report will include a description of the volume and disposition of materials removed, figures depicting the extent of the excavation and soil sample locations, and tables listing soil sample confirmation screening results.

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Figures

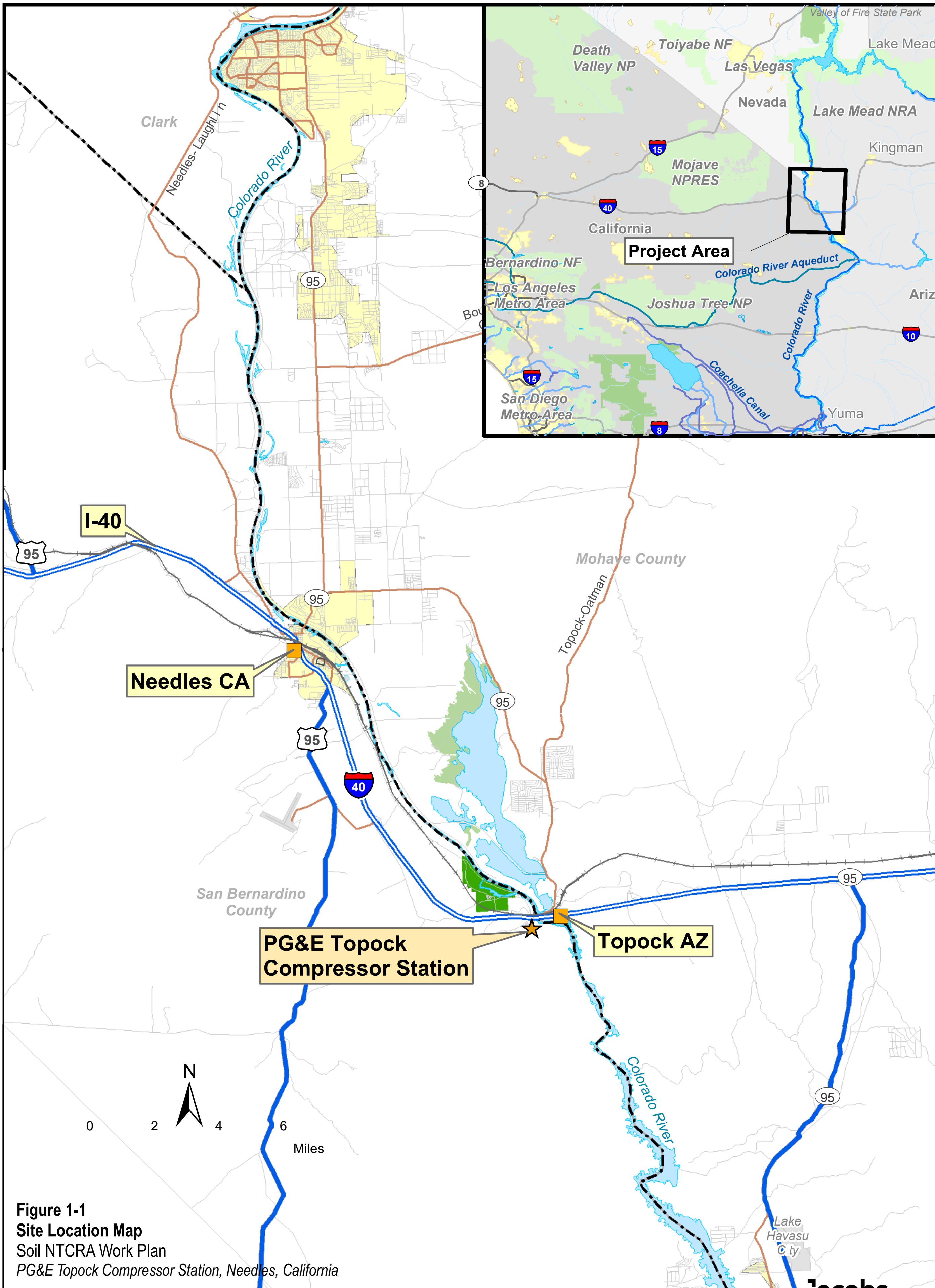

Figure 1-1
Site Location Map
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

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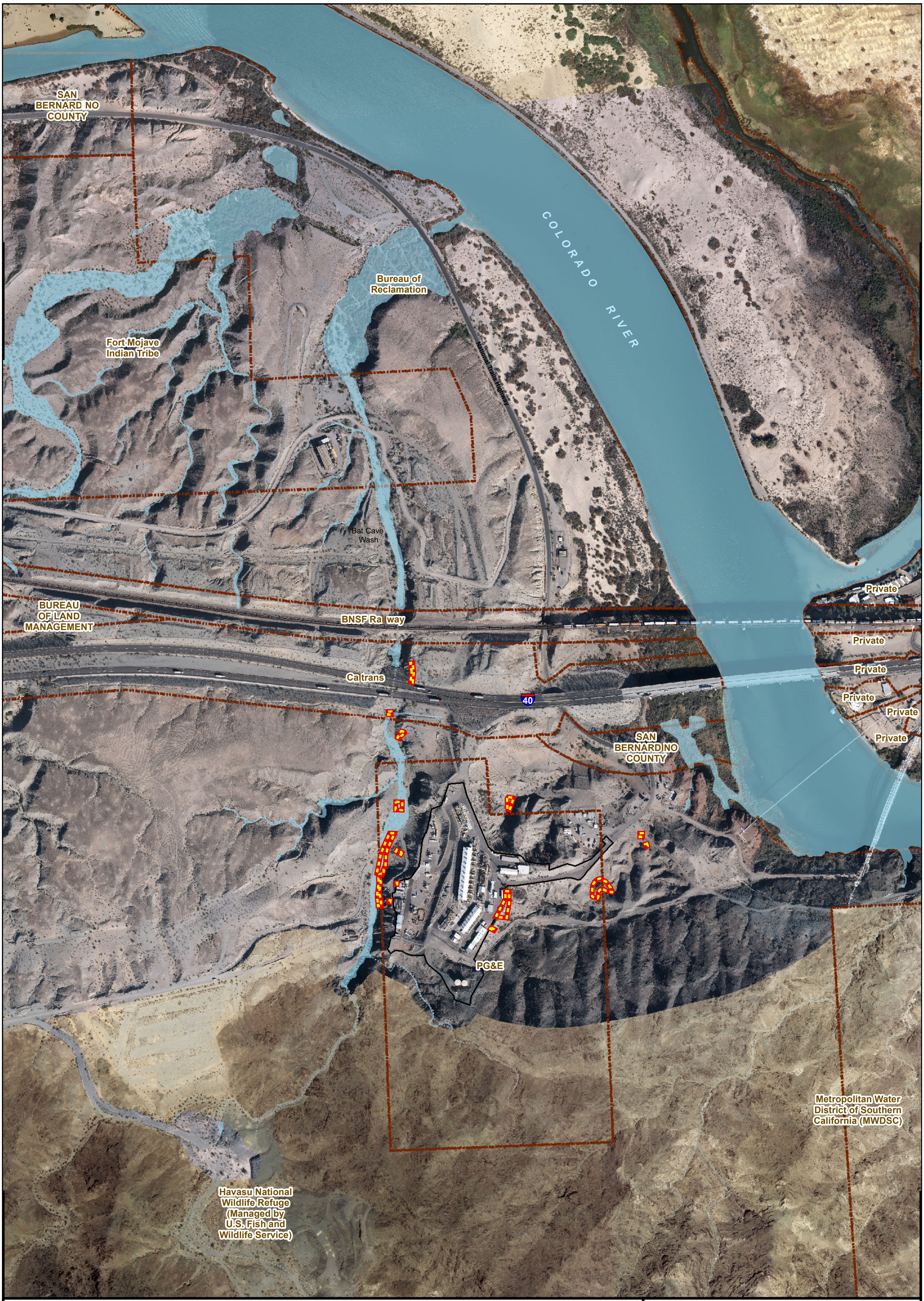

LEGEND

- Jurisdictional Waters and Wetlands
- Parcel Boundaries
- Topock Compressor Station Fence Line
- Target Action Area

N

0 430 860 Feet

Note:
Aerial photo date 2011, 2017

Figure 1-2
Land Owners and Jurisdictional Waters Map
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

Jacobs

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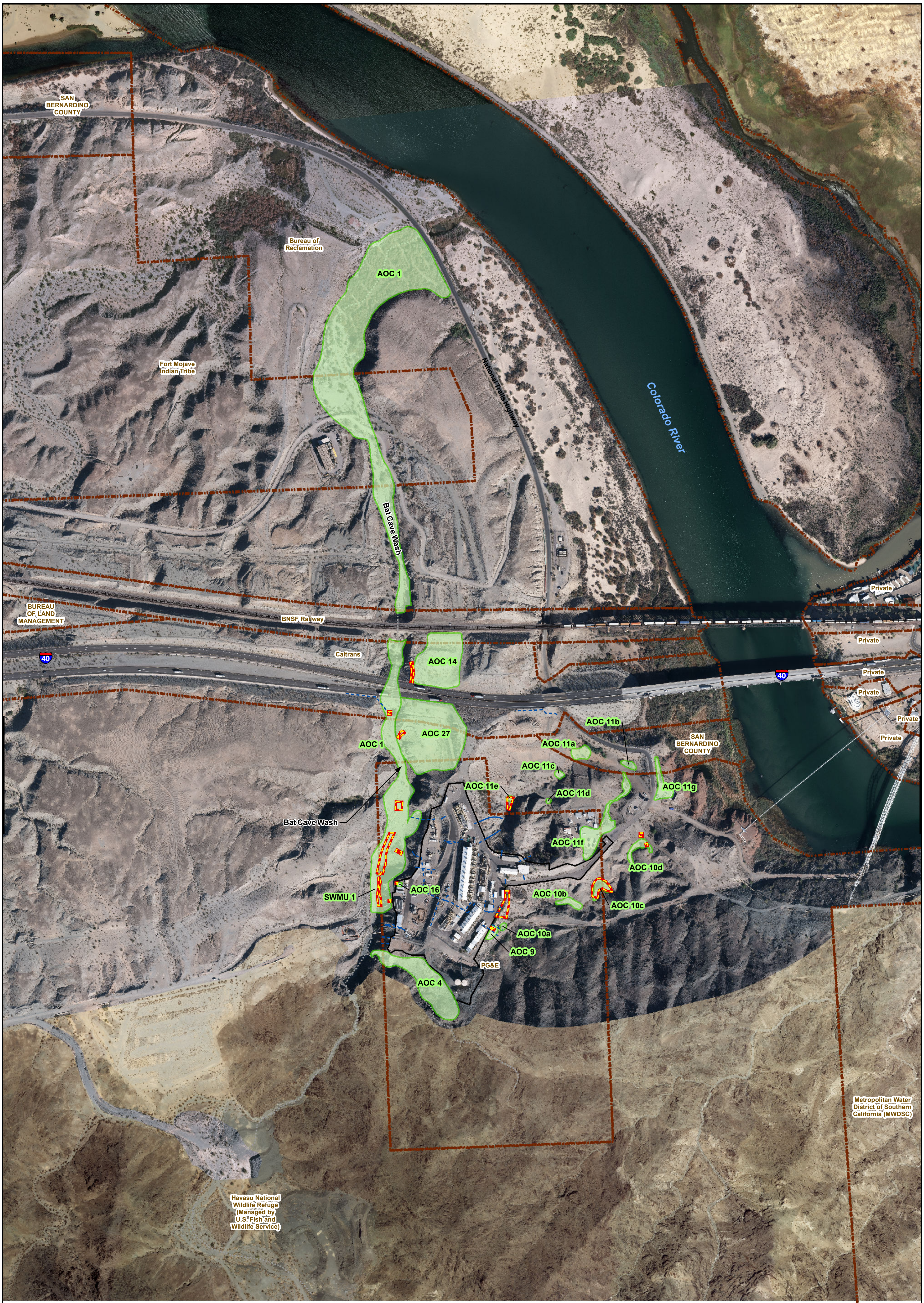

LEGEND

- Target Action Area
- Area of Concern (AOC)
- Stormwater Piping Below Ground
- Stormwater Piping Above Ground
- Parcel Boundaries
- Topock Compressor Station Fence Line

Notes:
RFI/RI = Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation
Aerial photo date 2011, 2017

N

0 430 860 Feet

Figure 1-3
Soil NTCRA Areas of Concern
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

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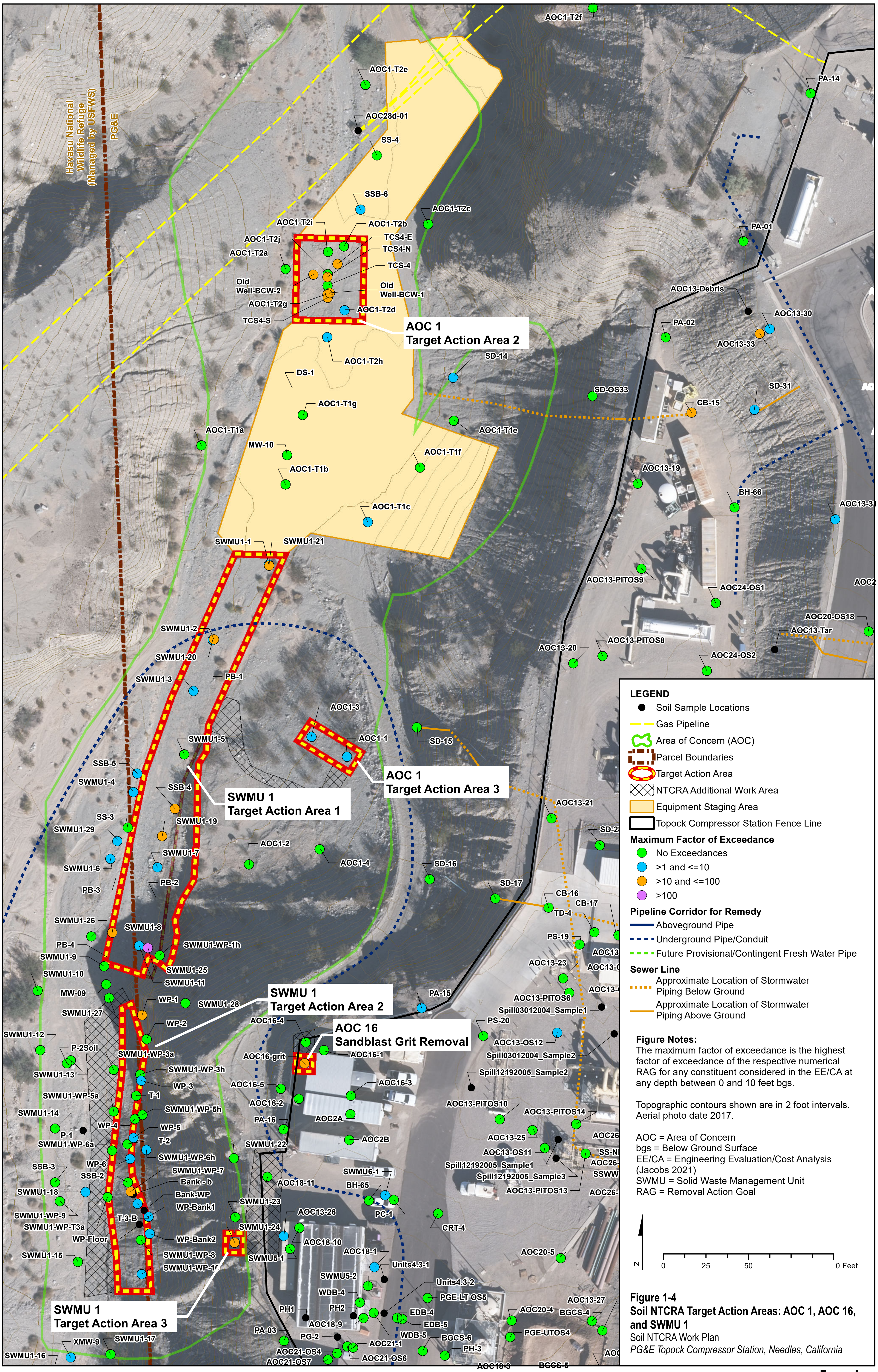
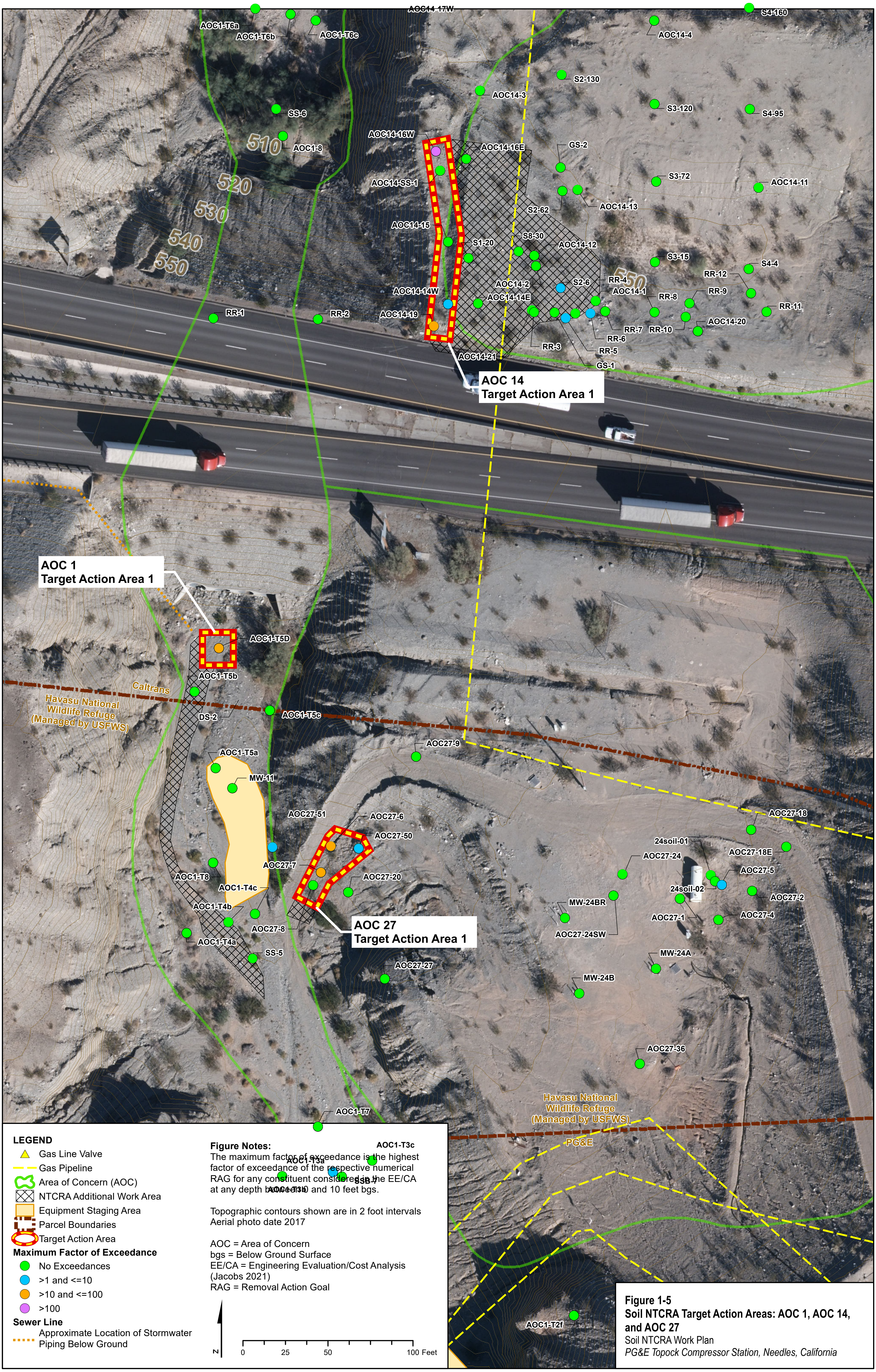


Figure 1-4
Soil NTCRA Target Action Areas: AOC 1, AOC 16, and SWMU 1
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California



LEGEND

- Gas Line Valve
- Gas Pipeline
- Area of Concern (AOC)
- NTCRA Additional Work Area
- Equipment Staging Area
- Parcel Boundaries
- Target Action Area

Maximum Factor of Exceedance

- No Exceedances
- >1 and <=10
- >10 and <=100
- >100

Sewer Line

- Approximate Location of Stormwater Piping Below Ground

Figure Notes:
The maximum factor of exceedance is the highest factor of exceedance of the respective numerical RAG for any constituent considered in the EE/CA at any depth between 0 and 10 feet bgs.

Topographic contours shown are in 2 foot intervals
Aerial photo date 2017

AOC = Area of Concern
bgs = Below Ground Surface
EE/CA = Engineering Evaluation/Cost Analysis (Jacobs 2021)
RAG = Removal Action Goal

N

0 25 50 100 Feet

Figure 1-5
Soil NTCRA Target Action Areas: AOC 1, AOC 14, and AOC 27
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

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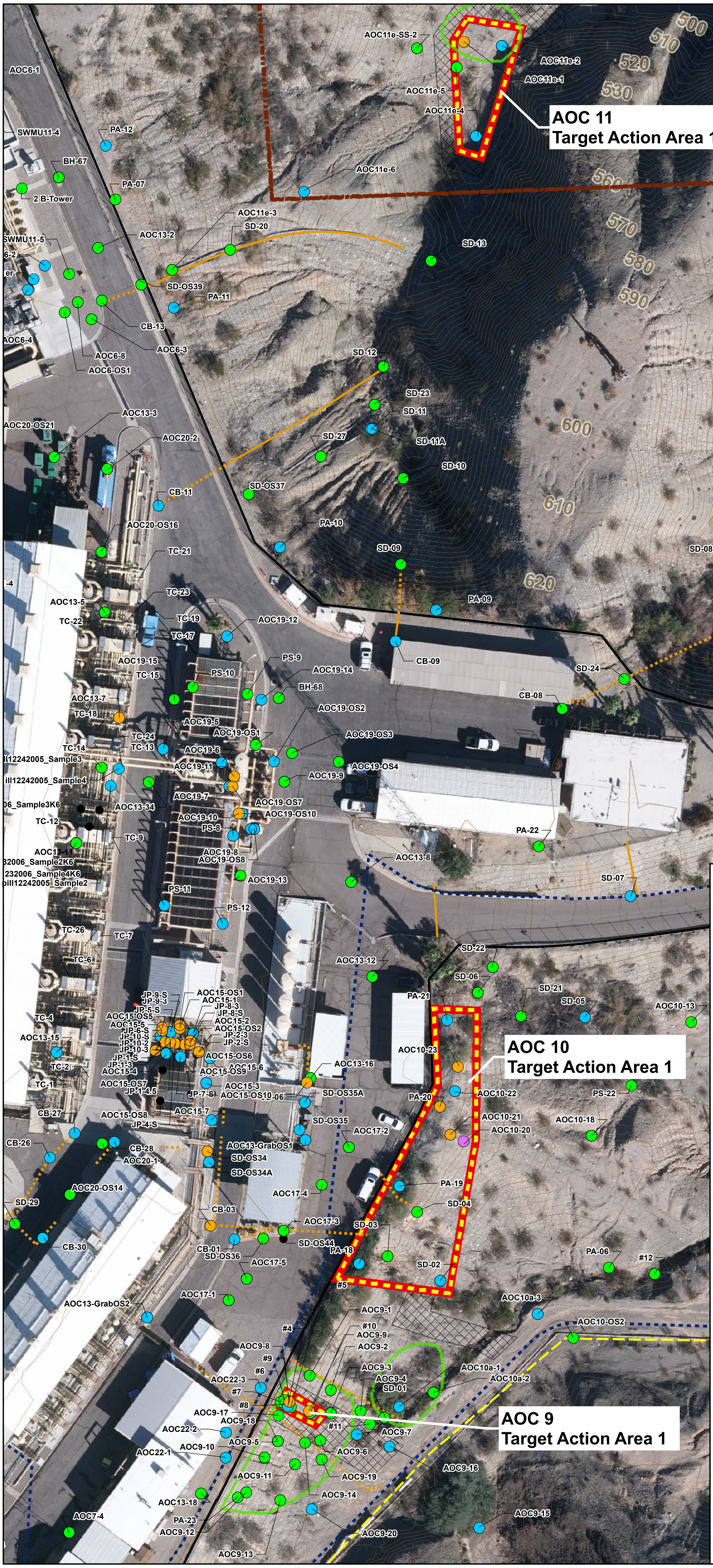
Jacobs



LEGEND

- Soil Sample Locations
- Gas Pipeline
- Area of Concern (AOC)
- Parcel Boundaries
- Target Action Area
- NTCRA Additional Work Area
- Topock Compressor Station Fence Line

Maximum Factor of Exceedance

- No Exceedances
- >1 and <=10
- >10 and <=100
- >100

Pipeline Corridor for Remedy

- Underground Pipe/Conduit

Sewer Line

- Approximate Location of Stormwater Piping Below Ground
- Approximate Location of Stormwater Piping Above Ground

Figure Notes:

The maximum factor of exceedance is the highest factor of exceedance of the respective numerical RAG for any constituent considered in the EE/CA at any depth between 0 and 10 feet bgs.

Topographic contours shown are in 2 foot intervals
Aerial photo date 2017

AOC = Area of Concern
bgs = Below Ground Surface
EE/CA = Engineering Evaluation/Cost Analysis (Jacobs 2021)
RAG = Removal Action Goal

N

0 25 50 100 Feet

Figure 1-6
Soil NTCRA Target Action Areas: AOC 9, AOC 10, and AOC 11
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

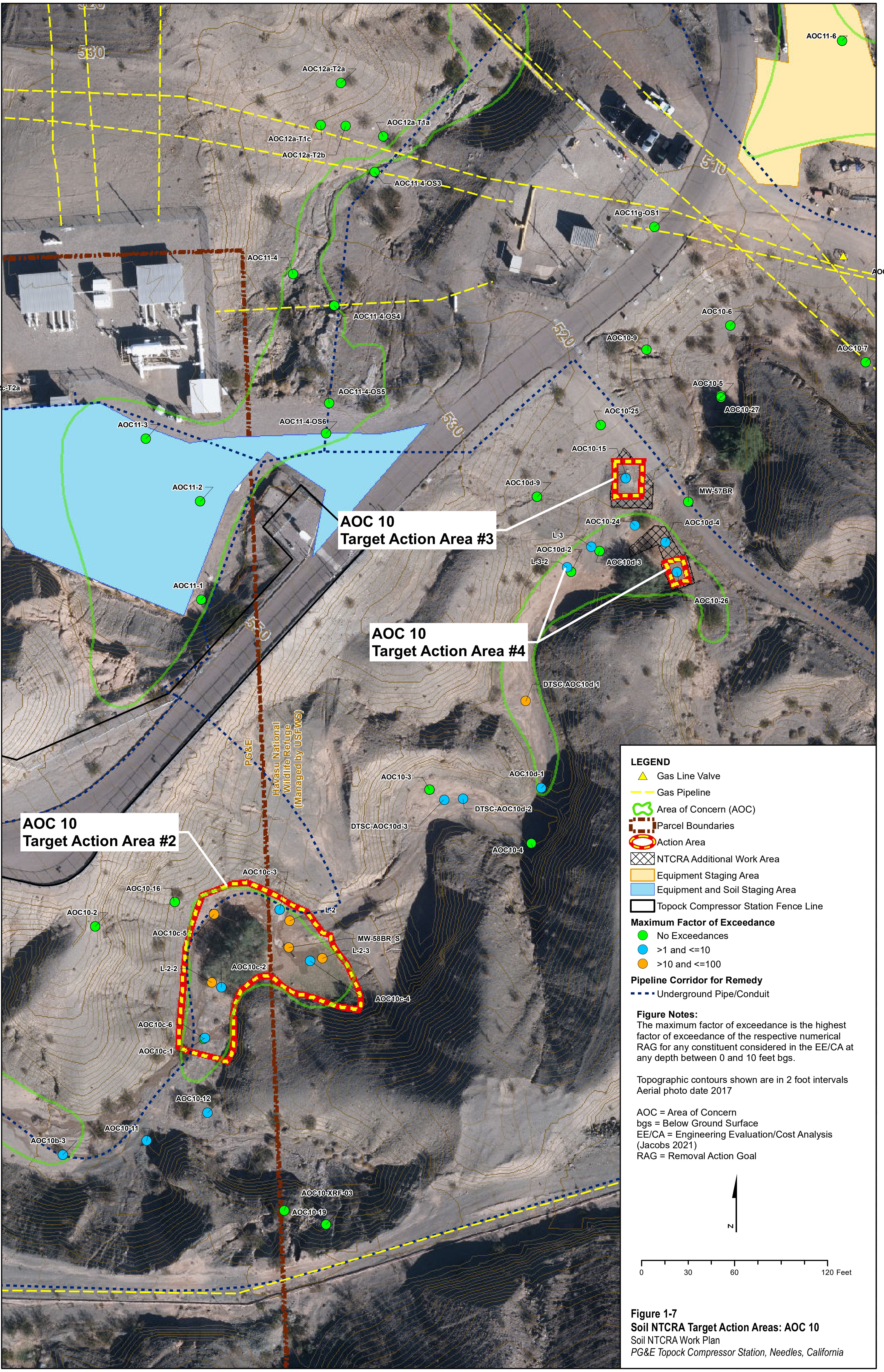


Figure 1-7
Soil NTCRA Target Action Areas: AOC 10
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

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Jacobs

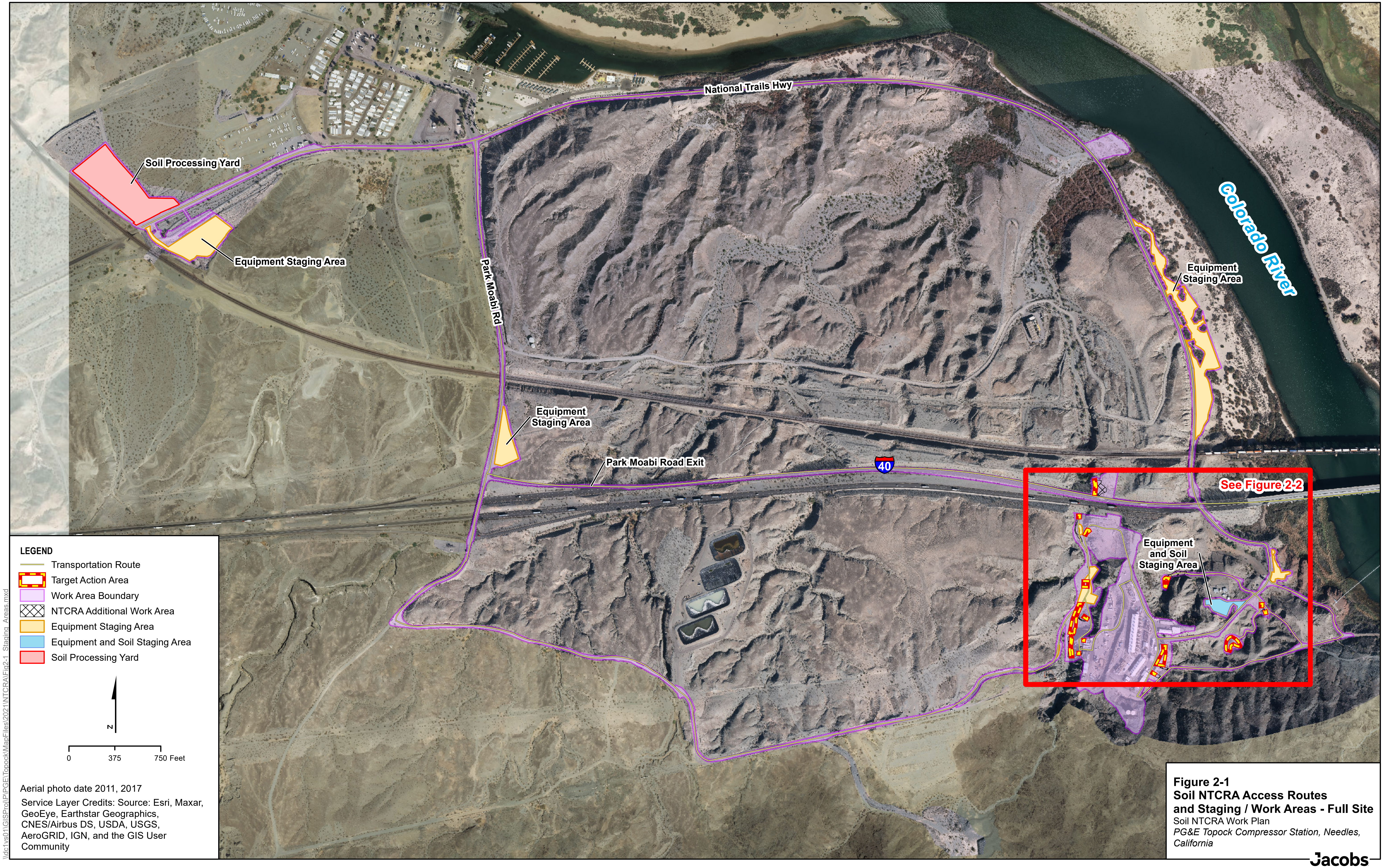


Figure 2-1
Soil NTCRA Access Routes and Staging / Work Areas - Full Site
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

Jacobs

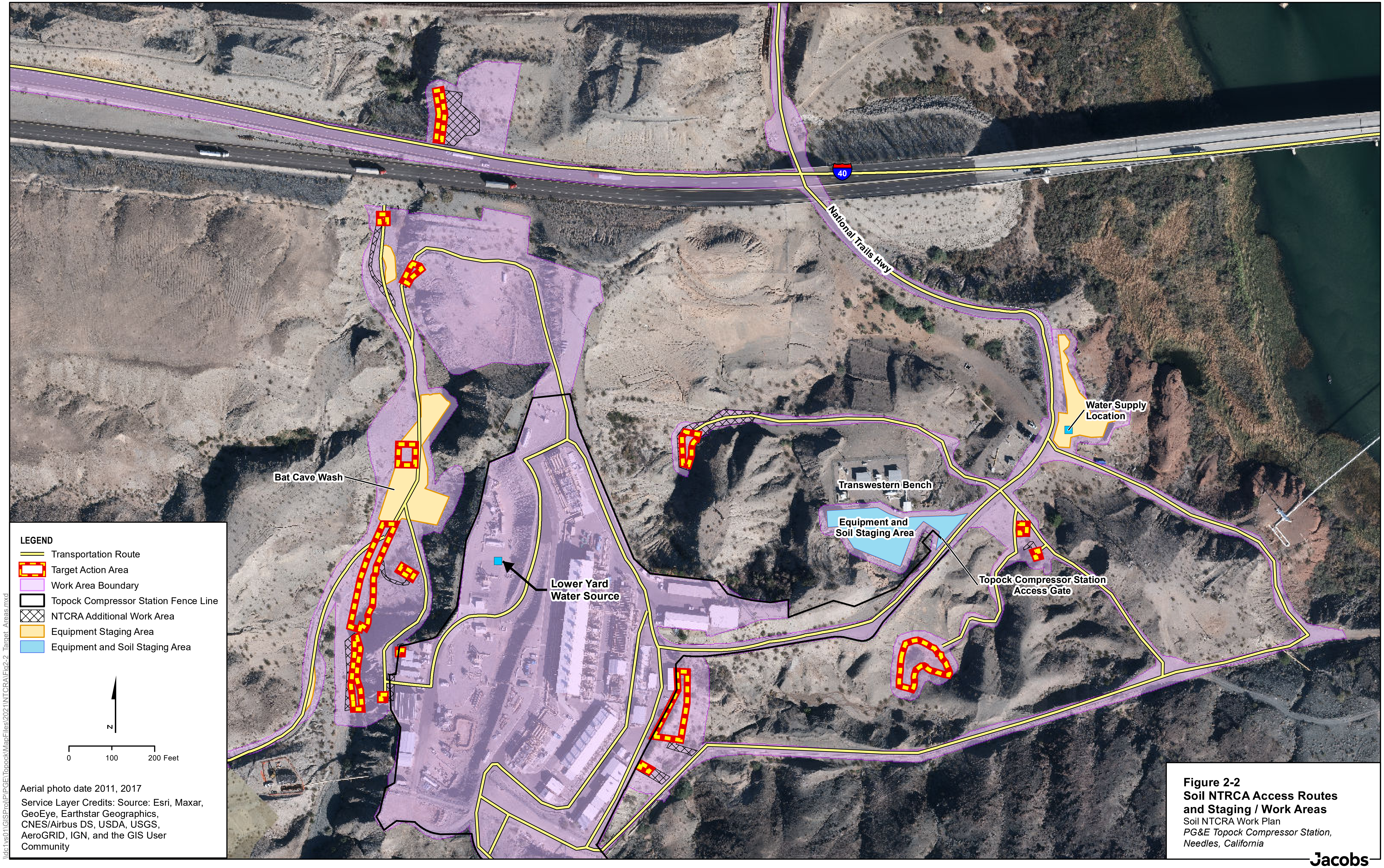
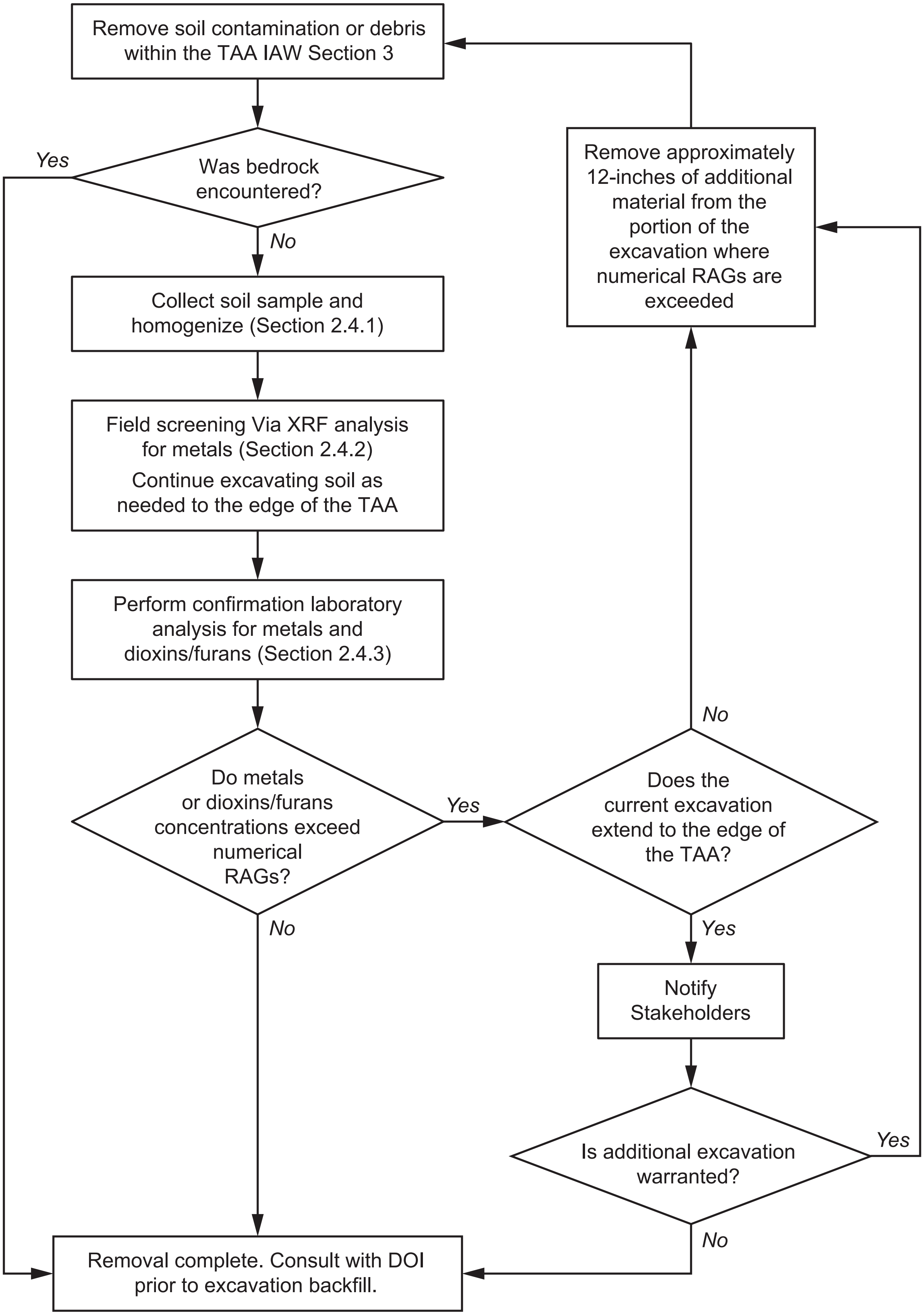


Figure 2-2
Soil NTCRA Access Routes and Staging / Work Areas
Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

Jacobs



LEGEND

DOI Department of Interior
RAGs Removal Action Goods
TAA Target Action Area
IAW In Accordance With

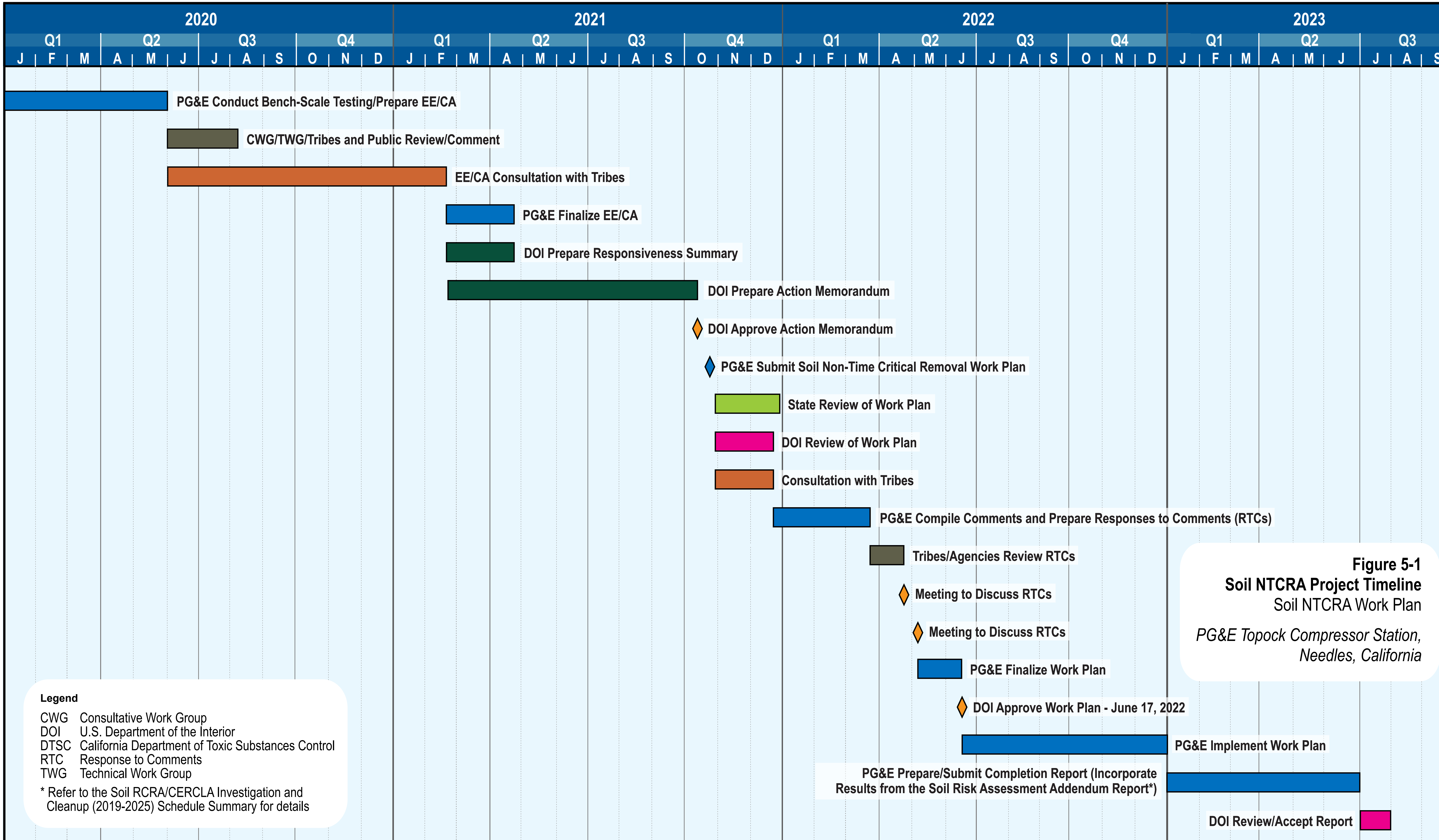
If continued removal is deemed unsafe, removal activities at given location will stop and DOI will be consulted.

Figure 2-3
Soil Screening and Removal Action Process Flow Diagram

Soil NCTRA Work Plan
PG&E Topock Compressor Station
Needles, California

Soil Non-Time Critical Removal Action (2020-2023)

June 2022



Legend

CWG Consultative Work Group
DOI U.S. Department of the Interior
DTSC California Department of Toxic Substances Control
RTC Response to Comments
TWG Technical Work Group

* Refer to the Soil RCRA/CERCLA Investigation and Cleanup (2019-2025) Schedule Summary for details

Figure 5-1
Soil NTCRA Project Timeline
Soil NTCRA Work Plan

PG&E Topock Compressor Station, Needles, California

Appendix A
Historical Soil Sample Results

(Note: This appendix includes pages 1-71 of the Soil EE/CA Appendix E [Jacobs 2021a])

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
MW-09		06/30/97	1	N	ND (0.05)	15	7.2	---	---	---	19.7	---
		06/30/97	3.5	N	0.06	4.1	3.1	---	---	---	11.8	---
		06/30/97	3.5	FD	0.21	7.6	3.5	---	---	---	12.6	---
		06/30/97	6	N	ND (0.05)	11.8	6.4	---	---	---	21	---
		07/01/97	10	N	ND (0.05)	42.2	6.8	2.7	---	ND (0.2)	29	---
		06/30/97	20	N	ND (0.05)	9	7.1	---	---	---	21.7	---
		07/01/97	30	N	ND (0.05)	16.3	12.4	3.9	---	ND (0.2)	29.4	---
		06/30/97	40	N	ND (0.05)	9.7	7.5	---	---	---	22.5	---
		07/01/97	50	N	ND (0.05)	11.7	14.7	3.2	---	ND (0.2)	23.3	---
		06/30/97	60	N	ND (0.05)	28.8	17.4	---	---	---	34.4	---
		06/30/97	70	N	ND (0.05)	8.9	10	---	---	---	19	---
		07/01/97	87	N	ND (0.05)	9.8	10.2	8.4	---	ND (0.2)	126	---
		07/01/97	87	FD	0.06	11.9	11.4	---	---	---	121	---
SWMU1-1	SWMU1 PAA #1	10/16/08	0 - 0.5	N	0.524	44	12	4.2	ND (0.12)	ND (1.2)	41	---
		10/16/08	2 - 3	N	0.462	67	9.4	3	ND (0.1)	ND (1)	37	---
		10/16/08	5 - 6	N	14.1	3,200	9.5	4.5	ND (0.1)	7.8	76	---
		10/16/08	9 - 10	N	0.907	55	8.6	1.7	ND (0.1)	ND (1)	89	---
SWMU1-2	SWMU1 PAA #1	10/15/08	0 - 0.5	N	ND (0.401)	26	22	6.5	ND (0.1)	ND (1)	37	---
		10/15/08	2 - 3	N	ND (0.404)	36	10	3.7	ND (0.1)	ND (1)	38	---
		10/15/08	5 - 6	N	ND (0.404)	44	12	6.1	ND (0.1)	3	38	---
		10/15/08	9 - 10	N	22.8	2,000	15	4	ND (0.1)	2.8	100	---

TABLE E-1

Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
SWMU1-3	SWMU1 PAA #1	10/06/08	0 - 0.5	N	ND (0.405)	28	11	3.9	ND (0.1)	ND (1)	33	---
		10/06/08	2 - 3	N	ND (0.413)	41	9.4	2.3	ND (0.1)	1.5	38	---
		10/06/08	2 - 3	FD	ND (0.41)	38	9	2.9	ND (0.1)	1.4	37	---
		10/06/08	5 - 6	N	22.7	1,300	11	3.8	ND (0.1)	4.2	78	---
		10/06/08	9 - 10	N	1.55 J	96	11	2.7	ND (0.11)	ND (1)	140	---
		10/06/08	19 - 20	N	ND (0.416)	20	10	2.9	ND (0.1)	ND (2.1)	39	---
		10/06/08	29 - 30	N	ND (0.424)	21	15	2.4	ND (0.1)	ND (5.3)	38	---
		10/06/08	39 - 40	N	ND (0.424)	22	8.5	2.7	ND (0.1)	ND (2.1)	35	---
		10/06/08	49 - 50	N	ND (0.405)	25	12	3.2	ND (0.11)	ND (2.1)	39	---
		10/06/08	59 - 60	N	ND (0.418)	38	14	3	ND (0.1)	2.1	36	---
		10/07/08	69 - 70	N	ND (0.42)	29	14	2.6	ND (0.1)	ND (2.1)	38	---
		10/07/08	79 - 80	N	ND (0.427)	20	13	3.1	ND (0.11)	ND (2.2)	39	---
		10/07/08	79 - 80	FD	ND (0.441)	21	15	2.6	ND (0.11)	1.3	34	---
SWMU1-4		10/15/08	0 - 0.5	N	ND (0.401)	17	6.8	2.6	ND (0.1)	ND (1)	26	---
		10/15/08	2 - 3	N	4.95	870	11	3.6	ND (0.1)	1.7	72	---
		10/15/08	5 - 6	N	1.39	100	10	1.8	ND (0.1)	ND (1)	170	---
		10/15/08	7 - 8	N	ND (0.415)	40	7.6	1.6	ND (0.1)	ND (1)	120	---
		10/15/08	9 - 10	N	ND (0.414)	23	7.9	1.7	ND (0.1)	ND (1)	110	---
		10/15/08	13 - 14	N	ND (0.413)	18	7.1	1.7	ND (0.1)	ND (1)	67	---
SWMU1-5	SWMU1 PAA #1	10/15/08	9 - 10	N	0.874	47	8.3	2.1	ND (0.1)	ND (1)	100	---
		10/15/08	13 - 14	N	ND (0.42)	21	7.9	2.8	ND (0.1)	ND (2.1)	42	---
		10/15/08	13 - 14	FD	ND (0.423)	21	8	2.9	ND (0.1)	ND (2.1)	44	---
		10/15/08	15 - 16	N	ND (0.414)	21	9.1	2.8	ND (0.1)	ND (2.1)	34	---
		10/15/08	19 - 20	N	ND (0.423)	19	11	3.1	ND (0.11)	1.5	37	---
SWMU1-6		10/15/08	0 - 0.5	N	1.32	220	11	3.3	ND (0.1)	1.2	42	---
		10/15/08	2 - 3	N	2.15	270	12	2.6	ND (0.1)	1.9	46	---
		10/15/08	5 - 6	N	ND (0.405)	32	10	2.6	ND (0.1)	ND (1)	29	---
		10/15/08	9 - 10	N	0.531	33	8.6	1.7	ND (0.1)	ND (1)	88	---

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
SWMU1-7	SWMU1 PAA #1	10/15/08	0 - 0.5	N	ND (0.403)	27	13	6.6	ND (0.1)	ND (1)	38	---
		10/15/08	2 - 3	N	6.45	630	14	3.6	ND (0.1)	1.7	130	---
		10/15/08	5 - 6	N	5.3	330	20	2.8	ND (0.1)	ND (1)	190	---
		10/15/08	9 - 10	N	0.517	51	9.2	1.9	ND (0.1)	ND (1)	150	---
		10/15/08	9 - 10	FD	0.554	47	8.3	1.6	ND (0.1)	ND (1)	150	---
SWMU1-8	SWMU1 PAA #1	10/15/08	0 - 0.5	N	0.618	120	9.1	4.7	ND (0.1)	ND (1)	36	---
		10/15/08	2 - 3	N	22.3	970	11	3.5	ND (0.1)	2.2	160	---
		10/15/08	5 - 6	N	9.25	1,600	22	3.3	ND (0.1)	3.2	120	---
		10/15/08	9 - 10	N	ND (0.433)	15	7.1	2.8	ND (0.11)	ND (1.1)	32	---
SWMU1-9		10/14/08	0 - 0.5	N	0.697	87	10	2.9	ND (0.11)	1.4	37	---
		10/14/08	2 - 3	N	ND (0.42)	13	5.9	5	ND (0.11)	ND (1)	26	---
		10/14/08	5 - 6	N	ND (0.417)	26	8.1	3.1	ND (0.1)	ND (2.1)	39	---
		10/14/08	9 - 10	N	ND (0.425)	22	11	3.2	ND (0.1)	ND (1.1)	38	---
SWMU1-10		10/14/08	0 - 0.5	N	ND (0.401)	19	11	2.6	ND (0.1)	ND (1)	32	---
		10/14/08	2 - 3	N	ND (0.403)	26	13	2.2	ND (0.1)	1.8	33	---
		10/14/08	5 - 6	N	ND (0.413)	21	8.4	2.9	ND (0.1)	ND (1)	42	---
		10/14/08	5 - 6	FD	ND (0.413)	22	10	2.9	ND (0.1)	ND (1)	41	---
		10/14/08	9 - 10	N	ND (0.431)	25	15	3.6	ND (0.11)	ND (1.1)	44	---
SWMU1-11	SWMU1 PAA #1	10/15/08	0 - 0.5	N	1.81	200	11	3.8	ND (0.11)	1.2	65	---
		10/15/08	2 - 3	N	8.82	840	11	4.3	ND (0.11)	4	120	---
		10/15/08	5 - 6	N	ND (0.431)	34	12	3.2	ND (0.11)	ND (2.1)	96	---
		10/15/08	9 - 10	N	ND (0.432)	22	10	3.4	ND (0.11)	ND (1.1)	43	---
SWMU1-12		10/14/08	0 - 0.5	N	ND (0.403)	19	8.5	2.7	ND (0.1)	ND (1)	31	---
		10/14/08	2 - 3	N	ND (0.406)	24	11	2.3	ND (0.1)	ND (2)	37	---
		10/14/08	5 - 6	N	ND (0.412)	20	13	2.7	ND (0.1)	ND (2)	40	---
		10/14/08	9 - 10	N	ND (0.419)	21	11	3.1	ND (0.1)	ND (5.2)	41	---

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
SWMU1-13		10/14/08	0 - 0.5	N	ND (0.407)	23	14	5.3	ND (0.1)	ND (1)	35	---
		10/14/08	2 - 3	N	ND (0.409)	28	11	3.5	ND (0.1)	ND (5.1)	39	---
		10/14/08	2 - 3	FD	ND (0.411)	27	11	3.5	ND (0.1)	ND (5.1)	39	---
		10/14/08	5 - 6	N	ND (0.416)	34	13	2.8	ND (0.1)	ND (2.1)	44	---
		10/14/08	9 - 10	N	ND (0.426)	30	16	3.5	ND (0.1)	ND (1)	45	---
SWMU1-14		10/14/08	0 - 0.5	N	ND (0.404)	20	8.2	2.6	ND (0.1)	ND (1)	33	---
		10/14/08	2 - 3	N	ND (0.408)	19	14	2.3	ND (0.1)	ND (1)	33	---
		10/14/08	5 - 6	N	ND (0.413)	28	17	3.4	ND (0.1)	ND (2)	42	---
		10/14/08	9 - 10	N	ND (0.415)	52	35	3.9	ND (0.1)	ND (1)	45	---
SWMU1-15		09/22/08	0 - 0.5	N	1.14	25	12	4.1	ND (0.1)	1.9	36	---
		09/22/08	2 - 3	N	ND (0.422)	23	11	3	ND (0.11)	1.2	34	---
		09/22/08	5 - 6	N	ND (0.424)	41	18	4.5	ND (0.11)	ND (2.1)	46	---
		09/22/08	9 - 10	N	ND (0.419)	58	24	4.4	ND (0.11)	ND (2.1)	50	---
		09/22/08	9 - 10	FD	ND (0.42)	60	23	4.5	ND (0.1)	ND (2.1)	50	---
		09/22/08	19 - 20	N	ND (0.425)	51	41	4.5	ND (0.11)	ND (2.1)	50	---
		09/22/08	29 - 30	N	ND (0.433)	54	23	5.4	ND (0.11)	ND (5.3)	54	---
		09/22/08	39 - 40	N	ND (0.422)	40	23	3	ND (0.1)	ND (1)	47	---
		09/22/08	49 - 50	N	ND (0.439)	55	25	5.4	ND (0.11)	ND (2.2)	59	---
		09/22/08	59 - 60	N	ND (0.449)	47	23	3	ND (0.1)	ND (5.3)	49	---
		09/22/08	59 - 60	FD	ND (0.411)	44	24	4.3	ND (0.1)	ND (2.1)	47	---
		09/22/08	69 - 70	N	ND (0.43)	39	25	3.8	ND (0.11)	ND (1.1)	53	---
		09/22/08	79 - 80	N	ND (0.43)	28	20	3.2	ND (0.11)	ND (1.1)	60	---
		09/23/08	89 - 90	N	ND (0.4)	6.5	ND (4)	ND (2)	ND (0.1)	ND (2)	21	---
SWMU1-16		09/21/08	0 - 0.5	N	ND (0.405)	10	5.2	2.3	ND (0.099)	ND (1)	21	---
		09/21/08	2 - 3	N	ND (0.408)	18	8.3	2	ND (0.1)	1	34	---
		09/21/08	5 - 6	N	ND (0.406)	18	8.9	2	ND (0.1)	ND (1)	35	---

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					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
SWMU1-17		09/21/08	0 - 0.5	N	ND (0.403)	27	16	3.5	ND (0.1)	ND (2)	46	---
		09/21/08	2 - 3	N	ND (0.405)	29	12	3.9	ND (0.1)	ND (2)	40	---
		09/21/08	5 - 6	N	ND (0.407)	29	12	3.1	ND (0.1)	2.4	44	---
		09/21/08	9 - 10	N	ND (0.408)	43 J	26	4.4	ND (0.1)	ND (2)	41	---
		09/21/08	9 - 10	FD	ND (0.408)	53 J	24	4.7	ND (0.1)	ND (2)	46	---
SWMU1-18		01/07/16	0 - 1	N	2.6	16	7.4	2	0.28	ND (1.1)	30	140
		01/07/16	2 - 3	N	ND (0.22)	26	20	2.5	0.27	ND (1.1)	40	0.37
		01/07/16	5 - 6	N	ND (0.22)	110	8.5	2.1	0.3	ND (1.1)	130	0.2
		01/07/16	9 - 10	N	ND (0.21)	41	17	2.6	0.34	ND (1.1)	43	0.23
		01/07/16	14 - 15	N	ND (0.21)	48	19 J	2.4	0.35	ND (1.1)	41	---
		01/07/16	14 - 15	FD	ND (0.21)	50	25 J	3.5	0.29	ND (1.1)	44	---
		01/07/16	19 - 20	N	ND (0.22)	50	21	3.6	0.33	ND (1.1)	49	---
		01/07/16	29 - 30	N	ND (0.21)	29	22	2	0.29	ND (1.1)	33	---
		01/07/16	39 - 40	N	ND (0.21)	42	19	2.9	0.29	ND (1.1)	44	---
		01/08/16	49 - 50	N	ND (0.24)	33 J	19	4.2	0.27	ND (1.2)	46 J	---
		01/08/16	59 - 60	N	ND (0.26)	27	16	5.6	0.31	ND (1.3)	54	---
		01/08/16	69 - 70	N	ND (0.23)	21	13	2.5	ND (0.12)	ND (1.1)	41	---
		01/08/16	79 - 80	N	ND (0.25)	28	17	2.1	ND (0.13)	ND (1.3)	37	---

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PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
SWMU1-19	SWMU1 PAA #1	01/09/16	0 - 1	N	1.3	1,400	10	3.5	ND (0.1)	1.1	160	3.9
		01/09/16	2 - 3	N	22	23	8.8	1.8	ND (0.11)	ND (1.1)	34	1,100
		01/09/16	5 - 6	N	4.9	680	9.9	1.8	ND (0.1)	ND (1)	87	41
		01/09/16	9 - 10	N	22	2,100	18	2.4	ND (0.1)	ND (1)	120	210
		01/09/16	14 - 15	N	6.8	240	23	1.6	ND (0.1)	ND (1)	150	63
		01/09/16	19 - 20	N	ND (0.21)	24 J	12	3.3	ND (0.11)	ND (1.1)	120	2
		01/09/16	19 - 20	FD	ND (0.21)	31 J	11	1.9	ND (0.11)	ND (1.1)	110	---
		01/09/16	29 - 30	N	ND (0.21)	19	59	1.8	ND (0.11)	ND (1.1)	35	---
		01/09/16	39 - 40	N	ND (0.21)	16	14	1.7	ND (0.1)	ND (1)	33	---
		01/09/16	49 - 50	N	ND (0.21)	32	28	2.2	ND (0.1)	ND (1.1)	40	---
		01/09/16	59 - 60	N	ND (0.21)	29	16	2.5	0.24	ND (1.1)	38	---
		01/10/16	69 - 70	N	ND (0.21)	22	17	2.6	0.23	ND (1)	38	---
		01/10/16	79 - 80	N	ND (0.21)	16	10	1.6	0.27	ND (1.1)	34	---
SWMU1-20	SWMU1 PAA #1	01/13/16	1 - 1.5	N	---	---	---	---	---	---	---	5.5
		01/13/16	2 - 3	N	---	---	---	---	---	---	---	3.7
		01/13/16	5 - 6	N	---	---	---	---	---	---	---	110
		01/13/16	9 - 10	N	---	---	---	---	---	---	---	950
		01/13/16	14 - 15	N	8.9	190	12	1.6	ND (0.1)	ND (1)	110	140
		01/13/16	14 - 15	FD	7.9	200	9.9	2.2	ND (0.1)	ND (1)	98	---
		01/13/16	19 - 20	N	ND (0.21)	23	8	1.8	ND (0.11)	ND (1)	37	0.29
		01/13/16	29 - 30	N	ND (0.21)	14	11	1.2	ND (0.1)	ND (1)	30	---
		01/14/16	39 - 40	N	ND (0.21)	18	13	1.7	ND (0.1)	ND (1)	36	---
		01/14/16	49 - 50	N	ND (0.22)	15	8	2	ND (0.11)	ND (1.1)	37	---
		01/14/16	59 - 60	N	ND (0.21)	21	38	1.2	ND (0.1)	ND (1)	32	---
		01/14/16	69 - 70	N	ND (0.2)	23	10	1.2	ND (0.1)	ND (1)	34	---
		01/14/16	79 - 80	N	ND (0.21)	27	11	1.7	ND (0.1)	ND (1)	41	---

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
SWMU1-21	SWMU1 PAA #1	01/26/16	0 - 1	N	---	---	---	---	---	---	---	190
		01/26/16	2 - 3	N	---	---	---	---	---	---	---	870
		01/26/16	5 - 6	N	---	---	---	---	---	---	---	41
		01/26/16	9 - 10	N	---	---	---	---	---	---	---	1.8
		01/26/16	14 - 15	N	0.5	19	13	1.4	ND (0.1)	ND (1)	78	0.68
		01/26/16	19 - 20	N	0.3	16	8.7	ND (1)	ND (0.1)	ND (1)	69	0.39
		01/27/16	29 - 30	N	ND (0.21)	16	11	1.3	ND (0.1)	ND (1)	34	---
		01/27/16	39 - 40	N	ND (0.21)	14	7.9	1.3	ND (0.1)	ND (1)	37	---
		01/27/16	49 - 50	N	ND (0.21)	14	9	1.5	ND (0.1)	ND (1)	33	---
		01/27/16	59 - 60	N	ND (0.21)	22	12	1.7	ND (0.1)	ND (1.1)	41	---
		01/27/16	69 - 70	N	ND (0.21)	23	10	1.5	ND (0.1)	ND (1)	40	---
		01/27/16	79 - 80	N	ND (0.22)	19	16	1.2	ND (0.11)	ND (1.1)	32	---
		01/27/16	79 - 80	FD	ND (0.22)	17	11	1.3	ND (0.11)	ND (1.1)	35	---
SWMU1-22		12/17/15	0 - 1	N	ND (0.2)	18	12	6.5	ND (0.1)	ND (1)	33	6.2
SWMU1-23		12/17/15	0 - 1	N	0.36	23	11	7.5	ND (0.1)	ND (1)	39	16
SWMU1-24	SWMU1 PAA #3	12/17/15	0 - 1	N	1.6	55	13	6.5	ND (0.1)	ND (1)	44	1,300
SWMU1-25	SWMU1 PAA #1	01/26/16	0 - 1	N	42	2,000	12	4.4	ND (0.1)	20	60	12,000
		01/26/16	2 - 3	N	9.5	450	13	1.6	ND (0.11)	ND (1.1)	200	9.9
		01/26/16	5 - 6	N	2.3	200	14	1.6	ND (0.11)	ND (1.1)	170	6.4
		01/26/16	9 - 10	N	ND (0.21)	17	11	2.1	ND (0.11)	ND (1.1)	37	2.6
SWMU1-26		01/08/17	0 - 0.5	N	---	---	---	---	---	---	---	13
		01/08/17	0 - 0.5	FD	---	---	---	---	---	---	---	26
		01/08/17	2 - 3	N	---	---	---	---	---	---	---	1.5
		01/08/17	5 - 6	N	---	---	---	---	---	---	---	31
		01/08/17	9 - 10	N	---	---	---	---	---	---	---	1
		01/08/17	14 - 15	N	---	---	---	---	---	---	---	0.22
		01/08/17	19 - 20	N	---	---	---	---	---	---	---	0.26

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
SWMU1-27		01/07/17	0 - 0.5	N	---	---	---	---	---	---	---	7.9
		01/07/17	2 - 3	N	---	---	---	---	---	---	---	1.1
		01/07/17	5 - 6	N	---	---	---	---	---	---	---	5.9
		01/07/17	9 - 10	N	---	---	---	---	---	---	---	0.24
		01/07/17	14 - 15	N	---	---	---	---	---	---	---	0.26
		01/07/17	19 - 20	N	---	---	---	---	---	---	---	ND (0.17)
SWMU1-28		02/14/17	0 - 0.5	N	ND (0.2)	15	9.1	1.6	ND (0.1)	ND (1)	31	3.8
		02/14/17	0 - 0.5	FD	ND (0.2)	16	13	1.5	ND (0.1)	ND (1)	34	3.6
		02/14/17	2 - 3	N	ND (0.2)	13	8.3	3	ND (0.1)	ND (1)	31	1.5
SWMU1-29		02/16/17	0 - 0.5	N	ND (0.2)	19	8.5	1.2	ND (0.1)	ND (1)	28 J	7.8
		02/16/17	2 - 3	N	17	1,100	8.7	2.3	ND (0.1)	1.2	41	320
		02/16/17	5 - 6	N	5.6	270	11	ND (1)	ND (0.1)	ND (1)	33	19
		02/16/17	9 - 10	N	1.4	98	13	1.1	ND (0.1)	ND (1)	140	15
SWMU1-WP-1h		10/07/08	0 - 0.5	N	ND (0.418)	25	11	3.9	ND (0.1)	ND (1)	38	---
		10/07/08	2 - 3	N	ND (0.418)	17	8.9	2.8	ND (0.1)	ND (1)	34	---
		10/07/08	5 - 6	N	ND (0.417)	15	7.1	2.5	ND (0.11)	ND (1.1)	39	---
		10/07/08	9 - 10	N	ND (0.422)	28	8.7	2.9	ND (0.1)	ND (1)	58	---
SWMU1-WP-3a		10/14/08	0 - 0.5	N	ND (0.419)	27	11	3.6	ND (0.11)	ND (1.1)	40	---
		10/14/08	2 - 3	N	ND (0.419)	20	9.4	2.3	ND (0.11)	1.1	34	---
		10/14/08	5 - 6	N	ND (0.425)	27	15	6.2	ND (0.11)	ND (2.1)	45	---
		10/14/08	7 - 8	N	ND (0.417)	23	11	3.4	ND (0.1)	ND (2.1)	39	---
		10/14/08	9 - 10	N	ND (0.415)	66	21	2.8	ND (0.1)	ND (5.1)	46	---
		10/14/08	9 - 10	FD	ND (0.414)	66	22	2.7	ND (0.1)	ND (5.1)	47	---
		10/14/08	11 - 12	N	ND (0.421)	30	27	4	ND (0.1)	ND (1)	40	---
		10/14/08	13 - 14	N	ND (0.426)	28	31	3.8	ND (0.1)	ND (1)	40	---

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**[a] TEQ Human b TEQ Mammal**
SWMU1-WP-3h	SWMU1 PAA #2	10/07/08	0 - 0.5	N	ND (0.433)	17	6.3	1.8	ND (0.11)	ND (2.1)	33	---
		10/07/08	2 - 3	N	ND (0.404)	17	8.6	2.1	ND (0.1)	ND (1)	34	---
		10/07/08	5 - 6	N	ND (0.404)	21	7.8	2.4	ND (0.1)	ND (1)	36	---
SWMU1-WP-5a		10/05/08	0 - 0.5	N	ND (0.405)	19	11	3.9	ND (0.1)	1	35	---
		10/05/08	2 - 3	N	ND (0.408)	19	9.2	2.4	ND (0.1)	ND (1)	35	---
		10/05/08	5 - 6	N	ND (0.419)	53	17	3.9	ND (0.1)	ND (2.1)	42	---
		10/05/08	5 - 6	FD	ND (0.42) J	58	19	3.5	ND (0.1)	ND (5.2)	46	---
		10/05/08	7 - 8	N	ND (0.416)	53	18	4.1	ND (0.1)	ND (2.1)	41	---
		10/05/08	9 - 10	N	ND (0.421)	43	21	4.2	ND (0.1)	ND (2.1)	47	---
		10/05/08	11 - 12	N	ND (0.416)	36	26	3.5	ND (0.1)	ND (2.1)	42	---
		10/05/08	13 - 14	N	ND (0.422)	27	13	3.5	ND (0.1)	ND (1)	52	---
SWMU1-WP-5h	SWMU1 PAA #2	10/07/08	0 - 0.5	N	ND (0.43)	14	12	2.7	ND (0.11)	ND (1.1)	31	---
		10/07/08⊖	2 - 3	N	ND (0.435)	33	12	4.9	ND (0.11)	ND (2.1)	46	---
		10/07/08	5	N	ND (0.415)	23	11	3.3	ND (0.1)	ND (1)	40	---
SWMU1-WP-6a		10/05/08	0 - 0.5	N	ND (0.405)	32	10	7.2	ND (0.1)	2.5	35	---
		10/05/08	2 - 3	N	ND (0.404)	19	10	2.3	ND (0.1)	ND (1)	35	---
		10/05/08	2 - 3	FD	ND (0.403)	19	9.2	2.2	ND (0.1)	ND (1)	33	---
		10/05/08	5 - 6	N	ND (0.413)	41	19	3.2	ND (0.1)	ND (2.1)	44	---
		10/05/08	7 - 8	N	ND (0.414)	35	18	3.5	ND (0.1)	ND (2.1)	38	---
		10/05/08	9 - 10	N	ND (0.412)	26	14	2.4	ND (0.1)	ND (5.1)	39	---
		10/05/08	11 - 12	N	ND (0.411)	51	17	3.1	ND (0.1)	3.6	35	---
		10/05/08	13 - 14	N	ND (0.41)	60	15	3.6	ND (0.1)	ND (2)	43	---
SWMU1-WP-6h		10/06/08⊖	0 - 0.5	N	4.98	130	15	5.5	ND (0.1)	ND (2)	87	---
		10/06/08	2 - 3	N	0.538	23	61	6.6	ND (0.1)	ND (1)	34	---
		10/06/08	5 - 6	N	ND (0.406)	19	10	2.4	ND (0.1)	ND (1)	36	---
		10/06/08	5 - 6	FD	ND (0.405)	20	12	2.3	ND (0.1)	ND (1)	37	---
		10/06/08	9 - 10	N	ND (0.409)	41	23	3.5	ND (0.11)	ND (1.1)	39	---

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
SWMU1-WP-7	SWMU1 PAA #2	10/06/08	0 - 0.5	N	0.566	2,600	11	13	ND (0.11)	7.1	88	---
		10/06/08⊖	2 - 3	N	18.2	1,200	16	5.7	ND (0.11)	3.4	56	---
		10/06/08	5 - 6	N	6.17	21	11	2.7	ND (0.1)	ND (1)	34	---
		10/06/08	9 - 10	N	ND (0.417)	23	15	2.7	ND (0.11)	ND (1)	31	---
SWMU1-WP-8	SWMU1 PAA #2	10/06/08	0 - 0.5	N	ND (0.402)	35	13	6.9	ND (0.1)	ND (2)	47	---
		10/06/08	2 - 3	N	0.541	26	10	4.1	ND (0.1)	ND (2.1)	32	---
		10/06/08	5 - 6	N	ND (0.407)	19	10	2.7	ND (0.1)	ND (1)	38	---
		10/06/08	9 - 10	N	ND (0.411)	22	9.8	2.6	ND (0.1)	ND (1)	38	---
SWMU1-WP-9		09/21/08	0 - 0.5	N	ND (0.406)	26	8.2	2.9	ND (0.1)	2.1	33	---
		09/21/08	2 - 3	N	ND (0.407)	34 J	15	2.3	ND (0.1)	1.2	34	---
		09/21/08	2 - 3	FD	ND (0.409)	20 J	10	2.7	ND (0.1)	ND (1)	34	---
		09/21/08	5 - 6	N	ND (0.416)	39	15	3.2	ND (0.1)	ND (2)	43	---
		09/21/08	7 - 8	N	ND (0.416)	28	14	3.5	ND (0.1)	ND (2.1)	45	---
		09/21/08	9 - 10	N	ND (0.411)	37	15	3.3	ND (0.1)	ND (2)	43	---
		09/21/08	11 - 12	N	ND (0.422)	68	23	4	ND (0.11)	ND (5.2)	56	---
		09/21/08	13 - 14	N	ND (0.423)	60	22	4.9	ND (0.11)	ND (2.1)	52	---
SWMU1-WP-10	SWMU1 PAA #2	10/05/08	0 - 0.5	N	6.64	540	11	8.3	ND (0.1)	ND (2.1)	56	---
		10/05/08⊖	2 - 3	N	3.85	1,400	18	10	ND (0.1)	ND (5.2)	360	---
		10/05/08	5 - 6	N	0.494 J	50	12	3.6	ND (0.11)	ND (2.1)	53	---
		10/05/08	9 - 10	N	2.31	250	11	5.4	ND (0.11)	ND (2.1)	83	---
SWMU1-WP-T3a		10/05/08	0 - 0.5	N	ND (0.41)	25	11	2.8	ND (0.1)	ND (1)	39	---
		10/05/08	2 - 3	N	ND (0.411)	18	12	2.9	ND (0.1)	ND (1)	35	---
		10/05/08	5 - 6	N	ND (0.431)	26	16	3.4	ND (0.11)	ND (1.1)	40	---
		10/05/08	5 - 6	FD	ND (0.438)	26	15	3.7	ND (0.11)	1.1	39	---
		10/05/08	7 - 8	N	ND (0.429)	38	19	4.4	ND (0.11)	ND (2.1)	44	---
		10/05/08	9 - 10	N	ND (0.406)	71	20	3.4	ND (0.1)	6.4	42	---
		10/05/08	11 - 12	N	ND (0.42)	50	17	4.5	ND (0.1)	ND (2.1)	42	---
		10/05/08	13 - 14	N	ND (0.424)	62	30	3.8	ND (0.11)	ND (5.3)	51	---

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
SSB-2	SWMU1 PAA #2	06/30/97	1	N	ND (0.05)	48.7	7.4	---	---	---	27.3	---
		06/30/97	3	N	ND (0.05)	7.6	6.8	---	---	---	20.4	---
		06/30/97	6	N	ND (0.05)	10.1	9.4	---	---	---	27	---
		06/30/97	10	N	ND (0.05)	9.7	11	3.1	---	ND (0.2)	27.3	---
SSB-3		06/30/97	1	N	ND (0.05)	8.2	4.3	---	---	---	13.7	---
		06/30/97	3	N	ND (0.05)	13.2	9.5	---	---	---	21.4	---
		06/30/97	6	N	ND (0.05)	23.5	13.7	---	---	---	27.1	---
		06/30/97	10	N	ND (0.05)	7.1	13.4	2.3	---	ND (0.2)	19.2	---
SSB-4	SWMU1 PAA #1	06/30/97	1	N	ND (0.05)	10.1	3	---	---	---	11.9	---
		06/30/97	3	N	ND (0.05)	1,520	10.3	---	---	---	141	---
		06/30/97	6	N	ND (0.05)	297	12.4	---	---	---	130	---
		06/30/97	10	N	ND (0.05)	201	11.9	2.1	---	ND (0.2)	188	---
SSB-5		06/30/97	1	N	0.06	521	13.5	---	---	---	39.6	---
		06/30/97	3	N	ND (0.05)	1,440	16	---	---	---	128	---
		06/30/97	6	N	ND (0.05)	617	14.9	---	---	---	115	---
		06/30/97	10	N	ND (0.05)	31.6	7	1.75	---	ND (0.2)	107	---
WP-1	SWMU1 PAA #2	06/30/97	0	N	47.5	2,090	3.9	---	---	---	44.5	---
WP-2	SWMU1 PAA #2	09/18/97	0	N	ND (0.5)	25.9	22.8	---	---	---	80.1	---
WP-3	SWMU1 PAA #2	09/18/97	0.5	N	11.8	1,290	13.2	---	---	---	50.3	---
		09/18/97	2	N	0.41	273	18.6	---	---	---	50	---
WP-4	SWMU1 PAA #2	09/18/97	0	N	1.14	120	10.8	---	---	---	65.6	---
WP-5	SWMU1 PAA #2	09/18/97	0	N	3.51	511	16.8	---	---	---	50.4	---
		09/18/97	1	N	6.66	711	15.4	---	---	---	61.5	---
		09/18/97	2	N	8.97	421	15.8	---	---	---	51.9	---
		09/18/97	3	N	6.1	158	10.1	---	---	---	22.9	---
		09/18/97	4	N	10.2	113	24.4	---	---	---	41.9	---

TABLE E-1
Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
WP-6	SWMU1 PAA #2	09/18/97	0	N	1.64	712	21.6	---	---	---	57.9	---
		09/18/97	1	N	9.46	1,030	18.2	---	---	---	46.5	---
		09/18/97	2	N	2.29	401	11.9	---	---	---	210	---
WP-Bank1	SWMU1 PAA #2	11/23/98	0	N	5.5	261	10.3	---	---	---	23.4	---
WP-Bank2	SWMU1 PAA #2	11/23/98	0	N	14	909	27.2	---	---	---	61.8	---
BANK-WP	SWMU1 PAA #2	11/13/98	Unknown	N	ND (0.51)	34.4	16.3	---	---	---	41.3	---
WP-Floor	SWMU1 PAA #2	11/23/98	Unknown	N	3.3	317	13.9	---	---	---	15.9 J	---
Bank - b	SWMU1 PAA #2	11/13/98	Unknown	N	0.7	20.1	15	---	---	---	38.2	---
T-1	SWMU1 PAA #2	11/13/98	Unknown	N	ND (0.53)	15.9	13.1	---	---	---	38.6	---
		11/13/98	Unknown	N	2.1	38.8	28	---	---	---	164	---
T-2	SWMU1 PAA #2	11/13/98	Unknown	N	ND (0.53)	21.2	12.4	---	---	---	44.7	---
		11/13/98	Unknown	N	0.6	44.4	14.2	---	---	---	43	---
T-3-B	SWMU1 PAA #2	11/13/98	0	N	3.1	619	19.6	---	---	---	673	---
P-1		11/13/98	Unknown	N	ND (0.52)	12	12.7	---	---	---	29.4	---
		11/13/98	Unknown	N	ND (0.53)	17.9	16.1	---	---	---	40.4	---
P-2Soil		11/13/98	- 3.5	N	ND (0.76)	33.2	6	---	---	---	6.4	---
		11/13/98	Unknown	N	ND (0.52)	15	9.7	---	---	---	36.1	---

TABLE E-1

Constituent Concentrations
Solid Waste Management Unit (SWMU) 1 – Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Notes:

Results greater than or equal to the Removal Action Goal are circled.

ϴ	white powder sample.
---	not analyzed
FD	field duplicate
ft bgs	feet below ground surface
J	concentration or reporting limit estimated by laboratory or data validation
mg/kg	milligrams per kilogram
N	primary sample
ND	not detected at the listed reporting limit
ng/kg	nanogram per kilogram
TEQ	dioxin and furans toxicity equivalent quotient

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human / b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
	Removal Action Goal (RAG) <2 ft bgs :				3.1	145	145	36	1	22	1,050	a 100
	Removal Action Goal (RAG) 2 to 10 ft bgs :				31	145	145	36	1	22	1,050	b 190
AOC1-BCW1		09/20/08	0 - 0.5	N	ND (0.401)	23	11	7.5	ND (0.1)	ND (1)	44	---
		09/20/08	2 - 3	N	ND (0.404)	25	15	2	ND (0.1)	ND (1)	28	---
AOC1-BCW2		10/04/08	0 - 0.5	N	ND (0.403)	21	7.6	3.7	ND (0.1)	ND (1)	40	---
		10/04/08	2 - 3	N	ND (0.407)	34	9.2	18	ND (0.1)	ND (1)	39	---
		10/04/08	5 - 6	N	ND (0.404)	35	8.8	4.4	ND (0.1)	1.5	41	---
		10/04/08	9 - 10	N	ND (0.426)	20	8.1	3.8	ND (0.1)	ND (1.1)	39	---
AOC1-BCW3		10/04/08	0 - 0.5	N	0.416	25	11	7.3	ND (0.1)	ND (1)	51	---
		10/04/08	2 - 3	N	ND (0.404)	25	9.8	4	ND (0.1)	ND (1)	38	---
		10/04/08	5 - 6	N	ND (0.415)	23	9.6	2.2	ND (0.1)	ND (2.1)	43	---
		10/04/08	9 - 10	N	ND (0.421)	21	8.5	2.2	ND (0.11)	ND (1.1)	38	---
		10/04/08	9 - 10	FD	ND (0.424)	22	8.8	2.3	ND (0.11)	ND (1.1)	41	---
AOC1-BCW4		10/04/08	0 - 0.5	N	1.3	36	13	9.4	ND (0.1)	ND (1)	61	---
		10/04/08	2 - 3	N	ND (0.407)	24	8.3	3.6	ND (0.1)	ND (1)	33	---
		10/04/08	5 - 6	N	ND (0.416)	23	8.4	2.7	ND (0.1)	ND (1)	45	---
		10/04/08	9 - 10	N	ND (0.426)	22	7.6	2.3	ND (0.11)	ND (2.1)	42	---
AOC1-BCW5		10/04/08	0 - 0.5	N	0.445	35	12	6	ND (0.099)	ND (1)	46	---
		10/04/08	2 - 3	N	ND (0.407)	31	9.6	7	ND (0.1)	ND (1)	42	---
		10/04/08	5 - 6	N	ND (0.42)	26	8.4	2.7	ND (0.1)	ND (1)	44	---
		10/04/08	9 - 10	N	ND (0.425)	22	ND (7.4)	3.2	ND (0.11)	ND (2.1)	40	---
		10/04/08	9 - 10	FD	ND (0.427)	24	ND (7.3)	3	ND (0.11)	ND (2.1)	40	---
AOC1-BCW6		08/22/08‡	0 - 0.5	N	2.63	71	22	23	ND (0.14)	ND (2.8)	81	64
		08/22/08‡	2 - 3	N	ND (0.608)	21	14	8.7	ND (0.14)	ND (2.9)	50	11
AOC1-T1a		10/16/08	0 - 0.5	N	ND (0.406)	19	11	4.9	ND (0.1)	ND (2)	38	---
		10/16/08	2 - 3	N	ND (0.404)	27	8.6	3.8	ND (0.1)	2	37	---
		10/16/08	5 - 6	N	ND (0.405)	26	9.5	3.4	ND (0.1)	2	34	---
		10/16/08	9 - 10	N	ND (0.404)	14	7.5	1.4	ND (0.1)	ND (1)	32	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
AOC1-T1b		10/16/08	0 - 0.5	N	ND (0.405)	43 J	9	3.1	ND (0.1)	ND (1)	31	---
		10/16/08	0 - 0.5	FD	ND (0.405)	33 J	10	3.2	ND (0.1)	ND (1)	32	---
		10/16/08	2 - 3	N	ND (1.94)	98	12	3.9	ND (0.1)	ND (1)	67	---
		10/16/08	5 - 6	N	0.402	28	9	3.2	ND (0.1)	1.7	31	---
		10/16/08	9 - 10	N	ND (0.402)	42	11	2.6	ND (0.1)	5	32	---
AOC1-T1c		10/16/08	0 - 0.5	N	0.601	44	13	7.5	ND (0.1)	1.9	53	---
		10/16/08	2 - 3	N	4.77 J	140	26	20 J	ND (0.1)	2.5	82 J	---
		10/16/08	2 - 3	FD	3.58 J	150	29	32 J	ND (0.1)	2.2	110 J	---
		10/16/08	5 - 6	N	0.446	46	15	5	ND (0.1)	3	44	---
		10/16/08	9 - 10	N	ND (0.418)	20	11	1.9	ND (0.1)	ND (1)	38	---
AOC1-T2a		10/05/08	0 - 0.5	N	ND (0.403)	26	10	4.8	ND (0.1)	ND (1)	38	---
		10/16/08	2 - 3	N	ND (0.407)	28	10	4	ND (0.1)	ND (2)	42	---
		10/16/08	5 - 6	N	ND (0.405)	19	8.3	2.4	ND (0.1)	1.1	35	---
		10/16/08	9 - 10	N	ND (0.416)	15	7.1	2.1	ND (0.1)	ND (1)	36	---
AOC1-T2b	AOC1 PAA #2	10/16/08	0 - 0.5	N	ND (0.408)	26	9.3	3.2	ND (0.1)	ND (1)	39	---
		10/16/08	2 - 3	N	ND (0.414)	26	10	3	ND (0.1)	2.4	33	---
		10/16/08	5 - 6	N	ND (0.407)	53	8.7	2.4	ND (0.1)	5.5	32	---
		10/16/08	9 - 10	N	ND (0.415)	18	8.5	1.8	ND (0.1)	1.3	33	---
		10/16/08	9 - 10	FD	ND (0.413)	18	9.6	1.6	ND (0.1)	1.2	35	---
AOC1-T2c		10/08/08	0 - 0.5	N	1.26	60	10	5.1	ND (0.1)	ND (1)	44	---
		10/08/08	2 - 3	N	ND (0.416)	42	11	3.3	ND (0.1)	ND (1)	33	---
		10/08/08	5 - 6	N	ND (0.412)	22	9.1	1.8	ND (0.1)	ND (1)	28	---
		10/08/08	9 - 10	N	ND (0.419)	24	9.7	2.6	ND (0.1)	ND (1)	40	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC1-T2d	AOC1 PAA #2	10/07/08	0 - 0.5	N	ND (0.408)	46	10	2.9	ND (0.1)	2.9	36	---
		10/07/08	2 - 3	N	5.73	970	13	4.7	ND (0.1)	1.5	98	---
		10/07/08	5 - 6	N	4.34	370	11	3.9	ND (0.1)	1.1	130	---
		10/07/08	9 - 10	N	2.92	140	14	3.1	ND (0.1)	ND (2.1)	68	---
		10/07/08	19 - 20	N	ND (0.423)	26	9.2	3	ND (0.11)	ND (2.1)	45	---
		10/07/08	29 - 30	N	ND (0.424)	21	8.9	2.7	ND (0.1)	ND (2.1)	37	---
		10/07/08	29 - 30	FD	ND (0.423)	24	ND (11)	2.2	ND (0.11)	ND (5.3)	36	---
		10/07/08	39 - 40	N	ND (0.431)	22	11	3.6	ND (0.11)	ND (2.1)	42	---
		10/07/08	49 - 50	N	ND (0.425)	28	10	2.1	ND (0.11)	ND (1.1)	38	---
		10/08/08	59 - 60	N	ND (0.406)	39	9.8	2.2	ND (0.1)	4.7	32	---
		10/08/08	69 - 70	N	ND (0.435)	18	9.8	2.8	ND (0.11)	2.2	31	---
AOC1-T2e		10/16/08	0 - 0.5	N	ND (0.405)	34	9.3	3.4	ND (0.1)	2.2	36	---
		10/16/08	2 - 3	N	ND (0.408)	30	8.4	3.2	ND (0.1)	1.4	30	---
		10/16/08	2 - 3	FD	ND (0.408)	32	8	3.2	ND (0.1)	1.3	33	---
		10/16/08	5 - 6	N	ND (0.402)	44	8.4	2.3	ND (0.1)	5.4	32	---
		10/16/08	9 - 10	N	ND (0.415)	20	4.9	1.1	ND (0.1)	1.1	27	---
AOC1-T3a		10/05/08	0 - 0.5	N	ND (0.403)	24	11	8.4	ND (0.1)	ND (1)	47	---
		10/17/08	2 - 3	N	ND (0.407)	19	9	4.2	ND (0.1)	ND (1)	37	---
		10/17/08	5 - 6	N	ND (0.405)	23	12	14	ND (0.1)	1.7	39	---
		10/17/08	9 - 10	N	ND (0.406)	15	10	1.9	ND (0.1)	ND (1)	33	---
AOC1-T3b		10/05/08	0 - 0.5	N	ND (0.402)	23	8	3.1	ND (0.1)	ND (1)	29	---
		10/17/08	2 - 3	N	2.77	170	13	9.1	ND (0.11)	ND (1)	120	---
		10/17/08	5 - 6	N	ND (0.405)	46	8.6	2.3	ND (0.1)	4.6	34	---
		10/17/08	9 - 10	N	ND (0.41)	17	7.7	1.7	ND (0.1)	1.1	31	---
		10/17/08	9 - 10	FD	ND (0.412)	16	6.5	1.9	ND (0.1)	1.1	32	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC1-T3c		10/05/08	0 - 0.5	N	0.42	27	11	7	ND (0.1)	ND (1)	46	---
		10/05/08	2 - 3	N	ND (0.41)	30	9.7	3.4	ND (0.1)	ND (1)	39	---
		10/05/08	5 - 6	N	1.65	89	12	5.8	ND (0.1)	1.4	65	---
		10/05/08	9 - 10	N	ND (0.403)	19	10	2.4	ND (0.1)	ND (1)	36	---
AOC1-T4a		10/03/08	0 - 0.5	N	ND (0.402)	28	11	5.5	ND (0.1)	ND (1)	51	---
		10/03/08	2 - 3	N	ND (0.407)	26	10	4	ND (0.1)	ND (1)	40	---
		10/03/08	5 - 6	N	ND (0.409)	25	11	3.3	ND (0.1)	ND (1)	40	---
		10/03/08	9 - 10	N	0.525	26	9.6	4.3	ND (0.1)	ND (1)	36	---
AOC1-T4b		10/02/08	0 - 0.5	N	1.26	21	7.5	2.6	ND (0.1)	ND (1)	29	---
		10/02/08	2 - 3	N	ND (0.412)	29	12	8.8 J	ND (0.1)	ND (1)	46	---
		10/02/08	2 - 3	FD	ND (0.408)	28	11	7 J	ND (0.1)	ND (1)	50	---
		10/02/08	5 - 6	N	ND (0.419)	24	9.6	3.2	ND (0.1)	ND (1)	39	---
		10/02/08	9 - 10	N	ND (0.415)	19	8.8	2.4	ND (0.1)	ND (1)	37	---
AOC1-T4c		10/04/08	0 - 0.5	N	ND (0.403)	19	22	5.9	ND (0.1)	ND (1)	33	---
		10/04/08	2 - 3	N	0.816	27	19	14	ND (0.1)	ND (1)	67	---
		10/04/08	5 - 6	N	0.868	28	21	19	ND (0.1)	1.3	71	---
		10/04/08	9 - 10	N	ND (0.413)	27	13	5.8	ND (0.1)	ND (1)	47	---
AOC1-T5a		10/04/08	0 - 0.5	N	ND (0.402)	21	13	4	ND (0.1)	ND (1)	41	---
		10/04/08	2 - 3	N	ND (0.403)	39	10	3.2	ND (0.099)	ND (1)	38	---
		10/04/08	5 - 6	N	ND (0.405)	35	24	3.4	ND (0.1)	2.2	38	---
		10/04/08	9 - 10	N	ND (0.411)	24	11	3.6	ND (0.1)	ND (1)	38	---
		10/04/08	9 - 10	FD	ND (0.409)	27	11	3.1	ND (0.1)	ND (1)	38	---
AOC1-T5b		10/04/08	0 - 0.5	N	ND (0.402)	26	11	4.9	ND (0.1)	ND (1)	33	---
		10/04/08	2 - 3	N	0.452	41	9.5	4.4	ND (0.1)	ND (1)	38	---
		10/04/08	5 - 6	N	0.596	61	9.8	4.8	ND (0.1)	ND (1)	41	---
		10/04/08	9 - 10	N	ND (0.409)	23	13	3.4	ND (0.1)	ND (1)	41	---

TABLE E-2

Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC1-T5c		10/04/08	0 - 0.5	N	ND (0.403)	15	8.8	5.8	ND (0.1)	ND (1)	37	---
		10/04/08	2 - 3	N	0.875	31	12	7.5	ND (0.1)	ND (1)	53	---
		10/04/08	5 - 6	N	0.641	36	12	11	ND (0.099)	ND (1)	49	---
		10/04/08	9 - 10	N	0.478	21	9.8	3.9	ND (0.1)	ND (1)	39	---
AOC1-T6a		09/30/08	0 - 0.5	N	ND (0.402)	20	11	5.6	ND (0.1)	ND (1)	47	---
		09/30/08	2.5 - 3	N	ND (0.408)	20	8.9	5.6	ND (0.1)	ND (1)	36	---
		09/30/08	2.5 - 3	FD	ND (0.407)	21	8.8	5.4	ND (0.1)	ND (1)	40	---
		09/30/08	5.5 - 6	N	ND (0.408)	16	7.9	3.9	ND (0.1)	ND (1)	34	---
		09/30/08	9.5 - 10	N	ND (0.41)	20	8.7	12	ND (0.1)	ND (1)	40	---
AOC1-T6b		09/30/08	0 - 0.5	N	ND (0.401)	26	9	5.5	ND (0.1)	ND (1)	41	---
		09/30/08	2.5 - 3	N	ND (0.404)	18	7.1	4.4	ND (0.1)	ND (1)	29	---
		09/30/08	5.5 - 6	N	ND (0.404)	22	10	3.2	ND (0.1)	ND (1)	36	---
		09/30/08	9.5 - 10	N	ND (0.405)	25	9.3	3.1 J	ND (0.1)	ND (1)	37	---
		09/30/08	9.5 - 10	FD	ND (0.404)	27	10	8.5 J	ND (0.1)	ND (1)	39	---
AOC1-T6c		09/30/08	0 - 0.5	N	ND (0.401)	18	8.7	3.2	ND (0.1)	ND (1)	39	---
		09/30/08	2.5 - 3	N	ND (0.407)	26	9.7	5.1	ND (0.1)	ND (1)	37	---
		09/30/08	5.5 - 6	N	ND (0.406)	21	9.4	2.9	ND (0.1)	ND (1)	37	---
AOC4-1		10/14/08	0 - 0.5	N	0.49	47	16	8.5	ND (0.1)	ND (1)	48	---
		10/14/08	0.5 - 1	N	ND (0.404)	32	13	10	ND (0.1)	ND (1)	47	---
		10/14/08	2 - 3	N	ND (0.405)	20	12	17	ND (0.1)	ND (1)	39	---

TABLE E-2

Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human / b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC1-1	AOC1 PAA #3	01/23/16	0 - 0.5	N	12	410	14	5.4	ND (0.1)	ND (1)	74	300
		01/23/16	2 - 3	N	4.1	290	14	4.5	ND (0.1)	ND (1)	74	190
		01/23/16	5 - 6	N	ND (0.2)	15	9	2.6	ND (0.1)	ND (1)	34	---
		01/23/16	9 - 10	N	ND (0.2)	17	9.6	2.1	ND (0.1)	ND (1)	35	---
		01/23/16	14 - 15	N	ND (0.2)	18	11	1.8	ND (0.1)	ND (1)	36	---
		01/23/16	14 - 15	FD	ND (0.2)	19	12	1.9	ND (0.1)	ND (1)	36	---
		01/24/16	19 - 20	N	ND (0.2)	18	9	1.3	ND (0.1)	ND (1)	39	---
		01/24/16	29 - 30	N	ND (0.21)	16	12	2.3	ND (0.1)	ND (1)	41	---
AOC1-2		01/23/16	0 - 0.5	N	ND (0.21)	20	9.1	4.2	ND (0.1)	ND (1)	38	1.9
		01/23/16	2 - 3	N	ND (0.2)	18 J	9.1	1.9	ND (0.1)	ND (1)	36	0.15
		01/23/16	5 - 6	N	ND (0.2)	19	11	1.8	ND (0.1)	ND (1)	36	---
		01/23/16	9 - 10	N	ND (0.2)	18	6.3	1	ND (0.1)	ND (1)	28	---
		01/23/16	14 - 15	N	ND (0.2)	13	8.1	1	ND (0.1)	ND (1)	34	---
		01/23/16	19 - 20	N	ND (0.2)	16 J	7.7	1.5	ND (0.1)	ND (1)	35	---
		01/23/16	20 - 30	FD	ND (0.2)	13 J	8	1.3	ND (0.1)	ND (1)	36	---
		01/23/16	29 - 30	N	ND (0.2)	15	7.6	1.2	ND (0.1)	ND (1)	31	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC1-3	AOC1 PAA #3	01/25/16	0 - 0.5	N	14	410	13	3.7	ND (0.1)	ND (1)	90	330
		01/25/16	2 - 3	N	3.7	210	11	3.3	ND (0.1)	ND (1)	60	180
		01/25/16	5 - 6	N	ND (0.2)	24	14	1.5	ND (0.1)	ND (1)	39	0.8
		01/25/16	9 - 10	N	ND (0.2)	13	7.7	1.4	ND (0.1)	ND (1)	32	0.52
		01/25/16	14 - 15	N	ND (0.2)	17	10	1.4	ND (0.1)	ND (1)	40	---
		01/25/16	14 - 15	FD	ND (0.2)	19	9.8	1.3	ND (0.1)	ND (1)	43	---
		01/25/16	19 - 20	N	ND (0.2)	19	11	1.6	ND (0.1)	ND (1)	38	---
		01/25/16	29 - 30	N	ND (0.2)	15	11	2.2	ND (0.1)	ND (1)	34	---
		01/25/16	39 - 40	N	ND (0.22)	22	10	1.7	ND (0.11)	ND (1.1)	39	---
		01/25/16	49 - 50	N	ND (0.21)	23	14	2.3	ND (0.11)	ND (1.1)	42	---
		01/25/16	59 - 60	N	ND (0.21)	39	14	2.2	ND (0.11)	ND (1.1)	42	---
		01/26/16	69 - 70	N	ND (0.21)	20	19	1.5	ND (0.1)	ND (1)	38	---
		01/26/16	79 - 80	N	ND (0.21)	17	13	1.3	ND (0.11)	ND (1)	31	---
AOC1-4		01/23/16	0 - 0.5	N	ND (0.2)	13	7	1.9	ND (0.1)	ND (1)	35	0.92
		01/23/16	2 - 3	N	ND (0.2)	19	8.7	3	ND (0.1)	ND (1)	30	0.66
		01/23/16	5 - 6	N	ND (0.2)	14	10	2.9	ND (0.1)	ND (1)	31	---
		01/23/16	9 - 10	N	ND (0.2)	14	9.3	2.2	ND (0.1)	ND (1)	33	---
		01/23/16	14 - 15	N	ND (0.2)	35	9.1	2	ND (0.1)	ND (1)	35	---
		01/23/16	19 - 20	N	ND (0.2)	16	8.4	1.2	ND (0.1) J	ND (1)	37	---
		01/23/16	19 - 20	FD	ND (0.2)	21	11	1.3	ND (0.1)	ND (1)	43 J	---
		01/23/16	29 - 30	N	ND (0.21)	16	7.9	2.2	ND (0.1)	ND (1.1)	39	---
AOC1-5		01/09/17	0 - 0.5	N	ND (0.21)	14	7.3	1.5	ND (0.1)	ND (1)	26	2.4
		01/09/17	2 - 3	N	ND (0.21)	24	8.7	ND (1)	ND (0.1)	ND (1)	32	0.2
		01/09/17	5 - 6	N	ND (0.21)	19	7.9	2.1	ND (0.1)	ND (1)	45	8
		01/09/17	9 - 10	N	ND (0.21)	13	9.5	ND (1)	ND (0.1)	ND (1)	28	0.45
		01/09/17	14 - 15	N	ND (0.21)	18	8.3	1.9	ND (0.11)	ND (1.1)	34	0.19

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human / [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
	Removal Action Goal (RAG) <2 ft bgs :				3.1	145	145	36	1	22	1,050	a 100
	Removal Action Goal (RAG) 2 to 10 ft bgs :				31	145	145	36	1	22	1,050	b 190
AOC1-6		01/09/17	0 - 0.5	N	0.22	23	11	2.9	ND (0.1)	ND (1)	34	14
		01/09/17	2 - 3	N	ND (0.21)	17	6.7	1.2	ND (0.1)	ND (1)	27	2.7
		01/09/17	5 - 6	N	ND (0.21)	14	8.8	ND (1)	ND (0.1)	ND (1)	30	0.3
		01/09/17	9 - 10	N	ND (0.21)	21	8.3	1.5	ND (0.1)	ND (1)	35	ND (0.16)
		01/09/17	14 - 15	N	ND (0.21)	23	7.3	1.6	ND (0.1)	ND (1)	38	0.24
AOC16-5		02/20/17	0 - 0.5	N	0.56	28 J	18 J	29 J	---	ND (1)	46 J	36
		02/20/17	0 - 0.5	FD	0.61	22 J	11 J	3.9 J	0.12	ND (1)	36 J	23
		02/20/17	2 - 3	N	ND (0.21)	13	28	1.3	ND (0.1)	ND (1)	25	ND (0.44)
AOC1-7		01/09/17	0 - 0.5	N	ND (0.21)	14	9.4	1.6	ND (0.1)	ND (1)	28 J	12
		01/09/17	2 - 3	N	ND (0.21)	20	9	1.9	ND (0.1)	ND (1)	35	5.8
		01/09/17	2 - 3	FD	ND (0.21)	18	7.1	1.4	ND (0.1)	ND (1)	33	3.8
		01/09/17	5 - 6	N	ND (0.21)	18	6.3	1.1	ND (0.1)	ND (1)	35	0.49
		01/09/17	9 - 10	N	ND (0.21)	25	8.8	1.6	ND (0.1)	ND (1)	42	0.15
		01/09/17	14 - 15	N	ND (0.21)	22	9.2	1.3	ND (0.1)	ND (1)	38	0.15
AOC1-8		01/05/17	0 - 0.5	N	ND (0.21)	26	12	4.1	ND (0.11)	ND (1.1)	41	5.8
		01/05/17	2 - 3	N	0.24	16	10	12	ND (0.12)	ND (1.2)	40	9
AOC1-BCW10		02/04/16	0 - 0.5	N	ND (0.21)	52	16	11	ND (0.1)	ND (1)	65	110
		02/04/16	2 - 3	N	0.42	66	15	11	ND (0.1)	ND (1)	63	18
		02/04/16	5 - 6	N	ND (0.2)	17	9.5	1.1	ND (0.1)	ND (1)	35	0.79
		02/04/16	9 - 10	N	ND (0.21)	25 J	7.9	1.8	ND (0.11)	ND (1)	49	0.15
		02/04/16	9 - 10	FD	ND (0.21)	19 J	8.2	1.9	ND (0.11)	ND (1.1)	44	0.089
AOC1-BCW11		02/04/16	0 - 0.5	N	ND (0.21) J	19	14	8.5	ND (0.11)	ND (1.1)	54	10
		02/04/16	2 - 3	N	0.36	38	15	6.3	ND (0.1)	ND (1)	54	19
		02/04/16	5 - 6	N	0.5	54	16	7.3	ND (0.1)	ND (1)	62	52
		02/04/16	9 - 10	N	ND (0.22)	11	6	ND (1.1)	ND (0.11)	ND (1.1)	27	ND (0.19)

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC1-BCW12		02/04/16	0 - 0.5	N	ND (0.23)	29	15	9.8	ND (0.11)	ND (1.1)	74	54
		02/04/16	2 - 3	N	0.8	48	17	10	ND (0.11)	ND (1.1)	58	100
		02/04/16	5 - 6	N	ND (0.21)	12	6.9	2	ND (0.11)	ND (1.1)	30	1.5
		02/04/16	9 - 10	N	ND (0.21)	13	6.5	1.3	ND (0.11)	ND (1.1)	29	---
AOC1-BCW13		02/04/16	0 - 0.5	N	ND (0.21)	29	16	8.7	ND (0.11)	ND (1.1)	62	19
		02/04/16	2 - 3	N	0.22	22	17	1.5	ND (0.11)	ND (1.1)	44	0.37
		02/04/16	5 - 6	N	ND (0.22)	17	11	2	ND (0.11)	ND (1.1)	39	0.21
		02/04/16	9 - 10	N	ND (0.22)	16	6.5	1.5	ND (0.11)	ND (1.1)	35	0.24
AOC1-BCW14		02/04/16	0 - 0.5	N	ND (0.21)	28	12	4.7	ND (0.11)	ND (1.1)	49	11
		02/04/16	2 - 3	N	0.23	15	10	3.6	ND (0.1)	ND (1)	34	1.7
		02/04/16	5 - 6	N	ND (0.21)	14	8.8	1.3	ND (0.1)	ND (1)	34	---
		02/04/16	9 - 10	N	ND (0.21)	19	22	1.2	ND (0.11)	ND (1.1)	29	---
AOC1-BCW15		02/04/16	0 - 0.5	N	ND (0.23)	21	15	9.2	ND (0.12)	ND (1.2)	52	9.6
		02/04/16	2 - 3	N	0.54	43	17	9.9	ND (0.13)	ND (1.2)	49	---
		02/04/16	5 - 6	N	ND (0.22)	14	6.6	1.4	ND (0.11)	ND (1.1)	39	---
		02/04/16	9 - 10	N	ND (0.22)	16	6.9	ND (1.1)	ND (0.11)	ND (1.1)	37	---
AOC1-BCW16		02/04/16	0 - 0.5	N	ND (0.22)	30	13	5.8	ND (0.11)	ND (1.1)	46	26
		02/04/16	2 - 3	N	0.36	50	18	12	ND (0.12)	ND (1.2)	51	18
		02/04/16	5 - 6	N	ND (0.21)	15	8.1	1.3	ND (0.11)	ND (1.1)	28	3.5
		02/04/16	9 - 10	N	ND (0.21)	10	6.2	ND (1.1)	ND (0.11)	ND (1.1)	22	0.21
AOC1-BCW17		02/04/16	0 - 0.5	N	ND (0.23)	15	13	5.1	ND (0.11)	ND (1.1)	36	0.42
		02/04/16	2 - 3	N	ND (0.21)	23	18	1.4	ND (0.11)	ND (1.1)	41	0.14
		02/04/16	5 - 6	N	ND (0.21)	18	18	2	ND (0.11)	ND (1.1)	38	---
		02/04/16	9 - 10	N	ND (0.21)	19	15	1.7	ND (0.11)	ND (1.1)	39	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
AOC1-BCW18		02/05/16	0 - 0.5	N	ND (0.26)	46	19	13	ND (0.13)	ND (1.3)	68	29
		02/05/16	2 - 3	N	ND (0.25)	10	7	3.5	ND (0.12)	ND (1.2)	30	0.31
		02/05/16	5 - 6	N	ND (0.22)	9.6	6.9	ND (1.1)	ND (0.11)	ND (1.1)	28	ND (0.13)
		02/05/16	9 - 10	N	ND (0.22)	17	6	1.5	ND (0.11)	ND (1.1)	35	ND (0.1)
AOC1-BCW19		02/05/16	0 - 0.5	N	1.4	58	15	11	ND (0.12)	ND (1.2)	60	210
		02/05/16	2 - 3	N	ND (0.21)	12	6.9	1.4	ND (0.1)	ND (1)	27	---
		02/05/16	5 - 6	N	ND (0.21)	15	6.9	1	ND (0.1)	ND (1)	34	---
		02/05/16	9 - 10	N	ND (0.22)	12	7.7	ND (1.1)	ND (0.11)	ND (1.1)	31	---
AOC1-BCW20		02/05/16	0 - 0.5	N	ND (0.21)	20	8.2	2.2	ND (0.1)	ND (1)	38	5.6
		02/05/16	2 - 3	N	ND (0.21)	14	7.4	1.6	ND (0.11)	ND (1.1)	31	0.22
		02/05/16	5 - 6	N	ND (0.22)	12	8.7	1.4	ND (0.11)	ND (1.1)	29	0.19
		02/05/16	9 - 10	N	ND (0.23)	22	17	2.9	ND (0.11)	ND (1.1)	48	ND (0.12)
AOC1-BCW21		02/05/16	0 - 0.5	N	ND (0.23)	42	17	13	ND (0.11)	ND (1.1)	64	42
		02/05/16	2 - 3	N	ND (0.22)	22	9.7	3.2	ND (0.11)	ND (1.1)	40	0.31
		02/05/16	5 - 6	N	ND (0.22)	15	13	1.6	ND (0.11)	ND (1.1)	33	ND (0.12)
		02/05/16	9 - 10	N	ND (0.22)	19	14	2	ND (0.11)	ND (1.1)	40	ND (0.12)
AOC1-BCW22		02/05/16	0 - 0.5	N	ND (0.21)	12	7	6.1	ND (0.1)	ND (1)	26	7
		02/05/16	2 - 3	N	ND (0.21)	20	10	16	ND (0.11)	ND (1)	43	---
		02/05/16	5 - 6	N	ND (0.21)	16	7.7	4.2	ND (0.1)	ND (1)	36	---
		02/05/16	9 - 10	N	ND (0.22)	15	8.8	ND (1.1)	ND (0.11)	ND (1.1)	33	---
AOC1-BCW23		02/05/16	0 - 0.5	N	ND (0.26)	38	22	16	ND (0.13)	ND (1.3)	84	21
		02/05/16	2 - 3	N	ND (0.24)	17	12	6.9	ND (0.12)	ND (1.2)	47	0.65
		02/05/16	5 - 6	N	ND (0.22)	11	5.7	1.7	ND (0.11)	ND (1.1)	24	---
		02/05/16	9 - 10	N	ND (0.22)	13	7.6	1.5	ND (0.11)	ND (1.1)	33	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
AOC1-BCW24		02/05/16	0 - 0.5	N	ND (0.24)	30	14	7.4	ND (0.12)	ND (1.2)	56	27
		02/05/16	2 - 3	N	0.28	29	15	8.8	ND (0.12)	ND (1.2)	49	26
		02/05/16	5 - 6	N	ND (0.22)	11	7.7	1.1	ND (0.11)	ND (1.1)	27	ND (0.18)
		02/05/16	9 - 10	N	ND (0.22)	7.9	4.9	1.3	ND (0.11)	ND (1.1)	21	---
AOC1-BCW25		02/05/16	0 - 0.5	N	ND (0.26)	39	18	11	ND (0.13)	ND (1.3)	69	58
		02/05/16	2 - 3	N	ND (0.26)	21	14	3.8	ND (0.13)	ND (1.3)	42	1.9
		02/05/16	5 - 6	N	ND (0.22)	13	7.9	2.6	ND (0.11)	ND (1.1)	37	0.58
		02/05/16	9 - 10	N	ND (0.22)	16	14	2	ND (0.11)	ND (1.1)	42	ND (0.067)
AOC1-BCW26		02/04/16	0 - 0.5	N	ND (0.22)	35	15	8.9	ND (0.11)	ND (1.1)	59	100
		02/04/16	2 - 3	N	ND (0.25)	12	10	8.2	ND (0.13)	ND (1.3)	43	0.75
		02/04/16	5 - 6	N	ND (0.21)	13	11	3.6	ND (0.11)	ND (1.1)	33	---
		02/04/16	9 - 10	N	ND (0.24)	19	25	3.1	ND (0.12)	ND (1.2)	40	---
AOC1-BCW27		02/05/16	0 - 0.5	N	ND (0.24)	33	17	17	ND (0.12)	ND (1.2)	59	3.9
		02/05/16	2 - 3	N	ND (0.23)	12	8.6	2	ND (0.11)	ND (1.1)	33	0.12
		02/05/16	5 - 6	N	ND (0.21)	9.7	9	1.3	ND (0.11)	ND (1.1)	29	0.13
		02/05/16	9 - 10	N	ND (0.23)	15	7.4	2.2	ND (0.11)	ND (1.1)	31	0.088
AOC1-BCW28		02/05/16	0 - 0.5	N	0.3	49	19	14	ND (0.12)	ND (1.2)	73	180
		02/05/16	2 - 3	N	ND (0.23)	18	10	4.2	ND (0.11)	ND (1.2)	38	0.83
		02/05/16	5 - 6	N	ND (0.22)	18	8.3	1.4	ND (0.11)	ND (1.1)	33	0.6
		02/05/16	9 - 10	N	ND (0.22)	18	11	2.1	ND (0.11)	ND (1.1)	39	ND (0.11)
AOC1-BCW29		02/04/16	0 - 0.5	N	ND (0.26)	33	15	8.3	ND (0.13)	ND (1.3)	56	84
		02/04/16	2 - 3	N	ND (0.27)	17	13	5.2	ND (0.14)	ND (1.4)	49	0.45
		02/04/16	5 - 6	N	ND (0.31)	27	23	7.6	ND (0.15)	ND (1.5)	66	0.56
		02/04/16	9 - 10	N	ND (0.24) J	11	7.1	ND (1.2)	ND (0.12)	ND (1.2)	29	0.55

TABLE E-2

Constituent Concentrations

Area of Concern (AOC) 1 – Area around Former Percolation Bed

Soil Engineering Evaluation/Cost Analysis

PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC1-BCW30		02/04/16	0 - 0.5	N	ND (0.24)	42	18	17 J	ND (0.12)	ND (1.2) J	61	140
		02/04/16	2 - 3	N	0.26	14	8.7	2.7	ND (0.12)	ND (1.2)	28	2.2
		02/04/16	5 - 6	N	ND (0.23)	12	8.4	2.9	ND (0.12)	ND (1.2)	29	---
		02/04/16	9 - 10	N	ND (0.23)	8.8	7.8	ND (1.2)	ND (0.12)	ND (1.2)	27	---
AOC1-BCW31		02/20/17‡	0 - 0.5	N	---	---	---	---	---	---	---	0.5
		02/20/17‡	2 - 3	N	---	---	---	---	---	---	---	ND (0.078)
AOC1-BCW32		02/20/17‡	0 - 0.5	N	---	---	---	---	---	---	---	1.9
		02/20/17‡	2 - 3	N	---	---	---	---	---	---	---	0.13
AOC1-BCW7		02/05/16	0 - 0.5	N	0.29	18	18	8	ND (0.1)	ND (1)	34	6.4
		02/05/16	2 - 3	N	0.36	20	8.4	1.7	ND (0.1)	ND (1)	29	3.1
		02/05/16	2 - 3	FD	0.28	23	7.5	1.7	ND (0.1)	ND (1)	27	2.5
		02/05/16	5 - 6	N	ND (0.21)	15	6.2	2.2	ND (0.1)	ND (1)	15	0.17
		02/05/16	9 - 10	N	0.36	24	23	1.4	ND (0.1)	ND (1.1)	26	0.23
		02/05/16	14 - 15	N	ND (0.21)	19	8.4	2.4	ND (0.1)	ND (1.1)	39	---
		02/05/16	19 - 20	N	ND (0.21)	20	7.2	1.8	ND (0.11)	ND (1)	38	---
		02/05/16	19 - 20	FD	ND (0.21)	19	8.7	1.8	ND (0.1)	ND (1.1)	38	---
AOC1-BCW8		02/04/16	0 - 0.5	N	ND (0.22)	21	14	8.3	ND (0.11)	ND (1.1)	53	21
		02/04/16	2 - 3	N	0.44	28	10	4.5	ND (0.1)	ND (1)	45	38
		02/04/16	5 - 6	N	0.24	18	8.4	3.2	ND (0.1)	ND (1)	35	9
		02/04/16	9 - 10	N	ND (0.21)	15 J	9.3	1.1	ND (0.11)	ND (1.1)	35	---
		02/04/16	9 - 10	FD	ND (0.21)	11 J	11	ND (1.1)	ND (0.11)	ND (1.1)	37	---
AOC1-BCW9		02/04/16	0 - 0.5	N	ND (0.22)	35	17	9.3	ND (0.11)	ND (1.1)	61	29
		02/04/16	2 - 3	N	1.2	66	16	11	ND (0.11)	ND (1.1)	57	0.68
		02/04/16	5 - 6	N	ND (0.21)	17	9.5	3	ND (0.1)	ND (1.1)	37	---
		02/04/16	9 - 10	N	ND (0.21)	13	10	ND (1.1)	ND (0.1)	ND (1.1)	32	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC1-T1e		01/11/16	0 - 1	N	ND (0.21)	26	13	3.3	---	ND (1)	37	19
		01/11/16	2 - 3	N	ND (0.21)	18	10	2	ND (0.1)	ND (1)	40	2.6
		01/11/16	5 - 6	N	ND (0.21)	16	7.5	1.1	ND (0.1)	ND (1)	30	0.27
		01/11/16	9 - 10	N	ND (0.2)	20	11	1.3	ND (0.1)	ND (1)	32	0.86
		01/11/16	9 - 10	FD	ND (0.21)	17	13	1.5	0.18	ND (1)	32	---
		01/11/16	14 - 15	N	ND (0.22)	17	11	1.3	0.16	ND (1.1)	28	---
AOC1-T1f		01/12/16	0 - 1	N	0.71	49	13	5.5	0.13	ND (1)	41	19
		01/12/16	2 - 3	N	ND (0.21)	20	7.2	1.5	0.13	ND (1)	32	0.092
		01/12/16	5 - 6	N	ND (0.21)	24	11	2	0.11	ND (1.1)	40	0.43
		01/12/16	9 - 10	N	ND (0.21)	18 J	9.1	1.9	0.11	ND (1)	46 J	0.43
		01/12/16	9 - 10	FD	ND (0.21)	30 J	11	2.6	ND (0.1)	ND (1)	35 J	---
		01/12/16	14 - 15	N	0.68	29	9.2	2	ND (0.1)	ND (1)	34	---
AOC1-T1g		02/17/17	0 - 0.5	N	ND (0.2)	26	12	4.1	ND (0.1)	ND (1)	33	6.5
		02/17/17	0 - 0.5	FD	ND (0.2)	24	14	1.6	ND (0.1)	ND (1)	36	12
		02/17/17	2 - 3	N	ND (0.21)	30	13	ND (1)	ND (0.1)	ND (1)	32	19
		02/17/17	5 - 6	N	0.63	23	9.2	1.1	ND (0.1)	ND (1)	30	6
		02/17/17	9 - 10	N	ND (0.21)	14	9.2	ND (1)	ND (0.1)	ND (1)	29	2.4
AOC1-T2f		12/17/15	0 - 1	N	0.22	14	12	7.9	ND (0.1)	3.2	39	---
		12/17/15	2 - 3	N	0.25	17	11	3.1	ND (0.1)	8.2	40	---
AOC1-T2g	AOC1 PAA #2	03/03/16	9 - 10	N	30	2,100	11	5.2	0.26	8.4	140	130
		03/03/16	14 - 15	N	0.77	28	8.9	2	0.16	ND (1.1)	75	18
		03/03/16	19 - 20	N	0.58	27	9.2	2	0.16	ND (1.1)	53	3.6
		03/03/16	29 - 30	N	0.25	21	9.9	2.1	0.15	ND (1.1)	50	---
		03/03/16	39 - 40	N	0.23	19	9.2	1.8	0.14	ND (1.1)	39	---
		03/03/16	39 - 40	FD	ND (0.21)	19	9.8	1.8	0.13	ND (1.1)	39	---
		03/03/16	49 - 50	N	ND (0.21)	18	15	1.9	0.12	ND (1.1)	37	---
		03/03/16	59 - 60	N	ND (0.21)	18	13	2.1	0.15	ND (1.1)	44	---
		03/03/16	69 - 70	N	ND (0.21)	15	8.4	1.4	0.11	ND (1.1)	36	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC1-T2h		03/04/16	0 - 1	N	2.5	100 J	9.2 J	2.2	ND (0.1)	ND (1)	39	34
		03/04/16	2 - 3	N	0.42	24	9.9	2.2	ND (0.11)	ND (1.1)	45	19
		03/04/16	5 - 6	N	6.8	200	9.8	3.4	ND (0.1)	ND (1)	85	1.9
		03/04/16	9 - 10	N	0.94	28	16	1.4	ND (0.1)	ND (1)	44	21
		03/04/16	14 - 15	N	0.29	19	9	1.1	ND (0.1)	ND (1)	33	---
		03/04/16	19 - 20	N	0.23	18	12	1.3	ND (0.1)	ND (1.1)	41	---
		03/04/16	29 - 30	N	ND (0.21)	18	8.9	1.2	ND (0.1)	ND (1)	34	---
		03/04/16	39 - 40	N	ND (0.21)	17	8	1.6	ND (0.1)	ND (1.1)	35	---
AOC1-T2i	AOC1 PAA #2	03/05/16	0 - 1	N	0.61	28	10	2.6	ND (0.1)	ND (1)	36	25
		03/05/16	2 - 3	N	0.55	25	9.2	2.5	ND (0.1)	ND (1)	34	14
		03/05/16	5 - 6	N	0.29	16	10	3.5	0.12	ND (1)	40	0.91
		03/05/16	9 - 10	N	0.31	40	12	4.8	ND (0.1)	ND (1)	40	32
		03/05/16	14 - 15	N	0.28	17	9.5	1.4	ND (0.1)	ND (1)	38	---
		03/05/16	19 - 20	N	0.27	18	14	1.3	ND (0.1)	ND (1)	39	---
AOC1-T2j	AOC1 PAA #2	03/05/16	0 - 1	N	0.6	31	8.8	1.9	ND (0.1)	ND (1)	40	4.8
		03/05/16	2 - 3	N	0.38	21	9.3	2.4	ND (0.1)	ND (1)	32	13
		03/05/16	2 - 3	FD	0.39	18	10	1.7	ND (0.1)	ND (1)	29	6.5
		03/05/16	5 - 6	N	ND (0.21)	18	9.2	1.4	0.11	ND (1)	31	4.8
		03/05/16	9 - 10	N	0.37	16	6.4	1.3	ND (0.1)	ND (1)	33	0.71
		03/05/16	14 - 15	N	0.26	26	12	2.1	ND (0.11)	ND (1.1)	44	---
		03/05/16	19 - 20	N	0.7	22 J	8.8	1.7	ND (0.11)	ND (1.1)	46	---
		03/05/16	19 - 20	FD	0.64	30 J	9.3	2	ND (0.11)	ND (1.1)	45	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC1-T5D	AOC1 PAA #1	01/12/16	0 - 1	N	ND (0.2)	23	8.3	6.2	ND (0.1)	ND (1)	33	10
		01/12/16	2 - 3	N	2.7	120 J	17	18	ND (0.11)	ND (1.1)	100 J	830
		01/12/16	2 - 3	FD	2.6	69 J	14	16	ND (0.1)	ND (1)	72 J	1,100
		01/12/16	5 - 6	N	2.4	80	9.7	3.7	ND (0.1)	ND (1)	42	92
		01/12/16	9 - 10	N	0.33	23	8.3	4.8	ND (0.1)	ND (1)	40	21
		01/12/16	14 - 15	N	0.92	36	8.8	4.1	ND (0.1)	ND (1)	36	53
		01/12/16	19 - 20	N	0.51	23	8.8	1.8	ND (0.099)	ND (1)	48	32
		01/12/16	19 - 20	FD	0.72	22	8.8	1.8	ND (0.11)	ND (1.1)	52	33
AOC1-T6D		02/09/16	0 - 0.5	N	ND (0.2) J	19	7.6	2.4	ND (0.1)	ND (1)	100	7.3
		02/09/16	2 - 3	N	0.32 J	19	11	1.3	ND (0.1)	ND (1)	38	2.2
		02/09/16	5 - 6	N	0.24 J	19	11	1.7	ND (0.1)	ND (1)	43	1.5
		02/09/16	9 - 10	N	ND (0.21) J	16	8.8	1.4	ND (0.1)	ND (1)	35	0.55
		02/09/16	9 - 10	FD	ND (0.21) J	16	9.5	1.7	ND (0.1)	ND (1)	36	1.3
		02/09/16	14 - 15	N	ND (0.21) J	16	8.3	1.2	ND (0.1)	ND (1)	36	---
		02/09/16	14 - 15	FD	ND (0.2) J	19	9.9	1.7	ND (0.1)	ND (1)	41	---
		02/09/16	19 - 20	N	ND (0.2) J	24	10	1.2	ND (0.1)	ND (1)	41	---
AOC1-T7		02/19/17	0 - 0.5	N	ND (0.21)	23	13	ND (1.1)	ND (0.1)	ND (1.1)	32	5.7
		02/19/17	2 - 3	N	0.33	27	8.9	1.1	ND (0.1)	ND (1)	35	9.8
		02/19/17	5 - 6	N	0.43	18	8.9	7.1	ND (0.1)	ND (1)	30	23
		02/19/17	9 - 10	N	ND (0.21)	17	10	ND (1)	ND (0.1)	ND (1)	30	3.2
AOC1-T8		02/18/17	0 - 0.5	N	0.23	43	11	1.1	ND (0.1)	ND (1)	34	14
		02/18/17	2 - 3	N	ND (0.21)	18	17	1.1	ND (0.1)	ND (1)	28	13
		02/18/17	5 - 6	N	ND (0.21)	14	8.6	ND (1.1)	ND (0.11)	ND (1.1)	36	1.7
		02/18/17	9 - 10	N	0.22	13 J	10	ND (1)	ND (0.1)	ND (1)	31	1.7
		02/18/17	9 - 10	FD	ND (0.21)	17 J	9.2	ND (1)	ND (0.1)	ND (1)	27	4
AOC4-GB10		02/10/10	0 - 0.5	N	ND (0.44)	35 J	16	14	ND (0.11)	ND (1.1)	71 J	87

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC4-GB11		02/10/10	0 - 0.5	N	ND (0.43)	31	13	7.2 J	ND (0.11)	ND (1.1)	46	87
		02/10/10	0 - 0.5	FD	0.57	29	14	16 J	ND (0.11)	ND (1.1)	47	110
AOC4-GB12		02/10/10	0 - 0.5	N	ND (0.44)	35	15	5.5	ND (0.11)	ND (1.1)	43	21
MW-10		06/27/97	1	N	ND (0.05)	14.2	14.1	---	---	---	20.9	---
		06/27/97	3	N	ND (0.05)	13.4	8.3	---	---	---	26.6	---
		06/27/97	6	N	ND (0.05)	19	8.4	---	---	---	23.3	---
		06/27/97	10	N	ND (0.05)	26.7	9.6	2.8	---	0.62	30.4	---
		06/27/97	20	N	ND (0.05)	14.7	7.7	---	---	---	27.1	---
		06/27/97	25	N	ND (0.05)	16.1	10.6	---	---	---	34.1	---
		06/27/97	30	N	ND (0.05)	13.8	9.4	---	---	---	31.5	---
		06/27/97	35	N	---	---	---	3.6	---	ND (0.2)	---	---
		06/27/97	40	N	ND (0.05)	14.5	9.2	---	---	---	29.4	---
		06/28/97	50	N	ND (0.05)	14.3	8.5	---	---	---	31.2	---
		06/27/97	60	N	ND (0.05)	9.1	6	---	---	---	16.3	---
		06/27/97	70	N	ND (0.05)	11.7	8.8	2.2	---	ND (0.2)	24.2	---
		06/27/97	75	N	ND (0.05)	11.5	6.4	---	---	---	24.9	---
		06/27/97	75	FD	0.1	9.6	6.97	---	---	---	21.6	---
		06/27/97	82	N	ND (0.05)	9.9	6.3	2.3	---	ND (0.2)	26.6	---

TABLE E-2

Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
MW-11		06/29/97	1	N	ND (0.05)	12.2	7.5	---	---	---	24.8	---
		06/29/97	3	N	ND (0.05)	31.1	6.6	---	---	---	29.5	---
		06/29/97	6	N	ND (0.05)	26.9	5.3	---	---	---	23.2	---
		06/29/97	10	N	ND (0.05)	13.5	8.3	6.3	---	0.32	38.5	---
		06/29/97	20	N	ND (0.05)	5.9	6	---	---	---	19.9	---
		06/29/97	30	N	ND (0.05)	12.6	6.9	1.8	---	0.8	28.4	---
		06/29/97	40	N	ND (0.05)	9.8	9.8	---	---	---	28.4	---
		06/29/97	50	N	ND (0.05)	13.6	6.9	---	---	---	29.8	---
		06/29/97	60	N	ND (0.05)	9.6	5.8	3	---	0.088 J	26.2	---
		06/29/97	60	FD	ND (0.05)	10	5.74	---	---	---	19.8	---
		06/29/97	69	N	ND (0.05)	16.9	13.8	5	---	ND (0.2)	35.7	---
MW-13		07/09/97	10	N	ND (0.05)	10.8	9.3	---	---	---	27.2	---
		07/09/97	20	N	ND (0.05)	10.5	7.1	2.4	---	0.14 J	28.3	---
		07/09/97	25	N	---	---	---	2.8	---	ND (0.2)	---	---
		07/09/97	30	N	ND (0.05)	12.2	8.6	---	---	---	33.3	---
		07/09/97	40	N	ND (0.05)	10.7	8.1	---	---	---	30.4	---
		07/09/97	40	FD	ND (0.05)	6.4	5.6	---	---	---	17.7	---
Old Well-BCW-1	AOC1 PAA #2	09/11/13	7 - 8	N	80	4,200	14	12 J	ND (0.11)	18	190	350
Old Well-BCW-2	AOC1 PAA #2	09/11/13	4 - 5	N	73	4,400	23	10	ND (0.11)	6.7	150	230
PA-01		11/09/15	0 - 1	N	0.65	20	8.5	9.3	ND (0.1)	ND (1)	80	---
PA-03		11/09/15	0 - 1	N	0.65	26	15	13	ND (0.1)	ND (1)	200	---
PA-04		11/09/15	0 - 1	N	0.69	36	14	25	ND (0.1)	ND (1)	56	---
PA-14		01/27/16	0 - 1	N	ND (0.21)	20	22	10	ND (0.1)	ND (1)	270	23
PA-15		01/27/16	0 - 1	N	1.1	170	26	20	ND (0.1)	ND (1)	120	86
PA-16		01/27/16	0 - 1	N	1.3	47	26	8.5	ND (0.1)	1.2	64	25

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
SD-14		01/11/16	0 - 1	N	0.72	29	14	13	ND (0.1)	ND (1)	37	190
		01/11/16	2 - 3	N	0.63	32	7.6	16	ND (0.1)	ND (1)	47	83
		01/11/16	5 - 6	N	3.1	42	64	120	ND (0.11)	5	660	40
		01/11/16	9 - 10	N	1.1	35	7.8	1.9	ND (0.1)	ND (1)	36	0.32
SD-15		01/12/16	0 - 0.5	N	0.77	19	13	2.7	ND (0.11)	ND (1.1)	32	41
		01/12/16	2 - 3	N	ND (0.21)	25	12	1.8	ND (0.11)	ND (1.1)	32	2
		01/12/16	5 - 6	N	ND (0.21)	21	11	1.5	ND (0.11)	ND (1.1)	32	1.6
		01/12/16	9 - 10	N	ND (0.21)	20	9.3	2.1	ND (0.11)	ND (1.1)	37	0.3
SD-16		01/12/16	0 - 0.5	N	ND (0.21)	16	10	1.8	ND (0.1)	ND (1.1)	32	0.31
		01/12/16	2 - 3	N	ND (0.21)	19	11	2.2	ND (0.1)	ND (1.1)	28	0.13
		01/12/16	5 - 6	N	ND (0.21)	24	9.3	2.4	ND (0.11)	ND (1)	40	0.12
		01/12/16	9 - 10	N	ND (0.21)	13	6.1	1.9	ND (0.1)	ND (1)	33	0.074
SD-17		12/17/15	0 - 0.5	N	ND (0.2)	17	15	15	ND (0.1)	ND (1)	60	---
		12/17/15	2 - 3	N	0.25	18	16	19	ND (0.1)	ND (1)	65	---
SD-18		12/17/15	0 - 0.5	N	ND (0.21)	32	17	3.4	ND (0.11)	ND (1.1)	310	---
SD-19		01/13/16	0 - 0.5	N	ND (0.21)	30	15 J	2	ND (0.1)	ND (1)	33	---
		01/13/16	0 - 0.5	FD	ND (0.21)	28	11 J	2.1	ND (0.11)	1.3	33	---
		01/13/16	2 - 3	N	ND (0.2)	24	10	2.8	ND (0.1)	ND (1)	33	---
		01/13/16	5 - 6	N	ND (0.2)	14	7.9	1.5	ND (0.1)	ND (1)	30	---
		01/13/16	8 - 8.5	N	ND (0.2)	15	7.8	1.8	0.12	ND (1)	35	---
SD-25		03/10/16	0 - 1	N	ND (0.21)	23	15	3.1	0.1	ND (1)	39	4.2
SD-26		03/10/16	0 - 1	N	0.32	24	21	16	ND (0.1)	ND (1)	220	41
SD-OS33		12/20/16	1.5 - 2	N	0.36	29	12	5.2	ND (0.1)	ND (1)	47	---
TCS-4	AOC1 PAA #2	03/25/14	59 - 60	N	2.2	61 J	18 J	32 J	ND (0.1)	ND (1)	30	150
		03/25/14	113	N	ND (0.4)	1,700	580	17	ND (0.1)	35	55	51

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
TCS4-E	AOC1 PAA #2	03/01/16	4 - 5	N	29 J	3,100	16 J	6.2	ND (0.1)	9.6 J	190 J	780
		03/01/16	4 - 5	FD	50 J	3,400	12 J	5	ND (0.11)	9.1 J	120 J	870
		03/01/16	5 - 6	N	0.99	13	8	ND (1)	ND (0.1)	ND (1)	31	4.6
TCS4-N	AOC1 PAA #2	03/01/16	4 - 5	N	33	3,400	8.7	6.9	ND (0.1)	4.9	82	110
		03/01/16	5 - 6	N	39	3,300	14	6.2	ND (0.11)	15	130	210
TCS4-S	AOC1 PAA #2	03/01/16	4 - 5	N	30	840	9	4.5	ND (0.11)	ND (1.1)	120	180
		03/01/16	5 - 6	N	21	2,200	11	3.1	ND (0.11)	3.4	150	47
SS-1		06/29/97‡	0.5	N	ND (0.05)	38.2	16.5	---	---	---	55	---
		06/29/97‡	1.5	N	ND (0.05)	25.3	13.6	---	---	---	43.4	---
SS-2		06/29/97	0.5	N	ND (0.05)	18.9	14.1	---	---	---	48.3	---
		06/29/97	1.5	N	ND (0.05)	10.2	12.9	---	---	---	42.2	---
SS-3		06/29/97	0.5	N	ND (0.05)	---	---	---	---	---	---	---
SS-4		06/29/97	0.5	N	ND (0.05)	---	---	---	---	---	---	---
SS-5		06/29/97	0.5	N	ND (0.05)	---	---	---	---	---	---	---
SS-6		06/29/97	0.5	N	ND (0.05)	---	---	---	---	---	---	---
SS-7		06/29/97	0.5	N	ND (0.05)	---	---	---	---	---	---	---
SS-8		06/29/97	0.5	N	ND (0.05)	---	---	---	---	---	---	---
SSB-1		06/25/97	1	N	ND (0.05)	13.7	14.9	---	---	---	35.7	---
		06/25/97	3	N	ND (0.05)	13.6	11	---	---	---	29.6	---
		06/25/97	6	N	ND (0.05)	16.7	16.9	---	---	---	34.5	---
		06/25/97	10	N	ND (0.05)	16.5	8.2	1.3	---	ND (0.2)	31.9	---
SSB-6		06/30/97	1	N	ND (0.05)	13.7	8.6	---	---	---	29.1	---
		06/30/97	3	N	ND (0.05)	27.5	6.6	---	---	---	24.8	---
		06/30/97	6	N	0.06	467	33.8	---	---	---	132	---
		06/30/97	10	N	ND (0.05)	14.8	9.6	3.1	---	0.79	33.4	---

TABLE E-2
Constituent Concentrations
Area of Concern (AOC) 1 – Area around Former Percolation Bed
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
SSB-7		06/30/97	1	N	ND (0.05)	19.8	7.7	---	---	---	28.1	---
		06/30/97	3	N	ND (0.05)	24.9	6.5	---	---	---	29.4	---
		06/30/97	6	N	ND (0.05)	8.6	14.7	---	---	---	23	---
		06/30/97	10	N	ND (0.05)	8.1	5.8	1.8	---	ND (0.2)	23.4	---
SSB-8		07/10/97	1	N	ND (0.05)	53.1	15.1	---	---	---	38.3	---
		07/10/97	3	N	ND (0.05)	13.6	14.1	---	---	---	35.3	---
		07/10/97	6	N	ND (0.05)	15.3	7.3	---	---	---	33.5	---
		07/10/97	10	N	ND (0.05)	17.1	10.7	2.8	---	0.071 J	35.8	---
		07/10/97	10	FD	ND (0.05)	13.7	8	---	---	---	30	---
SSB-9		07/10/97	1	N	ND (0.05)	17.3	8.6	---	---	---	35.5	---
		07/10/97	3	N	ND (0.05)	11	6.1	---	---	---	31.8	---
		07/10/97	6	N	ND (0.05)	9.6	6.4	---	---	---	25.3	---
		07/10/97	10	N	ND (0.05)	15.7	7.7	3	---	0.096 J	33.1	---
XMW-9		06/25/97	3	N	ND (0.05)	18.4	12	---	---	---	25.8	---
		06/25/97	10	N	ND (0.05)	45.7	19.7	5.7	---	0.075 J	44.2	---
		06/25/97	10	FD	ND (0.05)	31.1	16.7	---	---	---	38.7	---
		06/25/97	30	N	ND (0.05)	35.6	17.2	7.2	---	0.11 J	50.3	---
		06/25/97	50	N	ND (0.05)	36.3	15.6	4.5	---	ND (0.2)	54.2	---
		06/25/97	70	N	ND (0.05)	6.7	170	6.1	---	1.8	54.6	---

Notes:

Results greater than or equal to the Removal Action Goal are circled.

ǂ	This location is in an area where soil is transitioning into sediment.
---	not analyzed
FD	field duplicate
ft bgs	feet below ground surface
J	concentration or reporting limit estimated by laboratory or data validation
mg/kg	milligrams per kilogram
N	primary sample
ND	not detected at the listed reporting limit
ng/kg	nanogram per kilogram
TEQ	dioxin and furans toxicity equivalent quotient

TABLE E-3
Constituent Concentrations
AOC 9 – Southeast Fence Line
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
		Removal Action Goal (RAG) <2 ft bgs :			3.1	145	145	36	1	22	1,050	a 100
		Removal Action Goal (RAG) 2 to 10 ft bgs :			31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC9-1		10/01/08	0 - 0.5	N	1.03	23	9.1	19	ND (0.1)	ND (1)	46	---
		10/01/08	2 - 3	N	ND (0.478)	9.7	5	4.5	ND (0.1)	ND (1)	17	---
AOC9-2		09/18/08	0 - 0.5	N	ND (0.401)	16	11	9.6	ND (0.099)	ND (2)	33	1.8
		09/18/08	2 - 3	N	ND (0.406)	11	5.9	4.9	ND (0.1)	ND (2)	20	1.6
AOC9-3		09/18/08	0 - 0.5	N	ND (0.402)	25	17	9	ND (0.1)	ND (2)	49	---
		09/18/08	2 - 3	N	ND (0.454)	15	7.3	23	ND (0.1)	ND (2)	92	---
AOC9-4		09/18/08	0 - 0.5	N	1.06	22	12	13	ND (0.1)	ND (2)	53	---
		09/18/08	2 - 3	N	ND (0.402)	19	11	11	ND (0.1)	ND (2)	42	---
AOC9-5		10/01/08	0 - 0.5	N	0.726	35	19	28	ND (0.1)	ND (1)	100	---
		10/01/08	2 - 3	N	1	38	21	25	0.27	ND (2)	76	---
		10/01/08	2 - 3	FD	0.791	43	19	24	0.23	ND (2)	85	---
AOC9-6		09/18/08	0 - 0.5	N	0.789	25	12	23	0.14	ND (2)	68	---
		09/18/08	2 - 3	N	ND (0.458)	16	9.3	5	ND (0.1)	ND (2.1)	31	---
AOC9-7		09/18/08	0 - 0.5	N	4.37	72	14	15	ND (0.1)	ND (2)	120	---
		09/18/08	2 - 3	N	ND (0.411)	13	6.7	20	ND (0.1)	ND (1)	29	---
AOC9-8	AOC9 PAA #1	10/01/08	0 - 0.5	N	48.6 J	230	11	20	ND (0.1)	1	1,000	---
		10/01/08	2.5 - 3	N	2.41	41	13	59	ND (0.1)	4.5	130	81
		10/01/08	5.5 - 6	N	1.32	13	5.5	4.4	ND (0.1)	ND (1)	21	---
AOC9-9	AOC9 PAA #1	10/01/08	0 - 0.5	N	ND (0.404)	14	8	7	ND (0.1)	ND (1)	34	---
		10/01/08	2.5 - 3	N	ND (0.415)	21	10	3.8	ND (0.1)	ND (1)	41	---
		10/01/08	5.5 - 6	N	1.53	28	11	4.9	ND (0.1)	ND (1)	53	---
		10/01/08	5.5 - 6	FD	1.28	27	10	4.4	ND (0.1)	ND (1)	50	---
AOC9-10		10/01/08	0 - 0.5	N	0.418	28	11	18	ND (0.1)	ND (1)	49	---
		10/01/08	2 - 3	N	0.494	30	15	15	0.11	ND (2)	110	---
AOC9-11		09/18/08	0 - 0.5	N	ND (0.418)	18	8.5	7.7	0.13	ND (2.1)	35	---
		09/18/08	2 - 3	N	ND (0.406)	20	9.7	7.1	ND (0.1)	ND (2)	30	---

TABLE E-3
Constituent Concentrations
AOC 9 – Southeast Fence Line
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
AOC9-12		10/01/08	0 - 0.5	N	0.727	34	19	13	ND (0.1)	ND (2)	57	---
		10/01/08	2 - 3	N	ND (0.415)	40	17	11	ND (0.1)	ND (2.1)	50	---
AOC9-13		09/19/08	0 - 0.5	N	ND (0.404)	18	13	8.3	ND (0.099)	ND (2)	36	---
		09/19/08	2 - 3	N	ND (0.409)	23 J	9.8	10	ND (0.1)	ND (2)	35	---
		09/19/08	2 - 3	FD	ND (0.41)	18 J	9.6	5.6	ND (0.1)	ND (2)	32	---
AOC9-14		10/02/08⊖	0 - 0.5	N	1.7	31	24	34	ND (0.11)	ND (5.4)	81	---
		10/02/08	2 - 3	N	ND (0.412)	38	17	13	ND (0.1)	ND (2)	61	---
AOC9-15		12/06/15	0 - 1	N	ND (0.21)	24 J	17 J	15 J	ND (0.11)	ND (1.1)	52	59
		12/06/15	2 - 3	N	0.58	25	14	23	ND (0.1)	ND (1)	46	160
AOC9-16		01/13/16	0 - 0.5	N	4.4	48	11	22	0.14	ND (1)	69	190
		01/13/16	2 - 3	N	ND (0.2)	17	18	6.8	0.11	ND (1)	34	7.6
		01/13/16	5 - 6	N	ND (0.2)	14	6.3	7.1	ND (0.11)	ND (1)	26	13
		01/13/16	9 - 10	N	ND (0.2)	12	6.2	2.9	ND (0.1)	ND (1)	21	---
AOC9-17		01/10/16	9 - 10	N	1.2	---	---	---	---	---	---	---
		01/14/16	14 - 15	N	ND (0.21)	---	---	---	---	---	---	---
AOC9-18		01/10/16	5 - 6	N	0.55	25	17	14	0.18	ND (1)	57	55
		01/10/16	9 - 10	N	0.94	20	11	28	0.75	ND (1)	53	---
AOC9-19		01/13/16	0 - 0.5	N	---	19	9.3	9.4	0.15	ND (1)	42	24
		01/13/16	2 - 3	N	---	13	15	13	ND (0.1)	ND (1)	35	11
		01/13/16	5 - 6	N	---	13	7.6	7.4	0.12	ND (1)	33	5.9
		01/13/16	9 - 10	N	---	17	14	5.1	ND (0.1)	ND (1)	29	---
AOC9-20		01/13/16	0 - 0.5	N	---	---	---	7.1	0.11	---	---	9.8
		01/13/16	2 - 3	N	---	---	---	11	0.12	---	---	13
		01/13/16	2 - 3	FD	---	---	---	9.3	ND (0.1)	---	---	---
		01/13/16	5 - 6	N	---	---	---	47	0.16	---	---	35
		01/13/16	9 - 10	N	---	---	---	2.2	ND (0.1)	---	---	---

TABLE E-3

Constituent Concentrations
AOC 9 – Southeast Fence Line
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC9-21		01/08/17	0 - 0.5	N	---	34	11	3.8	ND (0.1)	ND (1)	47 J	110
		01/08/17	0 - 0.5	FD	---	33	13	4	ND (0.1)	ND (1.1)	45 J	110
		01/08/17	2 - 3	N	---	48	23	2.7	ND (0.1)	ND (1)	44	0.47
		01/08/17	5 - 6	N	---	57	22	2.4	ND (0.1)	ND (1)	42	ND (0.3)
AOC9-22		01/04/17	0 - 0.5	N	---	30	23	17	ND (0.12)	ND (1.2)	60	28
		01/04/17	2 - 3	N	---	62	27	20	0.17	ND (1)	42	100
		01/04/17[Y]	2.5 - 2.6	N	0.79	64	16	5.4	ND (0.14)	ND (1.4)	48	---
		01/04/17	4.5 - 5	N	---	41	13	6.4	ND (0.11)	ND (1.1)	18	4.4
PA-05		11/09/15	0 - 1	N	0.42	27	16	7.4	ND (0.1)	ND (1)	83	---
PA-23		01/27/16	0 - 1	N	0.52	8.9	6.7	5.1	ND (0.11)	ND (1.1)	49	26
#4	AOC9 PAA #1	04/06/00	0 - 3	N	4.2	53.2	12.4	---	---	---	343	---
#5	AOC9 PAA #1	04/06/00	0 - 3	N	2.7	29	13.8	---	---	---	64	---
#6	AOC9 PAA #1	04/06/00	0 - 3	N	2.6	33	12.4	---	---	---	92.7	---
#7	AOC9 PAA #1	04/06/00	0 - 3	N	1.3	32.1	15.3	---	---	---	68	---
#8	AOC9 PAA #1	04/06/00	0 - 3	N	2.8	28.8	12.9	---	---	---	61.1	---
#9	AOC9 PAA #1	04/06/00	0 - 3	N	2.7	92.7	50.4	---	---	---	215	---
#10	AOC9 PAA #1	04/06/00	0 - 3	N	114	398	17.9	---	---	---	744	---
#11		04/06/00	0 - 3	N	---	---	---	---	---	---	80.3	---
#12		04/06/00	0 - 3	N	0.8	38.3	35.6	---	---	---	---	---

Notes:

Results greater than or equal to the Removal Action Goal are circled.

Θ	white powder sample.
Y	debris sample
---	not analyzed
FD	field duplicate
ft bgs	feet below ground surface
J	concentration or reporting limit estimated by laboratory or data validation
mg/kg	milligrams per kilogram
N	primary sample
ND	not detected at the listed reporting limit
ng/kg	nanogram per kilogram
TEQ	dioxin and furans toxicity equivalent quotient

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC10-1		10/02/08	0 - 0.5	N	ND (0.401)	6.6	4.9	9.2	ND (0.1)	ND (1)	20	---
		10/02/08	2 - 3	N	ND (0.405)	7.4	5.6	5.8	ND (0.1)	ND (1)	21	---
		10/02/08	5 - 6	N	ND (0.407)	7.5	5.8	5.4	ND (0.1)	ND (1)	20	---
		10/02/08	9 - 10	N	ND (0.406)	6.8	5.7	4.8	ND (0.1)	ND (1)	21	---
AOC10-10		01/22/16	0 - 1	N	0.45	36	15	4.7	ND (0.1)	ND (1)	63	20
		01/22/16	2 - 3	N	ND (0.22)	27	13	2	ND (0.11)	ND (1.1)	41	0.56
		01/22/16	5 - 6	N	0.35	34	13	2.1	ND (0.11)	ND (1.1)	44	0.59
		01/22/16	9 - 10	N	0.35	32	11	2.6	ND (0.11)	ND (1.1)	43	---
		01/22/16	9 - 10	FD	0.39	31	11	2.4	ND (0.11)	ND (1.1)	42	---
AOC10-11		01/22/16	0 - 1	N	0.87	31	9.1	2.7	ND (0.1)	ND (1)	40	18
		01/22/16	0 - 1	FD	0.44	27	14	2.4	ND (0.1)	ND (1)	45	12
		01/22/16	2 - 3	N	0.9	45	13	2.6	ND (0.1)	ND (1)	44	18
		01/22/16	5 - 6	N	1.6	73	31	2.5	ND (0.1)	ND (1)	74	200
		01/22/16	9 - 10	N	0.72	42	19	2.4	ND (0.1)	ND (1)	160	4.1
AOC10-12		01/22/16	0 - 0.5	N	13	460	19	12	ND (0.11)	ND (1)	56	42
		01/22/16	2 - 3	N	0.3	25	9	3.6	ND (0.1)	1.4	34	19
		01/22/16	5 - 6	N	5	130	11	6	ND (0.1)	ND (1)	70	19
		01/22/16	9 - 10	N	0.66	37	16	2.5	ND (0.11)	ND (1)	47	---
AOC10-13		12/03/15	0 - 1	N	ND (0.21)	14	13	9.8	ND (0.11)	1.4	39	---
		12/03/15	0 - 1	FD	ND (0.21)	16	14	10	ND (0.11)	1.4	41	---
AOC10-14		12/03/15	0 - 1	N	ND (0.21)	11	13	5.9	ND (0.1)	1.3	29	---
AOC10-15	AOC10 PAA #3	12/15/15	0 - 1	N	2.6	67	23	21	ND (0.1)	14	98	290
		12/15/15	0 - 1	FD	2.6	70	27	20	ND (0.1)	14	110	270
		12/15/15	2 - 3	N	1.4	41	22	17 J	ND (0.1)	8.2	70 J	110
		12/15/15	5 - 6	N	1.1	33	14	7.6	ND (0.1)	4.2	100	77
		12/15/15	9 - 10	N	ND (0.21)	17	11	1.5	ND (0.1)	ND (1)	44	2.9

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent (mg/kg)	Chromium, total (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Zinc (mg/kg)	a TEQ Human / b TEQ Mammal (ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
AOC10-16		12/15/15	0 - 1	N	0.59	21	8.9	5.9	ND (0.1)	ND (1)	40	1.6
		12/15/15	2 - 3	N	0.24	21	9.7	2.5	ND (0.1)	ND (1)	44	4
		12/15/15	5 - 6	N	0.48	21	12	3.2	ND (0.1)	ND (1)	40	2.6
		12/15/15	9 - 10	N	ND (0.2)	14	9.4	2.4	ND (0.1)	ND (1)	38	1.6
AOC10-17		12/03/15	0 - 1	N	ND (0.21)	9.7	11	9.9	ND (0.1)	7.8	32	---
AOC10-18		12/06/15	0 - 1	N	ND (0.2)	5.6	2.8	1.9	ND (0.1)	ND (1)	13	1.8
		12/06/15	2 - 3	N	ND (0.2)	5.7	4.1	1.9	ND (0.1)	ND (1)	13	1.7
AOC10-19		02/24/16	0 - 1	N	ND (0.2)	27	14	6.7 J	ND (0.1)	ND (1)	48	2.3
		02/24/16	2 - 3	N	0.3	34 J	18	5.8	ND (0.1)	ND (1)	55	4.2
		02/24/16	2 - 3	FD	ND (0.21)	27 J	17	5.8	ND (0.1)	ND (1)	52	---
		02/24/16	5 - 6	N	ND (0.21)	27	17	3.8	ND (0.11)	ND (1)	47	---
AOC10-2		10/02/08	0 - 0.5	N	ND (0.402)	4.9	4.1	5.1	ND (0.1)	ND (1)	14	---
		10/02/08	2 - 3	N	ND (0.417)	17	9.4	3.4	ND (0.1)	ND (1)	38	---
		10/02/08	5 - 6	N	ND (0.415)	19	9.5	4.2	ND (0.1)	ND (2.1)	40	---
		10/02/08	7 - 8	N	ND (0.412)	17	9	3.2	ND (0.1)	ND (1)	32	---
AOC10-20	AOC10 PAA #1	02/17/16	0 - 0.5	N	2,700	2,800	11	6.1	ND (0.1)	ND (1)	38	0.28
		02/25/16	2 - 3	N	12	28	5	2.8	ND (0.1)	ND (1)	16	0.15
AOC10-21	AOC10 PAA #1	02/25/16	0 - 0.5	N	1.4	270	3,100	920	35	9.4	360	53
		02/25/16	2 - 3	N	0.2	8.1	5	2.9	ND (0.099)	ND (1)	16	0.22
AOC10-22	AOC10 PAA #1	02/17/16	0 - 0.5	N	ND (0.2)	35	14	12	ND (0.1)	ND (1)	50	17
		02/17/16	1 - 2	N	0.91	85	200	38	ND (0.11)	2.7	39	48
		02/17/16	2 - 3	N	0.37	35	42	17	ND (0.1)	ND (1)	35	25
		02/17/16	5 - 6	N	ND (0.2)	8.6	5.1	3.4	ND (0.1)	ND (1)	18	0.28
AOC10-23	AOC10 PAA #1	02/25/16	0 - 1	N	1.8	72	140	30	0.24	ND (1)	26	1,100
		02/25/16	1 - 2	N	2.6	130	22	22	ND (0.1)	ND (1)	56	8.8
		02/25/16	2 - 3	N	ND (0.2)	5.5	4.2	2.2	ND (0.1)	ND (1)	11	17

TABLE E-4

Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
AOC10-24	AOC10 PAA #4	03/07/16	0 - 1	N	---	---	---	---	---	---	---	21
		03/07/16	2 - 3	N	---	---	---	---	---	---	---	190
AOC10-25		01/08/17	0 - 0.5	N	ND (0.2)	15	8	7.9 J	ND (0.1)	ND (1)	32	0.96
		01/08/17	0 - 0.5	FD	ND (0.2)	18	9.5	11 J	ND (0.1)	ND (1)	38	4.3
		01/08/17	2 - 3	N	ND (0.2)	31	11	2.1 J	ND (0.1)	1.4	41	ND (0.35)
		01/08/17	5 - 6	N	ND (0.2)	25	11	1.5	ND (0.1)	ND (1)	45	0.6
		01/08/17	9 - 10	N	ND (0.2)	26	13	1.5	ND (0.1)	ND (1)	42	0.28
AOC10-26	AOC10 PAA #4	02/21/17	0 - 0.5	N	---	---	---	---	---	---	---	9.5
		02/21/17	2 - 3	N	---	---	---	---	---	---	---	80
		02/21/17	2 - 3	FD	---	---	---	---	---	---	---	180
		02/21/17 ⊖	2.5 - 2.7	N	9.5	340	40	18	0.15	ND (1.4)	110	410
		02/21/17	4.5 - 5	N	---	---	---	---	---	---	---	100
AOC10-27		01/04/17	0 - 0.5	N	---	---	---	---	---	---	---	13
		01/04/17	2 - 3	N	---	---	---	---	---	---	---	13
		01/04/17	4 - 5	N	---	---	---	---	---	---	---	1.7
AOC10-3		09/19/08	0 - 0.5	N	1.91	62	14	7.8	ND (0.1)	ND (2)	40	---
		09/19/08	0 - 0.5	FD	1.7	64	13	7.7	ND (0.1)	ND (2)	41	---
		09/19/08	2 - 3	N	ND (0.412)	43	14	ND (5.1)	ND (0.1)	ND (5.1)	47	---
		09/19/08	5 - 6	N	0.705	37	16	2.9	ND (0.1)	ND (5.1)	61	---
		09/19/08	9 - 10	N	ND (0.412)	28	12	2.8	ND (0.1) J	ND (1)	50	---
AOC10-4		09/19/08	0 - 0.5	N	0.55	33	14	11	ND (0.1)	ND (2)	52	---
		09/19/08	2 - 3	N	ND (0.409)	26	16	4.4	ND (0.1)	ND (2)	38	---
		09/19/08	5 - 6	N	ND (0.418)	27	16	3	ND (0.11)	ND (5.2)	63	---
		09/19/08	9 - 10	N	ND (0.413)	18	12	2.7	ND (0.1) J	ND (1)	48	---

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
AOC10-5		09/19/08	0 - 0.5	N	1.01	39	27	27	ND (0.1)	ND (5.1)	97	---
		09/19/08	2 - 3	N	0.48	30	21	34	ND (0.1)	ND (5.1)	77	---
		09/19/08	5 - 6	N	ND (0.407)	19	40	6.7	ND (0.1)	ND (5.1)	80	---
		09/19/08	5 - 6	FD	ND (0.407)	18	41	7.3	ND (0.1)	ND (5.1)	79	---
AOC10-6		09/20/08	0 - 0.5	N	ND (0.402)	24	11	26	ND (0.1)	ND (2)	58	5.2
		09/20/08	2 - 3	N	ND (0.404)	23	9.5	4.1	ND (0.1)	ND (1)	45	ND (2.3)
AOC10-7		09/20/08	0 - 0.5	N	ND (0.414)	22	12	8.6	ND (0.1)	ND (1)	54	---
		09/20/08	2 - 3	N	ND (0.406)	27	12	8.1	ND (0.1)	1.1	58	---
		09/20/08	5 - 6	N	ND (0.407)	33	13	4.4	ND (0.1)	ND (2)	58	---
AOC10-8		08/22/08	0 - 0.5	N	ND (0.402)	16	12	15 J	ND (0.1)	ND (2)	87	---
		08/22/08	0 - 0.5	FD	ND (0.416)	18	12	12 J	ND (0.1)	ND (2)	75	---
AOC10-9		12/07/15	0 - 1	N	ND (0.2)	19	12	3.2	ND (0.1)	ND (1)	41	---
		12/07/15	2 - 3	N	ND (0.2)	16	10	2.3	ND (0.1)	ND (1)	49	---
AOC10a-1		10/17/08	0 - 0.5	N	8.25	80	270 J	200 J	0.64	19	1,000 J	---
AOC10a-2		01/13/16	0 - 1	N	ND (0.21)	13	11	9.4	0.12	ND (1.1)	36	17
		01/13/16	2 - 3	N	ND (0.21)	3.6	2.9	2.1	ND (0.1)	ND (1)	10	ND (0.18)
		01/13/16	5 - 6	N	ND (0.21)	3.7	2.6	1.9	ND (0.1)	ND (1)	9.5	---
		01/13/16	9 - 10	N	ND (0.21)	4.6	3.6	2.4	ND (0.11)	ND (1.1)	12	---
AOC10a-3		01/13/16	0 - 1	N	5.3	100	27	4.2	0.13	ND (1)	35	120
		01/13/16	2 - 3	N	1.3	68	25	22	0.21	1.4	70	150
		01/13/16	5 - 6	N	ND (0.21)	45	12	1.7	0.19	ND (1)	34	0.48
		01/13/16	9 - 10	N	ND (0.21)	39	31	2.3	0.16	ND (1)	38	0.36
AOC10a-4		01/08/17	0 - 0.5	N	---	33	30	4	ND (0.11)	ND (1.1)	41	23
		01/08/17	2 - 3	N	---	11	6.3	2.6	ND (0.1)	ND (1)	20	0.33
		01/08/17	5 - 6	N	---	11	6.9	2.5	ND (0.1)	ND (1)	19	---
		01/08/17	9 - 10	N	---	47	14	2.1	ND (0.1)	ND (1)	41	---

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC10b-1		09/30/08	0 - 0.5	N	0.559	24	9.8	8.6	ND (0.1)	ND (1)	38	24
		09/30/08	2 - 3	N	1.39	63	28	8.4 J	ND (0.1)	ND (1)	110 J	200
		09/30/08	2 - 3	FD	1.39	61	27	12 J	ND (0.1)	1.5	160 J	---
		09/30/08	5 - 6	N	0.425	20	8	4.3	ND (0.1)	ND (1)	39	150
		09/30/08	9 - 10	N	ND (0.407)	29	10	3.7	ND (0.1)	ND (2)	29	---
AOC10b-2		09/30/08	0 - 0.5	N	0.434	29	11	8.2	ND (0.1)	1.1	40	---
		09/30/08	2 - 3	N	1.05	47	15	5.2	ND (0.1)	1.1	44	---
		09/30/08	5 - 6	N	0.453	29	8.8	4.2	ND (0.1)	1	27	---
		09/30/08	9 - 10	N	0.759	39	15	3.8	ND (0.1)	ND (2)	38	---
AOC10b-3		09/30/08	0 - 0.5	N	27.7	820	90	24	ND (0.1)	1.5	240	---
		10/01/08	2 - 3	N	1.82	90	23	5	ND (0.1)	ND (1)	59	---
		10/01/08	5 - 6	N	0.429	38	14	3.8	ND (0.1)	ND (2.1)	40	---
		10/01/08	5 - 6	FD	ND (0.417)	36	16	3.6	ND (0.1)	ND (2.1)	39	---
		10/01/08	9 - 10	N	ND (0.415)	36	13	3.5	ND (0.1)	ND (2.1)	44	---
AOC10b-4		09/30/08	0 - 0.5	N	ND (0.401)	12	5.8	41	ND (0.1)	ND (1)	29	---
		09/30/08	2 - 3	N	ND (0.403)	14	6.7	10	ND (0.1)	ND (1)	31	---
		09/30/08	5 - 6	N	ND (0.407)	20	8.9	3.4	ND (0.1)	ND (1)	35	---
		09/30/08	9 - 10	N	ND (0.415)	26	11	2.8	ND (0.1)	ND (1)	42	---
AOC10c-1		10/01/08	0 - 0.5	N	1.98	55	15	7.8	ND (0.1)	ND (1)	48	---
		10/01/08	2 - 3	N	27.3	490	41	18	ND (0.1)	1.2	76	---
		10/01/08	5 - 6	N	4.78	220	17	5.4	ND (0.1)	ND (2)	42	---
		10/01/08	9 - 10	N	1.37	63	14	3.4	ND (0.1)	1	39	---
AOC10c-2	AOC10 PAA #2	10/01/08	0 - 0.5	N	1.25	51	19	12	ND (0.1)	ND (2)	61	---
		10/01/08	2 - 3	N	3.77	190	37	17	ND (0.1)	2.2	78	---
		10/01/08	2 - 3	FD	3.8	180	34	16	ND (0.1)	1.9	75	---
		10/01/08	5 - 6	N	1.92	110	24	7	ND (0.1)	1.9	51	---
		10/01/08	9 - 10	N	0.605	32	13	2.7	ND (0.1)	ND (1)	50	---

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC10c-3	AOC10 PAA #2	10/02/08	0 - 0.5	N	2.56	110	42	32	ND (0.1)	ND (2)	140	---
		10/02/08	2 - 3	N	9.27	690	60	31	ND (0.11)	ND (2.1)	140	---
		10/02/08	2 - 3	FD	7.97	660	60	26	ND (0.1)	ND (2.1)	140	---
		10/02/08	5 - 6	N	0.512	29	9	4.5	ND (0.1)	ND (1)	36	---
		10/02/08	9 - 10	N	ND (0.412)	22	11	2.7	ND (0.1)	ND (1)	41	---
AOC10c-4	AOC10 PAA #2	10/01/08	0 - 0.5	N	2.66	120	46	36	ND (0.1)	ND (2.1)	150	360
		10/01/08	2 - 3	N	2.11	90	19	8.9	ND (0.1)	ND (2)	52	66
		10/01/08	5 - 6	N	2.84	27	14	2.6	ND (0.1)	ND (1)	47	3.1
		10/01/08	9 - 10	N	0.436	92	25	13	ND (0.1)	ND (2.1)	74	---
AOC10c-5	AOC10 PAA #2	10/01/08	0 - 0.5	N	2.49	81	29	15	ND (0.1)	ND (2)	80	---
		10/01/08	2 - 3	N	16.4	1,500	110	47	ND (0.1)	2.9	170	---
		10/01/08	5 - 6	N	1.48	82	12	4	ND (0.1)	ND (2.1)	44	---
		10/01/08	9 - 10	N	0.423	47	15	3	ND (0.1)	ND (1)	46	---
AOC10c-6		01/21/16	14 - 15	N	0.54	40	---	---	---	---	---	12
		01/22/16	19 - 20	N	ND (0.21)	31	---	---	---	---	---	---
		01/22/16	29 - 30	N	ND (0.23)	39	---	---	---	---	---	---
		01/22/16	49 - 50	N	ND (0.26)	33	---	---	---	---	---	---
		01/22/16	49 - 50	FD	ND (0.22)	32	---	---	---	---	---	---
		01/22/16	59 - 60	N	ND (0.21)	32	---	---	---	---	---	---
AOC10d-1		09/18/08	0 - 0.5	N	0.644	49	16	8.8	ND (0.1)	ND (2)	58	---
		09/18/08	2 - 3	N	2.86	150	31	6.8	ND (0.1)	ND (2)	76	---
		09/18/08	5 - 6	N	1.06	66	23	5.2	ND (0.11)	ND (5.2)	80	---
		09/18/08	5 - 6	FD	0.703	64	23	5.3	ND (0.1)	ND (5.2)	74	---
		09/18/08	9 - 10	N	ND (0.414)	23	12	3.5	ND (0.1) J	ND (2.1)	58	---

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC10d-2		09/17/08	0 - 0.5	N	ND (0.403)	22	17	21	ND (0.1)	ND (2)	61	---
		09/17/08	2 - 3	N	1.16	40	14	16	ND (0.1)	ND (2)	54	---
		09/17/08	5 - 6	N	0.597	33	16	6.2	ND (0.1)	ND (5.1)	70	---
		09/17/08	9 - 10	N	ND (0.406)	22	16	3.2	ND (0.1) J	ND (5.1)	73	---
AOC10d-3		09/17/08	0 - 0.5	N	ND (0.406)	20	12	22	ND (0.1)	ND (2)	52	---
		09/18/08	2 - 3	N	1.91	64	18	21	ND (0.1)	ND (2)	61	---
		09/18/08	5 - 6	N	ND (0.407)	30	18	3.3	ND (0.1)	ND (5.1)	60	---
		09/18/08	5 - 6	FD	ND (0.407)	31	18	5.1	ND (0.1)	ND (5.1)	59	---
		09/18/08	9 - 10	N	ND (0.408)	21	11	3.6	ND (0.1) J	ND (2)	56	---
AOC10d-4	AOC10 PAA #4	09/18/08	0 - 0.5	N	0.92	29	25	25	ND (0.1)	ND (5.2)	85	---
		09/18/08	2 - 3	N	3.93	130	27	26	ND (0.11)	ND (2.1)	81	---
		09/18/08	5 - 6	N	ND (0.415)	66	21	17	ND (0.1)	ND (2)	64	---
		09/18/08	9 - 10	N	ND (0.41)	32	16	5.2	ND (0.1) J	ND (5.1)	68	---
AOC10d-9		12/15/15	0 - 1	N	ND (0.2)	20	8.9	20	ND (0.1)	ND (1)	44	1.2
		12/15/15	2 - 3	N	ND (0.21)	20	13	2.4	ND (0.1)	ND (1)	48	0.2
		12/15/15	5 - 6	N	ND (0.21)	27	17	2.3	ND (0.1)	ND (1.1)	49	0.36
		12/15/15	9 - 10	N	ND (0.21)	24	17	2.6	ND (0.1)	ND (1)	54	ND (0.14)
AOC10-OS1		04/06/11	11 - 11.5	N	ND (0.4) J	43	---	---	---	5.9	---	---
AOC10-OS2		04/06/11	5.5 - 6	N	0.78 J	44	---	---	---	5.8	---	---
AOC10-OS4		04/06/11	6.5 - 7	N	ND (0.41) J	170	---	---	---	13	---	---
AOC10-XRF-01		08/25/08	0 - 0.5	N	ND (0.404)	9.2	---	---	---	---	---	---
AOC10-XRF-02		08/25/08	0 - 0.5	N	ND (0.404)	11	---	---	---	---	---	---
AOC10-XRF-03		08/25/08	0 - 0.5	N	ND (0.405)	10	---	---	---	---	---	---
AOC10-XRF-10		09/21/08	3 - 4	N	ND (0.416)	26	---	---	---	---	---	---
DTSC-AOC10d-1		01/18/08⊖	0	N	31.5	652	137	14.3	ND (0.0193)	ND (2.5)	134	---
DTSC-AOC10d-2		01/18/08⊖	0	N	6.03	243	66.5	13.1	ND (0.0192)	ND (4.89)	147	---
DTSC-AOC10d-3		01/18/08⊖	0	N	4.38	224	46.5	12	ND (0.0198)	ND (4.65)	197	---

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
MW-57BR		01/14/09	3 - 4	N	ND (0.16)	26	11	6.7	ND (0.1)	ND (2)	52	---
		01/14/09	8 - 9	N	ND (0.17)	20	11	2.7	ND (0.1)	1.3	46	---
		01/14/09	8 - 9	FD	ND (0.16)	22	11	2.9	ND (0.1)	1.3	48	---
		01/14/09	18 - 19	N	ND (0.16)	25	12	4.3	ND (0.1)	3	68	---
MW-58BR_S	AOC10 PAA #2	01/29/09	1.5 - 2	N	150	4,000	300	160	0.33	3.5	300	---
		01/29/09	19 - 20	N	0.43	33	24	4	ND (0.11)	ND (2.1)	63	---
		01/29/09	29 - 30	N	ND (0.17)	26	14	3.6	ND (0.11)	ND (2.1)	64	---
		01/29/09	39 - 40	N	0.43	35	17	4.2	ND (0.11)	ND (2.1)	51	---
		01/29/09	49 - 50	N	ND (0.17)	24	17	3.7	ND (0.11)	ND (1.1)	46	---
		01/29/09	59 - 60	N	ND (0.18)	27	58	3.4	ND (0.11)	ND (1.1)	41	---
PA-06		11/09/15	0 - 1	N	0.89	30	15	5.2	ND (0.1)	ND (1)	74	---
PA-18		01/27/16	0 - 1	N	0.28	65	64	47	ND (0.1)	1.4	190	280
		01/26/17	5 - 6	N	---	---	---	---	---	---	---	14
PA-19	AOC10 PAA #1	01/27/16	0 - 1	N	ND (0.46)	34	160	30	ND (0.12)	9.8	550	220
		01/31/17	2 - 3	N	---	---	---	---	---	---	---	0.62
		01/31/17	5 - 6	N	---	---	---	---	---	---	---	0.89
PA-20	AOC10 PAA #1	01/27/16	0 - 1	N	0.82 J	33	11	23	ND (0.1)	ND (1)	84	1,600
		01/31/17	2 - 3	N	---	---	---	---	---	---	---	53
		01/31/17	5 - 6	N	---	---	---	---	---	---	---	130
PA-21	AOC10 PAA #1	01/27/16	0 - 1	N	ND (0.2)	49	26	32	ND (0.1)	1.2	150	580
		01/31/17	2 - 3	N	---	---	---	---	---	---	---	14
		01/31/17	5 - 6	N	---	---	---	---	---	---	---	73
SD-01		01/13/16	0 - 0.5	N	0.24	14	29	7.6	ND (0.1)	ND (1.1)	190	---
		01/13/16	2 - 3	N	ND (0.22)	36	14	3.2	ND (0.11)	ND (1.1)	41	---
		01/13/16	5 - 6	N	ND (0.22)	49	15	2.5	ND (0.11)	ND (1.1)	43	---
		01/13/16	9 - 10	N	ND (0.21)	40	12	1.9	ND (0.11)	ND (1.1)	40	---

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
SD-02	AOC10 PAA #1	11/10/15	0 - 1	N	0.66	26	16	29	0.17 J	ND (1)	48	---
		11/10/15	2 - 3	N	11	280	590	170	3.2	9.1	300	---
SD-03	AOC10 PAA #1	11/10/15	0 - 1	N	0.28	12	7.3	9.7	ND (0.099)	ND (1)	31	---
		11/10/15	2 - 3	N	ND (0.2)	6.4	3.4	2.5	ND (0.1)	ND (1)	13	---
SD-04	AOC10 PAA #1	11/10/15	0 - 1	N	ND (0.2)	10	5.1	2.7	ND (0.1)	ND (1)	22	---
		11/10/15	2 - 3	N	ND (0.2)	8	4.4	2.5	ND (0.1)	ND (1)	19	---
SD-05		11/10/15	0 - 1	N	ND (0.2)	13 J	9.2	13 J	ND (0.1)	2.5	46	---
		11/10/15	0 - 1	FD	ND (0.2)	19 J	10	37 J	ND (0.1)	1.1	42	---
		11/10/15	2 - 3	N	ND (0.21)	30	12	10	ND (0.1)	ND (1)	41	---
SD-06		11/10/15	0 - 1	N	ND (0.2)	17	9.4	3.9	ND (0.1)	ND (1)	39	---
		11/10/15	2 - 3	N	ND (0.2)	21	10	4.2	ND (0.1)	ND (1)	40	---
		11/10/15	5 - 6	N	ND (0.21)	20	9.5	2.8	ND (0.1)	ND (1)	40	---
SD-21		03/10/16	0 - 1	N	ND (0.2)	21	8.7	2.4	ND (0.1)	ND (1)	44	1.3
		03/10/16	2 - 3	N	0.81	31	10	4.5	ND (0.1)	ND (1)	60	3
SD-22		03/09/16	0 - 1	N	ND (0.21)	22	13	10	ND (0.1)	ND (1)	61	---
		03/09/16	2 - 3	N	ND (0.21)	27	10	4.7	ND (0.1)	ND (1)	49	---
Bank 1		03/07/03	0	N	ND (4)	21.5	13.7	---	---	---	55	---
L-1		02/20/03	0	N	ND (4.1)	88.4	34.8	---	---	---	99.7	---
		02/20/03	2	N	2.5	217	69.6	---	---	---	123	---
L-2	AOC10 PAA #2	02/20/03	0	N	ND (4.7)	86.8	42.7	---	---	---	122	---
		02/20/03	2	N	13	3,360	211	---	---	---	278	---
L-2-2	AOC10 PAA #2	03/05/03	- 2	N	41	1,610	139	---	---	---	203	---
L-2-3	AOC10 PAA #2	03/05/03	- 2	N	99	2,740	288	---	---	---	299	---
L-3		02/20/03	0	N	ND (4.5)	28.4	22.7	---	---	---	74.3	---
		02/20/03	1	N	1.2 J	379	79.7	---	---	---	252	---
		02/20/03	1.5	N	ND (4)	77.7	17.2	---	---	---	61.9	---
L-3-2		03/05/03	0 - 0.5	N	9.4	228	40.5	---	---	---	129	---

TABLE E-4
Constituent Concentrations
AOC 10 – East Ravine
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
PS-21		04/13/99	0	N	0.9	16.5	14.2	---	---	---	43.9	---
		04/13/99	2	N	ND (0.51)	90	12.6	---	---	---	59.1	---
PS-22		04/13/99	0	N	ND (0.5)	24.7	11.4	---	---	---	85.3	---

Notes:

Results greater than or equal to the Removal Action Goal are circled.

ϴ	white powder sample.
---	not analyzed
FD	field duplicate
ft bgs	feet below ground surface
J	concentration or reporting limit estimated by laboratory or data validation
mg/kg	milligrams per kilogram
N	primary sample
ND	not detected at the listed reporting limit
ng/kg	nanogram per kilogram
TEQ	dioxin and furans toxicity equivalent quotient

TABLE E-5
Constituent Concentrations
AOC 11 – Topographic Low Areas
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
AOC11-4-OS6		06/11/14	0	N	0.22	18	9.2	7.2	ND (0.1)	ND (1)	39	7.1
AOC11-4-OS5		06/11/14	0	N	ND (0.2)	21	12	6.4	ND (0.1)	ND (1)	43	13
AOC11-4-OS4		06/11/14	0	N	ND (0.2)	16	9.6	3.5	ND (0.1)	ND (1)	40	0.51
AOC11-4-OS3		06/11/14	0	N	ND (0.2)	14	8.6	5.3	ND (0.099)	ND (1)	35	3.3
AOC11-4-OS1		06/11/14	0	N	ND (0.2)	18 J	11 J	4.2 J	ND (0.1)	ND (1) J	47 J	0.44
AOC11-4-OS4		06/11/14	2 - 3	N	ND (0.2)	14	8.6	3.2	ND (0.1)	ND (1)	37	0.38
AOC11-4-OS6		06/11/14	2 - 3	N	ND (0.21)	20	7.7	3.2	ND (0.11)	ND (1.1)	36	1.9
AOC11-4-OS5		06/11/14	2 - 3	N	ND (0.21)	18	9.3	5.4	ND (0.1)	ND (1)	36	17
AOC11-4-OS3		06/11/14	2 - 3	N	0.43	18	7.3	6.4	ND (0.1)	ND (1)	30	11
AOC11-4-OS1		06/11/14	2 - 3	N	ND (0.21)	16	11	3.5	ND (0.11)	ND (1.1)	41	0.51
AOC11-4-OS3		06/11/14	2 - 3	FD	0.43	17	7.7	6.2	ND (0.1)	ND (1)	30	11
AOC11-4-OS4		06/11/14	5 - 6	N	ND (0.21)	17	10	5.5	ND (0.1)	ND (1)	38	2.1
AOC11-4-OS5		06/11/14	5 - 6	FD	ND (0.21)	20	8.9	5.6	ND (0.1)	ND (1)	40	11
AOC11-1		01/05/16	0 - 1	N	ND (0.21)	11	9.7	7.8 J	ND (0.1)	ND (1)	67 J	0.24
		01/05/16	0 - 1	FD	ND (0.21)	11	8.1	5.4 J	ND (0.1)	ND (1)	50 J	---
		01/05/16	2 - 3	N	ND (0.21)	11	9.5	5.2	ND (0.1)	ND (1)	32	ND (0.062)
		01/05/16	5 - 6	N	ND (0.24)	18	8.1	5.3	ND (0.12)	ND (1.2)	38	---
		01/05/16	9 - 10	N	ND (0.28)	15	9.2	6.1	ND (0.14)	ND (1.4)	37	---
AOC11-2		01/05/16	0 - 1	N	ND (0.21)	21	8.7	2.4	ND (0.1)	ND (1)	51	0.39
		01/05/16	2 - 3	N	ND (0.21)	21	10	1.9	ND (0.1)	ND (1)	44	0.15
		01/05/16	5 - 6	N	ND (0.21)	30	12	2.2	ND (0.1)	ND (1)	45	0.09
		01/05/16	9 - 10	N	ND (0.21)	23 J	9.4	1.8	ND (0.11)	ND (1)	45	ND (0.084)
		01/05/16	9 - 10	FD	ND (0.21)	17 J	12	2.7	ND (0.1)	ND (1)	46	ND (0.1)
AOC11-3		01/05/16	0 - 1	N	ND (0.2)	15	8	2.6	ND (0.1)	ND (1)	31	3.1
		01/05/16	2 - 3	N	ND (0.21)	20	10	2.3	ND (0.1)	ND (1)	43	0.2
		01/05/16	5 - 6	N	ND (0.21)	20	11	2.4	ND (0.1)	ND (1)	38	1.6
		01/05/16	9 - 10	N	ND (0.21)	23	10	2.2	ND (0.11)	ND (1.1)	45	0.36
		01/05/16	9 - 10	FD	ND (0.21)	14	7.7	1.8	ND (0.1)	ND (1.1)	34	0.23

TABLE E-5
Constituent Concentrations
AOC 11 – Topographic Low Areas
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC11-4		01/05/16	0 - 1	N	ND (0.2)	25	9.1	4.1	ND (0.1)	1.3	33	1.2
		01/05/16	2 - 3	N	1	16	9	4.1	ND (0.1)	ND (1)	33	2.6
AOC11-5		02/03/16	0 - 0.5	N	ND (0.25) J	27	22	14	ND (0.13)	ND (1.2)	70	30
		02/03/16	2 - 3	N	ND (0.21) J	18	8.9	1.7	ND (0.11)	ND (1.1)	46	0.74
		02/03/16	5 - 6	N	ND (0.21) J	25	10	1.7	ND (0.1)	ND (1)	48	0.23
		02/03/16	9 - 10	N	ND (0.2) J	21	9.3	2	ND (0.1)	ND (1)	56	2
AOC11-6		01/06/16	0 - 1	N	ND (0.22)	20	12	21	ND (0.11)	1.7	67	0.74
		01/06/16	2 - 3	N	ND (0.2)	20	9.5	24	ND (0.1)	ND (1)	62	0.46
		01/06/16	5 - 6	N	ND (0.21)	25	10	2.4	ND (0.1)	ND (1)	59	---
		01/06/16	9 - 10	N	ND (0.21)	14	9.1	6.1	ND (0.1)	ND (1)	79	---
AOC11-7		01/06/16	0 - 1	N	ND (0.22)	11	8	220	ND (0.11)	ND (1.1)	40	3.3
		01/06/16	2 - 3	N	0.52	15	11	30	ND (0.1)	ND (1)	70	0.84
		01/06/16	5 - 6	N	ND (0.2)	15	7.5	8.5	ND (0.1)	ND (1)	79	---
AOC11-8		12/06/15	0 - 1	N	ND (0.2)	12	9.3	26	ND (0.1)	ND (1)	43	0.91
		12/06/15	2 - 3	N	ND (0.2)	9.6	8.1	28	ND (0.1)	ND (1)	45	0.63
AOC11-9		12/06/15	0 - 1	N	ND (0.2)	9.6	7.5	23	ND (0.1)	ND (1)	61	1.1
		12/06/15	2 - 3	N	ND (0.2)	11	8.6	13	ND (0.1)	ND (1)	63	0.32
AOC11a-1		09/21/08	0 - 0.5	N	ND (0.403)	19	12	9.9	ND (0.1)	ND (2)	46	---
		09/21/08	2 - 3	N	ND (0.411)	23	14	20	ND (0.1)	ND (2.1)	58	---
		09/21/08	5 - 6	N	ND (0.41)	22	9	4.7	ND (0.1)	ND (1)	44	---
		09/21/08	9 - 10	N	3	19	10	9.2	ND (0.1) J	ND (2)	44	---
AOC11a-2		09/21/08	0 - 0.5	N	0.417	32	20	15	ND (0.11)	ND (2.1)	75	---
		09/21/08	2 - 3	N	ND (0.413)	19	10	7.7	ND (0.11)	ND (2.1)	42	---
		09/21/08	5 - 6	N	ND (0.408)	25	14	3.4	ND (0.1)	ND (2)	56	---
		09/21/08	9 - 10	N	ND (0.412)	19	6.5	2.2	ND (0.1) J	1	47	---

TABLE E-5
Constituent Concentrations
AOC 11 – Topographic Low Areas
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC11a-3		09/20/08	0 - 0.5	N	ND (0.411)	22	16	13	ND (0.1)	ND (2)	62	42
		09/20/08	2 - 3	N	ND (0.423)	24	14	17	ND (0.1)	2.2	63	25
		09/20/08	2 - 3	FD	ND (0.418)	24	14	16	ND (0.1)	2.4	61	---
		09/20/08	5 - 6	N	0.634	76	15	25	ND (0.1)	ND (2.1)	75	150
		09/20/08	9 - 10	N	ND (0.407)	23	11	2.9	ND (0.1) J	1.1	48	0.4
AOC11a-4		09/20/08	0 - 0.5	N	ND (0.409)	25	18	17	ND (0.1)	ND (2)	79	---
		09/20/08	2 - 3	N	ND (0.41)	27	13	8	ND (0.1)	ND (2)	52	---
		09/20/08	5 - 6	N	ND (0.407) J	25	11	3.7	ND (0.1)	ND (2)	54	---
		09/20/08	9 - 10	N	ND (0.41)	27	14	3.5	ND (0.1) J	ND (2)	59	---
AOC11a-5		09/21/08	0 - 0.5	N	0.652	32	17	14	ND (0.1)	ND (2.1)	71	72
		09/21/08	2 - 3	N	ND (0.412)	30	12	9.4	ND (0.1)	2.5	57	19
		09/21/08	5 - 6	N	ND (0.411)	18	9.2	3	ND (0.1)	1.5	53	0.24
		09/21/08	5 - 6	FD	ND (0.412)	18	9.6	3.1	ND (0.1)	1.6	51	---
		09/21/08	9 - 10	N	ND (0.415)	24	9.8	3.1	ND (0.1) J	2.5	62	ND (0.68)
AOC11a-SS-1		09/21/08	0 - 0.5	N	ND (0.402)	13	9.4	5.6	ND (0.1) J	1.1	54	0.63
		09/21/08	2 - 3	N	ND (0.404)	19	8.9	6	ND (0.1) J	ND (2)	48	2.5
		09/21/08	5 - 6	N	ND (0.408)	16	7.6	3	ND (0.1) J	ND (1)	42	0.26
		09/21/08	9 - 10	N	ND (0.414)	13	7	3	ND (0.1) J	ND (1)	40	---
AOC11a-SS-2		09/21/08	0 - 0.5	N	ND (0.414)	15	8.1	7.1	ND (0.1) J	ND (1)	42	---
		09/21/08	2 - 3	N	ND (0.402)	19	15	5.9	ND (0.1) J	ND (1)	53	---
AOC11a-SS-3		09/20/08	0 - 0.5	N	0.622	29	17	16	ND (0.1) J	ND (2)	73	53
		09/20/08	2 - 3	N	ND (0.409)	27	15	5.7	ND (0.1) J	ND (2)	57	---
		09/20/08	5 - 6	N	ND (0.412)	19	9.5	3.7	ND (0.1) J	1.1	46	0.28
		09/20/08	9 - 10	N	ND (0.413)	24	11	3	ND (0.1) J	1.4	48	---

TABLE E-5
Constituent Concentrations
AOC 11 – Topographic Low Areas
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC11b-1		09/17/08	0 - 0.5	N	ND (0.402)	27	16	25	ND (0.1)	ND (5)	71	0.36
		09/17/08	0 - 0.5	FD	0.553	25	15	12	ND (0.1)	ND (5)	68	---
		09/17/08	2 - 3	N	ND (0.404)	17	7	8.2	ND (0.1)	ND (2)	28	2.7
		09/17/08	5 - 6	N	ND (0.411)	21	15	22	ND (0.1)	ND (2)	72	3.8
		09/17/08	9 - 10	N	ND (0.411)	20	13	13	ND (0.1) J	ND (2.1)	65	---
AOC11b-2		09/17/08	0 - 0.5	N	0.645	21	13	45	ND (0.1)	ND (2)	76	---
		09/17/08	2 - 3	N	ND (0.41)	32	15	7.6	ND (0.1)	ND (5.1)	74	---
		09/17/08	5 - 6	N	ND (0.411)	24	14	5.9	ND (0.1)	ND (5.1)	75	---
		09/17/08	9 - 10	N	ND (0.407)	24	15	8.2	ND (0.1) J	ND (5.1)	86	---
AOC11c-1		09/21/08	0 - 0.5	N	ND (0.4)	26	9.7	30	ND (0.098)	2.7	47	---
		09/22/08	2 - 3	N	2.03	64	20	26	ND (0.11)	2.1	110	---
		09/22/08	2 - 3	FD	1.47	63	19	25	ND (0.11)	2.3	110	---
		09/22/08	5 - 6	N	2.03	64	20	24	ND (0.1)	ND (2.1)	110	---
		09/22/08	9 - 10	N	3.33	130	17	11	ND (0.1) J	ND (2)	62	---
AOC11c-2		09/21/08	0 - 0.5	N	0.744	26	12	11	ND (0.1)	ND (2)	52	---
		09/22/08	2 - 3	N	2.74	81	21	28	ND (0.11)	2.7	130	---
		09/22/08	5 - 6	N	1.3	56	16	18	ND (0.11)	ND (2.1)	93	---
		09/22/08	9 - 10	N	2.05	70	16	10	ND (0.1) J	ND (2)	70	---
AOC11C-3		02/03/16	14 - 15	N	0.67 J	18	8.4	2.2	ND (0.1)	ND (1.1)	42	---
		02/03/16	19 - 20	N	ND (0.21) J	17	9.7	1.6	ND (0.1)	ND (1)	42	---
		02/03/16	29 - 30	N	ND (0.2) J	27	14	ND (1)	ND (0.1)	ND (1)	39	---

TABLE E-5
Constituent Concentrations
AOC 11 – Topographic Low Areas
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC11c-4		01/28/16	0 - 1	N	0.38	16	7.4	3.1	ND (0.1)	ND (1)	31	18
		01/28/16	2 - 3	N	ND (0.2)	12	9.2	1.8	ND (0.1)	ND (1)	34	0.93
		01/28/16	5 - 6	N	ND (0.2)	13	8.9	2.5	ND (0.1)	ND (1)	62	1.6
		01/28/16	9 - 10	N	ND (0.2)	18	8.4	1.7	ND (0.1)	ND (1)	67	---
		01/28/16	9 - 10	FD	ND (0.2)	16	7.7	1.5	ND (0.1)	ND (1)	63	---
		02/02/16	14 - 15	N	0.25	21	7.8	ND (1)	ND (0.1)	ND (1)	38	---
		02/02/16	19 - 20	N	ND (0.2)	17	8.1	1.1	ND (0.1)	ND (1)	37	---
AOC11c-SS-1		09/21/08	0 - 0.5	N	ND (0.401)	12	5.2	6.8	ND (0.1) J	ND (1)	23	---
		09/22/08	2 - 3	N	ND (0.403)	16	11	5.5	ND (0.1) J	ND (1)	30	---
		09/22/08	5 - 6	N	1.14	37	13	11	ND (0.1) J	2.9	57	---
		09/22/08	9 - 10	N	ND (0.408)	19	6.2	5	ND (0.1) J	ND (2)	31	---
AOC11c-SS-2		09/22/08	0 - 0.5	N	ND (0.401)	14	4.9	8	ND (0.1) J	ND (1)	25	---
		09/22/08	2 - 3	N	ND (0.402)	16	4.9	6.5	ND (0.1) J	ND (1)	30	---
		09/22/08	5 - 6	N	7.78	32	11	8.9	ND (0.1) J	ND (1)	54	---
		09/22/08	9 - 10	N	2.06	73	30	8.6	ND (0.1) J	ND (1)	290	---
AOC11d-1		09/23/08	0 - 0.5	N	0.677	31	19	16	ND (0.1)	ND (2.1)	73	7.2
		09/23/08	0 - 0.5	FD	0.628	33	20	14	ND (0.1)	ND (2)	76	---
		09/23/08	2.5 - 3	N	ND (0.414)	24	12	4.8	ND (0.1)	1.2	48	0.63
		09/23/08	5 - 6	N	ND (0.416)	29	12	5	ND (0.1)	ND (2.1)	52	0.36
		09/23/08	9 - 10	N	0.659	28	11	9.3	ND (0.1) J	ND (2.1)	49	---
AOC11e-1	AOC11 PAA #1	09/23/08	0 - 0.5	N	0.959	43	10	10	ND (0.098)	ND (2)	54	160
		09/23/08	2.5 - 3	N	3.19	92	41	9	ND (0.1)	ND (1)	170	3,200
		09/23/08	5.5 - 6	N	0.961	48	17	6.4	ND (0.1)	ND (1)	59	---
		09/23/08	9.5 - 10	N	3.2	84	31	13	ND (0.1) J	ND (1)	140	---

TABLE E-5
Constituent Concentrations
AOC 11 – Topographic Low Areas
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Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC11e-2	AOC11 PAA #1	09/24/08	0 - 0.5	N	1.4	37	12	28	ND (0.1)	1.1	160	120
		09/24/08	2 - 3	N	3.78	130	19	11	ND (0.099)	2.6	130	700
		09/24/08	2 - 3	FD	3.51	130	18	11	ND (0.11)	2.9	120	---
		09/24/08	5 - 6	N	2.25	98	30	9.6	ND (0.1)	1.3	150	1,800
		09/24/08	9 - 10	N	ND (0.436)	36	19	4.6	ND (0.11) J	ND (2.1)	53	450
AOC11e-3		01/08/16	0 - 1	N	2.3 J	16	6.3	5.9	ND (0.1)	ND (1)	24	7.8
		01/08/16	0 - 1	FD	0.44 J	17	6.5	5.5	ND (0.1)	ND (1)	27	---
		01/10/16	2 - 3	N	ND (0.2)	11	6.7	3.6	ND (0.1)	ND (1)	21	3.3
		01/10/16	5 - 6	N	ND (0.22)	19	7.5	4.5	ND (0.11)	ND (1.1)	29	1.6
		01/10/16	9 - 10	N	ND (0.21)	12	6.9	4.4	ND (0.1)	ND (1)	25	2.5
		01/10/16	13 - 14	N	ND (0.2)	11	5.9	3.3	ND (0.1)	ND (1)	35	---
AOC11e-4	AOC11 PAA #1	01/28/16	0 - 1	N	1.2	16	7.4	4.3	ND (0.1)	ND (1)	33	14
		01/28/16	2 - 3	N	2.1	32	9	7	ND (0.1)	ND (1)	42	940
		01/28/16	5 - 6	N	0.74	27	22	3.5	ND (0.1)	ND (1.1)	76	250
		01/28/16	14 - 15	N	ND (0.2)	17	22	1.7	ND (0.1)	ND (1)	35	---
AOC11e-5	AOC11 PAA #1	01/19/16	14 - 15	N	ND (0.21)	34 J	21 J	2	ND (0.11)	ND (1.1)	48 J	---
		01/19/16	19 - 20	N	ND (0.21)	40	16	2.4	ND (0.1)	1.5	38	---
		01/19/16	29 - 30	N	ND (0.21)	18	11	1.7	ND (0.1)	ND (1.1)	34	---
		01/19/16	39 - 40	N	ND (0.21)	30	8.3	2	ND (0.11)	ND (1.1)	38	---
		01/20/16	49 - 50	N	ND (0.21)	17	11	1.4	ND (0.1)	ND (1)	36	---
		01/21/16	59 - 60	N	ND (0.21)	25	12	2	ND (0.1)	ND (1.1)	45	---
		01/21/16	69 - 70	N	ND (0.22)	24	12	2.8	ND (0.11)	ND (1.1)	47	---
AOC11e-6		12/03/15	0 - 1	N	16	320	12	8.4	ND (0.1)	1.6	37	4.5
AOC11e-SS-1		09/23/08	0 - 0.5	N	0.698	20	8.7	8.6	ND (0.1) J	ND (1)	35 J	---
		09/23/08	2.5 - 3	N	ND (0.411)	21	7.7	4.8	ND (0.1) J	ND (1)	27	---
		09/23/08	5.5 - 6	N	ND (0.407)	9.2	5.1	5.2	ND (0.1) J	ND (1)	20	---
		09/23/08	9.5 - 10	N	ND (0.407)	10	10	5.4	ND (0.1) J	ND (1)	19	---

TABLE E-5
Constituent Concentrations
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PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC11e-SS-2		09/23/08	0 - 0.5	N	1.38	28	8.1	9.5	ND (0.1) J	ND (1)	39	---
		09/23/08	2.5 - 3	N	0.438	21	9.7	7.4	ND (0.1) J	ND (2)	35	---
		09/23/08	5.5 - 6	N	0.466	26	10	5.1	ND (0.1) J	ND (1)	39	---
		09/23/08	5.5 - 6	FD	0.437	27	9.6	5.5	ND (0.1) J	ND (1)	37	---
		09/23/08	9.5 - 10	N	0.5	21	11	3.8	ND (0.11) J	ND (1.1)	37	---
AOC11g-OS1		04/06/11	8.5 - 9	N	ND (0.4) J	26	11	4.1	ND (0.1) J	7.1	61	---
PA-07		11/09/15	0 - 1	N	1.9	66	19	17	ND (0.1)	1.3	170	---
PA-09		01/27/16	0 - 1	N	ND (0.2)	21	13	150	0.18	ND (1)	130	15
PA-10		01/27/16	0 - 1	N	0.95	40	24	56	ND (0.1)	ND (1)	190	140
		01/26/17	2 - 3	N	---	---	---	---	---	---	---	0.38
		01/26/17	5 - 6	N	---	---	---	---	---	---	---	0.38
PA-11		01/27/16	0 - 1	N	0.35	63	23	28	ND (0.1)	3.3	300	120
		01/25/17	2 - 3	N	---	10	7.1	4.7	ND (0.1)	ND (1)	29	2.1
		01/25/17	2 - 3	FD	---	10	6.9	3.7	ND (0.1)	ND (1)	24	---
		01/25/17	5 - 6	N	---	---	---	---	---	---	---	82
PA-12		01/27/16	0 - 1	N	0.56	50	31	12	ND (0.1)	3.1	130	520
		01/25/17	2 - 3	N	---	13	9.7	5.7	ND (0.1)	ND (1)	37 J	1.7
		01/25/17	5 - 6	N	---	---	---	---	---	---	---	10
SD-08		11/11/15	0 - 1	N	ND (0.2)	9.2 J	6	5.3 J	ND (0.1)	ND (1)	31	---
		11/11/15	0 - 1	FD	0.26	12 J	13	6.8 J	ND (0.1)	ND (1)	37	---
		11/11/15	2 - 3	N	2.7	34	35	7.8	ND (0.1)	ND (1)	97	---
SD-09		11/10/15	0 - 1	N	ND (0.21)	11	6.4	3.8	ND (0.11)	ND (1)	25	---
		11/10/15	2 - 3	N	ND (0.21)	11	5.6	3.1	ND (0.1)	ND (1.1)	21	---
		11/10/15	5 - 6	N	ND (0.21)	12	7.1	4.3	ND (0.1)	ND (1.1)	24	---
SD-10		11/10/15	0 - 1	N	ND (0.2)	7.9	6.7	6.1	ND (0.1)	ND (1)	36	---
		11/10/15	2 - 3	N	1.4	27	9	16	0.37	ND (1)	180	---

TABLE E-5
Constituent Concentrations
AOC 11 – Topographic Low Areas
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
SD-11		12/06/15	0 - 0.5	N	ND (0.2)	38	14	22	ND (0.1)	ND (1)	1,100	---
		12/06/15	2 - 3	N	1	21	10	6.2	ND (0.1)	ND (1)	42	---
SD-11A		03/07/16	0 - 1	N	0.51	110	19	20	ND (0.1)	ND (1)	170	140
		03/07/16	2 - 3	N	0.63	90	44	36	ND (0.1)	ND (1)	310	130 JR
		03/07/16	5 - 6	N	0.79	23	11	11	ND (0.1)	ND (1)	88	67
SD-12		11/10/15	0 - 1	N	ND (0.2)	8.1	5.1	7.2	ND (0.1)	ND (1)	38	---
		11/10/15	2 - 3	N	0.51	16	8.9	4.1	ND (0.1)	ND (1)	27	---
SD-13		11/10/15	0 - 1	N	0.92	33	7.8	3.6	ND (0.1)	ND (1)	30	---
		11/10/15	2 - 3	N	0.34	25	9.4	3	ND (0.11)	ND (1.1)	40	---
SD-20		11/11/15	0 - 1	N	0.5	18 J	7.1	5.3	ND (0.1)	ND (1)	48 J	---
		11/11/15	0 - 1	FD	0.61	14 J	7.3	4.6	ND (0.099)	ND (1)	71 J	---
		11/11/15	2 - 3	N	ND (0.2)	8.9	4.3	2.7	ND (0.1)	ND (1)	17	---
SD-23		03/09/16	0 - 1	N	0.27	19	11	5.6	ND (0.11)	ND (1.1)	87	14
		03/09/16	2 - 3	N	ND (0.22)	31	14	3	ND (0.11)	ND (1.1)	39	---
SD-27		02/15/17	2 - 3	N	ND (0.21)	20	9	ND (1)	ND (0.1)	ND (1)	34	0.96
SD-OS37		11/30/16	0 - 0.5	N	0.41	35	21	36	ND (0.1)	ND (1)	92	---
		11/30/16	3 - 3.5	N	0.24	16	9.4	5.4	ND (0.1)	2.7	24	---
		11/30/16	5 - 5.5	N	ND (0.2)	14	7.4	3.3	ND (0.1)	ND (1)	20	---

Notes:

Results greater than or equal to the Removal Action Goal are circled.

---	not analyzed
FD	field duplicate
ft bgs	feet below ground surface
J	concentration or reporting limit estimated by laboratory or data validation
JR	estimated value, one or more input values is "R" qualified
mg/kg	milligrams per kilogram
N	primary sample
ND	not detected at the listed reporting limit
ng/kg	nanogram per kilogram
R	The result has been rejected; identification and/or quantitation could not be verified because critical QC s
TEQ	dioxin and furans toxicity equivalent quotient

TABLE E-6
Constituent Concentrations
AOC 14 – Railroad Debris Area
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC14-1		09/30/08	0 - 0.5	N	0.841	25	11	18	ND (0.1)	ND (2)	70	---
		09/30/08	2 - 3	N	ND (0.412)	25	8.5	8.7	ND (0.1)	ND (2)	47	---
		09/30/08	5 - 6	N	ND (0.412)	27	9.5	2.3	ND (0.1)	1.6	38	---
		09/30/08	9 - 10	N	ND (0.403)	17	8.2	2.7	ND (0.099)	ND (1)	34	---
		09/30/08	14 - 15	N	ND (0.412)	18	12	2.1	ND (0.1)	ND (1)	34	---
AOC14-2		09/30/08	0 - 0.5	N	0.768	28	44	18	ND (0.1)	ND (2)	49	---
		09/30/08	2 - 3	N	1.04	42	ND (21)	7.6	ND (0.11)	ND (11)	34	---
		10/01/08⊖	3 - 3.25	N	2.16	26	ND (23)	ND (1.1)	ND (0.11)	ND (11)	ND (11)	---
		09/30/08	5 - 6	N	1.32	42	19	21	ND (0.11)	ND (5.2)	51	---
		09/30/08	9 - 10	N	ND (0.405)	21	16 J	1.8	ND (0.1)	ND (1)	40	---
		09/30/08	9 - 10	FD	ND (0.404)	21	11 J	1.9	ND (0.1)	ND (1)	41	---
		09/30/08	14 - 15	N	ND (0.407)	15	9.1	2.1	ND (0.1)	ND (1)	35	---
AOC14-3		10/01/08	0 - 0.5	N	ND (0.403)	31	12	8.4	ND (0.1)	1.6	52	---
		10/01/08	2 - 3	N	ND (0.405)	26	13	6.4	ND (0.1)	ND (1)	46	---
		10/01/08	5 - 6	N	0.877	32	11	9	ND (0.1)	2.1	40	---
		10/01/08	9 - 10	N	ND (0.404)	19	7.1	2	ND (0.1)	ND (1)	33	---
		10/01/08	14 - 15	N	ND (0.403)	17	12	2.2	ND (0.1)	ND (1)	32	---
AOC14-4		10/01/08	0 - 0.5	N	ND (0.402)	13	7.3	7.2	ND (0.1)	ND (1)	31	---
		10/01/08	2 - 3	N	ND (0.405)	16	6.2	3.5	ND (0.1)	1.5	23	---
		10/01/08	5 - 6	N	ND (0.403)	16	5.3	3.5	ND (0.1)	1.5	23	---
		10/01/08	9 - 10	N	ND (0.403)	8.2	2.9	2.8	ND (0.1)	1.2	16	---
		10/01/08	9 - 10	FD	ND (0.404)	8.1	2.7	2.9	ND (0.1)	1.2	16	---
		10/01/08	14 - 15	N	ND (0.406)	15	7.9	2.2	ND (0.1)	ND (1)	29	---
AOC14-5		10/02/08	0 - 0.5	N	ND (0.403)	15	9.6	5.3	ND (0.099)	ND (2)	35	---
		10/02/08	2 - 3	N	ND (0.405)	17	16	16	ND (0.1)	ND (2)	46	---
		10/02/08	5 - 6	N	ND (0.404)	15	7.9	2.7	ND (0.099)	ND (1)	35	---
		10/02/08	9 - 10	N	ND (0.403)	15	9.5	2.3	ND (0.1)	ND (1)	35	---
		10/02/08	14 - 15	N	ND (0.406)	16	7.3	2.2	ND (0.1)	ND (1)	30	---

TABLE E-6
Constituent Concentrations
AOC 14 – Railroad Debris Area
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC14-6		10/02/08	0 - 0.5	N	ND (0.402)	11	6.1	7.4	ND (0.1)	1.2	35	---
		10/02/08	2 - 3	N	ND (0.403)	23	9.5	3.3	ND (0.1)	2.4	37	---
		10/02/08	5 - 6	N	ND (0.405)	18	9.1	2.3	ND (0.099)	ND (1)	35	---
		10/02/08	9 - 10	N	ND (0.406)	18	9.6	2.4	ND (0.1)	ND (1)	39	---
		10/02/08	9 - 10	FD	ND (0.406)	18	9.7	2.3	ND (0.1)	ND (1)	39	---
		10/02/08	14 - 15	N	ND (0.402)	16	7.2	2.2	ND (0.1)	ND (1)	28	---
AOC14-7		10/02/08	0 - 0.5	N	ND (0.404)	15	7.4	6.1	ND (0.099)	ND (1)	31	---
		10/02/08	2 - 3	N	ND (0.405)	13	10	7.1	ND (0.1)	ND (1)	30	---
		10/02/08	5 - 6	N	ND (0.405)	18	10	4.8	ND (0.1)	ND (2)	35	---
		10/02/08	9 - 10	N	ND (0.404)	26	14	2.9	ND (0.1)	ND (1)	46	---
		10/02/08	14 - 15	N	ND (0.401)	25	9.9	3.5	ND (0.1)	2.4	32	---
AOC14-8		10/02/08	0 - 0.5	N	ND (0.403)	12	7.9	6.4	ND (0.099)	ND (2)	30	---
		10/02/08	2 - 3	N	ND (0.406)	15	8.8	6.8	ND (0.1)	ND (2)	31	---
		10/02/08	5 - 6	N	ND (0.404)	18	6.6	2.4	ND (0.1)	ND (1)	39	---
		10/02/08	9 - 10	N	ND (0.404)	19	12	2.7	ND (0.1)	ND (1)	38	---
		10/02/08	9 - 10	FD	ND (0.404)	19	10	3	ND (0.1)	ND (1)	39	---
		10/02/08	14 - 15	N	ND (0.413)	23 J	18	3.7	ND (0.1)	ND (1)	42 J	---
AOC14-9		10/01/08	0 - 0.5	N	ND (0.404)	13	7.6	5.4	ND (0.1)	ND (1)	28	---
		10/01/08	2 - 3	N	ND (0.407)	12	7.2	6	ND (0.1)	ND (2)	29	---
		10/01/08	5 - 6	N	ND (0.4)	9	4.1	2.8	ND (0.1)	ND (1)	13	---
		10/01/08	9 - 10	N	ND (0.405)	15	7.6	3.6	ND (0.1)	ND (1)	29	---
		10/01/08	14 - 15	N	ND (0.406)	13	8.2	5	ND (0.1)	ND (2)	32	---
AOC14-10		10/01/08	0 - 0.5	N	ND (0.401)	10	3.5	3.5	ND (0.1)	ND (1)	14	---
		10/01/08	2 - 3	N	ND (0.401)	11	3.1	2.9	ND (0.1)	ND (1)	14	---
		10/01/08	5 - 6	N	ND (0.403)	12	4.6	3.4	ND (0.1)	ND (1)	17	---
		10/01/08	5 - 6	FD	ND (0.402)	12	4.1	3.1	ND (0.1)	ND (1)	15	---
		10/01/08	9 - 10	N	ND (0.409)	11	7.1	5.9	ND (0.1)	ND (1)	28	---
		10/01/08	14 - 15	N	ND (0.404)	9.8	ND (8.1)	2.6	ND (0.1)	ND (4)	13	---

TABLE E-6
Constituent Concentrations
AOC 14 – Railroad Debris Area
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
				Removal Action Goal (RAG) <2 ft bgs :	3.1	145	145	36	1	22	1,050	a 100
				Removal Action Goal (RAG) 2 to 10 ft bgs :	31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
AOC14-11		10/01/08	5 - 6	N	ND (0.406)	15	7.3	4.2	ND (0.1)	1	28	---
		10/01/08	9 - 10	N	ND (0.405)	18	13	2	ND (0.1)	ND (1)	37	---
		10/01/08	14 - 15	N	ND (0.41)	20	9	3	ND (0.1)	ND (1)	39	---
AOC14-12		09/30/08	5 - 6	N	ND (0.406)	27	8.4	3.2	ND (0.1)	2.4	36	---
		09/30/08	9 - 10	N	ND (0.405)	17	7.7	3	ND (0.1)	ND (1)	37	---
		09/30/08	14 - 15	N	ND (0.401)	20	9.8	2.8	ND (0.1)	1.2	35	---
AOC14-13		09/30/08	5 - 6	N	ND (0.405)	22	11	3.6	ND (0.099)	2	30	---
		09/30/08	9 - 10	N	ND (0.405)	16	7.2	2.1	ND (0.1)	ND (1)	34	---
		09/30/08	14 - 15	N	ND (0.409)	16	11	2.2	ND (0.1)	ND (1)	33	---
		09/30/08	14 - 15	FD	ND (0.409)	16	13	2.4	ND (0.1)	ND (1)	33	---
AOC14-14E		02/18/16	0 - 1	N	0.27	16	11	7.2	ND (0.1)	ND (1)	44	4.6
		02/18/16	2 - 3	N	0.25	30	13	3	ND (0.1)	ND (1)	42	14
		02/18/16	2 - 3	FD	0.35	26	10	3.5	ND (0.1)	ND (1)	43	12
		02/18/16	5 - 5.5	N	0.8	27	9.8	2.1	ND (0.1)	ND (1)	38	32
		02/18/16	6 - 7	N	ND (0.2)	19	9.9	2.1	ND (0.1)	ND (1)	38	2.5
		02/18/16	9 - 10	N	ND (0.2)	20	8	2.6	ND (0.1)	ND (1)	39	6.6
AOC14-14W	AOC14 PAA #1	02/16/16	0 - 1	N	0.33	16	12	15	ND (0.1)	ND (1)	65	3.5
		02/16/16	2 - 3	N	ND (0.2)	13	12	3.4	ND (0.1)	ND (1)	32	1.1
		02/16/16	5 - 5.5	N	6.7	420	170	160	0.22	4.5	310	480
		02/16/16	6 - 7	N	2.7	65	80	70	ND (0.1)	2.8	260	27
		02/16/16	9 - 10	N	0.66	15	9.7	2.6	ND (0.1)	ND (1)	34	6
AOC14-15	AOC14 PAA #1	02/18/16	0 - 1	N	ND (0.2)	14	11	2.2	ND (0.1)	ND (1)	36	3
		02/18/16	2 - 3	N	0.21	16	12	4.6	ND (0.1)	ND (1)	40	6.1
		02/18/16	5 - 6	N	ND (0.2)	11	9.7	3.1	ND (0.1)	ND (1)	34	4.4
		02/18/16	7 - 8	N	ND (0.2)	16	8.9	2.5	ND (0.1)	ND (1)	33	0.59

TABLE E-6

Constituent Concentrations
AOC 14 – Railroad Debris Area
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC14-16E		02/23/16	0 - 1	N	0.26	20	9.6	5.9	ND (0.1)	ND (1)	62	8.2
		02/23/16	2 - 3	N	ND (0.21)	12	9	3	ND (0.1)	ND (1)	33	3.8
		02/23/16	5 - 6	N	0.22	12	6.7	3	ND (0.1)	ND (1)	30	1.3
		02/23/16	9 - 10	N	ND (0.21)	15	9	1.6	ND (0.1)	ND (1)	31	0.13
AOC14-16W	AOC14 PAA #1	02/22/16	0 - 1	N	ND (0.2)	13	7.3	2.7	0.41	ND (1)	27	0.22
		02/22/16	2 - 3	N	20	360	1,300	110	180	63	110	8.2
		02/22/16	5 - 6	N	3	50	100	28	72	14	61	1.3
		02/22/16	7 - 8	N	0.96	23	35	14	17	ND (1)	45	2.3
		02/22/16	9 - 10	N	ND (0.2)	13	8.7	2.3	ND (0.1)	ND (1)	31	0.11
		02/22/16	9 - 10	FD	ND (0.2)	13	7.1	1.6	ND (0.1)	ND (1)	30	0.074
AOC14-17E		02/24/16	9 - 10	N	ND (0.2)	11	7.8	2.7	ND (0.1)	ND (1)	31	0.075
AOC14-17W		02/24/16	0 - 1	N	ND (0.2)	9	4.7	3.9	ND (0.1)	ND (1)	21	0.44
		02/24/16	1 - 2	N	ND (0.2)	12	9.2	8.5	ND (0.1)	ND (1)	26	0.97
		02/24/16	2 - 3	N	ND (0.2)	13	7.7	3.7	ND (0.1)	ND (1)	29	0.4
		02/24/16	5 - 6	N	ND (0.2)	12	10	3.4	ND (0.1)	ND (1)	24	0.096
		02/24/16	9 - 10	N	ND (0.2)	12	8.6	2.6	ND (0.1)	ND (1)	29	0.11
AOC14-18		02/17/16	0 - 1	N	ND (0.2)	14	13	14	ND (0.1)	ND (1)	41	---
		02/17/16	2 - 3	N	ND (0.21)	13	12	3.5	ND (0.1)	ND (1)	34	---
		02/17/16	5 - 6	N	ND (0.21)	13	12	4.4	ND (0.1)	3	36	---
AOC14-19	AOC14 PAA #1	02/17/16	2 - 3	N	ND (0.21)	380 J	1,800	1,600 J	ND (0.1)	16	2,000 J	140
		02/17/16	3 - 4	N	ND (0.21)	13	19	6.3	ND (0.1)	ND (1)	41	1.2
AOC14-20		04/26/17	0 - 0.5	N	ND (0.2)	14	9	5.6	ND (0.1)	ND (1)	37	0.36
		04/26/17	2 - 3	N	ND (0.2)	12	7.1	3.4	ND (0.1)	ND (1)	31	0.29
		04/26/17	5 - 6	N	ND (0.2)	14	11	2.6	ND (0.1)	ND (1)	29	0.4
		04/26/17	8 - 9	N	ND (0.2)	9.9	6.5	1.1	ND (0.1)	ND (1)	24	0.35

TABLE E-6
Constituent Concentrations
AOC 14 – Railroad Debris Area
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
AOC14-21		04/26/17	0 - 0.5	N	ND (0.2)	15	10	11	ND (0.1)	ND (1)	41	0.85
		04/26/17	2 - 3	N	ND (0.2)	15	11	9.4	ND (0.1)	ND (1)	45	2.9
		04/26/17	2 - 3	FD	ND (0.2)	17	12	9.8	ND (0.1)	ND (1)	44	3.2
		04/26/17	5 - 6	N	ND (0.2)	13	40	1.4	ND (0.1)	ND (1)	39	ND (0.19)
		04/26/17	9 - 10	N	ND (0.2)	14	8.1	2	ND (0.1)	ND (1)	30	0.22
AOC14-SS-1	AOC14 PAA #1	10/01/08	0 - 0.5	N	ND (0.405)	15	9.4	7.2	ND (0.1)	ND (1)	34	---
		10/01/08	2 - 3	N	0.456	22	15	11	0.25	ND (2)	32	---
		10/01/08	5 - 6	N	ND (0.406)	18	15	4.8	ND (0.1)	ND (2)	35	---
		10/01/08	9 - 10	N	ND (0.402)	17	7.4	1.6	ND (0.1)	ND (1)	33	---
		10/01/08	14 - 15	N	ND (0.406)	13	9	2.6	ND (0.1)	ND (1)	31	---
AOC14-SS-2		10/01/08	0 - 0.5	N	ND (0.403)	14	8.8	4.8	ND (0.1)	1.1	27	---
		10/01/08	2 - 3	N	ND (0.407)	14	7.6	5.5	ND (0.1)	ND (2)	29	---
		10/01/08	5 - 6	N	ND (0.405)	10	6.5	5.5	ND (0.1)	ND (2)	25	---
		10/01/08	9 - 10	N	ND (0.407)	9.5	6.7	5.3	ND (0.1)	ND (1)	24	---
		10/01/08	14 - 15	N	ND (0.404)	17	9.6	3	ND (0.1)	ND (1)	32	---
		10/01/08	14 - 15	FD	ND (0.405)	18	9.6	3	ND (0.1)	ND (1)	33	---
AOC14-SS-3		10/02/08	0 - 0.5	N	ND (0.401)	17	11	3.8	ND (0.1)	ND (1)	35	---
		10/02/08	2 - 3	N	ND (0.402)	18	9.5	2.7	ND (0.1)	ND (1)	36	---
		10/02/08	5 - 6	N	ND (0.403)	12	6.7	2	ND (0.1)	ND (1)	29	---
		10/02/08	9 - 10	N	ND (0.404)	16	8.4	2.2	ND (0.1)	ND (1)	32	---
		10/02/08	14 - 15	N	ND (0.404)	17	9.5	2.4	ND (0.1)	ND (1)	35	---
AOC14-SS-4		10/02/08	0 - 0.5	N	ND (0.402)	15	8.1	5.1	ND (0.1)	ND (1)	31	---
		10/02/08	2 - 3	N	ND (0.401)	14	6.9	10	ND (0.1)	ND (1)	27	---
		10/02/08	5 - 6	N	ND (0.403)	16	6.4	11	ND (0.1)	1.5	27	---
		10/02/08	9 - 10	N	ND (0.404)	16	11	2.3	ND (0.1)	ND (1)	32	---
		10/02/08	14 - 15	N	ND (0.405)	17	11	3	ND (0.1)	ND (1)	37	---
		10/02/08	14 - 15	FD	ND (0.405)	17	8.5	1.6	ND (0.1)	ND (1)	34	---

TABLE E-6
Constituent Concentrations
AOC 14 – Railroad Debris Area
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	**Potential Action Area**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Chromium, Hexavalent**	**Chromium, total**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Zinc**	**a TEQ Human b TEQ Mammal**
S1-20		11/01/98	3	N	0.7	31.8	15.7	---	---	---	49.4	---
S2-6		11/01/98[Θ]	3	N	12	45.5	1.8	---	---	---	14.5	---
		11/01/98	5	N	1.8	39.9	9.7	---	---	---	35.7	---
S2-62		11/01/98[Θ]	2	N	1	32	4.1	---	---	---	8.4	---
		11/01/98[β]	3	N	---	72.7	22.2	7.9	0.046 J	0.86 J	ND (29.3)	---
		11/01/98	4	N	ND (0.5)	21.9	11.5	---	---	---	39.8	---
S2-130		11/01/98	1	N	ND (0.5)	22.1	10.6	---	---	---	34.5	---
S3-15		11/01/98	2	N	ND (0.5)	13.8	9.4	---	---	---	24.1	---
		11/01/98	4	N	ND (0.5)	12.1	11	---	---	---	29.2	---
S3-72		11/01/98[Θ]	1	N	ND (0.5)	18.7	6.7	---	---	---	27	---
		11/01/98	2	N	ND (0.5)	11.3	8	---	---	---	28.9	---
S3-120		11/01/98	1	N	ND (0.5)	12.1	4.2	---	---	---	18	---
S4-4		11/01/98[Θ]	4	N	15.4	23.4	3.2	---	---	---	1.9	---
		11/01/98	6	N	1	13.7	10.3	---	---	---	32.6	---
S4-95		11/01/98[Θ]	2	N	ND (0.5)	10.3	2.5	---	---	---	4.3	---
		11/01/98	3	N	ND (0.5)	14.9	8.3	---	---	---	27	---
S4-160		11/01/98	2	N	0.5	25	11.8	---	---	---	38.2	---
S8-23		11/01/98[β]	3	N	---	28.7	14.3	12.5	0.092 J	0.42 J	57	---
S8-30		11/01/98	3	N	0.5	12.8	10.8	---	---	---	40.9	---
GS-1		11/01/98[Θ]	0	N	0.59	33.7	2.2	---	---	---	31.3	---
GS-2		11/01/98[Θ]	0	N	ND (0.5)	21.9	8.2	---	---	---	32.7	---
RR-1		02/02/00	0	N	ND (0.5)	23.4	15.6	---	---	---	44	---
RR-2		02/02/00	0	N	ND (0.5)	16.1	13.8	---	---	---	37.5	---
RR-3		02/02/00	0	N	ND (0.5)	18.3	11.6	---	---	---	35	---
RR-4		02/02/00[Θ]	0	N	0.6	19.4	19.2	---	---	---	27.1	---
RR-5		02/02/00	0	N	5.8	39.5	7.1	---	---	---	34.1	---

TABLE E-6
Constituent Concentrations
AOC 14 – Railroad Debris Area
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
RR-6		02/02/00	0	N	4.8	74.9	7.5	---	---	---	243	---
RR-7		02/02/00ϴ	0	N	ND (0.51)	28.6	9.7	---	---	---	35.1	---
RR-8		02/02/00	0	N	ND (0.51)	28.9	9.9	---	---	---	29.8	---
RR-9		02/02/00ϴ	0	N	2.7	19.6	27.9	---	---	---	15.4	---
RR-10		02/02/00	0	N	ND (0.51)	18.8	12.9	---	---	---	36.3	---
RR-11		02/02/00	0	N	ND (0.51)	18.1	20.2	---	---	---	47.5	---
RR-12		02/02/00ϴ	0	N	ND (0.5)	17.5	3.8	---	---	---	11.3	---

Notes:

Results greater than or equal to the Removal Action Goal are circled.

ϴ	white powder sample.
ß	black sandy material
---	not analyzed
FD	field duplicate
ft bgs	feet below ground surface
J	concentration or reporting limit estimated by laboratory or data validation
mg/kg	milligrams per kilogram
N	primary sample
ND	not detected at the listed reporting limit
ng/kg	nanogram per kilogram
TEQ	dioxin and furans toxicity equivalent quotient

TABLE E-7
Constituent Concentrations
AOC 27 – MW-24 Bench
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
24soil-01		01/31/08	2.5 - 3	N	ND (0.4)	15	7.2	6.4	ND (0.1)	0.63	16	---
24soil-02		01/31/08	2.5 - 3	N	ND (0.4)	15	9.1	8.7	ND (0.1)	0.7	17	---
AOC27-1		03/18/16	0 - 1	N	0.35	17	11	28	ND (0.1)	ND (1)	37	---
		03/18/16	2 - 3	N	ND (0.2)	11	12	5.4	ND (0.1)	ND (1)	31	0.12
		03/18/16	5 - 6	N	ND (0.2)	17	11	2.9	ND (0.1)	ND (1)	31	---
		03/18/16	9 - 10	N	ND (0.2)	13	8.6	1.9	ND (0.1)	ND (1)	29	---
AOC27-18		03/17/16	0 - 1	N	0.3	15	8.3	5.7	ND (0.1)	ND (1)	26	9.3
		03/17/16	2 - 3	N	0.36	22	9.7	8.4	ND (0.1)	ND (1)	31	7.6
		03/17/16	5 - 6	N	ND (0.21)	11	7.4	6.9	ND (0.1)	ND (1)	27	6.8
		03/17/16	9 - 10	N	1.2	22	6.8	7.1	ND (0.1)	ND (1)	47	---
AOC27-18E		03/17/16	4 - 5	N	ND (0.2)	11	6.6	10	ND (0.1)	ND (1)	250	11
AOC27-2		03/18/16	0 - 1	N	0.2	13	5.6	3.8	ND (0.1)	ND (1)	24	0.84
		03/18/16	2 - 3	N	0.28	16	8.1	5.7	ND (0.1)	ND (1)	24	0.83
		03/18/16	5 - 6	N	ND (0.2)	11	8.5	4.9	ND (0.1)	ND (1)	30	---
		03/18/16	9 - 10	N	ND (0.2)	14	9.3	3.3	ND (0.1)	ND (1)	32	---
AOC27-20		03/01/16	0 - 1	N	ND (0.2)	17	9.2	8.4	ND (0.1)	ND (1)	38	19
		03/01/16	2 - 3	N	ND (0.21)	19	11	4.6	ND (0.1)	ND (1)	42	5.8
		03/01/16	2 - 3	FD	ND (0.21)	18	9.7	3.6	ND (0.11)	ND (1.1)	42	---
		03/01/16	5 - 6	N	0.29	20	27	15	0.13	ND (1)	74	10
		03/01/16	9 - 10	N	ND (0.21)	20	11	2.7	ND (0.1)	ND (1)	41	---
AOC27-24		03/18/16	0 - 1	N	0.36	29	12	6.2	ND (0.1)	ND (1)	37	---
		03/18/16	2 - 3	N	ND (0.2)	19	9.4	3.6	ND (0.1)	ND (1)	33	---
		03/18/16	5 - 6	N	ND (0.2)	14	11	4.1	ND (0.1)	ND (1)	30	---
		03/18/16	9 - 10	N	ND (0.2)	20	14	3	ND (0.1)	ND (1)	34	---

TABLE E-7
Constituent Concentrations
AOC 27 – MW-24 Bench
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	a TEQ Human b TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
Removal Action Goal (RAG) <2 ft bgs :					3.1	145	145	36	1	22	1,050	a 100
Removal Action Goal (RAG) 2 to 10 ft bgs :					31	145	145	36	1	22	1,050	b 190
AOC27-24SW		03/18/16	0 - 1	N	ND (0.2)	15	13	4.3	ND (0.1)	ND (1)	32	---
		03/18/16	2 - 3	N	0.34	17	8.9	7	ND (0.1)	ND (1)	29	---
		03/18/16	5 - 6	N	ND (0.2)	20	11	2.9	ND (0.1)	ND (1)	33	---
		03/18/16	9 - 10	N	ND (0.2)	12	9.3	1.9	ND (0.1)	ND (1)	29	---
AOC27-27		03/02/16	0 - 1	N	ND (0.2)	22	11	5.5	0.12	ND (1)	38	---
		03/02/16	2 - 3	N	ND (0.21)	16	8.2	3.8	0.1	ND (1)	38	---
AOC27-36		03/17/16	0 - 1	N	ND (0.21)	14	11	6	ND (0.1)	ND (1)	59 J	---
		03/17/16	2 - 3	N	ND (0.21)	14	7	4.3	ND (0.11)	ND (1)	24	---
		03/17/16	5 - 6	N	ND (0.22)	16	8.8	3.7	ND (0.11)	ND (1.1)	29	---
		03/17/16	9.6 - 10	N	ND (0.22)	13	11	6.5	ND (0.11)	ND (1.1)	34	---
AOC27-4		03/17/16	0 - 1	N	0.23	16	7.5	7.3	ND (0.1)	ND (1)	31	20
		03/17/16	0 - 1	FD	0.28	16	8.9	6.6	ND (0.1)	ND (1)	31	26
		03/17/16	2 - 3	N	ND (0.2)	13	9.5	5.9	ND (0.1)	ND (1)	27	2.8
		03/17/16	5 - 6	N	ND (0.2)	14	8.1	2	ND (0.099)	ND (1)	28	ND (0.34)
AOC27-5		03/17/16	0 - 1	N	0.31	15	7.6	7	ND (0.1)	ND (1)	48	---
		03/17/16	2 - 3	N	0.48	21	14	38	ND (0.1)	ND (1)	500	18
		03/17/16	5 - 6	N	ND (0.2)	15	9.2	2.4	ND (0.099)	ND (1)	32	0.2
		03/17/16	9 - 10	N	ND (0.2)	13	8.6	2.5	ND (0.1)	ND (1)	33	---
AOC27-50		03/02/16	0 - 1	N	0.3	25	25	73	0.13	ND (1)	250	12
		03/02/16	2 - 3	N	1.3	50 J	100 J	190 J	0.47	4.7 J	330 J	57
		03/02/16	5 - 6	N	ND (0.21)	18	7.9	2.1	0.13	ND (1)	39	0.41
		03/02/16	9 - 10	N	ND (0.21)	18	9.1	2.1	0.12	ND (1)	38	---
AOC27-51		02/17/17	0 - 0.5	N	ND (0.21)	20	36	19	ND (0.1)	ND (1)	1,200	9.2
		02/17/17	2 - 3	N	ND (0.2)	10	7.4	1.4	ND (0.1)	ND (1)	28	0.65
		02/17/17	5 - 6	N	ND (0.2)	13	8.3	ND (1)	ND (0.1)	ND (1)	30	0.15

TABLE E-7
Constituent Concentrations
AOC 27 – MW-24 Bench
Soil Engineering Evaluation/Cost Analysis
PG&E Topock Compressor Station, Needles, California

Location	Potential Action Area	Date	Depth (ft bgs)	Sample Type	Chromium, Hexavalent	Chromium, total	Copper	Lead	Mercury	Molybdenum	Zinc	[a] TEQ Human [b] TEQ Mammal
					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ng/kg)
	Removal Action Goal (RAG) <2 ft bgs :				3.1	145	145	36	1	22	1,050	a 100
	Removal Action Goal (RAG) 2 to 10 ft bgs :				31	145	145	36	1	22	1,050	b 190
AOC27-6	AOC27 PAA #1	02/29/16	0 - 1	N	0.87 J	43	500	630	0.51	8.3	700	120
		02/29/16	2 - 3	N	4.8	24	76	37	0.26	ND (1)	130	32
		02/29/16	5 - 6	N	ND (0.21)	39	18	51	0.14	ND (1)	92	6.9
AOC27-7	AOC27 PAA #1	02/29/16	0 - 1	N	2.7	150	580	170	0.32	11	420	110
		02/29/16	2 - 3	N	4	290	1,000	570	0.95	26	1,300	230
		03/01/16	5 - 6	N	0.5	16	9.8	2.6	ND (0.1)	ND (1)	38	4.3
AOC27-8	AOC27 PAA #1	03/01/16	1 - 2	N	0.49	20	29	24	0.17	ND (1)	93	33
		03/01/16	5 - 6	N	ND (0.2)	17	15	6.1	ND (0.1)	ND (1)	45	2.8
AOC27-9		03/08/16	0 - 1	N	ND (0.2)	13	8.2	2.5	ND (0.1)	ND (1)	30 J	5.3
		03/08/16	0 - 1	FD	ND (0.2)	14	14	5.9	ND (0.1)	ND (1)	38 J	---
		03/08/16	2 - 3	N	ND (0.2)	14	8.3	3.7	ND (0.1)	ND (1)	35	2
		03/08/16	5 - 6	N	ND (0.2)	15	11	2.7	ND (0.1)	ND (1)	36	1
		03/08/16	9 - 10	N	ND (0.2)	11	7.8	1.6	ND (0.1)	ND (1)	28	---
PA-13		01/27/16	0 - 1	N	0.26	15	12	5.8	ND (0.1)	ND (1)	45	---

Notes:

Results greater than or equal to the Removal Action Goal are circled.

---	not analyzed
FD	field duplicate
ft bgs	feet below ground surface
J	concentration or reporting limit estimated by laboratory or data validation
mg/kg	milligrams per kilogram
N	primary sample
ND	not detected at the listed reporting limit
ng/kg	nanogram per kilogram
TEQ	dioxin and furans toxicity equivalent quotient

Appendix B
Project Health, Safety, and Environment Plan

This Project Health, Safety, and Environment Plan is site-specific and contains proprietary information. Hard copy available to site staff

Appendix C
Transportation Plan

PG&E Topock Compressor Station, Needles, California

Appendix C
Transportation Plan for
Soil Non-Time-Critical Removal Action

June 2022

Pacific Gas and Electric Company

PG&E Topock Compressor Station, Needles, California

Project No:	D31084AS.A.CS.EV.TM.02
Document Title:	Appendix C: Transportation Plan for Soil Non-Time-Critical Removal Action
Document No.:	FES0726211631BAO
Revision:	Final
Date:	June 2022
Client Name:	Pacific Gas and Electric Company
Project Manager:	Keith Sheets
Author:	Mike Reynolds
File Name:	Topock_NTCRA_AppC_Transportation Plan_Final_06152022

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Contents

Figures

Acronyms and Abbreviations

Acronyms	Definitions
AOC	Area of Concern
CCR	California Code of Regulations
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
DOI	U.S. Department of the Interior
DTSC	California Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
H&SC	Health and Safety Code
mg/kg	milligrams per kilogram
NTCRA	Non-Time-Critical Removal Action
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
SWMU	Solid Waste Management Unit
TCS	Topock Compressor Station

1. Introduction

The United States Department of the Interior (DOI) issued an Action Memorandum entitled "Request for a Non-Time-Critical Soil Removal Action at Areas of Concern and Solid Waste Management Units, Pacific Gas and Electric Topock Compressor Station" (DOI 2021). DOI's Action Memorandum directed Pacific Gas and Electric Company (PG&E) to implement a Soil Non-Time-Critical Removal Action (NTCRA) at the Topock Compressor Station (TCS) in Needles, California. The Soil NTCRA, which is being conducted in accordance with the Comprehensive Environmental Response, Compensation and Liability Act, is intended to address the release or substantial threat of a release of hazardous substances from the TCS to the Havasu National Wildlife Refuge. Previous environmental investigations determined that there are specific areas outside of the TCS where concentrations of constituents of potential concern to humans (COPCs) and constituents of potential ecological concern (COPECs) significantly exceed background values or ecological and human health screening levels. These areas are located within or adjacent to active desert washes subject to potential scouring during rain events that could move contamination toward the Colorado River or spread the contamination footprint over a larger area.

The scope of the Soil NTCRA is limited to the removal of contaminated soil and debris including white powder and black sandy material on federal land or in locations where constituents have the potential to migrate to federal land. The removal action will be conducted in the following areas identified in the Action Memorandum: Solid Waste Management Unit (SWMU) 1, Area of Concern (AOC) 1, AOC 9, AOC 10, AOC 11, AOC 14, AOC 16, and AOC 27.

COPCs and COPECs for the Soil NTCRA include hexavalent chromium, total chromium, copper, lead, mercury, molybdenum, zinc, and dioxin/furans.

All wastes generated during the Soil NTCRA will be transported by a qualified (licensed/registered and insured) waste hauler in covered trucks under manifests or proper shipping documents to permitted disposal facilities. This Transportation Plan is intended to provide the protocol and procedures for the preparation, loading, transportation, and documentation of all transportation-related activities during the removal action. The plan covers the following activities:

a. Transportation of hazardous and non-hazardous wastes from the project site in accordance with all applicable federal, state, and local laws, regulations, and ordinances.

b. Compliance with all applicable regulations related to transportation of waste materials to protect public health and safety.

c. Compliance with PG&E requirements for spill prevention and traffic safety.

d. Transportation of all waste materials in a manner that prevents the release of any waste to areas outside of the approved disposal facilities.

e. Disposal of waste materials after profiling and receipt of written acceptance from the permitted disposal facilities.

f. Identification of staging areas and site access routes that will minimize disruption to station operations and prevent spills.

g. Implementation of a site-specific health and safety plan as outlined in Appendix B of the Soil NTCRA Work Plan (Jacobs 2021) and compliance with all approved project procedures to prevent or minimize the occurrence of accidents, spills, or worker exposure to hazardous materials.

2. Waste Characterization and Quantity

2.1 Waste Profile

The site-specific COPCs and COPECs include hexavalent chromium, total chromium, copper, lead, mercury, molybdenum, zinc, and dioxin/furans. Waste characterization procedures and required laboratory analyses are outlined in the Soil NTCRA Work Plan. Approval or acceptance by the disposal facilities will be obtained before the removal action begins.

If the waste material is designated as a hazardous waste, the Contractor will use a new U.S. Environmental Protection Agency (EPA) generator ID number, different from PG&E TCS or IM3 EPA generator ID numbers, for waste manifesting. If the waste material is designated as a non-hazardous waste, the Contractor will use EPA generator ID number CAR000181560, or directed otherwise by PG&E, for waste manifesting.

2.1.1 RCRA Hazardous Waste

Resource Conservation and Recovery Act (RCRA) hazardous waste is regulated under both the (federal) RCRA and the California Health and Safety Code (H&SC). The RCRA regulatory levels for D-wastes, using the Toxicity Characteristic Leaching Procedure, are listed under the California Code of Regulations, Title 22 Section 66261.24(a)(1) (22 CCR 66261.24(a)(1)).

2.1.2 Non-RCRA Hazardous Waste

Non-RCRA Hazardous Waste is regulated only under the H&SC and Title 22 of the CCR. The Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) values for the chemicals of concern are listed under 22 CCR Section 66261.24(a) (2).

2.1.3 Non-Hazardous Waste

H&SC Section 25157.8 prohibits the disposal of any waste containing total lead in excess of 350 milligrams per kilogram (mg/kg), copper in excess of 2,500 mg/kg, or nickel in excess of 2,000 mg/kg to land other than to a Class 1 disposal facility in California. For example, waste soils containing lead at 500 mg/kg may not be hazardous waste based on STLC results; however, these waste soils must be disposed of at a Class 1 disposal facility.

2.1.4 Asbestos Containing Materials

The DTSC classifies asbestos-containing material as hazardous waste if it is “friable” and contains one percent (1.0%) or more asbestos. A friable waste is one that can be reduced to a powder or dust under hand pressure when dry. This classification standard is defined in 22 CCR 66261.24. Because the EPA does not regulate asbestos-containing material as hazardous waste under RCRA, it is considered to be a “non-RCRA,” or “California-only” hazardous waste. DTSC considers non-friable bulk asbestos-containing waste to be nonhazardous regardless of its asbestos content; as such, it is not subject to regulation under Title 22, Division 4.5, of the CCR. Any excavated soil designated for offsite disposal that contains greater than 1% by weight of asbestos will be disposed of at a disposal facility permitted to accept such waste.

3. Requirements for Transporters

All transporters of waste materials will comply with the following procedures and requirements during the Soil NTCRA.

3.1 Shipping Documents

Waste will be managed either as hazardous or non-hazardous 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 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 Waste Shipped

The Contractor's designated personnel on site will maintain a copy of all shipping document for each truckload of excavated soil, waste, or fill material until completion of the removal action.

3.2 License and Insurance

The selected haulers or transporters shall be licensed and insured in both the shipping and receiving states, and in any states through which the waste will be transported. Hazardous wastes must be shipped by a registered hazardous waste hauler. The Contractor will verify the status of registration and insurance policy of the selected transporters.

3.3 Contingency Plan

Each transporter is required to have a written contingency plan for PG&E review and approval to address the following conditions:

a. Emergency situations (vehicle breakdown, accident, waste spill, waste leak, fire, explosion, etc.) during transportation of waste from the site to the destined disposal facility;

b. Change in the volume and condition of the waste;

c. Change in waste characteristics and condition; or

d. Inclement weather.

The contingency plan shall be prepared in accordance with DTSC's guidance for transportation plans for site remediation (DTSC, 1994). After the transporter is selected, a copy of its contingency plan will be made a part of this Transportation Plan.

4. Traffic Control

Traffic control procedures and requirements to be implemented during the Soil NTCRA include the following:

4.1 Traffic Control

Speed Limit: While travel on unpaved roads, all vehicles are required to maintain slow speeds, e.g., less than 10 miles per hour for safety purposes and for dust control. While on paved roads or freeways, all transporters will follow the posted speed limits and apply defensive driving techniques (over traffic or road conditions) for traffic safety.

Site Access Control: All trucks shall 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 Site. The

Contractor's designated personnel will be available at the staging area just off I-40 and Park Moabi road to inspect and approve vehicles, then assist the truck drivers to safely enter and depart the Site.

Truck Staging Area: Empty waste bins will be inspected by the Contractor to confirm cleanliness prior to being off-loaded at the designated locations, as directed by the flagger. Truck loading will be coordinated so as to avoid staging offsite and long wait times for trucks; idling will be minimized to avoid unnecessary exhaust fumes.

I-40 Lane Closure: Removal actions at AOC 14 Target Action Area #1 will require closure of the shoulder and a westbound lane of I-40. A lane closure plan with Caltrans will be required during permitting of the Soil NTCRA.

4.2 Transportation Routes

TCS Routes: PG&E Remediation Site Operations Manager will coordinate access to and travel within the TCS with TCS. If needed, general highway trucks will enter and exit the TCS through the main gate along National Trails Highway. Prior to entering the site, trucks will be visually inspected at the staging area (off I-40 and Park Moabi Road) for fuel or oil leaks. Figure 1 illustrates the proposed traffic routes near the TCS and throughout the Work Area. Appropriate signage will be developed to control traffic flow.

Work Area Routes: Transportation within the Work Area will be along approved routes shown in Figure 1. The Work Area includes both on and off highway roads. Travel on public roadways will follow all applicable traffic laws. Appropriate signage will be placed in high traffic areas on private property.

Offsite Routes: Transportation of wastes from the Work Area to the approved disposal facility in Beatty Nevada and Parker Arizona will follow the designated route shown in Figure 2. Road conditions and access restrictions will be determined prior to each shipment.

4.3 Dust Control

Waste for offsite disposal will be transported in covered end-dump trailers/trucks, drums, or roll-off bins to reduce dust during transport. All waste hauler vehicles will be decontaminated to remove soil and debris from the exterior prior to leaving the work area.

4.4 Truck Inspection and Cleaning

After loading the trucks, the Contractor is responsible for ensuring trucks are clean prior to leaving the work zone. A cleanout station (for example, rumble track, ground liner, dry decontamination brushes, elevated work platform, etc.), will be maintained by the Contractor for inspection and truck cleaning prior to transport to the landfill. If wet decontamination is warranted, a secondary containment pad will be used to contain wash water. Best management practices in accordance with the BMP Plan will be implemented to prevent runoff and discharge to land.

5. Landfill Disposal Facilities

Based on the results of waste profiling and classification, waste material will be transported under waste manifests or proper shipping documents to a permitted offsite disposal facility. Once the disposal facility has provided written acceptance, copies of waste profile reports will be provided to DOI. Compliance with the land disposal restrictions, as necessary, will be documented and provided to DOI after receipt of written acceptance from the disposal facility.

All hazardous wastes will be properly managed, manifested, and transported by a DOT registered and California registered hazardous waste hauler to a proper waste management facility.

5.1 RCRA Hazardous Waste Facilities (Class I)

All RCRA hazardous wastes will be disposed of in a Class 1 hazardous waste disposal facility permitted to accept such wastes. RCRA hazardous waste generated during the Soil NTCRA will be transported to the following facility for disposal:

US Ecology Inc
Highway 95, 11 miles South of Beatty
Beatty, Nevada 89003
Phone: 1.800.239.3940

5.2 Non-RCRA Hazardous Waste Facilities (Class I or II)

A non-RCRA hazardous waste is a California-only hazardous waste. When an asbestos-containing waste is regulated as non-RCRA hazardous waste, it may be disposed of at a California Class 2 landfill or an out-of-state Class 3 landfill (permitted to accept such wastes). All other non-RCRA hazardous wastes will be disposed of at a California Class 1 land disposal facility or an out-of-state Class 3 landfill permitted to accept such wastes. Non-RCRA hazardous waste generated during the Soil NTCRA will be transported to one or both of the following facilities for disposal:

Republic Services, Inc.
26999 AZ-95
Parker, AZ 85344
(928) 669-8886

US Ecology Inc.
Highway 95, 11 miles South of Beatty
Beatty, Nevada 89003
Phone: 1.800.239.3940

5.3 Nonhazardous Waste Facilities (Class I or II)

Waste classified as non-hazardous will be transported to a Subtitle D landfill for disposal. Nonhazardous waste generated during the Soil NTCRA will be transported to one or both of the following facilities for disposal:

Republic Services, Inc.
26999 AZ-95
Parker, AZ 85344
(928) 669-8886

US Ecology Inc.
Highway 95, 11 miles South of Beatty
Beatty, Nevada 89003
Phone: 1.800.239.3940

5.4 Land Disposal Restriction

Land Disposal Restrictions ensure that toxic constituents present in hazardous waste are properly treated before hazardous waste is disposed of to land. Some wastes may require mandatory technology-based treatment before disposal. Agreements between PG&E and the approved facility or landfill will be made prior to transporting the waste to the facility.

6. Documentation

The Contractor will be responsible for maintaining proper documentation of all waste removal and transportation and site restoration activities.

6.1 Photographs

Photographic documentation representative of activities with particular attention to compliance with this Transportation Plan and the NTCRA Work Plan will be collected by the contractor throughout the course of the project.

6.2 Field Log Book

The Contractor will be responsible for maintaining a field logbook to document observations, transporter's personnel on-site, truck arrival and departure times, and other vital project information.

6.3 Truck/Equipment Inspection Log Book

All trucks and equipment used in project activities will be inspected daily and prior to entering and leaving the Site. A log book will be kept to document thorough and complete inspections.

6.4 Weekly Reports

The Contractor will summarize the transportation activities and accomplishments of each week in a weekly report. The weekly report will also include the completion status of all project objectives, verify the Contractor's adherence to proper site health and safety procedures, and describe the following week's activities and goals. The weekly reports will be submitted to PG&E by the following Wednesday.

7. Plan Review Corrective Actions

7.1 Plan Update Log

This Transportation Plan is a "living document" that will be updated as needed based on changed project circumstances or lessons learned that may occur during execution of the project. The Contractor will keep a log of all updates to the Transportation Plan, recording written acknowledgment of any changes or additions. Updates to the Transportation Plan should be approved by DOI prior to implementation.

7.2 Corrective Action Log

The Contractor will keep a log of all corrective actions taken to accomplish project objectives.

8. References

California Department of Toxic Substances Control (DTSC). 1994. *Transportation Plan. Preparation Guidance for Site Remediation*. May.

United States Department of Interior. 2021. *Request for a Non-Time Critical Soil Removal Action at Areas of Concern and Solid Waste Management Units*, Pacific Gas and Electric, Topock Compressor Station. October.

Figures

Figure 1
Soil NTCRA Transportation Routes
Transportation Plan for Soil NTCRA
PG&E Topock Compressor Station, Needles, California

Jacobs

Figure 2
Soil NTCRA Disposal Facility Transportation Route
Transportation Plan for Soil NTCRA
PG&E Topock Compressor Station,
Needles, California

Appendix D
Best Management Practices Plan

PG&E Topock Compressor Station, Needles, California

Appendix D
Best Management Practices Plan for Soil Non-Time-Critical Removal Action

June 2022

Pacific Gas and Electric Company

PG&E Topock Compressor Station, Needles, California

Project No:	D31084AS.A.CS.EV.TM.02
Document Title:	Appendix D Best Management Practices Plan for Soil Non-Time-Critical Removal Action
Document No.:	FES0726211631BAO
Revision:	Final
Date:	June 2022
Client Name:	Pacific Gas and Electric Company
Project Manager:	Keith Sheets
Author:	Mike Reynolds
File Name:	Topock_NTCRA_AppD_BMP Plan_Final_06162022

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Acronyms and Abbreviations

Acronyms	Description
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirement
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
SMART	Stormwater Multiple Application and Report Tracking System
SOP	Standard Operating Procedure
SWPPP	Stormwater Pollution Prevention Plan
TCS	Topock Compressor Station

1. Introduction

This Best Management Practices (BMPs) Plan for the Soil Non-Time-Critical Removal Action (NTCRA) at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station (TCS) in Needles, California has been prepared in compliance with applicable or relevant and appropriate requirements (ARARs) #37 and #44 established in the Soil Engineering Evaluation/Cost Analysis (EE/CA) (Jacobs 2021). ARAR #37 requires the implementation of BMPs for stormwater runoff that comes in contact with soil removal activities (>1 acre of ground disturbance). ARAR #44 requires the implementation of fugitive dust control measures during construction.

This BMPs Plan has been prepared to meet the above requirements and has been prepared in accordance with the substantive criteria of the California General Permit for construction activities in San Bernardino County, California and the substantive criteria of the Mohave Desert Air Quality Management District Rule 403 – Fugitive Dust.

Because the Soil NTCRA is part of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action, removal action activities conducted onsite are covered under the permit exemption codified in CERCLA Section 121(e)(1). While the permit exemption applies to the administrative or procedural elements (preparing and submitting permit applications and obtaining permits), the substantive requirements of applicable laws remain.

This BMPs Plan has been prepared by a Qualified Stormwater Pollution Prevention Plan (SWPPP) Developer (QSD) and will be implemented under the direction of a Qualified SWPPP Practitioner (QSP). A summary of key BMPs identified for the Soil NTCRA is presented in Section 2.0; inspection, monitoring, corrective actions, reporting, and recordkeeping information for the BMPs Plan is presented in Section 3.0.

The PG&E Construction Manager and appropriate Contractor team members will have control over day-to-day activities and will implement this BMPs Plan under the direction of the QSP (Section 3.7 of this plan contains additional details on the BMPs project team).

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2. Best Management Practices for Soil Non-Time Critical Removal Action

This section provides a summary of the BMPs to be implemented during the Soil NTCRA. Figures 2-1 through 2-4 show the site topography and inferred surface water flow, as well as the proposed erosion control BMPs for each major work area.

Consistently with current site practice, BMPs will be inspected daily (during workdays) by designated inspectors. Contractors will repair or correction any identified BMP deficiencies will be initiated within 72 hours of notification.

2.1 Erosion Control BMPs

2.1.1 Preservation of Existing Vegetation

Existing vegetation will be preserved to the maximum extent practicable to facilitate protection of surfaces from erosion and help control sediments. Throughout the planning process, efforts have been made to locate NTCRA facilities along previously disturbed areas to avoid impacts to vegetation. Existing vegetation will be preserved whenever feasible during clearing and grubbing or other soil-disturbing activities. In the event that existing vegetation needs to be disturbed, areas that need to be preserved will be identified by a qualified biologist in accordance with the Soil NTCRA Work Plan and marked with temporary fencing.

Contractors and subcontractors will be informed of the limits of disturbance within the construction site and will be instructed to keep clear of vegetation to be preserved.

2.1.2 Access Road Maintenance

No new access roads will be required for the Soil NTCRA, only existing roads will be used. Road maintenance may be required during the NTCRA to ensure access to the work area. Ongoing road maintenance will include:

1. Visual inspections to identify areas of erosion
2. Localized road repair and regrading, installation, and maintenance of erosion control features such as berms,silt fences, or straw wattles
3. Grading for road smoothness
4. Measures to reduce water erosion such as clearing ditches and culverts of debris will be performed as needed to reduce potential for erosion

2.2 Sediment Control BMPs

2.2.1 Silt Fence

Silt fences are perimeter controls, typically used in combination with sediment basins and sediment traps, as well as erosion controls, which are designed to retain sediment in place where soil is being disturbed by construction processes. They are also placed downslope of areas where sheet flows discharge from the site. They could also be used as interior controls downslope of disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas. Silt fences are most effective when used in combination with erosion controls along the perimeter of a project, below the toe or downslope of exposed and erodible slopes, along streams and channels, around temporary spoil areas and stockpiles, and below other small cleared areas, including spoils that have been treated by soil stabilizer (e.g., Soiltac).

2.2.2 Fiber Rolls/Sediment Wattles

These consist of aspen wood excelsior, straw, flax, or other similar materials rolled and bound into tight tubular rolls and placed on the face of slopes at regular intervals, depending on steepness of slopes, to intercept runoff and reduce flow velocity. Rolls/wattles will be installed prior to start of soil removal 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 sandbags are preferred; however, fiber rolls can be used and secured with gravel or sandbags. The fiber rolls/sediment wattles will be inspected prior to a forecasted rain event and after rain events to ensure the fiber rolls are working properly. Sediment accumulated by the fiber rolls will be removed to maintain the effectiveness of the fiber rolls. Sediment accumulated behind the fiber rolls will be removed and transported to the Soil Processing Yard for management with other potentially contaminated soil.

2.2.3 Gravel Bag Berm

Gravel bag berms can be used as an alternative to fiber rolls and sediment wattles. If used, they will be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. The QSP will determine whether gravel bags will be placed along the upgradient side of equipment not in use. Gravel bags will also be used, if necessary, during excavation activities when stockpiles are onsite. In the event that gravel bag berms are used as perimeter erosion control, bags will be stacked, one on top of the other (two high). When used to anchor stockpiles, the bags will be placed one high.

2.2.4 Sandbag Berm

Sandbag berms can also be used as an alternative to fiber rolls and sediment wattles. If used, they will be installed prior to rain events to form a barrier to intercept runoff or reduce its velocity. The purpose is to allow sediment to settle from runoff before water leaves the construction site. Sandbags will also be used, if necessary, during excavation activities when stockpiles are left overnight. In the event that sandbag berms are needed, they will be placed around the staging area and excavation area.

2.2.5 Straw-bale Barrier

Straw-bale barriers can also be used as an alternative to fiber rolls, gravel bag berms, and sandbag berms. Straw-bale barriers intercept and slow down sheet-flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions, allowing sediment to settle. Straw-bale barriers also interrupt the slope length, thereby reducing erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills and ultimately gullies, into disturbed, sloped soils.

2.3 Waste and Materials Management Control BMPs

2.3.1 Material Delivery and Staging

Proper delivery and staging of materials will be implemented to ensure minimal discharge or elimination of discharge of these materials to the storm drain systems or waterways. Construction materials and equipment will be parked in the staging area. Employees and subcontractors will be trained on proper material delivery and staging practices. Material Safety Data Sheets (SDSs) will be supplied for materials stored or used onsite. Instructions on proper storage of materials will be posted in a conspicuous location. An inventory of materials delivered and staged will be maintained onsite.

2.3.2 Material Use

Proper use of materials will be implemented to ensure minimal or complete elimination of discharge to the storm drain systems or waterways. SDSs will be supplied for materials used. Spill cleanup materials or kits will be kept near the construction and staging areas. Leaks and spills will be cleaned up, tested, and disposed of accordingly. Contractors and subcontractors will be informed on the practices and procedures and must implement these procedures throughout the project.

2.3.3 Stockpile Management

Stockpile management procedures and practices are implemented to reduce or eliminate pollution to the air and stormwater from materials that are stockpiled. Stockpile protection is required year-round. Stockpiles will be located in the primary work zone or 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, sandbags, straw bales, and/or polymer soil stabilizer products.

Stockpiling will not be allowed within 150 feet of the high water mark of the waters of the State or US. This is to prevent substances that could be hazardous to aquatic life or water from entering the waterways.

Excavated soil and debris will be temporarily stockpiled within the target action area (TAA) or transferred directly to haul trucks for transport to a waste management area. Significant stockpiling at individual TAAs is not anticipated, but if required, individual stockpiles will follow the requirements presented below. However, no bottom liner will be required if the stockpile is located within the extent of the TAA on potentially contaminated soil that is slated for removal.

Additional stockpile management BMPs for categories of soil generated during the Soil NTCRA consistent with the Soil Management Plan are presented below.

RCRA and non-RCRA Hazardous Soil

Temporary stockpiling of Resource Conservation and Recovery Act (RCRA) and non-RCRA hazardous waste/soil will be conducted using the following BMPs:

- Stockpiles will be constructed with liners and perimeter berms to prevent release or infiltration of liquids.
- Wind erosion will be prevented by use of a cover, applying Soiltac or other pre-approved soil stabilization product, or other suitable means.
- The perimeter berm will be constructed of clean materials (such as straw wattle under the liner).
- If a cover is employed, it shall extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the stockpile.
- Covers and perimeter berms will be secured in place when not in use and at the end of each workday and as necessary to prevent wind dispersion or 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 frequently and after storms to verify that controls for windblown dispersion and prevention of runoff and run-on are functioning properly.
- If the stockpiling BMPs listed here are ineffective at containing hazardous soil and debris, then roll-off bins with covers may be necessary.
- After the stockpile has been removed, the area will be inspected and any residual material shall be removed from the underlying and surrounding areas.

Nonhazardous Soil above Soil Management Screening Levels

Soil above approved soil management screening levels can be stockpiled if placed on liner or placed in roll-off bins or similar containers. The following BMPs will be followed:

- Stockpiles will be constructed with liners and perimeter berms to prevent release or infiltration of liquids.
- Wind erosion will be prevented by use of a cover, applying Soiltac, a pre-approved soil stabilization product, or other suitable means.
- The perimeter berm will be constructed of clean materials (such as straw wattle under the liner).
- If a cover is employed, it will extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the bermed area.
- Covers and perimeter berms will be secured in place when not in use, at the end of each workday, and as necessary to prevent wind dispersion or runoff from precipitation events.
- Liquids that accumulate inside the berm will be pumped from the stockpile to a container or tank for characterization and disposal.
- If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until the stockpiles are removed from the site.
- Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind-generated particulate matter.
- After the 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 that are non-hazardous, clean, and suitable for reuse will be stockpiled following these BMPs:

- Prevent wind erosion by use of a cover, applying Soiltac, a pre-approved soil stabilization product, or other suitable means.
- Construct a perimeter berm with straw wattle. No plastic liner is required.
- 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 as necessary to prevent wind dispersion or run off from precipitation events.
- If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until the stockpiles are removed from the site.
- Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind-generated particulate matter.
- After the stockpile has been removed, covers and erosion control materials, if any, will be removed from the underlying and surrounding areas.

2.3.4 Spill Prevention and Control

Spill prevention and control procedures and practices will be implemented in conjunction with the Waste Management Plan (Appendix F of the Work Plan to which this BMPs Plan is Appendix D) to prevent and control spills any time chemicals and/or hazardous materials are staged on the work site. Implementation of these procedures will minimize or prevent the discharge of spilled material into the drainage system or watercourses. Leaks and spills will be cleaned up to the extent possible, characterized, and disposed of properly. Leaks and spills will not be covered and/or buried or washed with water. Kits with appropriate spill response equipment will be kept near the construction and staging areas. The materials used for cleaning will be collected and disposed of in accordance with BMPs. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as non-hazardous.

2.3.5 Sanitary/Septic Waste Management

Sanitary/septic waste management procedures and practices are implemented at work sites when a temporary or portable sanitary/septic waste system exists. Sanitary facilities will be located away from drainage facilities, waterways, and from traffic circulation. In the event of high winds or a risk of high winds,temporary sanitary facilities will be secured to prevent overturning. Wastewater will not be discharged or buried. Waste will be removed and disposed of offsite. Regular waste collection should be arranged before facilities overflow. The sanitary facility will be located a minimum of 50 feet away from drainage facilities and away from waterways and traffic circulation.

2.3.6 Liquid Waste Management

Liquid waste or wastewater will be containerized, and the containers will be placed inside temporary secondary containment. Examples of secondary containment for containers are durable plastic liner with L-brackets or thick plastic liner with fiber rolls. The secondary containments will be inspected frequently (e.g., daily during workdays) for leaks or breach. No discharge of wastewater to land (including dust control) is allowed.

2.4 Wind Erosion Control BMPs

To comply with ARAR #44, wind erosion control will be applied as necessary to prevent fugitive dust and to minimize the movement of sediment disturbed during soil removal. The project site will be watered periodically with a water truck for short-term stabilization of disturbed surface areas, including haul roads, to minimize visible fugitive dust emissions during dust episodes.

A water truck also will be used to control dust on disturbed surfaces during visible dusting episodes. Water application rates will be optimized to the greatest practical extent while still maintaining dust control but controlling runoff from affected material. Water may be applied as a pre-wetting step or may be used during soil removal activities. Loaded haul vehicles will be covered on all transportation routes. Graded sites will be stabilized using soil binders, as necessary, upon completion of grading when subsequent development is delayed or is expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface area to eliminate visible fugitive dust emissions. Nonessential earthmoving activities will also be curtailed or reduced under high wind conditions (sustained winds greater than 25 miles per hour).

2.5 Tracking Control BMPs

A temporary construction entrance is defined as a stabilized point of entrance/exit to a construction site to reduce the tracking of mud and dirt onto private or public paved roads by construction vehicles. A temporary construction entrance will be established at applicable paved intersections and entry points to prevent sediment tracking. The temporary construction entrance will be inspected routinely. Consistent with current site management practices, project-related track-out or spills on transportation routes beyond Area of Concern (AOC) boundaries will be cleaned up within 24 hours.

2.6 Non-stormwater BMPs

2.6.1 Water Conservation Practices

Water conservation practices will be implemented during the removal action to avoid causing erosion and transporting pollutants offsite. With one exception, washing of vehicles and equipment is prohibited at the work site. The exception is when washing with water is determined to be necessary for decontamination of vehicles/equipment. Application of water for dust control shall not cause run-offs. Contractors and subcontractors will be informed on the requirements of water conservation practices and will be required to implement the practices.

2.6.2 Illicit Connection/Illegal Discharge Detention Reporting

Illicit connections are connections that could convey anything not composed entirely of surface and storm water directly to the storm drainage system or a water body. Illicit connection and illegal discharge detection and reporting will be implemented. Illicit connections or illegally dumped or discharged materials on the construction site will be reported to the PG&E Site Operations Manager at the time of discovery. The site will be inspected regularly for evidence of illicit connections or illegal dumping or discharges. The Contractor's Onsite Supervisor will report instances to the PG&E Site Operations Manager immediately after he or she learns of them. Contractors and subcontractors will be informed on the practices and will be required to implement the practices throughout the project.

2.6.3 Vehicle and Equipment Fueling

Vehicle and equipment fueling policies/procedures will be implemented to minimize or eliminate discharge of pollutants associated with fueling to storm drain systems or watercourses (see Attachment 1, SOP-02 for Safe Fueling and Fuel Handling Policy). Contractors are required to prepare and submit fueling plans for approval by PG&E prior to refueling.

Onsite refueling will be used where it is impractical to send vehicles and equipment offsite for fueling. Fueling will only occur onsite over proper secondary containment. Fuel areas will be kept clean using dry cleanup methods, such as sweeping or using rags and absorbents for leaks and spills, and will be covered to prevent contact with stormwater. Contractors and subcontractors will be informed of the vehicle and equipment fueling practices, trained, and required to implement them. Spill kits and absorbent spill cleanup materials will be available in fueling areas and on fueling trucks.

2.6.4 Vehicle and Equipment Maintenance

Vehicle and equipment maintenance procedures will be used to minimize or eliminate the discharge of pollutants to storm drain systems or watercourses when onsite vehicle and equipment maintenance is necessary. For open road vehicles, offsite maintenance facilities will be used whenever possible. Onsite vehicle maintenance, allowed only in emergencies, will occur with proper spill control and containment. The emergency maintenance area will be located at least 50 feet from downstream drainage facilities and waterways and will be protected from stormwater runoff and onsite flooding. Employees and subcontractors will be informed of the procedures and practices and will be required to implement these practices.

2.7 Good Housekeeping BMPs

Good housekeeping measures will be implemented onsite for the duration of the project and include the following:

- Store chemicals in watertight containers (with appropriate secondary containment) in a completely enclosed storage cabinet, trailer, or sealed drums shed to prevent spillage and leakage.
- Minimize exposure of construction materials to precipitation.

- Minimize windblown trash/plastic and provide trash receptacles that are emptied regularly.
- 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.
- Prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters.
- Immediately clean up leaked material and dispose of properly.
- Establish and maintain effective perimeter controls and stabilize construction entrances and exits to control erosion and sediment discharges from the site.
- Conduct regular stormwater tailgate meetings with the workforce when the project is staffed and work is underway.

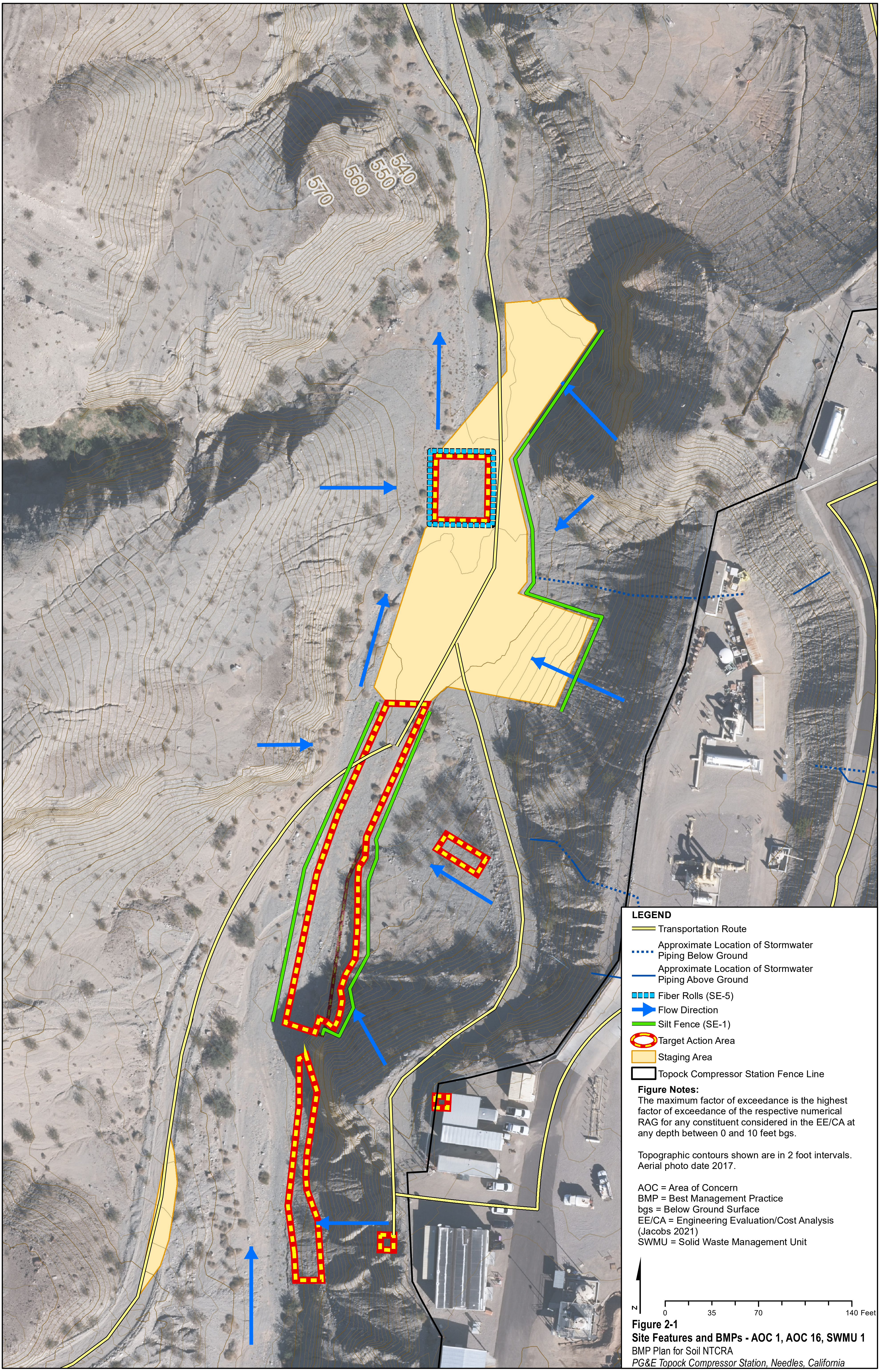


Figure 2-1
Site Features and BMPs - AOC 1, AOC 16, SWMU 1
BMP Plan for Soil NTCRA
PG&E Topock Compressor Station, Needles, California

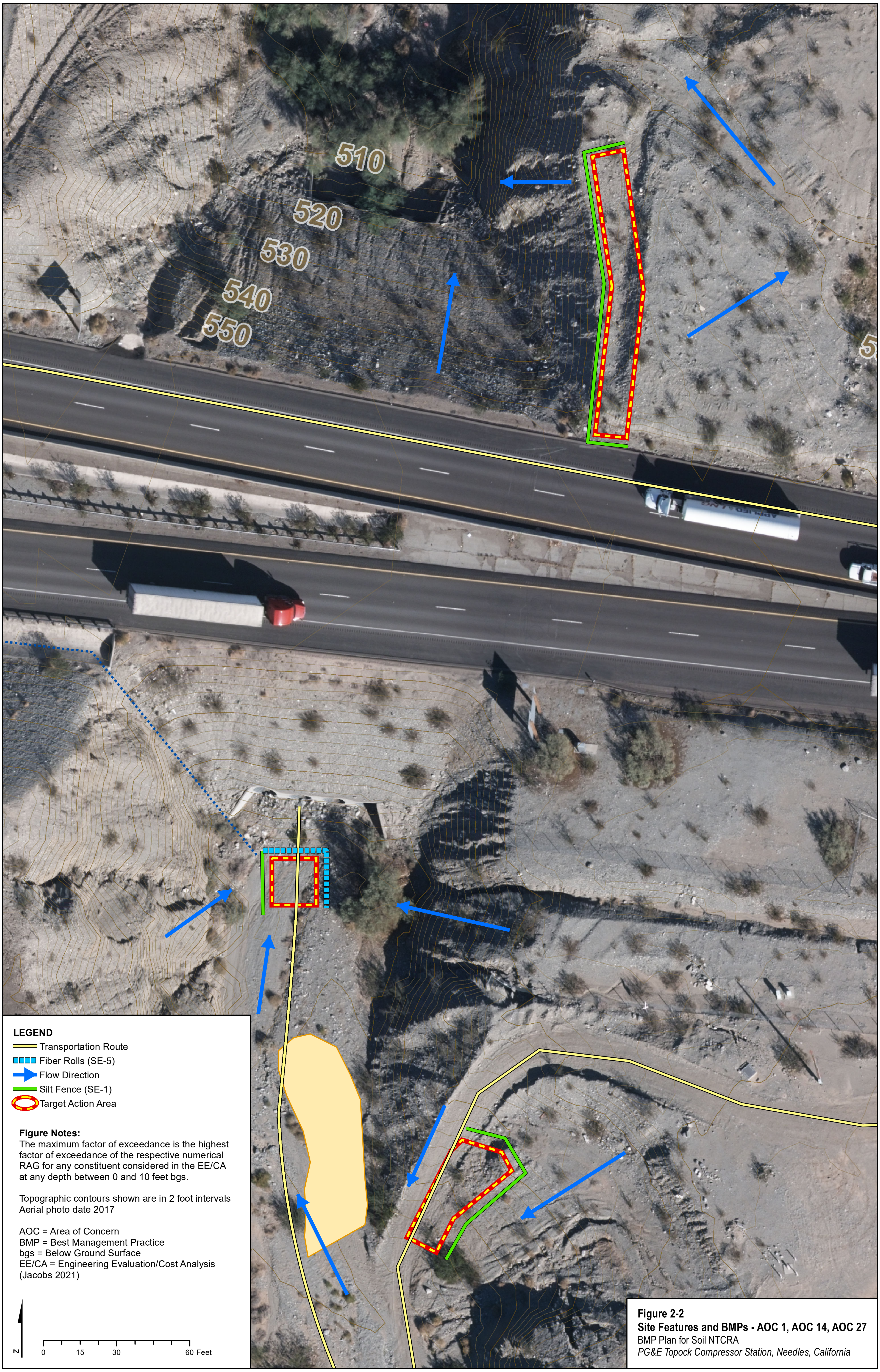


Figure 2-2
Site Features and BMPs - AOC 1, AOC 14, AOC 27
BMP Plan for Soil NTCRA
PG&E Topock Compressor Station, Needles, California

Figure 2-3
Site Features and BMPs - AOC 9, AOC 10, AOC 11
BMP Plan for Soil NTCRA
PG&E Topock Compressor Station, Needles, California

Figure 2-4
Site Features and BMPs - AOC 10
BMP Plan for Soil NTCRA
PG&E Topock Compressor Station, Needles, California

3. Visual Inspection, Monitoring for Nonvisual Pollutants, Reporting, Training, and Recordkeeping

This section discusses visual inspections, monitoring for nonvisual pollutants, reporting, worker training and education, and recordkeeping.

3.1 Visual Inspection after Qualifying Rain Event

In conformance with the substantive requirements of the California General Permit (Order No. 2009-0009-DWQ), visual inspections will be implemented to assess the effectiveness of BMPs and to modify those BMPs, if necessary, to continue to reduce pollutants and impacts on receiving waters. Anticipated activities associated with the inspections include the following:

- Visually inspect BMPs and stormwater discharges at discharge locations within 2 business days (48 hours) after each qualifying rain event (producing precipitation of 0.5 inch or more). The objectives are to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs accordingly.
- Visually inspect the discharge of stored or contained stormwater derived from and discharged subsequent to a qualifying rain event producing precipitation of 0.5 inch or more at the time of discharge. Stored or contained stormwater that will likely discharge after operating hours due to anticipated precipitation will be discharged during operating hours as necessary.
- Record the time, date, and rain gauge reading of qualifying rain events.
- Implement corrective actions, as appropriate.

Rain event inspections shall occur during working hours when it is safe to do so by the Construction Health and Safety Manager or designee. 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, electrical storms, or situations that otherwise make inspections unsafe. The inspection must resume as soon as conditions are safe. Results of the inspection and any corrective action performed will be documented and kept onsite. An example Inspection and Corrective Action Report Form is included in Attachment 2.

3.2 Visual Inspection for Non-stormwater Discharge

In addition, quarterly visual inspections will be conducted for non-stormwater discharge. The objective is to inspect for the presence of (or indications of prior) unauthorized and authorized non-stormwater discharges and their sources. Inspection records will include the personnel performing the visual observation (inspections), the dates and approximate time of the inspection, and the response taken to eliminate unauthorized non-stormwater discharges and to reduce or prevent pollutants from contacting non- stormwater discharges, if any.

3.3 Monitoring for Nonvisual Pollutants

Monitoring for nonvisual pollutants will be conducted to determine whether pollutants known to occur within the construction area and that cannot be visually observed or detected in stormwater discharges are being conveyed from the site by stormwater.

The QSP will develop and implement the sampling and analysis requirements prior to the start of construction to monitor for nonvisual pollutants associated with construction activities. These requirements may be modified as needed to meet the monitoring objectives. Sampling and analysis is only required where the QSP believes pollutants associated with construction activities have the potential to be discharged with stormwater runoff due to a spill or in the event there was a breach, malfunction, failure, and/or leak of a BMP. If sampling is required as determined by the QSP, samples will be collected downgradient from potential discharge locations in areas that can be safely accessed. In addition, a sample of stormwater that has not come into contact with disturbed soil or materials stored or used onsite (uncontaminated sample) will be collected for comparison with the discharge sample. These samples will be collected during the first 2 hours of discharge from rain events occurring during business and daylight hours and generating runoff.

Samples will be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required by the Construction General Permit which states:

> *Identify the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions(i.e., poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).*

3.4 Reporting

Annual reports include a summary and evaluation of sampling and analysis results, original laboratory reports, chain-of-custody forms, a summary of corrective actions taken during the compliance year, and compliance activities or corrective actions that were not implemented. Annual reporting is a requirement of permitted SWPPP documents, and reports are submitted electronically through the Stormwater Multiple Application and Report Tracking System (SMARTs). Because this is not a permitted SWPPP, the annual reports will not be submitted through SMARTs. The annual reports will be submitted to the U.S. Department of the Interior.

3.5 Workers Training and Education

Prior to the beginning of the removal action, workers will be trained on the overall stormwater 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 requiring stormwater management training after the start of the removal action will be provided training. Documentation of the training will be kept onsite.

3.6 Recordkeeping

The following records will be maintained onsite:

- This BMPs Plan and updates necessary to reflect current conditions and to maintain accuracy.
- Copies of relevant documents affecting the provisions or implementation of the BMPs Plan.
- Descriptions and dates of incidences of significant spills, leaks, or other releases pertaining to construction resulting in discharges of pollutants in stormwater to a regulated municipal separate stormwater system or to waters of the U.S., the circumstances leading to the release, and actions taken in response to the release and measures taken to prevent the recurrence of such releases.
- Documentation of maintenance, including repairs of structural control measures, including the date(s) of discovery of areas in need of repair/replacement, date(s) that the structural control measure(s) returned to full function, and the justification for any extended repair schedules. The maintenance records shall include the date(s) of regular maintenance.
- BMP inspection reports and corrective action report forms (Attachment 2).
- Annual reports.
- Training documentation.

3.7 Project Team

The project team members include:

- PG&E Site Operations Manager, David Diaz – Responsible for overall onsite operations, and primary point of contact for field activities at the site
- PG&E Construction Manager, TBD – Overall management of activities related to the Soil NTCRA program
- Construction Manager, TBD – Operational control over construction plans and specifications, management of construction contractors
- QSD, Gino Nguyen – Overall development and Implementation of this BMPs Plan
- QSP, Gino Nguyen – Implementation of BMPs in this plan, non-stormwater and stormwater visual observations, and sampling and analysis.
- Construction Contractor(s) TBD – Responsible for day-to-day activities

The 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 project to ensure project success.

Attachment 1
SOP-02 for 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.

Attachment 2
Inspection and Corrective Action Report Form

PG&E - LUP TYPE 1 BMP VISUAL INSPECTION CHECK LIST

Circle All That Apply:

LUP Type 1	Daily Site BMP	Pre-Storm Event Baseline	Daily Storm BMP	Post Storm
Visual Inspection	X	X	X	X
Photographic Records [1]		X	X	X

[1] Photo-documentation transmitted to QSD (stormwater@JacobsonJames.com)

Good Housekeeping for Construction Materials	Y	N	N/A
1. Inventory of products up to date.			
2. Stockpiled construction materials not actively in use are covered and bermed.			
3. All chemicals are stored in water tight containers with appropriate secondary containment.			
4. Construction materials are minimally exposed to precipitation.			
5. BMPs preventing the off-site tracking of materials are implemented and effective.			

Good Housekeeping for Waste Management	Y	N	N/A
1. Portable toilets are contained to prevent discharge of waste.			
2. Sanitation facilities are clean with no apparent leaks or spills.			
3. BMPs are in place to cover waste disposal containers at the end of the day and during rain events.			
4. Discharges from waste disposal containers are prevented from entering storm drain inlets or receiving waters.			
5. Stockpiled waste material is securely protected from wind and rain if not actively in use.			
6. Procedures are in place to address hazardous and non-hazardous spills.			
7. Appropriate spill response personnel are assigned and trained.			
8. Equipment and materials for spill clean-up are available onsite.			
9. Washout areas are contained appropriately to prevent discharge or infiltration to soil.			

Good Housekeeping for Vehicle Storage & Maintenance	Y	N	N/A
1. Measures are in place to prevent oil and fuel from leaking into ground, storm drain inlets, or surface waters.			
2. All equipment or vehicles are fueled, maintained, and stored in designated areas with appropriate BMPs.			
3. Vehicle and equipment leaks are cleaned immediately and disposed of properly.			

Good Housekeeping for Landscape Materials	Y	N	N/A
1. Stockpiled materials such as mulches and topsoil are contained and covered when not in use.			
2. Erodible landscape materials have not been applied 2 days prior to a forecasted rain event.			
3. Erodible landscape materials are applied at quantities and rates with manufacturer recommendations.			
4. Bagged erodible landscape materials are stored on pallets and covered.			

Non-Stormwater Management	Y	N	N/A
1. Non-Stormwater discharges are properly controlled.			
2. Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems.			
3. Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			

SWPPP	Y	N	N/A
1. The project SWPPP and BMP plans are up to date, available on-site and properly implemented.			

Erosion Controls	Y	N	N/A
1. Wind erosion controls are effectively implemented.			
2. Effective soil cover is provided for disturbed areas that are inactive as well as finished slopes, open space, utility backfill and completed areas.			
3. Measures are implemented on-site to control the air deposition of site materials and from site operations.			
4. The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			

Sediment Controls	Y	N	N/A
1. Perimeter controls are established and effective at controlling erosion and sediment discharges from the site.			
2. Entrances and exits are stabilized to control erosion and sediment discharges from the site.			
3. Sediment basins are properly maintained.			

Run-On and Run-Off Controls	Y	N	N/A
1. Run-on to the site is effectively managed and directed away from all disturbed areas.			

NOTES

BMP SHEET NOTES

1) EQUIPMENT REFUELING

2) HAZARDOUS MATERIALS

3) CONSTRUCTION ENTRANCES

4) SILT FENCE

5) SILT FENCE MAY HAVE GAPS OR BREAKS TO ALLOW ACCESS TO DOWN SLOPE AREAS. SECTIONS OF SILT FENCE SHALL OVERLAP AS NEEDED.

6) REMOVE SILT FENCE AFTER COMPLETION OF CONSTRUCTION AND STABILIZED GROUND SURFACE.

7) GRAVEL BAG CHECK DAMS EVERY 50 FEET.

8) INSTALL GRAVEL BAG CHECK DAMS EVERY 50 FEET ALONG SILT FENCES TO REDUCE THE VELOCITY OF STORMWATER.

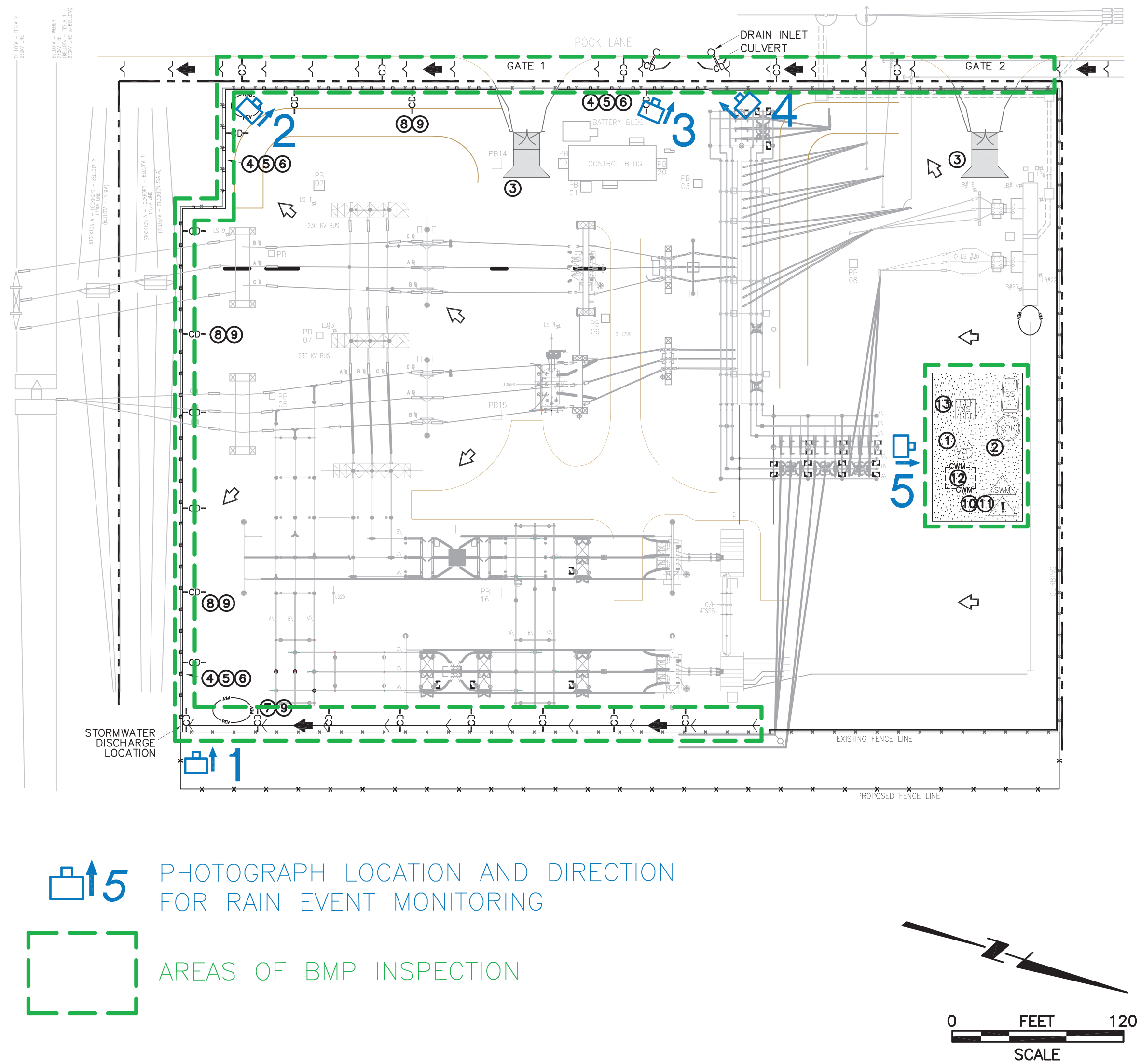
9) REMOVE GRAVEL BAG CHECK DAMS AFTER THE COMPLETION OF CONSTRUCTION AND STABILIZED GROUND SURFACE.

10) EROSION CONTROL FOR ALL STOCKPILES.

11) WASTE MANAGEMENT CONTROL FOR ALL STOCKPILES.

12) CONCRETE WASTE MANAGEMENT.

13) CONSTRUCTION EQUIPMENT AND MATERIALS STORAGE AREA.



PACIFIC GAS AND ELECTRIC COMPANY
WEBER SUBSTATION
KENNEDY, CALIFORNIA

PROJECT NO.	DATE	DRAWN BY	APPROVED BY

FIGURE 1

DAILY VISUAL INSPECTION LOCATIONS

Appendix E
Air Monitoring Plan

PG&E Topock Compressor Station, Needles, California

Appendix E
Air Monitoring Plan for
Soil Non-Time-Critical Removal Action

Final

June 2022

Pacific Gas and Electric Company

PG&E Topock Compressor Station, Needles, California

Project No: D31084AS.A.CS.EV.TM.02

Document Title: Appendix E
Air Monitoring Plan for
Soil Non-Time-Critical Removal Action

Document No.: FES0726211631BAO

Revision: Final

Date: June 2022

Client Name: Pacific Gas and Electric Company

Project Manager: Keith Sheets, Jacobs

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File Name: Topock_NTCRA_AppE_AMP_Final_ce

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Acronyms and Abbreviations

Acronym	Description
µg/dL	microgram(s) per deciliter
µg/kg	microgram(s) per kilogram
µg/m^3	microgram(s) per cubic meter
ACM	asbestos-containing material
AOC	area of concern
ARA	ARA Instruments N-FRM ambient air sampler
AQS	air quality specialist
CARB	California Air Resources Board
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
Cr(VI)	hexavalent chromium
D/F	dioxin and furans
DOI	U.S. Department of the Interior
DTSC	California Department of Toxic Substances Control
IUR	inhalation unit risk
FD	field duplicate
FTL	field team lead
IC	ion chromatography
ICP	inductively coupled plasma
IUR	inhalation unit risk
L/min	liter(s) per minute
LOC	level of concern
MDAQMD	Mojave Desert Air Quality Management District
NELAP	National Environmental Laboratory Accreditation Program
NIST	National Institute of Standards and Technology
NTCRA	Non-Time-Critical Removal Action
OEHHA	California Office of Environmental Health Hazard Assessment
PCM	phase contrast microscopy
PG&E	Pacific Gas and Electric Company
PUF	polyurethane foam
QAPP	quality assurance project plan
SOP	standard operating procedure
SPY	Soil Processing Yard

Acronym	Description
SWMU	solid waste management unit
TAA	target action area
TCS	Topock Compressor Station
U.S.	United States
USB	Universal Serial Bus
USEPA	U.S. Environmental Protection Agency
UV	ultraviolet

1. Introduction

The U.S. Department of the Interior (DOI) issued an Action Memorandum directing Pacific Gas and Electric Company (PG&E) to implement a Soil Non-Time-Critical Removal Action (NTCRA) at the Topock Compressor Station (TCS) in Needles California (DOI 2021). The Soil NTCRA, which will be conducted in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), is intended to address the release or substantial threat of a release of hazardous substances from the TCS into the Havasu National Wildlife Refuge.

Previous environmental investigations (CH2M 2007, 2014) determined that there are specific areas outside of the TCS where concentrations of constituents of potential concern (COPCs) to humans and constituents of potential ecological concern (COPECs) significantly exceed background values or ecological and human health screening levels. These areas are located within or adjacent to active desert washes subject to potential scouring during rain events that could move contamination toward the Colorado River or spread the contamination footprint over a larger area. COPCs and COPECs for the Soil NTCRA include the following:

- Hexavalent chromium
- Total chromium
- Copper
- Lead
- Mercury
- Molybdenum
- Zinc
- Dioxin and furans (D/F)

The scope of the Soil NTCRA is limited to the removal of soil and other solid-phase matrices on federal land or in locations where constituents have the potential to migrate to federal land, including:

- Black, sandy material
- Debris
- Sediment
- White powder

The removal action will be conducted in the 15 target action areas (TAAs) within the solid waste management unit (SWMU) and areas of concern (AOCs) identified in SWMU 1 the Action Memorandum and shown on Figures 1-1 and 1-2:

- AOC 1
- AOC 9
- AOC 10
- AOC 11
- AOC 14
- AOC 16
- AOC 27

1.1 Purpose of Air Monitoring

Air monitoring will be conducted during construction to evaluate the ongoing effectiveness of the dust control program, to guide modifications to field activities and engineering control measures, if necessary, and to document that soil removal activities do not result in the migration of soil contaminants beyond the work area boundaries.

This Air Monitoring Plan describes the program and procedures to be implemented during Soil NTCRA activities at the Topock site. Perimeter air monitoring will be performed during soil removal activities that have the potential to generate visible dust and/or during periods of high winds. The air monitoring program will consist of both real-time fugitive dust monitoring and perimeter air sampling for select soil contaminants.

1.2 Roles and Responsibilities

PG&E will have the following responsibilities:

- Overall responsibility for implementing the field activities specified in this Air Monitoring Plan
- Contracting and coordinating with the laboratories (Chester LabNet, EMSL, and Pace Analytical)
- Performing data validation
- Reporting

Table 1-1 summarizes the team roles and responsibilities.

1.3 Risk-based Levels of Concern

Risk-based levels of concern (LOCs) have been developed as a basis for project-specific action levels for the protection of receptors outside the work area. The work area boundary is defined herein as the exclusion zone perimeter of a TAA. The LOCs, which represent conservative concentrations of compounds that receptors outside the work area could be safely exposed to during construction, have been evaluated for all compounds that have been detected in soil samples collected at the site during prior investigations.

The LOCs have been developed using these assumptions:

- Receptors are present outside the perimeter of the work areas.
- Exposure time via inhalation is 10 hours per day over a 10 days on and 4 days off exposure frequency.
- Duration of the Soil NTCRA is 5 months, which is also the exposure duration.

1.3.1 Site Contaminants

Similar to the LOCs established for use during groundwater remedy construction, the LOCs for the NTCRA were developed using standard U.S. Environmental Protection Agency (USEPA) and California Environmental Protection Agency risk assessment methodology, toxicology data, and exposure assumptions (USEPA 2009, 2021; DTSC 2020). Both cancer and noncancer health effects were considered. For each type of health effect, the LOC was calculated from an established target or from acceptable cancer risk or noncancer hazard when USEPA or California Department of Toxic Substances Control (DTSC) toxicity values are available. These compounds include the following:

- D/F
- Hexavalent chromium (Cr[VI])
- Mercury

There are no human health toxicity values for total chromium, copper, lead, molybdenum, and zinc. The LOCs for cancer effects are based on a target excess cancer risk of one in a million (1×10^{-6}). Cumulative cancer risk will be calculated for each sampling event after receiving analytical results against the 1×10^{-6} risk value. The LOCs for noncancer effects are based on a target hazard quotient of 1. There are no cumulative non-cancer adverse effects because the three compounds that have a reference concentration or reference exposure level all act on different target organs.

The equations and constants used to calculate the LOCs for this removal action follow.

Cancer Effects:

$$LOC_c = \frac{RISKx\,AT_c\,x\,24}{IURxEFxEDxET} \qquad \text{(Eq. 1)}$$

Where:

Parameter	Description	Value
LOC_c	Level of concern for cancer risks (micrograms per cubic meter [μg/m^3])	Compound specific
RISK	Target cancer risk (unitless)	10^{-6}
AT_c	Averaging time for carcinogenic effects (days)	25,550
IUR[b]	Inhalation unit risk (μg/m^3)$^{-1}$	Compound specific
EF	Exposure frequency (days per year)	110
ED	Exposure duration (years)	1
ET	Exposure time (hours per day)	10

Noncancer Effects:

$$LOC_{nc} = \frac{HQxRfCx\,AT_{nc}}{EFxED} \qquad \text{(Eq. 2)}$$

Where:

Parameter	Description	Value
LOC_c	Level of concern for noncancer effects (μg/m^3)	Compound specific
HQ	Target hazard quotient (unitless)	1
AT_c	Averaging time for noncarcinogenic effects (days)	365
RfC	Reference concentration (μg/m^3)	Compound specific
EF	Exposure frequency (days per year)	110
ED	Exposure duration (years)	1

Table 1-2 summarize the LOCs for compounds detected in soil samples. These LOCs were used to determine action levels described in Section 1.4. LOCs calculated using target excess cancer risk range between 1 in a million (1 × 10^{-6}) and 1 in 10,000 (1 × 10^{-4}) were used when assessing exposure to receptors outside the work area.

1.4 Action Levels

The project-specific action levels were developed as an indicator to determine whether additional dust control measures are necessary. If fugitive dust levels cannot be controlled to less than action levels with implementation of the measures, work will stop or be modified until additional controls can be implemented to reduce dust generation from the work area. A separate Dust Control Plan will be submitted prior to the start of the Soil NTCRA.

1.4.1 Fugitive Dust

The action level for fugitive dust monitoring is 100 μg/m^3 for a net (downwind minus upwind) dust concentration. This action level is based on Mojave Desert Air Quality Management District (MDAQMD)

Rule 403, Part C. A 10-hour time-weighted average of readings collected throughout the workday will be used to document compliance with MDAQMD Rule 403.

Similar to the groundwater remedy construction and immediately after receipt of DOI's approval of this work plan, PG&E intends to request a variance from MDAQMD Rule 403 for use of a direct reading field instrument for fugitive dust monitoring. For reference, the approval by the MDAQMD for the groundwater is included in Attachment A.

1.4.2 Analytes Detected in Soil

The equation used to calculate maximum allowable airborne particulate concentrations (based on the approach presented by Marlowe [1999]) for receptor exposure outside the work area is:

$$AL = \frac{LOC \ x \ 1{,}000{,}000{,}000 \ \mu g/kg}{CS} \qquad \text{(Eq. 3)}$$

Where:

Parameter	Description	Value
AL	Action level for airborne particulates	µg/m^3
LOC	Risk-based level of concern	µg/m^3
CS	Maximum detected concentration of compound in site soil	micrograms per kilogram [µg/kg]

Action levels were determined as follows:

- Soil data from prior investigations were gathered for the entire site.
- Sample locations within the action areas were evaluated.
- The maximum reported soil concentration for each compound was determined (Table 1-3) and then used to calculate an airborne particulate action level (Table 1-2).
- All compounds had allowable airborne particulate action levels greater than 100 µg/m^3, except for Cr(VI) at several locations.
- Lead does not have USEPA or DTSC toxicity values; however, an action level was calculated using the DTSC (2011) LeadSpread 8 model. This is based on the maximum reported soil concentration for lead of 1,600,000 µg/kg from samples collected within the construction footprint and a blood level of concern through inhalation of 1 microgram per deciliter (µg/dL). The resulting dust action level for lead is 480 µg/m^3.
- Therefore, keeping fugitive dust less than the action level 100 µg/m^3 will result in airborne particulate concentrations of contaminants (other than Cr(VI)) remaining less than their respective LOCs. Work areas where Cr(VI) concentrations in soil are greater than 37,000 µg/kg could potentially exceed the LOC with fugitive dust concentrations less than 100 µg/m^3.

1.4.3 Asbestos

The action levels for asbestos were calculated based on both USEPA (1988) and California Office of Environmental Health Hazard Assessment (OEHHA) (2003) inhalation unit risk (IUR) factors and the assumptions in Tables 1-4 and 1-5. The assumptions include target risk values of 10^{-6} and 10^{-5} for USEPA and OEHHA, respectively. These target risk values were selected because the resulting action levels are greater than the detection limit, based on logistic sampling considerations detailed in Section 2.2.3.5.

1.5 Constituents to Be Monitored and Sampled

The air monitoring program includes the following components:

- Real-time monitoring of the following:
  - Fugitive dust
  - Wind speed and direction
- Air sampling of the following parameters:
  - Asbestos
  - Cr(VI)
  - D/F
  - Mercury

1.6 Locations to Be Monitored and Sampled

The following work areas will be monitored, sampled, or both during soil removal related activities at the site. Monitoring will only occur in these areas when there is a potential to generate visible dust. Depending on the field schedule, some work areas may be combined and monitored together. Work area boundaries for each TAA will be identified in advance of the start of construction activities as part of the Environmental Release to Construction process.

Locations to be monitored and sampled are as follows:

- Real-time fugitive dust monitoring will be performed and sampled around all TAAs that have the potential to generate visible dust, as well as the mechanical screening area and the Soil Processing Yard (SPY).
- Air sampling will be performed in at least one TAA per soil investigation area. The compounds that will be sampled will vary by TAA, with a sampling strategy that targets the locations with greatest reported concentrations of those compounds in soil (Table 1-6).
- Air sampling for Cr(VI), mercury, and D/F in the mechanical screening area and SPY will be performed periodically.
- Air sampling for asbestos will be limited to TAAs where asbestos-containing material (ACM) has been observed in prior field investigations, including AOC1 TAA 2, AOC14 TAA 1, and AOC 27 TAA 1. Perimeter air monitoring may also be performed at other TAAs at the site if ACM is discovered during construction activities.

Table 1-6 lists the TAAs in the AOCs and SWMU where air sampling is proposed by compound.

2. Methods and Procedures

The general description of methods and procedures are presented in this section. Attachment B provides the standard operating procedures (SOPs).

2.1 Real-time Air Monitoring

2.1.1 Fugitive Dust

Daily observations will be conducted at all work areas. Observations will include whether there is visible fugitive dust outside of the work area and the appropriate use of fugitive dust control measures. Immediate feedback will be given to the construction crew if fugitive dust is observed. In addition, if fugitive dust is observed, real-time measurements will be taken. Real-time fugitive dust monitoring will be performed with a direct reading instrument (TSI DustTrak or equivalent) capable of reporting to 1 µg/m^3. Fugitive dust measurements will be collected periodically from one upwind and two downwind locations, although more frequent monitoring may be performed if necessary at the direction of the air quality specialist (AQS) or field team lead (FTL).

Frequency of monitoring may be reduced in areas if dust control measures are effective or are not necessary based on recent data collected or from other observations at the site (such as weather). The measurements will be collected just outside the work area perimeter at breathing zone height (approximately 5–6 feet above the ground surface). The measurements will be recorded on an electronic field form. A description of activities and any other information that is helpful in explaining the measurements, along with photos, should also be included on the electronic field form.

2.1.2 Wind

Portable meteorological stations (Davis Instruments Vantage Vue or similar) that indicate wind direction, wind speed, temperature, barometric pressure, humidity, and rainfall will be located near the work areas. Depending on the configuration of work area locations, one weather station may be used for multiple work areas. Wind speed and wind direction data will be monitored and documented hourly on an electronic field form. These data will inform the upwind and downwind locations for fugitive dust monitoring and the air sampling.

MDAQMD Rule 403.2 states that a reduction of earthmoving activity is required under high-wind conditions. High winds are defined as gusts exceeding 25 miles per hour, or exceeding 15 miles per hour on a 15-minute average. Construction personnel will monitor the wind speed and reduce earthmoving activities under high-wind conditions.

Meteorological data will be stored internally in the stations' memory:

- Wind direction
- Wind speed
- Temperature
- Barometric pressure
- Humidity
- Rainfall

The weather stations may be removed at the end of the work day. One station will be permanently located at the SPY and will continuously stream data to cloud-based data storage.

2.2 Confirmation Air Sampling

Confirmation sampling will be performed as described in this section.

2.2.1 Monitoring Locations

Confirmation air sampling will be conducted, as indicated in Section 1.6, at three locations outside the work area boundary. One station will be located upwind of the work area, and two stations will be downwind of the work area. Monitoring locations will be stored in an electronic notepad.

Monitoring stations and air samples will be sited at the beginning of the day to meet the following criteria, where practicable:

- The monitoring station will be as close as feasible to the work area boundary without compromising safety to personnel and equipment.
- Airflow to the sampler will be unrestricted in all directions.
- The monitoring station will be sited away from obstructions and no closer to any obstruction than twice the height of the obstruction.
- The sampler's inlets will be located approximately 5–6 feet above the ground surface.
- Monitoring station locations will be selected to avoid the sheltering effect of nearby structures to the extent possible. Locations from which the work is directly visible are preferred.
- The upwind and downwind sample locations will be based on wind direction as determined from onsite weather stations.
- The locations of upwind and downwind samplers may be moved during the sampling period if the wind switches direction 180 degrees.
- The air samplers will be removed at the end of the work day.

2.2.2 Sampling Frequency

Sampling frequency will meet the following criteria, where practicable:

- When there is potential to generate visible dust in a TAA, and Cr(VI) has been reported in soil at greater than 37,000 µg/kg, perimeter air monitoring for Cr(VI) will be performed. One set of samples will be collected for each week (5 days) soil removal is expected to occur within the TAA.
- When there is potential to generate visible dust in a TAA and greater concentrations of mercury or D/F have been reported in soil, perimeter air monitoring for these compounds will be performed. At least one set of samples will be collected for each week (5 days) soil removal is expected to occur within the TAA.
- Air monitoring of Cr(VI) will also be performed around the perimeter of the SPY and mechanical screening area at a frequency of once every week during active soil processing. Air monitoring of mercury and D/F will be performed around the perimeter of the SPY and mechanical screening area at a frequency of once every month, targeting times with active soil processing with greater concentrations of these compounds. Monitoring frequency may be reduced later in the project if the compound concentrations from laboratory data are less than the action levels.
- Perimeter air monitoring for asbestos will be performed when construction activities have the potential to disturb ACM.

Table 1-6 summarizes the locations, compounds to be sampled, and an approximate number of sample days.

2.2.3 Air Sampling Procedures

2.2.3.1 Hexavalent Chromium

Air samples for Cr(VI) will be collected using an ARA Instruments N-FRM ambient air sampler (ARA), or equivalent. The sampler draws ambient air into a modified sample inlet and through a 47-millimeter-diameter sodium bicarbonate cellulose acid-washed filter. The filters are preloaded into cassettes by the laboratory. The sampler will be set to a flow rate of 15 liters per minute (L/min) for approximately 8-10 hours to include all Soil NTCRA activities. The ARA monitor's flow rate and variability in flow will be downloaded weekly and reviewed for each sampling period.

2.2.3.2 Mercury

Air samples for mercury will be collected following Method OSHA ID-145*, Particulate Mercury in Workplace Atmospheres* (OSHA 1987) using a battery-operated pump (Leland Legacy, AirChek, or equivalent). The sampler draws ambient air through a 37-mm-diameter cellulose ester membrane filter in a cassette. The sampler will be set to a flow rate of 2.5 L/min for approximately 8-10 hours to include all Soil NTCRA activities.

2.2.3.3 Dioxins and Furans

Air samples for D/F will be collected following modified USEPA Method TO-9A (low-volume), *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air* (USEPA 1999) using a battery-operated pump (Leland Legacy, AirChek, or equivalent). The sampler draws ambient air into a through a polyurethane foam (PUF) cartridge in a cassette. The sampler will be set to a flow rate of 5 L/min for approximately 8-10 hours to include all Soil NTCRA activities. The PUF cartridges will be pre-spiked with a field fortification standard prior to shipment from the lab.

2.2.3.4 Asbestos

Air samples for asbestos will be collected following *Asbestos and Other Fibers by PCM*, *Method 7400* (NIOSH 2019) using a battery-operated pump (Flite 3 or equivalent). The sampler draws ambient air into a through a 25-mm-diameter cellulose ester membrane filter in a cassette with a conductive cowl. The sampler will be set to a flow rate of 8 L/min for approximately 8-10 hours to include all Soil NTCRA activities. Higher flow rates, resulting in lower detection limits, may considered, but concerns related to dust loading could make the filters unreadable during analysis.

2.2.4 Disposal

Any expendables (including sample wrappers or film, tubing, and trash) can be disposed of as municipal waste.

2.2.5 Sampling Packaging and Shipment

Air samples will be delivered to the respective laboratories via overnight delivery under chain-of-custody procedures. If possible, samples should be shipped the day they are collected. However, samples may be saved for up to 5 days and shipped as a batch. Cr(VI) and D/F samples will be stored in a freezer until shipped.

Each sample container will be appropriately labeled immediately after collection and packaged along with the appropriate chain-of-custody forms. The Cr(VI) and D/F samples will be shipped cool on ice in a laboratory-provided cooler. The samples should be shipped Monday through Wednesday to reduce the chance the shipment gets delayed over the weekend and samples get warm.

2.3 Field Documentation

All measurement data should be included in the electronic field logs. In addition to the information outlined in the procedures described, the following general information will also be recorded on field forms or logs as appropriate:

- Project name, site address, dates, and identification numbers
- Names and affiliations of field and regulatory personnel, and names of visitors

- For photographs: time, date, location, description, and photographer
- Test equipment calibration logs
- Description of departures from SOPs, including reasons for departures
- Pertinent observations and discussions

2.4 Instrument and Equipment Testing, Inspection, and Maintenance

A preventive maintenance program consists of positive actions aimed toward preventing and detecting monitoring system failures. The overall objective of a routine preventive maintenance program is to increase measurement system reliability and provide complete data acquisition. Preventive maintenance schedules for monitoring instruments will be in accordance with the manufacturer's recommendations as noted in the instrument manuals. Only qualified personnel will service instruments and equipment. All maintenance actions, scheduled and unscheduled, will be documented in the project log book.

2.5 Quality Control

2.5.1 Instrument and Equipment Calibration and Frequency

The ARA sampler's calibration will be verified every other week for the duration of the project. Parameters that will be verified include ambient temperature, barometric pressure, and flow rate. A single-point check of ambient pressure and ambient temperature sensors will be performed using National Institute of Standards and Technology (NIST)–traceable standards. Acceptance criteria are ±10 millimeters of mercury for pressure, and ±2 degrees Celsius for temperature. Results will be documented in the field log book.

The single-point flow check will be performed using a primary flow meter, which is calibrated or certified annually against a NIST-traceable standard. If the results of the flow check do not fall within the project's warning threshold of ±4%, then the instrument will be recalibrated. The criterion of ±7% is used for data validation.

A zero verification will be performed on the DustTrak daily before use.

The flow rate for the battery-operated pumps used for collecting mercury D/F, and asbestos samples will be set and verified daily with a flow calibrator before and after use.

2.5.2 Field Quality Control Samples

Field duplicates (FDs) will be collected for the following parameters:

- Cr(VI)
- D/F
- Mercury

FD samples will be used to confirm the precision of the sample results. FD samples will consist of co-located samples and will be collected at a frequency of approximately 20% of the total number of samples. Each FD will be assigned a unique sample number and be indistinguishable to the laboratory from the primary sample. For each set of paired primary and FD air samples, the relative percent difference between the primary and FD result will be calculated and compared. A control window of 40% for relative percent difference will be established.

Trip blanks for Cr(VI) and D/F will be used to evaluate the potential for contamination from sources not associated with the air being sampled. The trip blanks will be chosen at random from the media supplied by the laboratory. Trip blanks will be taken to the field, stored in the same manner as the field samples, and then shipped back to the laboratory along with a group of field samples. Trip blanks will be included with each shipment and can be associated with a batch of up to 10 samples.

Field blanks for asbestos will be used to evaluate the potential for contamination from sources not associated with the air being sampled. The field blanks will be chosen at random from the media supplied by the laboratory. A field blank will be handled exactly like a sample but will be exposed to air in an area known to be free of ACM. Field blanks will be included with each shipment and can be associated with a batch of up to 10 samples.

2.5.3 Field Audits

Field audits will be performed on an as-needed basis by the AQS. The purposes of the audits are as follows:

- Confirm appropriate documents are properly completed and are kept current and orderly
- Confirm measurement systems are accurate
- Identify nonconformance or deficiencies, and initiate necessary corrective actions
- Verify that quality assurance procedures are properly followed and executed

Reports and recommendations on all audits will be prepared and submitted to the project manager for retention in the project files.

2.6 Laboratory Analytical Methods

Cr(VI) samples will be analyzed by Chester LabNet, a laboratory accredited by the National Environmental Laboratory Accreditation Program (NELAP). D/F samples will be analyzed at Pace Analytical, a laboratory accredited by NELAP. Mercury and asbestos samples will be analyzed by EMSL, a laboratory accredited by the Industrial Hygiene Laboratory Accreditation Program.

After the samples have been properly collected and documented, they will be submitted to the laboratories for analysis. Samples will be analyzed in accordance with the *Quality Assurance Project Plan (QAPP) Addendum for the RCRA Facility Investigation/Remedial Investigation for Soil at the Topock Compressor Station* (Jacobs 2019), subsequent QAPP updates, and laboratory SOPs. The target analytes and the reporting limits or limits of detection are presented in Table 2-1. The laboratory turnaround time requested will be 2 weeks. Data verification and validation of laboratory data will be performed by the project chemist after final data package receipt, as indicated in the QAPP. Analytical methods are summarized in the following subsections.

2.6.1 Hexavalent Chromium

Cr(VI) will be analyzed by Chester LabNet Proprietary SOP based on California Air Resources Board (CARB) MLD039*, Standard Operating Procedure for Determination of Hexavalent Chromium in Ambient Air by Ion Chromatography* (CARB 2018) and ASTM D7614-20, *Standard Test Method for Determination of Total Suspended Particulate (TSP) Hexavalent Chromium in Ambient Air Analyzed by Ion Chromatography (IC) and Spectrophotometric Measurements* (ASTM 2020).

The filters will be extracted in deionized water via sonication for 1 hour. The extract will be analyzed by ion chromatography (IC) using a system composed of the following elements:

- A guard column
- An analytical column
- A post-column derivatization module
- An ultraviolet (UV) visible detector

In the analysis procedure, Cr(VI) exists as chromate due to the near-neutral pH of the eluent. After separation through the column, the Cr(VI) forms a complex with the 1,5-diphenylcarbohydrazide, which can be detected at 530 nanometers. The total Cr(VI) concentration reported is divided by the total volume of air sampled to determine the final concentration.

2.6.2 Mercury

Mercury will be analyzed by OSHA ID-145 (OSHA 1987). The filters will be digested in acid, and then potassium permanganate and hydroxylamine hydrochloride will be added. The mercury in the sample is reduced using stannous chloride and analyzed using a cold vapor-atomic absorption spectrophotometer. The mercury concentration reported is divided by the total volume of air sampled to determine the final concentration.

2.6.3 Dioxin and Furans

D/F will be analyzed by EPA-TO-9A (EPA 1999). The PUF cartridge will be extracted with solvent. After a cleanup process, the sample extracts will be analyzed by high-resolution gas chromatography and high-resolution mass spectrometry in selected ion monitoring mode. The D/F concentration reported is divided by the total volume of air sampled to determine the final concentration.

2.6.4 Asbestos

Laboratory analysis will be performed by phase contrast microscopy following Method NIOSH 7400 (NIOSH 2019). If asbestos action levels are exceeded, then the confirmation analysis with transmission electron microscopy will be performed following *Asbestos by TEM, Method NIOSH 7402* (NIOSH 1994). The total number of fibers observed is divided by the total volume of air sampled to determine the final amount of asbestos in air.

3. Data Management, Communication, and Reporting

3.1 Data Management

Data management begins in the field at the monitoring locations. The field team will enter all relevant sample collection information into the forms on the electronic notepad or site log book each time a sampler is visited. Field data will be uploaded from electronic notepads into the project database at the end of each day. This information will be reviewed daily by either the FTL or the AQS.

For the duration of this monitoring project, data from the ARA will be downloaded manually via Universal Serial Bus (USB) port by the FTL at the end of each week. The FTL will upload these data to the project database for review by the data manager. The data manager will check the data for flags set by the instrument's internal logger. The data manager will review the results from the field quality assurance checks performed on the monitor as well as the performance audit results to further determine data validity. Any nonconformances will be communicated to the AQS.

Data from the weather stations will be downloaded manually by the FTL at the end of each week. The FTL will upload these data to the project database for review by the data manager. The data manager will spot check that field observations are consistent with the downloaded weather data. One weather station will be permanently located at the SPY. Data from this station will continuously download to a cloud-based data storage site (Weatherlink).

Electronic laboratory data will be uploaded to the project database by the data manager after validation by the project chemist. The laboratory reports will be stored on the project's cloud-based data storage site.

3.2 Data Evaluation and Communication

There will be immediate feedback to the construction crew from air monitoring personnel if the fugitive dust concentration is approaching or exceeding the 100-$\mu g/m^3$ action level so that additional fugitive dust suppression activities can be implemented as indicated in the Dust Control Plan.

A summary of daily field activities will be prepared by the FTL and sent to the compliance manager; the summary will include any instantaneous fugitive dust action level exceedances as well as pertinent observations. A periodic summary will be emailed to the compliance manager and AQS by E2 Consulting Engineers. This summary will include daily observations and all instantaneous and time-weighted average fugitive dust action levels. Initially, it will be emailed weekly, but the frequency may be reduced as the project progresses.

There will be ongoing evaluation of confirmation air sampling data against action levels by the AQS as validated data become available. There will be immediate feedback to the compliance manager if any of the action levels for the following parameters are exceeded:

- Asbestos
- Cr(VI)
- D/F
- Mercury

The air sampling frequency may be changed based on the effectiveness of the dust suppression activities. The AQS will participate in weekly compliance calls as needed to discuss air monitoring results as well as modifications to air monitoring activities.

3.3 Reporting

At the end of the Soil NTCRA field activities, a final report will be prepared to document the air monitoring activities. The report will include a summary of field activities, action levels exceedances, and recommendations.

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Tables

Table 1-1. Team Roles and Responsibilities

Role	Responsible
Quality and compliance manager	• Enforces onsite compliance with the provisions of the Air Monitoring Plan • Communicates with the client and construction management team
AQS and technical lead	• Oversees the technical aspects of the air monitoring program • Supports decision-making and implements decisions for the project • Provides technical support during the Environmental Release to Construct process • Provides guidance on implementation of field tasks • Performs training for onsite field team • Reviews data • Provides technical review of deliverables • Performs audits • Participates in status update calls • Reports to the quality and compliance manager • Confirms conformance with the QAPP
FTL	• Supervises and directs the daily activities of the field technicians • Confirms that field activities are conducted in accordance with the Air Monitoring Plan and approved SOPs • Is the first point of contact for deviations from Air Monitoring Plan or any questions pertaining to work conducted in field • Conveys the progress of field activities, including deviations from the sampling plan, to the AQS • Identifies and documents nonconformances and corrective actions when necessary • Verifies that all field instruments are calibrated and in good working order • Oversees instrument maintenance • Downloads data from weather station and the ARA at the end of each week • Uploads field data to the project database • Reviews field data daily • Coordinates field activities with the laboratories and project chemist • Reports to the AQS
Field technicians	• Confirms that field activities are conducted in accordance with the Air Monitoring Plan and approved SOPs • Verifies that samples are collected, labeled, preserved, stored, and transported, as specified in this Air Monitoring Plan and the SOPs • Submits documents for review prior to being filed in the project binder • Reports to the FTL
Data manager	• Coordinates data management and reporting activities • Works with project chemist to confirm data quality and validation • Confirms data are collected, stored, and archived in accordance with contract requirements • Checks ARA data for flags set by the ARA's internal logger • Reviews results from the field QA checks and performance audit results to determine data validity • Spot checks field-collected wind data against downloaded weather data • Communicates nonconformances to the AQS • Assists in preparing data deliverables • Reports to the AQS
E2 Consulting Engineers, Inc.	• Coordinates electronic field data management • Works with the field team to make modifications to electronic field forms (if necessary) • Maintains the electronic field data database • Provides periodic outputs to the compliance manager and AQS

Role	Responsible
Project chemist	• Oversees all activities related to analytical chemistry • Prepares the QAPP • Reviews preliminary and final analytical data packages from the laboratory • Coordinates data validation and reporting activities • Aids in evaluating data usability • Reports to the AQS • Performs laboratory audits • Confirms conformance with the QAPP
Chester LabNet	• Performs Cr(VI) analyses following associated laboratory SOPs and QA/QC procedures • Maintains laboratory custody of samples • Adheres to all protocols in the QAPP • Prepares and submits reports within the required turnaround time • Maintains laboratory accreditation and laboratory personnel qualifications • Adheres to corrective action program • Confirms proper storage of electronic and hardcopy records • Coordinates activities with other laboratories, as necessary
EMSL	• Performs mercury and asbestos analyses following associated laboratory SOPs and QA/QC procedures • Maintains laboratory custody of samples • Adheres to all protocols in the QAPP • Prepares and submit reports within the required turnaround time • Maintains laboratory accreditation and laboratory personnel qualifications • Adheres to corrective action program • Confirms proper storage of electronic and hardcopy records • Coordinates activities with other laboratories, as necessary
Pace Analytical	• Performs D/F analyses following associated laboratory SOPs and QA/QC procedures • Maintains laboratory custody of samples • Adheres to all protocols in the QAPP • Prepares and submit reports within the required turnaround time • Maintains laboratory accreditation and laboratory personnel qualifications • Adheres to corrective action program • Confirms proper storage of electronic and hardcopy records • Coordinates activities with other laboratories, as necessary

Notes:
AQS = air quality specialist
ARA = ARA Instruments N-FRM ambient air sampler
Cr(VI) = hexavalent chromium
D/F = dioxin and furans
FTL = field team leader
QA = quality assurance
QAPP = quality assurance project plan
QC = quality control
SOP =standard operating procedure

Table 1-2. Levels of Concern and Action Levels for Air Monitoring

Investigation Area	Sample ID	Sample Date	Sample Matrix	Depth (ft bgs)	Analyte	Result (µg/kg)	Inhalation Unit Risk $(\mu g/m^3)^{-1}$	RfC or REL $\mu g/m^3$	Cancer LOC $\mu g/m^3$	Cancer Airborne Particulate Action Level $\mu g/m^3$	Non-Cancer LOC $\mu g/m^3$	Non-Cancer Airborne Particulate Action Level $\mu g/m^3$
AOC11	AOC-11e1	9/23/2008	Soil	0 - 0.5	TEQ Human	12	3.80E+01[a]	4.00E-05[a]	0.000015	1222	0.000133	11061
AOC10	AOC-10-20	2/17/2016	Soil	-2	Chromium, Hexavalen	2,700,000	1.50E-01[b]	1.00E-01[b]	0.0037	1	0.33	123
AOC1	TCS4-N-05	3/1/2016	Soil	4 - 5	Chromium, total	4,400,000						
CatchBasins	CB-3-01	11/7/2015	Soil	0	Copper	3,100,000						
CatchBasins	CB-6-01	11/7/2015	Soil	0	Lead	1,600,000						
AOC14	AOC14-16W	2/22/2016	Soil	0.5 - 1	Mercury	180,000		3.00E-02[b]			0.10	553
AOC15	AOC15-1-D1	12/5/2013	Soil	0 - 0.5	Molybdenum	79,000						
CatchBasins	CB-6-01	11/7/2015	Soil	0	Zinc	2,000,000						

[a] USEPA. 2021. Regional Screening Levels (RSLs) - Generic Tables (May).
[b] DTSC, 2020. Human Health Risk Assessment Note 3 – DTSC-Modified Screening Levels (DTSC-SLs), California Department of Toxic Substances Control, Human and Ecological Risk Office (HERO). June.

Notes:

µg/kg = micrograms per kilogram

$\mu g/m^3$ = micrograms per cubic meter

ft bgs = feet below ground surface

LOC = Level of Concern

RfC = Reference Concentration

REL = Reference Exposure Level

Table 1-3. Maximum Concentrations In Target Action Areas

Target Action Area	Chromium, Hexavalent (µg/kg)	Mercury (µg/kg)	TEQ Human (µg/kg)
AOC1 - TAA1	2,700	110	1.1
AOC1 - TAA2	80,000	260	0.87
AOC1 - TAA3	14,000	110	0.33
AOC10 - TAA1	2,700,000	35,000	1.6
AOC10 - TAA2	150,000	330	0.36
AOC10 - TAA3	2,600	100	0.29
AOC10 - TAA4	9,500	150	0.41
AOC11 - TAA1	3,780	110	3.2
AOC14 - TAA1	20,000	180,000	0.48
AOC16 - TAA1	ND	100	ND
AOC27 - TAA1	4,800	950	0.23
AOC9 - TAA1	114,000	100	0.081
SWMU1 - TAA1	42,000	270	12
SWMU1 - TAA2	47,500	110	ND
SWMU1 - TAA3	1,600	100	1.3
Maximum	**2,700,000**	**180,000**	**12**

Notes:

ND = Not detected

TEQ = Dioxin toxic equivalency values

Table 1-4. Asbestos in Air Action Levels, Based on USEPA Inhalation Unit Risk

Parameter	Units	Value	Notes
Target risk	Unitless	10^{-6}	—
Unit risk factor	$(f/cc)^{-1}$	0.23	USEPA: Based on continuous lifetime exposure
Averaging time	Hours	613,200	70 years, 365 days per year, 24 hours per day
Exposure time	Hours per day	10	—
Exposure frequency	Days per year	110	10 days on, 4 off for 5 months
Exposure duration	Years	1	—
Action level	**f/cc**	**2.42E-03**	—

Notes:
— = not applicable
f/cc = fiber(s) per cubic centimeter
USEPA = U.S. Environmental Protection Agency

Table 1-5. Asbestos in Air Action Levels, Based on California OEHHA Inhalation Unit Risk

Parameter	Units	Value	Notes
Target risk	Unitless	10^{-5}	—
Unit risk factor	$(f/cc)^{-1}$	1.9	California OEHHA: Based on continuous lifetime exposure
Averaging time	Hours	613,200	70 years, 365 days per year, 24 hours per day
Exposure time	Hours per day	10	—
Exposure frequency	Days per year	110	10 days on, 4 off for 5 months
Exposure duration	Years	1	—
Action Level	**f/cc**	**2.93E-03**	—

Notes:
— = not applicable
f/cc = fiber(s) per cubic centimeter
OEHHA = California Office of Environmental Health Hazard Assessment

Table 2-1. Target Analytes and Limits of Detection

Parameter	Method	Reporting Limit or Limit of Detection [a]	Holding Time
Cr(VI)	SOP MLD039 and ASTM D7614-20	0.000022 μg/m^3 [b]	90 days
Mercury	OSHA ID-145	0.067 μg/m^3	28 days
D/F	TO-9A - Modified	0.000004 μg/m^3 [b]	7 days
Asbestos	NIOSH 7400/7402	5.7E-04 f/cc [b]	—

[a] Reporting Limit or Limit of Detection based on a 10-hour sample period

[b] Estimated Limit of detection used for Cr(VI), asbestos, and D/F

Notes:

— = not applicable

μg/m^3 = microgram(s) per cubic meter

ASTM = ASTM International

Cr(VI) = hexavalent chromium

D/F = dioxin/furans

f/cc = fiber(s) per cubic centimeter

NIOSH = National Institute for Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

SOP = standard operating procedure

Figures

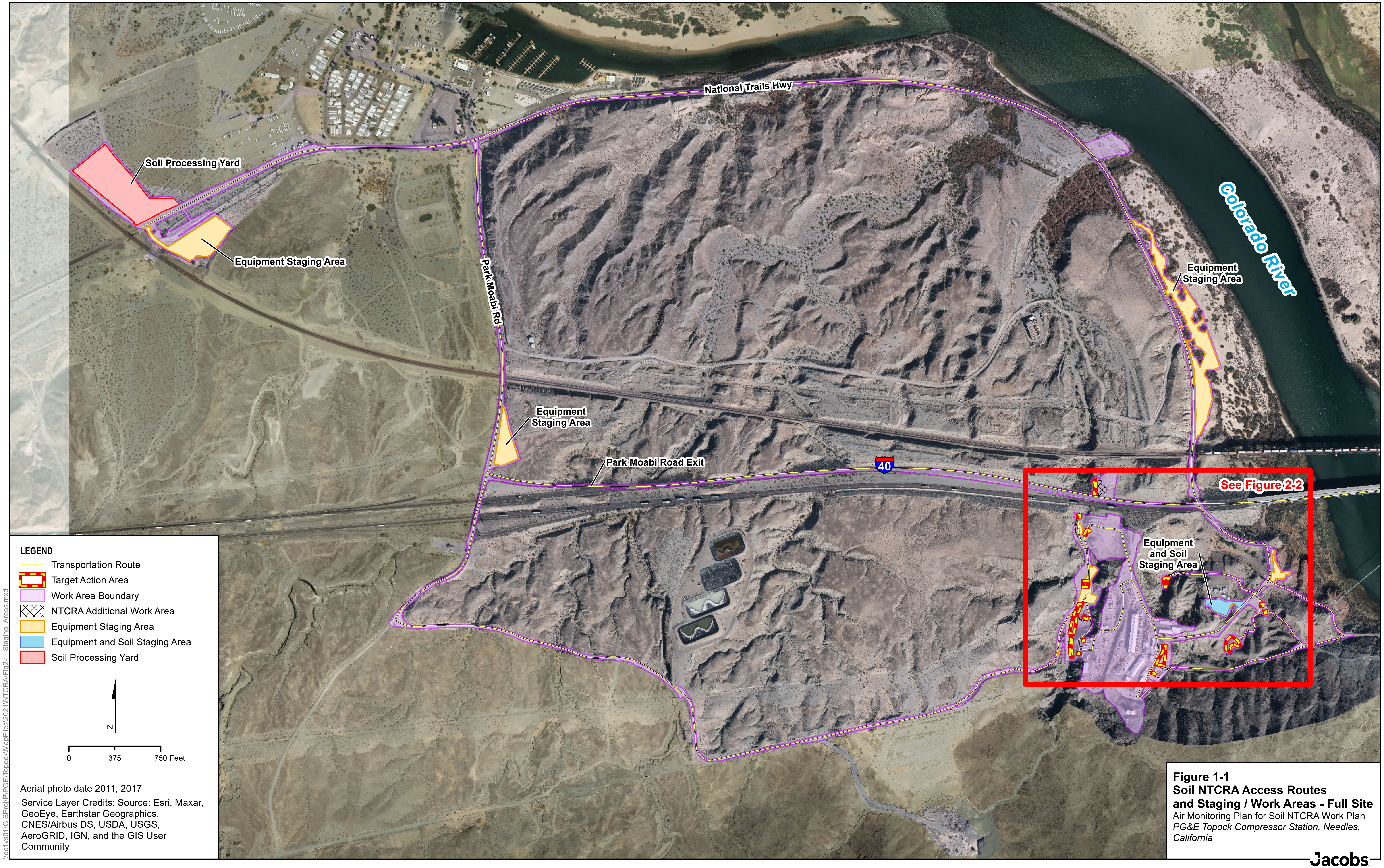


Figure 1-1
Soil NTCRA Access Routes and Staging / Work Areas - Full Site
Air Monitoring Plan for Soil NTCRA Work Plan
PG&E Topock Compressor Station, Needles, California

Jacobs

\\dc1vs01\GISProj\P\PGE\Topock\MapFiles\2021\NTCRA\Fig2-1_Staging_Areas.mxd

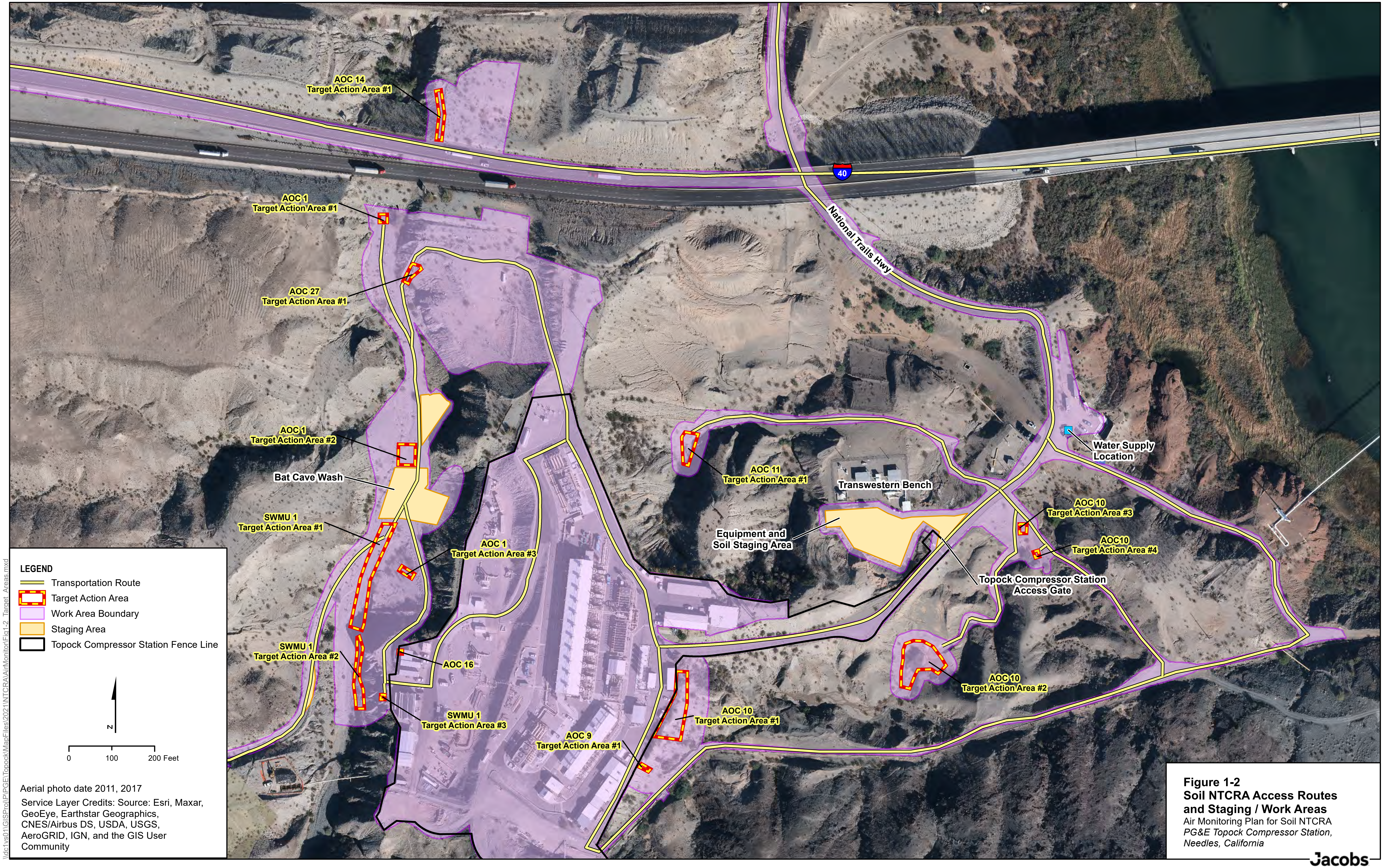


Figure 1-2
Soil NTCRA Access Routes and Staging / Work Areas
Air Monitoring Plan for Soil NTCRA
PG&E Topock Compressor Station, Needles, California

\\dc1vs01\GISProj\P\PGE\Topock\MapFiles\2021\NTCRA\AirMonitor\Fig1-2_Target_Areas.mxd

Attachment A
Request for Exemption

Hong, Christina/LAC

From: Alan De Salvio <Adesalvio@mdaqmd.ca.gov>
Sent: Wednesday, May 23, 2018 7:43 AM
To: Hong, Christina/LAC
Cc: gcr4@pge.com
Subject: [EXTERNAL] RE: PG&E Topock Compressor Station groundwater cleanup project -- Request an exemption from Rule 403 Subpart C (Fugitive Dust)

The request for an exemption for the use of air sampler for the purpose of collecting samples for fugitive dust at the PG&E Topock site is granted. I do not believe the MDAQMD required upwind and downwind sampling, but in terms of Rule 403 the exemption is granted.

Alan J. De Salvio
Deputy Director – Mojave Desert Operations
(Antelope Valley AQMD by contract)
(760) 245-1661, ext. 6726 *Office*
(760) 403-4724 *Mobile*
(760) 245-2022 *Fax*
Clean air is everybody's business.
www.MDAQMD.ca.gov

From: Hong, Christina/LAC [mailto:Christina.Hong@jacobs.com]
Sent: Wednesday, May 23, 2018 7:04 AM
To: Alan De Salvio
Cc: gcr4@pge.com
Subject: PG&E Topock Compressor Station groundwater cleanup project -- Request an exemption from Rule 403 Subpart C (Fugitive Dust)

Hi Alan -

Pacific Gas and Electric (PG&E) recently received approvals from the California Department of Toxic Substances Control (DTSC) and the US Department of the Interior (DOI), in April 2018, to start the construction of the groundwater cleanup project at PG&E Topock site in Needles, CA. PG&E is in the process of getting ready for the construction which is currently scheduled to start in early October 2018. The preparatory activities involve planning for the implementation of the fugitive dust control measures specified in DTSC's Final Subsequent EIR (see attached) and the fugitive dust notification signage requirement stated in your letter dated November 20, 2017 (see attached).

During construction of the groundwater remedy, PG&E plans to perform perimeter air monitoring to:

- Evaluate and document the ongoing effectiveness of the fugitive dust control measures prescribed in DTSC's Final Subsequent EIR,

- Guide modifications to field activities and engineering control measures if necessary, and
- Document that construction activities do not result in the migration of soil contaminants beyond the work area boundaries.

The work area boundary will be defined as the exclusion zone perimeter of construction areas within the site's property line. This is a conservative approach because the work areas are typically at some distance from the actual property line. Air monitoring will be performed if construction activities have the potential to generate visible dust. The air monitoring approach is being developed using the MDAQMD Rule 403 limit of 100 micrograms per cubic meter ($\mu g/m^3$) for particulate matter as fugitive dust as a guideline to determine if additional fugitive dust control is necessary per the dust control plan.

Air will be monitored from one upwind and two downwind locations for dust around the work area boundaries. Because of the Topock site's rugged terrain and potential for high heat exposure during certain times of the year, portability and ease of deployment is essential when choosing equipment. Real-time dust monitoring will be performed with a handheld direct reading instrument (Casella Microdust, or equivalent) capable of reporting to 1 microgram per cubic meter. Dust measurements will be collected hourly, although more frequent monitoring may be performed if deemed necessary by the Air Quality Specialist in charge of the monitoring program.

Other methods, such as upwind and downwind sample collection for fugitive dust using an air sampler per Subpart C of Rule 403 (http://mdaqmd.ca.gov/home/showdocument?id=294) are not planned at this time, but may be considered if directed by the MDAQMD. This email requests an exemption for the use of air sampler for the purpose of collecting samples for fugitive dust at the PG&E Topock site.

Please let Curt or myself know if you have any questions or would like to discuss this request.

Thank you for your consideration,

Christina Hong

(626) 297-5292

Attachment B
Standard Operating Procedures

Air Sampling for Hexavalent Chromium: Standard Operating Procedure

1. Scope and Application

This standard operating procedure (SOP) describes the approach for collecting hexavalent chromium samples in ambient air using an ARA Instruments N-FRM sampler.

2. Project-Specific Considerations

1) Sample collection will occur with a flow rate of 15 liters per minute (LPM) for a period of 8 to 10 hours.
2) Sample frequency and locations will be selected based on the procedures and criteria provided in the air monitoring plan and under the direction of the Air Quality Specialist.

3. Apparatus and Materials

1) ARA Instruments N-FRM sampler
2) Tripod sampler mount
3) Hexavalent chromium filter cassette in a Nalgene plastic container
4) Small, cooler to keep filters cool while transporting them to the work areas
5) Black caps
6) Silicon grease
7) Electronic notepad and field logbook
8) Ziplocs (gallon and snack size)
9) Ice for sample shipment
10) Vinyl gloves
11) USB drive for weekly data download
12) ARA Instruments FTS Flow Calibrator for biweekly flow verification

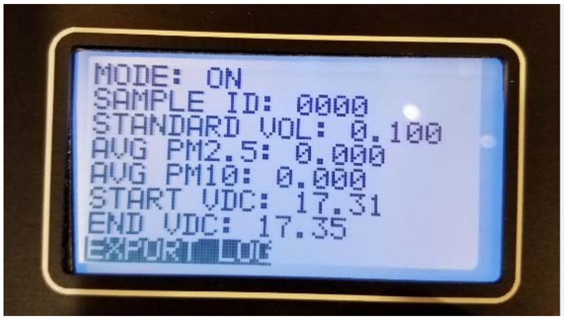
4. Sample Collection Procedure

1) From the freezer, obtain new hexavalent chromium filter cassettes in Nalgene plastic containers, Wrap them in bubble wrap with sample lid up, put them in a small cooler, and place an ice pack on top of the sample jars.
2) Take the sampling equipment to the work area and set the ARA sampler up in the desired location. Attach the sampler to the top of the tri-pod and tighten with the Allen wrench.
3) Remove the new sample from the jar (using vinyl gloves) and carefully slide the fitting on the top of the filter housing (orange indicates the top) to the Teflon sample down tube and gently hand-tighten the Teflon nut, being extremely careful not to cross thread or damage the fitting (not “gorilla” tight).

4) Remove the protective black cap on the ARA sampler inlet and place the sampler down-tube on the sampler and ensure the fitting goes all the way down on the sampler air inlet.
5) Turn power to the ARA sampler on. Verify the date and time are correct on the display. Set to the correct date and time via the setup menu (Setup | System Setup | Date/Time) if not.
6) Start sampler by turning the mode to on. Verify flow rate (SET FLOW) on the display is 15 LPM.
7) Record the ARA sampler ID, sample ID, start time, indicated flow rate (IND. FLOW), and location on the field log. If the indicated flow rate is outside 14.4 to 15.6 LPM, then corrective action is needed.
8) After the end of the construction day (nominal 8 to 10 hours of sampling time), record the indicated flow rate then stop the sampler by turning the mode to off.
9) Record the stop time and flow rate on the field log.
10) Record the Sample Duration (HH:MM:SS), sample Volume (m^3), and average Flow (LPM) from the ARA samplers screen as follows:
    a) From the main screen, turn the knob and press to select "DATA"

    b) Using the selector knob, select "VIEW SUMMARIES" and push the selector knob

    c) Sampler data for sample duration, average flow (LPM), and standard sample volume (m^3) (be sure to scroll down and record the standard sample volume, not the sample volume) are displayed on the ARA's screen.



11) Remove the sampler downtube and sample holder from the unit and place a black cap over the sample air inlet.

12) Unscrew the filter housing from the sampler down-tube. Place black caps on the clear nuts on the sample housing. Place the sample into a pre-labeled sample jar with the orange side towards the bottom. (The label should be filled out before retrieval of the sample). Remember to add the standard sample volume to the label after this data is collected from the sampler.

13) Tighten the lid, and place the sample jar into a Ziploc bag. Place the sample and bag into a small cooler with an ice-pack on top of the sample jar. Remove the sample from the cooler and place the sample in the freezer as soon as possible.

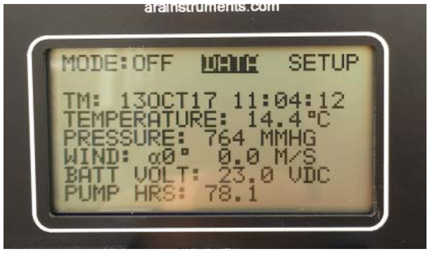
14) Remove the ARA sampler from the work area.

15) Remove and recharge the batteries each night.

5. Air Sampler Data Download

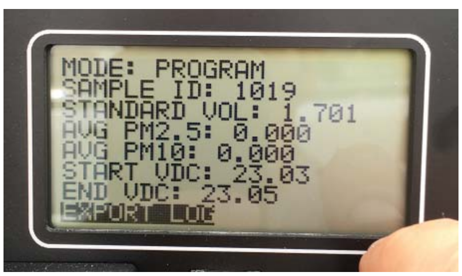
Once per week, down load the air sampling summaries from each of the ARA samplers.

1) From the main screen, turn the knob and press to select “DATA”



2) Using the selector knob, select “VIEW SUMMARIES” and push the selector knob

3) Download the USB data log. Insert the USB stick into the USB port below the sampler screen. Scroll to the bottom of the “DATA” screen, select “EXPORT LOG” and press the selector knob.



- USB log file name (NNNNJJJH.CSV)
  - NNNN = Last 4 digits of Sampler serial number
  - JJJ = Start day of sampling event , Julian Day Number (Example: February 5th = 36)
  - H = Start hour of sampling event, Letter (Example: 2 a.m. = B)

4) This process needs to be repeated for all the sampling events that have occurred since the last down load. To do this, move the cursor to the ST: line. Press the selector knob to cycle though each of the sample events and repeat step 3 for each one.

5) Using the selector knob, scroll to the top of the screen and select “EXIT” by pressing the knob.

6. Flow Verification

At least once per every two weeks QC checks will be conducted for each sampler. In order to conduct a flow, temperature, and pressure check, follow these steps:

1) Perform the QC checks in a clean environment such as the construction trailer.
2) Remove the hexavalent chromium inlet or black cap from the sampler.
3) Turn flowmeter on and allow it to warm up for a few minutes.
4) Attach the alligator clip and insert the temperature probe to the temperature radiation shield and the flowmeter tube and black pipe-attachment to the sampler.
5) Compare the temperature and pressure on the ARA screen to the temperature and pressure readings on the flowmeter and record in the field log.
6) Compare the time including seconds to the time on your cell phone.
7) Turn on the sampler, go to Mode "On".
   a) Selecting "SETUP"

   b) Selecting "SYSTEM SETUP"

   c) Selecting "FLOW RATE"

   d) Changing the "PUMP" selection to "ON"

e) On the flowmeter, select the “FLOW” mode.

8) Compare the “IND. FLOW” on the sampler to the “AMB FLOW” (top line) on the transfer standard. Record the results in the field log.

9) Turn the “PUMP” selection to “OFF” and “EXIT” back to the home screen

10) If any parameters are outside of specified criteria, perform corrective action: look for source of leaks, recalibrate, etc. Follow calibration procedures in attached ARA handout. If applicable, record all calibration information in the field log.

11) In the event that the flow rate is outside of acceptable range, conduct a flow calibration check using the appropriate spreadsheet in order to calculate a new slope and intercept. Update the values in red in the spreadsheet and a new slope and intercept will be calculated.

12) The slope and intercept can be entered into the same screen used to verify the flow rate once they have been calculated with the spreadsheet located on the USB. After updating these values, conduct the one point flow check again at 15.0 LPM. Repeat the process as necessary.

Parameter	Requirement	Acceptance Criteria
ARA Cr6+$_0$	Flow rate verification	±4% of transfer standard Cr(VI): 14.4 to 15.6 LPM
	Temperature check	±2°C
	Pressure check	±10 mm Hg

7. Sample Handling and Shipping

1) Fill out all appropriate documentation (chain-of-custody [COC] form, sample tags). Include the total standard volume of air sampled on the COC form.

2) The filters should be shipped back to the laboratory in the same container provided.

3) At least one day prior to shipment: contact the lab to let them know samples will be arriving on the shipment date. It is best to ship samples on Monday through Wednesday to reduce the potential of having samples in transit over the weekend.

4) On day of shipment: Add enough ice packs to keep samples frozen. Place COC in Ziploc and put in cooler. Secure cooler with filled-out custody seals that are placed where the cooler lid meets the cooler body. Cover custody seals with clear packing tape, making sure that the tape goes completely around the cooler.

5) Ship filters for overnight delivery.

8. Quality Control

1) Trip blanks—trip blanks will be taken to the field stored in the same manner as the field samples, and then shipped back to the laboratory along with a group of field samples. Trip blanks will be included with each shipment and can be associated with a batch of up to 20 samples.

2) The flow rate for the sampling pumps used for collecting hexavalent chromium samples will be verified biweekly and the pumps will be recalibrated as necessary.

3) Field duplicates—One field duplicate will be collected per every 10 samples (10% frequency)

Fugitive Dust Monitoring: Standard Operating Procedure

1. Scope and Application

This standard operating procedure (SOP) describes the real-time analysis of fugitive dust utilizing the TSI DustTrak II.

2. Project-Specific Considerations

1) The action level for fugitive dust monitoring is 100 micrograms per cubic meter (μg/m^3) for a net (downwind minus upwind) dust concentration. Note: the TSI DustTrak II reads out in mg/m^3. Be sure to convert the reading to μg/m^3 when recording data (ie. 0.100 mg/m^3 = 100 μg/m^3).
2) Real-time fugitive dust monitoring will be performed and sampled around all work areas that have the potential to generate visible dust, including the construction headquarters and the soil-processing area.
3) Real-time fugitive dust monitoring will be performed with a direct reading instrument (TSI DustTrak II or equivalent) capable of reporting to 1 μg/m^3. Fugitive dust measurements will be collected hourly from one upwind and two downwind locations around the work area boundary, although more frequent monitoring may be performed if necessary at the direction of the air quality specialist (AQS) or field team lead (FTL).
4) There will be immediate feedback to the construction crew from air monitoring personnel if the fugitive dust concentration (net downwind minus upwind concentration) is approaching or exceeding the 100-μg/m^3 action level so that additional fugitive dust suppression activities can be implemented as indicated in the dust control plan.

3. Apparatus and Materials

1) TSI DustTrak II or equivalent
2) Zero filter (for zero calibration)
3) Rechargeable batteries and charger. Be sure to charge the instrument every night.

4. Monitoring Procedure

4.1 Initial Set Up

1) Obtain all necessary materials for monitoring of fugitive dust: TSI DustTrak II, zero filter, and batteries.
2) Press the On/Off key. Confirm that the battery indicator shows a good charge.
3) An initialization screen will be displayed, followed by a Start Up screen.
4) Select Setup then select User Cal.
5) Select Ambient Cal and select on. (The Asterix indicates which calibration is currently active)
6) Select Settings then select Date Time. Enter the current and time.
7) Select Run Mode and then select Survey. Set the time constant (averaging period for each dust reading) to 5 seconds. Then set Auto Start on Power up to ‘No’.

4.2 Daily Set Up and Zero Calibration

1) Press the On/Off key. Confirm that the battery indicator shows a good charge.
2) An initialization screen will be displayed, followed by a Start Up screen.

3) Verify the User Cal has the option for Ambient Cal selected. (The Asterix indicates which calibration is currently active)
4) Verify the date and time are correct.
5) Daily before field use, perform a zero calibration.
6) Remove the inlet cap and attach the zero filter to the inlet. Select Zero Cal and press Start. Wait for the instrument to complete the calibration, then remove the zero filter and re-attach the inlet cap.
7) Select Run Mode and verify that Survey is selected and that the time constant (averaging period for each dust reading) is 5 seconds. The averaging time may need to be increased if highly variable readings are encountered.

4.3 Making a Measurement Run

1) The unit should now be ready to make a measurement. Press the Start button to start taking dust readings.
2) Select 'Stats' to be able to see the average reading. This is the value that should be recorded on the field forms.
3) In accordance with the air monitoring plan (AMP), for a given area, fugitive dust analysis will be performed at three locations outside the work area boundary on an hourly basis, one upwind and two downwind outside the perimeter of the work area at a height of 5–6 feet above ground surface. The locations should be determined based on the current wind direction indicated from the metrological station.
4) Allow the instrument to take to stabilize (15-30 seconds) at each location before recording the Average reading. Note: the TSI DustTrak II reads out in mg/m^3. Be sure to convert the reading to $\mu g/m^3$ when recording data (ie. 0.100 mg/m^3 = 100 $\mu g/m^3$).
5) After each reading, record the fugitive dust results and locations along with the wind speed/direction on the field sample log.
6) Stop the instrument after done taking readings.
7) Power the instrument off between sample periods and store out of direct sunlight.
8) For additional guidance, refer to the TSI DustTrak II Operations and Service Manual.
9) Be sure to charge the instrument every night. The instrument will automatically turn itself on when plugged in and should remain on in order to properly charge.

5. Quality Control

1) Perform a Zero calibrations on the TSI DustTrak II sensor daily before use.
2) Clean the inlet every 350 hours of use (at 1 mg/m^3*).
3) Replace the internal filters every 350 hours of use (at 1 mg/m^3*).
4) Send the instrument back to the manufacturer for calibration annually.

* Usage times vary based on actual concentrations of dust encountered. Higher concentrations will require more frequent maintenance.

Meteorological Station: Standard Operating Procedure

1. Scope and Application

This standard operating procedure (SOP) describes the use of the portable meteorological stations (Davis Instruments Vantage Vue), which indicate wind direction, wind speed, temperature, barometric pressure, humidity, and rainfall.

2. Project-Specific Considerations

1) Wind speed and wind direction data will be monitored and documented hourly on an electronic field form. These data will inform the real-time upwind and downwind locations for fugitive-dust monitoring and air sampling.
2) All meteorological data will be downloaded on a weekly basis.
3) Weather station locations will be located near work areas as indicated in the air monitoring plan.
4) Weather stations will be set up before and taken down after each construction day.

3. Apparatus and Materials

1) Davis Vantage Vue Wireless Weather Station
2) Tripod and poles for mounting the weather station, available from Davis Instruments (PN 7716)
3) Sand bags, pegs, or other form of weighting/securing to prevent weather station from blowing over
4) Three C-size batteries for the Vantage Vue console
5) Davis Instruments WeatherLink USB Data Logger (Windows). Includes WeatherLink software, data logger, and USB Mini-B to USB-A cable (PN 6510USB)
6) Suunto M-3 compass (or equivalent) for orienting the weather station

4. Procedure

4.1 Initial Set Up

1) Remove the Vantage Vue ISS (Integrated Sensor Suite) from the box.
2) Attach the wind cups to the anemometer. Slide the cups onto the anemometer shaft and tighten the Allen screw near the top of the hub with the wrench provided. Spin the cups to ensure they spin freely.
3) Attach the wind vane. Lay the ISS on its side with the wind cups on the left. The wind vane shaft is now horizontal with the flat side of the shaft facing to the right. Insert the wind vane with the arrow end pointing down. This should ensure the vane is properly aligned on the shaft. Tighten the Allen screw.
4) Install the rain collector tipping spoon assembly. Locate the tipping spoon slot on the underside of the ISS. Insert the wider end of the tipping spoon into the slot first, sliding it under the raised lip of the slot. Fit the narrow end of the spoon into the slot and tighten the thumbscrew.
5) Obtain the small black plastic debris screen for the rain collector. The screen has four small tabs which hold it in the bottom of the collector. Install the screen into the collector by pressing it into the opening in the collector until the tabs snap into place.
6) Remove the battery cover and insert the ISS Li-battery to apply power. To verify power, wait 30 seconds then push and release the white transmitter ID pushbutton next to the battery compartment. The green transmitter ID LED next to the battery compartment will illuminate when you press the pushbutton. When you release the pushbutton, the LED will blink once (indicating transmitter ID 1),

then begin to flash every 2.5 seconds to show transmission of a data packet. This flashing will stop within a few minutes to conserve battery life.

7) Obtain the Vantage Vue console. Install the 3 C batteries by removing the battery cover on the back of the unit and installing the batteries in the battery channels. Replace the cover.

8) Check to make sure the console runs through a brief self-test procedure successfully. On power up, the console displays all the LCD segments and beeps three times. A message displays at the bottom of the console, followed by the first screen of Setup Mode. Press DONE to skip the message and enter Setup Mode. (Note: set up mode can be entered at any time during normal weather operation by holding DONE and the down (-) keys at the same time.

9) The console needs to be configured before initial use. Instructions on how to do this can be found at the following link: Vantage Vue Wireless Weather Station | Davis Instruments. Some of the critical parameters to configure are time, date, time zone, active transmitters, latitude, longitude, and elevation. Parameters for the Topock Compressor Station are included in Table 1 for reference. These parameters can also be configured through WeatherLink software.

10) An additional parameter that needs to be configured that is NOT a console parameter is the recording frequency or active interval. This parameter is configured through the WeatherLink software. This parameter is then downloaded to the console via the WeatherLink USB data logger. To configure this parameter, download the WeatherLink software to an available laptop and follow the setup instructions. Connect the console to the laptop via the USB cable included with the WeatherLink software. Ensure that serial port connection was selected during software setup (use autodetect to confirm connection). Navigate through the software until the Archive Interval parameter is displayed. Adjust this parameter to 15 minutes. The console and ISS should now be ready for use.

11) Press and hold DONE to enter weather mode.

4.2 Daily Use

1) Obtain the mounting tripod. Attach the Vantage Vue to the mounting pole using the U-bolt provided with the unit.

2) Place the tripod at the predetermined location and secure to the ground. Attach the mounting pole with station to the tripod.

3) Position the solar panel on the unit facing south for maximum sun exposure. Use the compass to help properly orient the weather station. The compass is equipped with a rotating bezel, magnetized needle and orienting needle (arrow outline inside bezel). The compass needs to be oriented to adjust for declination. Magnetic north is 10.93° at the Topock Compressor Station. Adjust the compass to true north by rotating the bezel 10.93° to the east. Use the degree scale around the circumference of the bezel.

4) Record the location of the station on the field form.

5) Verify that the site-specific parameters are still correct, and that the console is displaying weather data.

6) Record the wind speed and direction hourly on the electronic field form.

7) At the end of the construction day, remove the weather station from the site.

8) Plug the console into line power at night

4.3 Weekly Weather Data Download

1) Data from the weather stations will be downloaded manually by the FTL (or designee) at the end of each week.

2) Attach the console to a computer using the USB cable. Open the WeatherLink software.

3) Click the Open Station button. Select the station of interest.

4) Click on Download.

5) Press the browse the station data button. Export the records by selecting Browse | Export Records. Select all days since the last time weather data was exported from the station. Press OK. Save the file as the weather station ID followed by todays date. (ie. Met1_081418). The txt file is saved in the directory C:\WeatherLink\

6) Open file in Excel and verify that the data downloaded properly. Compare the data imported to the data that was collected hourly in the field. Ensure the data looks equivalent. Disconnect the station from the computer.

7) Each time data is downloaded from the data logger, the data logger's memory is cleared and is ready to store up to another 26 days' worth of data, based on a 15-minute archive interval. Therefore, it is important to verify data has downloaded properly and appears accurate in comparison with the data recorded on the field log.

8) Upload the downloaded data to the project database for review by the data manager.

Table 1. Vantage Vue Console Parameters

Location	Latitude	Longitude	Elevation	Time Zone	Declination
PG&E Topock Compressor Station	34.714004	-114.492683	1329 feet	Pacific	10.93°E

Air Sampling for Asbestos Fibers (NIOSH 7400): Standard Operating Procedure

1. Scope and Application

This standard operating procedure (SOP) describes the approach for collecting air for asbestos following National Institute for Occupational Safety and Health (NIOSH) 7400.

2. Project-Specific Considerations

1) Sample collection will occur with a flow rate of 8 liters per minute (L/min) for a period of 8 to 10 hours.
2) Higher flow rates, resulting in lower detection limits, may be considered, but concerns related to dust loading could make the filters unreadable during analysis.
3) Sample frequency and locations will be selected based on the procedures and criteria provided in the air monitoring plan and under the direction of the Air Quality Specialist.

3. Apparatus and Materials

1) Sampling cassettes: field monitor, 25-millimeter (mm) cassette with an electrically conductive extension cowl and cellulose ester membrane filter, 0.45- to 1.2-µm pore size, for use in conjunction with battery-operated sample pumps.
2) Battery-operated sampling vacuum pump (QuickTake, Flite 3 or equivalent).
3) TSI 4146 or Gillibrator flow calibrator (or equivalent) for verifying flow rates.
4) Tygon tubing.
5) Telescoping tripod sample stands for fixed position sampling with sample cassettes, 5–6 feet high.
6) A shipping container.
7) Ziploc bags and packing material for safe shipment of samplers.

4. Sample Collection Procedure

1) Obtain all necessary materials: sampling cassettes, battery-operated sample pump, flow measurement device, and Tygon tubing.
2) Turn on the sample pump and allow it to warm up for several minutes.
3) Attach an adequate length of Tygon tubing to the sample pump.
4) Attach a spare filter cassette (for flow calibration) to the Tygon tubing.
5) Next, using another piece of Tygon tubing and an adapter, attach the flow calibrator device to the inlet of the sample cassette.
6) Adjust the pump sampling rate to achieve the desired flow rate of 8 L/min using the flow calibrator.
7) Take three consecutive readings to verify a stable flow rate. The flow rate must be within 10% of the target 8-L/min flow rate (7.2–8.8 L/min) before sampling can begin. Record the flow rates on the field log sheet.
8) Stop the pump and remove the flow calibrator and the spare sample cassette from the pump's Tygon tubing.
9) Remove the plug/cover from the inlet and outlet of a fresh sample cassette. <u>Save these for later.</u>
10) Attach the outlet end of the sample cassette to the Tygon tubing attached to the pump.
11) Place the sampler on the sampling stand in the desired location and with the inlet of the sampling cassette facing downward.
12) Start the pump. Record the sample ID, cassette identification number, and sampling start time.

13) After the end of the construction day (nominal 8 to 10 hours of sampling time), recover the pump and sample cassette from the sample location.

14) Turn the pump off, remove the sampling cassette from the pump, and record the end time.

15) Place protective end cap/cover on the inlet and outlet of the sample cassette.

16) Reattach the spare sample cassette to the pump and the flow calibrator and measure the ending flow rate. Record on the log sheet.

17) Attach a sample label with a unique sample ID to the sampling cassette and place in protective packaging for shipment to the lab.

5. Sample Handling and Shipping

1) Fill out all appropriate documentation (chain-of-custody [COC] form, sample tags) and return the sampling cassettes to the laboratory. Include the total volume of air sampled on the COC form.

2) The filters should be shipped back to the laboratory in the same container provided.

3) Place a custody seal over the openings of the shipping container.

4) Ship filters for overnight delivery.

6. Quality Control

1) Only use filters which have been checked for background fibers. Manufacturer provided quality assurance checks on filter blanks are normally adequate if field blanks are analyzed.

2) Field blanks—a field blank is a filter which has been handled exactly like a sample but which has been exposed in an area known to be free of asbestos-containing material. Field blanks will be included with each shipment and can be associated with a batch of up to 10 samples.

3) The flow rate for the sampling pumps used for collecting asbestos samples will be set and verified daily before and after use to be within 10% of the desired flow rate.

Appendix F
Waste Management Plan

PG&E Topock Compressor Station, Needles, California

Appendix F
Waste Management Plan for
Soil Non-Time-Critical Removal Action

June 2022

Pacific Gas and Electric Company

PG&E Topock Compressor Station, Needles, California

Project No:	D31084AS.A.CS.EV.TM.02
Document Title:	Appendix F Waste Management Plan for Soil Non-Time-Critical Removal Action
Document No.:	FES0726211631BAO
Revision:	Final
Date:	June 2022
Client Name:	Pacific Gas and Electric Company
Project Manager:	Keith Sheets
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File Name:	Topock_NTCRA_AppF_WMP_Final_06152020

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Contents

Acronyms and Abbreviations

Acronyms	Description
ARAR	applicable or relevant and appropriate requirement
BMP	best management practice
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOI	U.S. Department of the Interior
EE/CA	Engineering Evaluation/Cost Analysis
NTCRA	Non-Time-Critical Removal Action
PG&E	Pacific Gas and Electric Company
PPE	personal protective equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
SDS	safety data sheet
STLC	soluble threshold limit concentration
TC	toxicity characteristic
TCLP	toxicity characteristic leaching procedure
TCS	Topock Compressor Station
U.S.C.	United States Code
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
WET	California Waste Extraction Test
WMP	Waste Management Plan

1. Introduction

This Waste Management Plan (WMP) presents procedures for the proper collection, characterization, storage, transportation, and disposal of waste generated during the Soil Non-Time-Critical Removal Action (NTCRA) at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station (TCS) in Needles, California. Wastes generated from soil removal activities will be managed onsite in compliance with the applicable or relevant and appropriate requirements (ARARs) established in the Soil Engineering Evaluation/Cost Analysis (EE/CA) (Jacobs 2021) and will be disposed of offsite in a manner consistent with applicable local, state, and federal laws and regulations.

2. Expected Waste Streams

Expected waste streams from the Soil NTCRA activities and their estimated quantities are described in this section.

2.1 Waste Generated from Onsite Screening Operation

Approximately 7,250 cubic yards of excavated soil and debris will require mechanical separation. Soil gradation testing conducted during the EE/CA treatability study indicated that approximately 50 percent of the excavated material is greater than 3/8 inch and approximately 50 percent of the excavated material is less than 3/8 inch (CH2M 2019). Therefore, approximately 3,600 cubic yards of coarse material (greater than 3/8 inch) and 3,600 cubic yards of fine material (less than 3/8 inch) are anticipated to be generated from onsite screening of excavated materials. In compliance with ARAR #16, excavated or displaced materials from the removal action will be managed in accordance with the Groundwater Remedy Soil Management Plan (Jacobs 2019).

Based on bench-scale testing results, the majority, if not all, of the coarse material will be reused onsite as backfill in the excavated areas. The fine material is anticipated to be highly contaminated (significantly above soil management screening levels) and therefore will not be reused onsite. The fine material (less than 3/8 inch) and any coarse material with visual evidence of contamination will be properly disposed of off-site.

2.2 Wastewater

Miscellaneous wastewater streams can include equipment decontamination water, rainfall that collects in secondary containment areas, etc. The wastewater will be initially containerized or stored in a holding tank in the primary work zone, and will be transferred from the primary work zone, as needed, to centrally located 20,000-gallon frac tanks. Each transfer load is tracked. Once a frac tank is full, its contents will be characterized and disposed offsite.

From a sustainability perspective, it is preferable to manage the wastewater onsite by disposal at the TCS ponds and not haul offsite for disposal at permitted facilities. However, an amendment to the Waste Discharge Requirements for the ponds would be required to accept wastewater from any soil remedial activities, including this removal action. Since the volume of wastewater to be generated from this action is anticipated to be fairly small, it is assumed that the wastewater will be hauled offsite for disposal.

2.3 General Waste

The following general waste streams will be transported offsite for recycling or disposal:

- Used personal protective equipment (PPE).
- Miscellaneous waste, including trash, paper bags, cardboard boxes, office debris, etc.
- Empty drums/cans, unused chemicals/paints, used oil, used solvents, oily solids, and used fuel filters/ parts from equipment maintenance, etc.
- Universal waste, including batteries, electronic devices, lamps, aerosol cans, and mercury-containing equipment.
- Sampling equipment, such as calibration gas cylinders.

2.4 Sanitary Waste

This waste stream will be handled by portable toilets, and will be hauled offsite.

3. Waste Characterization and Classification

3.1 General Requirements

Wastes will require characterization prior to disposal so that they can be classified accurately. Waste classification will be performed following the hierarchy specified in California action-specific ARAR 19, Standards Applicable to Generators of Hazardous Waste (Title 22 California Code of Regulations [CCR] Section 66262.11), as follows:

- Determine whether the waste is exempt from regulation.
- Determine whether the waste is a listed hazardous waste.
- Determine whether the waste exhibits hazardous waste characteristics.
- If the waste is hazardous, determine whether waste-specific exclusions or restrictions apply.

Based on information presented in the Soil Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation Volume 1 (Site Background and History) (CH2M HILL 2007), listed hazardous wastes are not present in soil media at the site; therefore, classification of these materials will be based solely on hazardous waste characteristics.

Sampling and analysis for hazardous waste characteristics will use methods specified in SW-846, *Test Methods for Evaluation Solid Waste, Physical/Chemical Methods* (U.S. Environmental Protection Agency [USEPA] 2007). Test results will be compared to hazardous waste characteristic levels presented in 22 CCR Division 4.5, Chapter 11, Article 3, Characteristics of Hazardous Waste.

Waste material will be characterized per the procedures outlined in the next section. Note that once the characteristics or profile of a waste stream is established, PG&E will continue to use the same waste profile unless new information emerges indicating that the waste stream should be re-characterized.

3.1.1 Solid Wastes

Solid wastes (e.g., fine material from onsite screening operation) will be analyzed for total metals and dioxin/furans, 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, will not be performed.
2) If the total constituent concentration exceeds the numeric value of the RCRA TC level by 20 times or more, the TCLP will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the material will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in Step 3, will not be performed.
3) If the material has not been classified as hazardous waste in Steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by 10 times or more, the WET will be performed. If the constituent concentration in the WET exceeds the STLC, the material will be classified as a non-RCRA hazardous waste.

If the material has not been classified as a hazardous waste in Steps 1, 2, or 3, it will be classified as non-hazardous waste.

3.1.2 Liquid Wastes

Liquids will be classified as hazardous waste if they exhibit hazardous waste characteristics. Characterization will be conducted as appropriate as defined in the following sections. Liquids will be evaluated for the presence of metals having hazardous waste toxicity characteristic levels specified in 22 CCR 66261.24 using the following approach:

- For liquid wastes containing less than 0.5 percent filterable solids, the filtered liquid will be analyzed for total metals, and the results will be compared with the RCRA toxicity characteristic (TC) limits in 22 CCR 66261.24(a)(1) and the soluble threshold limit concentrations (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 constituents 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.
- For liquid wastes containing 0.5 percent or more filterable solids, the filter solids will be analyzed using the toxicity characteristic leaching procedure (TCLP), and the results will be compared with the RCRA TC limits. If a TC limit is exceeded, the waste will be classified as RCRA hazardous. If no TC limits are exceeded, the waste will be analyzed using the California Waste Extraction Test (WET), and the results compared with the STLCs. If one or more STLCs is exceeded, the waste will be classified as non-RCRA hazardous. If neither limit is exceeded, the waste will be classified as non-hazardous.

3.1.3 Miscellaneous Wastes

Miscellaneous waste, such as trash, paper bags, and cardboard boxes, will be disposed of as non-hazardous solid waste.

3.2 Characterization Requirements for Specific Waste Types

Characterization requirements for specific waste types are provided in the following subsections.

3.2.1 Calibration Gas Cylinders

Safety data sheets (SDSs) will be reviewed to verify that calibration gas is Division 2.2 nonflammable gas that can be disposed of by venting to the atmosphere, as described in Section 4.2.3.

3.2.2 Surplus or Partially Used Chemicals

SDSs will be reviewed for surplus chemicals or container residues that do not meet the definition of "empty." If SDS information is insufficient to determine waste classification, one representative sample will be collected and evaluated as described in Section 3.1.2. Analytical parameters will be selected based on thecomposition of the material involved.

3.2.3 Used Oil

Used oil must be tested for flash point, polychlorinated biphenyls, and halogens. Testing is the responsibilityof the used oil transporter/recycler.

3.2.4 Oily Solids, Used Absorbents Containing Oil, and Oily Rags

Oily solids (soil and absorbents) will be presumed to be hazardous unless tested and determined to be non-hazardous. Testing will be based on the requirements of the disposal site for establishing a waste profile. Anticipated parameters are total petroleum hydrocarbons using USEPA Method 8015B and Title 22 metals using USEPA Methods 6010B and 7470A. Oily rags are presumed to be non-hazardous if they do not contain free liquids and will not be tested.

3.2.5 Personal Protective Equipment

PPE will be characterized based on whether it has come in contact with contaminants and the degree of contamination. If direct contact is experienced and the PPE cannot be decontaminated, it will take on the same profile as the waste in which it is contaminated.

3.2.6 Sampling Equipment

Disposable sampling equipment will be characterized based on whether it has come in contact with contaminants and the degree of contamination. Equipment that is visibly contaminated and cannot be decontaminated will take on the same characteristics as the contacted media. If the media has been classified as hazardous, the sampling equipment will be classified and managed as hazardous waste. If the media has been classified as non-hazardous, the sampling equipment will be classified and managed as non-hazardous waste. Disposable sampling equipment that shows no visible evidence of contamination will be disposed of as non-hazardous waste regardless of the classification of the media to which it has been exposed. No sampling and analysis will be performed.

3.2.7 Stormwater from Secondary Containment

Stormwater may accumulate in secondary containment structures during construction, before the process using the structures becomes operational. This collected water will be considered stormwater unless visual evidence of contamination or pollutant sources are identified, in which case it will be managed in accordance with the Best Management Practices (BMP) Plan (Appendix D of the *Soil Non-Time-Critical Removal Action Work Plan*), which is consistent with the substantive requirements of the General Permit for Stormwater Discharges Associated with Construction Activities (2009-0009-DWQ and as amended by 2010-0014-DWQ and 2012-0006-DWQ).

3.3 Waste Profiles

Waste profiles will be prepared by PG&E based on the requirements of the disposal site.

3.4 USEPA Identification Numbers

The PG&E Topock Compressor Station and PG&E Topock Groundwater Extraction Site hold USEPA ID number CAT080011729 and CAR000151118, respectively.

During the groundwater remedy construction, non-hazardous soil was shipped offsite under USEPA ID number CAR 000181560.

4. Management of Waste

This section contains procedures for onsite management of wastes temporarily stored and accumulated, as well as onsite management of wastewater.

4.1 General Waste Management Procedures

The following waste accumulation and handling procedures apply to all wastes. Additional or alternate management procedures for specific wastes are presented in Section 4.2.

4.1.1 Waste Storage Time Limit

Non-RCRA and RCRA hazardous wastes will be removed from the site within 90 days of the date that waste was first placed into the container or stockpiled. If accumulation begins in a satellite accumulation area the waste must be removed from the site within 1 year of the accumulation start date, or within 90 days from the date that the waste was transferred to a central accumulation area (Section 4.1.4).

No hazardous wastes will be stored at the Soil Processing Yard.

4.1.2 Labels

The labeling of waste containers will be in accordance with ARAR 19, Standards Applicable to Generators of Hazardous Waste (22 CCR 66262.34) and 49 Code of Federal Regulations (CFR) 172. Containers used to store/accumulate waste (including soil and groundwater) shall display one or more labels described in the following subsections as soon as waste is placed in the container. Labels other than the ones shown below may be used as authorized by PG&E; labeling requirements for soil are outlined in the Groundwater Remedy Soil Management Plan (Jacobs 2019). A hazardous waste label must be used if there is a possibility that the waste will be classified as hazardous. Universal Waste labels must be used for hazardous waste that qualifies as Universal Waste (e.g., aerosol cans, batteries, lamps, and electronic devices); refer to Section 4.2.15.

"Analysis Pending" or "Waste Material"

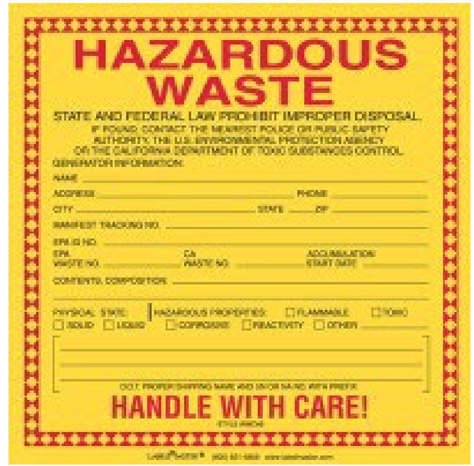
A temporary or handwritten label can be used until analytical results are received and reviewed. This label shall include the accumulation start date. These labels should only remain on the container for the length of time necessary to receive the results of waste characterization analyses, typically no longer than 2 weeks.

Once results are received, the analysis pending label must be removed and the container relabeled, if necessary, within 10 days. An analysis pending label should not be used for wastes that have been classifiedas hazardous or non-hazardous based on generator knowledge, even if lab analysis of the waste is being performed.

"Hazardous Waste"

- Preprinted hazardous waste labels with the following information can be used:
  - Accumulation start date
  - Generator Name: PG&E Topock Groundwater Extraction Site for Target Action Areas outside of TCS or PG&E Topock Compressor Station for the TAAs on TCS

- Generator Address
- USEPA ID number: CAR000151118 or [TBD]
- Waste codes
- Description of waste, including hazardous properties and physical state
- U.S. Department of Transportation (USDOT) proper shipping name
- Manifest document number (added prior to transportation)



- A hazardous waste label, along with an analysis pending label, must be used if there is the possibility that the waste could be classified as hazardous. If the waste is suspected to be hazardous but analysis is being performed to confirm the classification, do not fill in the waste code or USDOT proper shipping name until the analytical results have been received.

"Non-hazardous Waste"

Preprinted labels with the following information can be used:

- Generator Name: PG&E Topock Groundwater Extraction Site for TAAs outside of TCS or PG&E Topock Compressor Station for the TAAs on TCS
- Generator Address
- Waste-specific information (for example, contaminated soil)

USDOT Hazard Class

The appropriate USDOT hazard class label will be placed on the container prior to loading onto the transport vehicle.

4.1.3 Segregation and Aggregation

Hazardous wastes will be segregated from non-hazardous wastes. Additionally, if incompatible wastes are generated (for example flammable and corrosive wastes), they must be segregated. Wastes of the same matrix, contamination, and source may be aggregated to facilitate storage and disposal. Hazardous wastes will be aggregated only if they are from the same source and if they carry the same hazardous waste codes. Hazardous wastes will not deliberately be diluted.

4.1.4 Waste Accumulation Areas

4.1.4.1 Central or 90-day Hazardous Waste Accumulation Areas

Unless specifically designated as a satellite accumulation area (Section 4.1.4.2), hazardous waste accumulation areas will be managed at central or 90-day accumulation areas at the soil staging area on the Transwestern Bench.

Central accumulation areas must be equipped with the following:

- Spill control and decontamination equipment suitable for the waste being accumulated
- Fire control equipment suitable for the waste being accumulated

- Communication equipment to notify onsite personnel and summon external aid in an emergency

Waste accumulation areas should not be located near storm drains or in locations where spilled material could be discharged to surface water.

4.1.4.2 Hazardous Waste Satellite Accumulation Areas

Satellite accumulation areas may be used to store hazardous waste at or near the point of generation at a location under the control of the operator of the process generating the waste. Satellite accumulation areas are limited to 55 gallons of waste or 1 quart of acutely hazardous or extremely hazardous waste. A separate 55-gallon limit applies to each incompatible waste, and to wastes that are not practicable to combine (e.g., prevents recycling or requires unreasonable accumulation procedures). Within 3 days of reaching the 55-gallon limit, the container must be moved to a central accumulation area. In addition to the accumulation start date, satellite accumulation containers must be marked with the date that they are moved to a central accumulation area.

Containers in satellite accumulation areas must be under the control of the operator of the process generating the waste, in good condition, compatible with the contents, and be kept closed except when adding or removing waste.

Satellite accumulation areas are not required to maintain the equipment described in Section 4.1.4.1 and are not subject to the inspections described in Section 4.1.7; however, meeting these requirements is still a good practice.

4.1.4.3 Non-hazardous Waste Accumulation Areas

Non-hazardous wastes must be accumulated in accordance with the best management practices specified in the BMP Plan (Appendix D of the *Soil Non-Time-Critical Removal Action Work Plan*).

4.1.5 Container Management

Wastes in containers shall be accumulated according to the following requirements, in accordance with California action-specific ARAR 19, Use and Management of Containers (22 CCR Division 4.5, Chapter 14, Article 9). A container is a device capable of being moved when full and not hard-plumbed or permanently attached to the ground or to other structures.

4.1.5.1 Containers

- Containers will be transported to the temporary accumulation area using proper handling methods, such as transportation by forklift on wood pallets, secured together with nonmetallic bonding, etc., as appropriate for the type of container being transported.
- Empty drums and other reusable containers that will be used for waste accumulation will be inspected and inventoried upon arrival onsite for signs of contamination and/or deterioration. Containers arriving onsite with contents will be rejected.
- Adequate aisle space (for example, 36 inches) will be provided for hazardous waste containers to allow the unobstructed movement of personnel and equipment. A row of drums should be no more than two drums wide.
- Each container will be provided with its own label, and the container will be oriented so that the label is visible. Labels will be replaced if they become damaged or faded. If a label is replaced, the original accumulation start date will be transferred to the new label.
- Containers will remain securely closed except when removing or adding waste.
- If a container becomes damaged or begins to leak, the contents will be immediately transferred to a new container, or the leaking/damaged container will be overpacked.

- Containers must be compatible with the waste being accumulated.
- Incompatible hazardous wastes must not be placed in the same container.

4.1.5.2 Additional Requirements for Roll-off Boxes

- Roll-off boxes shall be provided with covers and disposable liners. Liners will be disposed of with the waste contained in the roll-off box.
- When not in use, securely fastened covers will be installed on all roll-off boxes.
- Roll-off boxes will be labeled as described previously. Old labels, if present, will be removed as soon as the box is received onsite.
- Roll-off boxes will be filled only to the point where applicable weight limits will not be exceeded. This is typically half full for boxes containing soil. A box may be filled more than half full if it has been determined that the applicable weight limit will not be exceeded.
- Free liquids will not be placed in standard roll-off boxes. Containers designed to contain and transport free liquids (for example, phase separators) should be used for this purpose.
- Materials placed into the roll-off boxes will be equally distributed to prevent the box and truck from tipping.

4.1.5.3 Secondary Containment

- Container storage areas for hazardous waste with free liquids must have a containment system that includes an impervious base sloped to drain liquids away from the containers unless the containers are elevated.

4.1.6 Stockpile Management

Stockpiling of excess displaced material will be in accordance with the Groundwater Remedy Soil Management Plan.

4.1.7 Waste Accumulation Area Inspections

Areas used for hazardous waste accumulation shall be inspected for malfunctions, deterioration, discharges,and leaks that could result in a release. The following inspection schedule shall be followed:

- Weekly inspection of hazardous waste containers (for leaks, signs of corrosion or general deterioration, labeling, container closure, remaining accumulation time)
- Weekly inspection of overall hazardous waste accumulation area (for general condition, adequate supply of spill control equipment, fire control and communication equipment present and operating properly)

Inspections will be recorded in a logbook or otherwise documented, and the record of inspection will be maintained onsite.

Regular, documented inspections are not required for non-hazardous waste accumulation areas. However, the containers should be inspected periodically for leaks, signs of corrosion or general deterioration, labeling, and container closure. The overall accumulation area should be inspected periodically for general conditions and adequate supply of spill control equipment.

4.2 Management Procedures for Specific Waste Types

4.2.1 Aerosol Cans

Aerosol cans that are empty (contain no residual pressure or liquid) or that contain residual liquid that is not a hazardous material (e.g., air freshener) but no residual pressure, can be disposed of in the trash. Aerosol cans that contain residual pressure or residual liquid that is a hazardous material (e.g., marking paint) cannot be disposed of in the trash and must be managed as a universal waste; refer to Section 4.2.15.

4.2.2 Batteries

Small batteries including alkaline, nickel-cadmium, and lithium batteries found in many common items, including power tools, radios, electronic equipment, mobile telephones, and portable computers, cannot be disposed of in the trash and must be managed as a universal waste; refer to Section 4.2.15.

Used lead-acid batteries should be returned to the retailer for recycling. If necessary, to store onsite prior to return, the battery should be placed in a secure location where it will not become damaged. If a battery becomes damaged or begins to leak, place it in a plastic or other compatible container with a securely fitting cover, label with the accumulation start date, and transport to a battery recycler. Used lead-acid batteries that are not returned to the retailer or recycler must be managed as hazardous waste.

4.2.3 Calibration Gas Cylinders

Calibration gas for field instruments is usually shipped in nonrefillable DOT-39 specification cylinders. They can be identified by a code stamped into the cylinder that begins with "DOT-39, NRC" followed by a series of other numbers and letters. These cylinders cannot be refilled and are intended to be disposed of by the end user once the contents are consumed. Because of the high cost of shipping partially full cylinders to an equipment rental company or the manufacturer, most calibration gas cylinders should be disposed of locally using the procedure described in the following subsections.

4.2.3.1 Applicability

This procedure applies only to nonrefillable DOT-39 specification cylinders containing calibration gas that is classified by USDOT as a Division 2.2 nonflammable gas. The cylinder will display the green nonflammable gas label. Calibration gas usually contains parts per million (ppm)-range concentrations of compounds such as isobutylene, hexane, or methane. This procedure does not apply to Division 2.1 flammable gasses, Division 2.3 poison gasses, corrosive gasses, or oxidizing gasses. It also does not apply to gasses contained in larger refillable USDOT-specification cylinders.

4.2.3.2 Disposal Procedure

- Review the cylinder labeling and SDS to verify that the material in question is calibration gas containing ppm-range concentrations of materials such as isobutylene, hexane, or methane, and that the gas is classified as a Division 2.2 nonflammable gas. If the material is a flammable gas (Division 2.1), poison gas (Division 2.3), corrosive gas, oxidizing gas, or contains toxic air contaminants such as trichloroethylene, do not follow this procedure. Characterize and classify the gas in accordance with Section 3.

- Attach the appropriate regulator or valve to the cylinder, open the valve, and allow the gas to vent slowly to the atmosphere in an unconfined area outdoors.

- If a regulator is not available, depress the valve with a non-sparking tool (e.g., pencil, stick). Be sure that the cylinder is pointed away from you at all times. The valve operates the same way as the valve on a car or bicycle tire.
- Wear leather work gloves and keep your hands away from the flow of gas.
- Leave the valve open until all gas is discharged from the cylinder.
- If the cylinder has a permanently attached valve, leave it open. If a removable regulator or valve was used, remove it from the cylinder.
- Mark the cylinder as “EMPTY” or “MT.”
- Recycle the empty cylinder as scrap metal or dispose as solid waste after verifying that the solid waste collection company will accept this material in the trash.
- If required to puncture the empty cylinder before disposal or recycling, do not attempt to do so using hand tools such as a hammer and nail or punch; obtain a tool that is designed for this purpose.

4.2.4 Electronic Devices

Waste electronic devices will be managed as universal waste, as described in Section 4.2.15.

4.2.5 Empty Chemical Containers

Empty chemical containers that formerly held a hazardous material exhibiting hazardous waste characteristics must be managed as a hazardous waste unless handled in accordance with the following procedure.

The container must be “empty.”

- If the material is pourable, no hazardous material can be poured or drained from the container or inner liner when the container or inner liner is held in any orientation (e.g., tilted, inverted, etc.).
- If the material is not pourable, no hazardous material remains in or on the container or inner liner that can feasibly be removed by physical methods (excluding rinsing) which comply with applicable air pollution control laws and which are commonly employed to remove materials from that container or inner liner. Following material removal, the top, bottom and sidewalls of such a container shall not contain remaining adhered or crusted material resulting from buildup of successive layers of material or a mass of solidified material. A thin uniform layer or dried material or powder is considered acceptable.
- If the material is an acute hazardous waste or extremely hazardous waste, the container or inner liner has been triple-rinsed using a solvent capable of removing the waste and all pourable residues have been removed from the container or inner liner as described previously for pourable material. Note that rinsing such containers is considered treatment of hazardous waste and is subject to additional requirements that are not addressed in this plan.

Empty containers 5 gallons or smaller can be disposed of as non-hazardous trash if they are acceptable to the solid waste management company. Rinsing such containers after they are empty is not considered treatment of hazardous waste as long as the rinsate is managed appropriately.

Empty containers larger than 5 gallons must be marked with “Empty” and the date emptied. Accumulation time is limited to one year. They must be reused onsite in a manner that is considered exempt recycling as described in California Health and Safety Code Section 25142.3, sent to a reconditioner or to a recycler, or returned to the chemical supplier for refilling. Containers returned to the supplier for refilling are not subject to the marking and accumulation time requirements. Rinsing empty containers larger than 5 gallons is considered treatment of hazardous waste and is subject to additional requirements that are not addressed in this plan.

4.2.6 Fuel and Oil Filters, Used

Used fuel and oil filters will be drained to remove free-flowing liquid, and accumulated in closed containers that are labeled with “Used (oil or type of fuel) Filters” and the accumulation start date. Used filters will be removed from the site within one year and disposed of at a permitted recycler. Free liquid that is drained from the filters or accumulates in the container will be managed as hazardous waste.

4.2.7 Lamps

Lamps containing mercury (e.g., fluorescent lamps, mercury vapor lamps) will be managed as universal waste as described in Section 4.2.15.

4.2.8 Oil, Used

Used oil will be managed as a hazardous waste and disposed of at a permitted recycling facility.

4.2.9 Oily Solids, Used Absorbents Containing Petroleum, Oily Rags

Oily solids (soil, used absorbents) are presumed to be hazardous waste unless tested and verified to be non-hazardous, and will be managed as hazardous waste.

Debris contaminated with petroleum products (e.g., rags) may be managed as non-hazardous waste if all of the following conditions are met:

- The debris consists exclusively of wood, paper, textile materials, concrete rubble, metallic objects, or other solid manufactured objects.
- The debris is not subject to regulation as a hazardous waste or used oil under federal law.
- The debris does not contain any free liquids.
- The debris, if not contaminated with petroleum, would not otherwise be regulated as a hazardous waste.
- The debris is not a container or tank that is subject to regulation as hazardous waste.
- The debris is disposed of at a Class I or Class II disposal site.

4.2.10 PPE

Used PPE will be managed as non-hazardous waste unless it is visibly contaminated with hazardous waste or hazardous materials.

4.2.11 Sampling Equipment, Plastic Sheeting

Used disposable sampling equipment will be managed as non-hazardous waste unless it is visibly contaminated with hazardous waste or hazardous materials.

4.2.12 Sanitary Waste

Waste from portable sanitary/septic waste systems will be removed from the site by the vendor providing the equipment. Portable toilets will be managed in accordance with the BMP Plan (Appendix D of the *Soil Non-Time-Critical Removal Action Work Plan*).

4.2.13 Stormwater from Secondary Containment Structures

Stormwater that accumulates in secondary containment structures during construction, before the process using the structure becomes operational, will be managed in accordance with the BMP Plan.

4.2.14 Trash

Miscellaneous trash and debris will be managed as non-hazardous waste and will be disposed of at a municipal solidwaste landfill. Recyclable materials such as cardboard, glass and plastic bottles, etc. may be recycled.

4.2.15 Universal Wastes

Universal waste (e.g., aerosol cans, batteries, lamps, and electronic devices) must be handled as follows:

- Store universal waste in containers or packages that remain closed; are structurally sound, adequate to prevent breakage, and compatible with their contents; and that lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions.
- Any universal waste that shows evidence of breakage, leakage, or damage that could cause the release of lead, mercury, or other hazardous constituents to the environment must be contained.
- Containers of universal waste should be labeled with the words “Universal Waste,” the type of waste (e.g., batteries, aerosol cans), and the accumulation start date.

Universal waste must be removed from the site by a registered hazardous waste transporter and taken to a permitted universal waste recycling location within 1 year of the accumulation start date.

5. Waste Transportation and Disposal

Wastes ready for offsite disposal will be loaded onto trucks or containers for transport to preapproved disposal facilities. A designated transportation and disposal coordinator will be onsite during transportation and disposal activities. This individual will be responsible for coordinating and overseeing these activities.

As truck loading is completed, the containers and trucks will be inspected and brushed as necessary to remove loose materials. Each load on the trucks will be inspected by the driver to ensure that the load is secure. Hazardous waste labels on all non-bulk containers will be verified to be accurate and complete, and non-bulk containers will be labeled with the appropriate USDOT hazard class label. Copies of appropriate documentation to include waste manifests or shipping papers will be completed, checked, and kept onsite. In addition, a truck log with loading and transportation information will be maintained. Transport vehicles will proceed to the designated disposal facilities in accordance with local, state, and federal transportation requirements. Additional details regarding the transportation of excavated materials within the work area and the offsite transportation of wastes generated during the Soil NTCRA are provided in the Transportation Plan (Appendix C of the *Soil Non-Time-Critical Removal Action Work Plan*).

5.1 Transporter Requirements

The selected transporters will be licensed and insured in both the shipping and receiving states, and in any other states through which the waste will be transported. Prior to transporting hazardous waste, the driver's license of each driver will be checked to verify that it is the proper class and has the appropriate endorsements for the vehicle being driven. The transporter must be registered with the California Department of Toxic Substances Control as a hazardous waste hauler and have a USEPA Identification number. Transporters operating in Arizona must also be registered with the Arizona Department of Environmental Quality. Transporters operating in Nevada must also hold a permit and certificate of registration issued by the Nevada Department of Environmental Protection.

Each load of hazardous waste shall be accompanied by a properly competed Uniform Hazardous Waste Manifest and, if necessary, a land disposal restriction notification/certification form. Each load of non-hazardous waste shall be accompanied by a properly completed non-hazardous waste manifest form or bill of lading.

The transporter will be responsible for ensuring that loaded trucks comply with all applicable weight limits. For each load of material, weight measurements will be obtained for each full and empty container and dump truck. Official disposal quantities for project records will be based on the difference of weight measurements between the full and empty container or dump truck measured at the disposal facility's scale. Weights will be recorded on the weight ticket by the disposal facility.

The transporter will observe the following practices when hauling and transporting hazardous and non-hazardous waste offsite:

- Minimize impacts to general public traffic.
- Line and cover trucks, trailers, and roll-off bins used for hauling soil before transport and to prevent spills or releases.
- Decontaminate exterior of vehicle using dry methods as necessary prior to leaving the site.
- Wastes or materials from other projects may not be combined with wastes generated during this project.
- Personnel involved in offsite disposal activities will follow safety and spill response procedures outlined in project-specific health and safety plans.

Requirements under 22 CCR 66262.30 through 66262.33 (California action-specific ARAR 19) will apply to offsite shipments of hazardous waste. The requirements of 49 CFR 171-178 (USDOT) will apply to shipments of hazardous waste that are also USDOT-regulated hazardous materials. These requirements do not apply to shipments of non-hazardous waste. It is the responsibility of a USDOT-trained individual to ensure that the requirements of 49 CFR 171-178 are met, including proper classification, marking, labeling, and placards.

5.1.1 Spill Reporting

In the event of a spill or release of hazardous or non-hazardous waste, the transporter must immediately notify a PG&E representative**.** The following information about the spill will be reported and recorded:

- Type of material (for example, soil) and contaminant
- Location
- Estimated volume
- Media affected (for example, spilled on concrete pad or soil)
- Time of spill/release
- Final disposition of spilled material

The transporter will also report serious transportation-related incidents, as defined in 49 CFR 171.15, or releases of a reportable quantity of a hazardous substance, to the National Response Center at (800) 424-8802 or (202) 426-2675. The transporter will also report, in writing, as required by 49 CFR 171.16, to the Director, Office of Hazardous Materials Regulations, Materials Transportation Bureau, Department of Transportation, Washington, DC 20590.

5.1.2 Spill Response

The transporter will clean up spills or releases of hazardous or non-hazardous waste (including soil) that occur during transportation or will take such action as may be required or approved by federal, state, or local officials. Spilled waste will be immediately cleaned up, including soils on the outside of the trucks, the truck and/or container, or road surface. Where appropriate, the spilled material will be returned to the original waste container. Regardless, the spilled material will be properly contained and disposed of.

5.2 Disposal Facilities

Disposal facilities that receive Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste (wastes that contain CERCLA hazardous substances, pollutants, or contaminants) will be in compliance with the CERCLA Off-Site Rule (42 U.S.C. 9621 (d) (3) and 40 CFR 300.440). Wastes designated asRCRA or non-RCRA hazardous wastes, and non-hazardous waste will be transported to and disposed of at anappropriately permitted facility.

PG&E proposes use of the following potential disposal facilities for the project, subject to the communication and approval processes under the Consent Decree (DOI 2013):

Republic Services, Inc.
La Paz Landfill
26999 AZ-95
Parker, AZ 85344
(928) 669-8886

US Ecology Inc. – Landfill
Highway 95 (12 miles South of Beatty, NV)
Beatty, NV 89003

6. Training and Recordkeeping

6.1 Training

Personnel who handle waste will receive initial and annual training in accordance with California action-specific ARAR 19, Standards Applicable to Generators of Hazardous Waste (22 CCR 66262.34). Training will be documented by records that include:

- The job title for each position related to hazardous waste management and the name of the employee filling each job
- A written job description for each position related to hazardous waste management that includes the requisite skill, education, or other qualifications and duties of facility personnel assigned to each position
- A written description of the type and amount of introductory and continuing training that will be given to each person filling a position related to hazardous waste management
- Records that document that the training or job experience required has been completed

6.2 Recordkeeping

Recordkeeping will be in accordance with California action-specific ARAR 19 (22 CCR 66262.40), Standard Applicable to Generators of Hazardous Waste (22 CCR 66262.40 and 66262.41). Records related to waste management will be maintained for a minimum of three years.

Further, 22 CCR 66262.41 requires large quantity generators of RCRA hazardous waste to submit a biennial report to USEPA by March 1 of each even-numbered year that describes hazardous waste generated in the previous odd-numbered year. The following records and documents will be maintained for hazardous waste shipment:

- Transportation and offsite disposal records, including:
  - Profiles and associated characterization data
  - Manifests, Land Disposal Restriction notifications/certifications, bills of lading, and weight tickets
  - Offsite facility waste receipts, certificates of disposal/destruction/recycle
  - Trucking logs
- Training records
- Inspection records

In addition, in accordance with the Revised Management Protocol for Handling and Disposition of Displaced Site Material (PG&E 2015), PG&E will maintain a Displaced Material Inventory for all displaced soil, as described in the Groundwater Remedy Soil Management Plan.

7. References

CH2M HILL. 2007. *Revised Final RCRA Facility Investigation and Remedial Investigation Report. Volume 1 – Site Background and History.* August.

Jacobs Engineering Group Inc. (Jacobs). 2019. *Soil Management Plan. PG&E Topock Compressor Station, Needles, California.* November.

Jacobs Engineering Group Inc. (Jacobs). 2021. *Soil Engineering Evaluation/Cost Analysis. PG&E Topock Compressor Station, Needles, California.* March.

Pacific Gas and Electric Company (PG&E). 2015. *Revised Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California*. November.

Pacific Gas and Electric Company (PG&E). 2013. Remedial Action/Remedial Design Consent Decree (CD) between the United States of America and Pacific Gas & Electric Company. Case 5:13-cv-00074-BRO-OP, Document 23. Entered November 21.

United States Environmental Protection Agency (USEPA). 2007. *Test Methods for Evaluation Solid Waste, Physical/Chemical Methods. (SW-846).* February.

Appendix G
Fill and Backfill Specification

31 23 23
FILL AND BACKFILL

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):

    a. C117, Standard Test Method for Materials Finer Than 75-Micrometers (No. 200) Sieve in Mineral Aggregates by Washing.

    b. C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

    c. D75, Standard Practice for Sampling Aggregates.

    d. D1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

    e. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

    f. D2487, Classification of Soils for Engineering Purposes (Unified soil Classification System).

    g. D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.02 DEFINITIONS

A. Relative Compaction:

1. Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D1557.

2. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by Engineer.

B. Optimum Moisture Content:

1. Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction.

2. Determine field moisture content on basis of fraction passing 3/4-inch sieve.

C. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and subgrade preparation.

D. Completed Course: A course or layer that is ready for next layer or next phase of Work.

E. Lift: Loose (uncompacted) layer of material.

F. Well-Graded:

1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
2. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

G. Influence Area: Area within planes sloped downward and outward at 60-degree angle from horizontal measured from:

1. 1 foot outside outermost edge at base of foundations or slabs.
2. 1 foot outside outermost edge at surface of roadways or shoulder.
3. 0.5 foot outside exterior at spring line of pipes or culverts.

H. Borrow Material: Material from required excavations or from designated borrow areas on or near Site.

I. Selected Backfill Material: Materials available onsite that Engineer determines to be suitable for specific use. Classify soils in accordance with ASTM D2487.

J. Imported Material: Materials obtained from sources offsite, suitable for specified use.

K. Structural Fill: Fill materials as required under structures, pavements, and other facilities.

L. Embankment Material: Fill materials required to raise existing grade in areas other than under structures.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Manufacturer’s specifications with application and installation instructions for proprietary materials and items.
2. Samples: Imported material taken at source.

B. Informational Submittals:

1. Manufacturer's data sheets for compaction equipment.
2. Certified test results from independent testing agency.

1.04 QUALITY ASSURANCE

A. Notify Engineer when:

1. Excavation is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.
2. Soft or loose subgrade materials are encountered wherever embankment or site fill is to be placed.
3. Fill material appears to be deviating from Specifications.

1.05 SEQUENCING AND SCHEDULING

A. Conduct backfilling operations only after confirmation soil sample results confirm excavation has achieved project objectives.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Collect samples in accordance with ASTM D75. Clearly mark samples to show source of material and intended use. Collect enough samples to support testing specified below.

B. Gradation Tests:

1. As necessary to locate acceptable sources of imported material.
2. During production of processed or imported material, one test every 1,500 cubic yards of material delivered. This applies to all processed or imported fill materials.

2.02 EARTHFILL

A. Well-graded fill materials for general fill and embankment zones. Excavated from required excavations and designated borrow sites. Includes excavated material that has been screened to remove fine grained materials (less than 3/8 inch)

2.03 GRANULAR BASE LEVELING COURSE

A. Well-graded sand and gravel.

B. Free of clay, organic materials and other deleterious substances.

C. Well-graded from coarse to fine and containing sufficient fines to bind material when compacted, but with maximum 6 percent by weight passing No. 200 sieve. No rocks or lumps greater than 2 inches.

2.04 GRANULAR FILL

A. 1-inch minus crushed gravel or crushed rock.

B. Free from dirt, clay balls, and organic material.

C. Well-graded from coarse to fine and containing sufficient fines to bind material when compacted, but with maximum 5 percent by weight passing No. 200 sieve.

2.05 SAND

A. Free from clay, organic matter, or other deleterious material.

B. Gradation as determined in accordance with ASTM C117 and ASTM C136:

Sieve Size	Percent Passing by Weight
1/4-inch	100
No. 4	95 – 100
No. 200	0 – 8

2.06 GRANULAR DRAIN MATERIAL

A. Gradation: ASTM C117 and ASTM C136.

Sieve Size	Percent Passing By Weight
2 inches	100
1-1/2 inches	90 – 100
3/4 inch	0 – 15
3/8 inch	0 – 5
No. 4	---
No. 16	---
No. 50	---
No. 200	---

2.07 GRANULAR FILTER MATERIAL

A. Clean, hard, durable gravel, free from foreign materials and washed.

B. Gradation as determined in accordance with ASTM C117 and ASTM C136:

Sieve Size	Percent Passing by Weight
1/2 inch	95 – 98
3/8 inch	54 – 64
No. 4	0 – 3

2.08 WATER FOR MOISTURE CONDITIONING

A. Free of hazardous or toxic contaminates, or contaminants deleterious to proper compaction.

PART 3 EXECUTION

3.01 GENERAL

A. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.

B. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.

C. During filling and backfilling, keep level of fill and backfill even.

D. Do not place fill or backfill, if fill or backfill material is frozen, or if surface upon which fill or backfill is to be placed is frozen.

E. Tolerances:

1. Final Lines and Grades: Within a tolerance of 0.1 foot unless dimensions or grades are shown or specified otherwise.
2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.

F. Settlement: Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

3.02 EARTHFILL

A. Outside Influence Areas beneath Structures, Tanks, Pavements, Curbs, Slabs, Piping, and Other Facilities: Unless otherwise shown, place earthfill as follows:

1. Allow for topsoil where required.
2. Maximum 8-inch thick loose lifts.

3. Place and compact fill across full width of embankment, ensuring fill is placed in equal depths on opposite sides of structures and tanks.
4. Compact to minimum 90 percent relative compaction as determined in accordance with ASTM D1557.
5. Dress completed embankment with allowance for topsoil, crest surfacing, and slope protection, where applicable.

3.03 FIELD QUALITY CONTROL

A. Gradation:

1. One sample from each 1,500 cubic yards of finished product or more often as determined by Engineer, if variation in gradation is occurring, or if material appears to depart from Specifications.
2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.
3. Remove material placed in Work that does not meet Specification requirements.

B. In-Place Density and Moisture Control Tests:

1. During placement of all fill materials, test at least once for every 12-inch lift every 500 square feet of compacted area, or one test for every 25 lineal feet of trench. Test in accordance with ASTM D6938, nuclear gauge testing.
2. Proof roll fill materials that are too coarse to be tested in accordance with ASTM D6938. Proof roll with a loaded water truck, dump truck, or similar vehicle.

END OF SECTION

Appendix H
Standard Operating Procedures

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-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-B14

Soil Sampling
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance for sample collection from soil at the surface and shallow subsurface. 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 additional guidance for soil characterization and logging.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP), work plan or event-specific field instructions, and planned soil sampling depth.
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) Coordinate with laboratory for coolers and courier for pickup of samples.
3) Initiate field logbook for sampling activity.
4) Review sampling procedures and equipment, and planned sample depths field crew.

Equipment List

- Soil sample containers appropriate for sample analysis and preservation as called for in SAP and QAPP (glass jars, auger sleeves, sealed plastic bags, etc.)
- Soil sampling equipment (hand auger, auger extensions, stainless steel trowel, spatula or putty knife, stainless steel compositing bowl, etc.)
- Field logbook
- Sediment sampling logs
- 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 will be completed at the time of sample collection. An example of a soil sampling log is provided in SOP-B14 attachment A. Items to be documented on the sampling log include:

1) **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.
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 sample to the nearest inch of sample recovered. Record total length and percent of sample recovered.
4) **Sampling:** Sampling difficulties shall be noted. 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 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.

SOIL SAMPLING BY HAND TROWEL —GENERAL PROCEDURE

Sampling with a pre-cleaned stainless steel or disposable hand trowel may be used to collect soil up to 6 inches deep for samples that will be not analyzed for volatile organics.

1) Use the hand trowel to remove the upper 2 inches of soil and acquire a representative sample of deeper materials to a depth of 6 inches.
2) The soil sample should be placed in an 8-ounce clear glass jar after homogenizing (if applicable) and placed in a plastic bag inside a cooler maintained at 4°C.

3) The sample should be classified, labeled, and documented in accordance with SOP B3 *Borehole Sampling and Logging of Soil Borings*.

4) Labels shall be affixed to the sample containers with job designation, time, sample number, sample depth interval, sample number, date sampled, and the initials of the sampler clearly marked.

5) Sample information shall be placed on the chain-of-custody, the soil sample log, and the field logbook. All samples shall be handled in accordance with *Chain of Custody Procedures* and the QAPP.

6) Decontaminate equipment in between samples in accordance with SOP-B5 Decontamination of Personnel and Equipment, Well Drilling and Subsurface Sampling and Investigations, and dispose of IDW in accordance with SOP-B6 Disposal of Waste Fluids and Solid.

SOIL SAMPLING BY HAND AUGER —GENERAL PROCEDURE

Hand auger soil sampling procedures shall be executed in accordance with American Society for Testing and Materials (ASTM) D4700-91, "Standard Guide for Soil Sampling in the Vadose Zone" (ASTM 1984). For dry, sandy soils it may be necessary to use a variation of the regular barrel auger that includes a specially-formed bit to retain the sample in the barrel. Sand augers with 2, 3, 4-inch diameters are available. These procedures may be modified as field conditions dictate. Ultimately, the method that yields the best results should be used.

1) Assemble hand auger pieces and extension rods to desired length.

2) Pre-cleaned sample liners may be loaded into the core barrel before sampling, if applicable. These liners are used to acquire samples and serve as the sample container.

3) The hand auger shall be advanced to the top of the sampling interval by rotating the auger and applying downward pressure.

4) When the barrel is filled, the auger is removed from the cavity and a sample may be collected from the barrel with clean, stainless steel utensils. Another potential method when sampling for metals is to auger down to depth and then remove the auger and accumulated soil and set aside in a 1-gallon pail. Then a stainless steel slide hammer is inserted into the hole and the sample is collected.

5) The sample should be classified, labeled, and documented in accordance with SOP-B3 *Borehole Sampling and Logging of Soil Borings*.

6) In general, the deeper part of the soil sample is collected for laboratory analysis, and 10 percent of the liners (if any) are collected for quality assurance testing. If a liner was used for sampling, it shall be placed in a re-sealable plastic bag. Otherwise, the soil sample will be placed in an 8-ounce clear glass jar after homogenizing (see SOP-B7 *Homogenization of Soil and Sediment Samples*) and placed in a plastic bag.

7) Labels shall be affixed to the sample containers/liners with job designation, time, sample number, sample depth interval, sample number, date sampled, and the initials of the sampler clearly marked.

8) The samples should be placed in a cooler maintained at 4°C.

9) Sample information shall be placed on the chain-of-custody, the sample log, and the field logbook. All samples shall be handled in accordance with *Chain of Custody Procedures*.

10) Decontaminate sampling equipment prior to the beginning of work and between each sample in accordance with SOP-B5 *Decontamination of Personnel and Equipment, Well Drilling and Subsurface Sampling and Investigations*.

11) 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 B-6 *Disposal of Waste Fluids and Solids* (IDW) in Appendix B, and in SOP 39, Standard of Practice H-83, and Appendix D of the project *Soil and Groundwater Management Plan*.

ATTACHMENT A

Soil Sampling Log

SURFACE AND SHALLOW SOIL SAMPLE LOG

Project Number	Project Name	Date	Time
Sample Identification Number and Time		Checked by	
Sampled by		Recorded by	
Method of Collection			
Surface Description			
Notes			

Soil Sample Data

Location	
Coordinates	Elevation

LITHOLOGY	DEPTH (FEET)	DESCRIPTION	USCS SYMBOL	Est. % of			COMMENTS
				G	S	F	

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-B19

Remote Equipment Refueling
Standard Operating Procedures for PG&E Topock Program

Background

Pacific Gas and Electric Company PG&E is conducting a soil investigation near the intersection of Park Moabi Road and Interstate 40, approximately 10 miles west of Needles, California, at and near the PG&E Topock Compressor Station. This Standard Operating Procedure summarizes the methods required to remotely refuel the equipment used during this work. These methods are to be followed by all contractors conducting this work.

Policy and Permission to Proceed

PG&E strongly prefers for equipment refueling to be conducted at commercial fueling stations or at the Topock Compressor Station fueling facilities whenever feasible. However, PG&E also realizes that some refueling is best conducted remotely, when the equipment is located at the worksite and should not be moved.

For onsite refueling at the Topock Compressor Station fueling facilities, the first step is for the contractor to discuss the onsite process and procedures with PG&E's onsite remediation staff (Chris Smith, Curt Russell, or Glen Riddle). This includes the process of filling portable fuel containers at Topock Compressor Station, if PG&E allows.

If the Topock Compressor Station onsite fueling facilities are not the best way to refuel remote equipment, the contractor must receive positive permission from one of the PG&E staff employees listed above before proceeding to remotely refuel equipment following the procedures below. The contractor must also obtain PG&E permission prior to bringing or storing any fuel onsite.

Remote Refueling Procedure

Several steps must be accomplished before remote refueling can be initiated to avoid spills and incident. The following considerations and procedure will be followed during refueling:

Preparation and Pre-fueling Considerations

- Turn off all equipment or engines before refueling.
- Stage/inspect fire extinguisher to ensure that is in within specifications and is accessible.
- Stage spill containment such as a spill pad (bermed) and absorbent pads under the equipment that is being refueled.
- Distinguish all ignition sources (that is, cigarettes, torches, etc.).
- Allow small engines (such as generators) to cool down before refueling because gasoline spilled on hot engine parts may ignite.

- Do not leave the equipment fueling point while refueling to avoid spills and spark ignition. (Do not enter your vehicle during refueling.)
- Never jam or force the hold-open latch open by using some other object.
- Use only an approved container 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.
- Never store fuel near a generator or near any ignition sources.
- If a flash fire occurs during refueling, you should attempt to stop the flow of fuel before backing away from the equipment or vehicle.

General Remote Fueling Procedure

1. Position the fuel supply source as close to the equipment to be fueled, as practicable and safe. Chock wheels of involved vehicles to avoid adjustments in vehicle position during fueling.
2. Prepare the work area by positioning bermed spill pad(s) at both the fuel source, equipment fill point, and ALL areas between. A spill containment kit containing sorbent pads should be positioned nearby and its contents should be verified prior to fueling.
3. Don appropriate personal protective equipment, as defined in the Health and Safety Plan.
4. 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.
5. In the event a defect is identified in fuel conveyance equipment; notify the appropriate personnel, and stand down from fueling operations immediately.
6. Ensure the area is free from ignition sources (that is, hot equipment/work, sources of spark or static electricity).
7. Position one crew member at the fuel pump and one crew member at the equipment fill point and begin fueling. Station fire extinguisher within 10 feet of fueling operations. Only one crew member is required for filling equipment from a portable container. Do not over fill or top off the fuel tank.
8. 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).
9. Replace all fueling equipment and re-inspect for signs of wear or defect (that is, identify areas that may be seeping fuel at a slow rate).
10. Inspect work area for any signs of spills, and remove spill pad(s), as appropriate.

Communication and Contingency Action

If a spill occurs, the appropriate clean-up actions should commence as efficiently and safely as possible. Further, 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, the following communication protocol must be followed:

- **If the spill is contained by the spill containment measures:** the contractor's field team leader must be notified.
- **If the spill is not contained by the spill containment measures:** the contractor's field team leader must be immediately notified. Subsequently, the contractor's field team leader must immediately notify Chris Smith, Curt Russell, or Glen Riddle.

Waste Management

Waste generated during refueling, such as oily absorbent pads, must be transported and disposed at Interim Measures No. 3 oil waste-storage area, or as directed by Chris Smith, immediately following generation. Do not dispose of any oil/fuel-contaminated pads or rags in the soil rolloff bins or waste dumpsters.

Appendix I
Avoidance and Minimization Measures

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Inland Deserts Region
Blythe Field Office
P.O. Box 2160
Blythe, California 92226
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

March 6, 2013

Yvonne Meeks
Manager, Environmental Remediation
Pacific Gas and Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Subject: Confirmation of Application of the CERCLA 121(e)(1) Permit Exemption to Pacific Gas and Electric Company's Soil and Groundwater Investigation and Remediation Project

Dear Ms. Meeks:

You asked the California Department of Fish and Wildlife (CDFW) to determine whether or not the permit exemption in Section 121(e)(1) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) applies to response actions conducted onsite at the Pacific Gas and Electricity (PG&E) Topock CERCLA site, specifically soil and groundwater investigations and remediation activities at the site (Project). CDFW has determined that the permit exemption applies to the Project. As a result, PG&E is relieved from obtaining a Lake or Streambed Alteration Agreement (Agreement). However, PG&E must still comply with any substantive elements CDFW would require in an Agreement for the Project. In this case, the substantive elements are the avoidance and mitigation measures (AMMs) attached hereto which PG&E previously agreed to follow. PG&E must comply with the AMMs for the duration of the Project unless they are modifed later.

Please note in particular the five day notification procedure specified in AMM 34. The notification required under AMM 34 must include: a written description of any Project-related construction activities; a location map; biological clearance; and additional AMMs PG&E's biologist determines are necessary.

If you have any questions regarding this matter, please contact Victoria Chau, Environmental Scientist at (760) 922-6783 or Victoria.Chau@wildlife.ca.gov.

Sincerely,

Chris Hayes

Chris Hayes
Deputy Regional Manager
Inland Deserts Region

Attachment: CDFW Topock Remediation AMMs

2/5/13

Avoidance and Mitigation Measures for Topock Remediation Project (Project)

The California Department of Fish and Wildlife (Department) recommends the following avoidance and mitigation measures (AMMs 1-34) for all work conducted in CDFW Jurisdictional Washes. Additional AMMs will be developed for the Project, as needed, by the qualified Biologist or Cultural Specialist. The following AMMs will be implemented in a manner consistent with the mitigation measures set forth in the Mitigation Monitoring and Reporting Program (MMRP) for the Topock Compressor Station Final Remedy FEIR approved by DTSC on January 31, 2011.

1. Formal environmental training will be provided for all onsite personnel prior to construction. This training will include biological, environmental laws, and guidelines.

2. If required for species or habitat protection, a biological site monitor will be on site during all ground disturbing activities.

3. No direct or indirect impacts shall occur to any State or federally listed threatened, endangered, or candidate species. Any and all impacts to these species are strictly prohibited and are punishable by Federal and State laws. If threatened, endangered, or candidate species occur within the proposed work area or could be impacted by the proposed project, Pacific Gas and Electric Company (hereinafter called the Operator) shall obtain the required State and Federal threatened and endangered species permits or comply with the substantive requirements of such laws, pursuant to CERCLA Section 121(e)(1).

4. No discharges to the CDFW Jurisdictional Washes or Colorado River shall occur without permits or compliance with the substantive requirements of applicable Federal and state laws, pursuant to CERCLA Section 121(e)(1).

5. Spoil sites shall not be located within the bed, bank, and channel of any watercourse, where spoil could be washed back into a stream, or where it will cover aquatic or riparian vegetation. Any materials placed in seasonally dry portions of a stream that could be washed downstream or could be deleterious to aquatic life shall be removed from the project site prior to inundation by high flows.

6. Structures and associated materials, including construction debris, not designed to withstand high seasonal flows shall be removed to areas above the high water mark before such flows occur.

7. All debris, bark, slash, sawdust, rubbish, silt, cement or concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances resulting from project related activities that could be hazardous to aquatic life or waters of the State, shall be prevented from

contaminating the soil and/or entering the waters of the State and shall not be deposited within 150 feet of the high water mark, unless containerized. None of these materials shall be allowed to enter into or be placed within or where they may enter or be washed by rainfall or runoff into waters of the State. When operations are completed, any excess materials or debris shall be removed from the work area.

8. Erosion control measures shall be implemented where necessary to reduce erosion and sedimentation in wetlands, waters of the United States, waters of the state, and habitat occupied by covered species and plant species when activities are the source of potential erosion impacts.

9. During construction, the contractor shall not dump any litter or construction debris within the riparian/stream zone. All such debris and waste shall be removed daily and properly disposed of at an appropriate site.

10. The Operator shall comply with all litter and pollution laws. All contractors, subcontractors and employees shall also obey these laws and it shall be the responsibility of the Operator to ensure compliance. The clean-up of all pollution spills shall begin immediately. The Operator shall notify the Department immediately of any spills and shall consult with the Department regarding clean-up procedures and requirements.

11. Spills and releases of materials shall be cleaned up immediately and thoroughly. Appropriate spill response equipment, including spill kits preloaded with absorbents in an over-pack drum (where feasible), will be provided at convenient locations throughout the site. Spent absorbent material will be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste will be managed as hazardous waste unless characterized as nonhazardous.

12. Trash and scrap receptacles shall be located throughout work areas, as necessary, to promote proper disposal of solid wastes. Receptacles shall be provided with lids or covers to prevent windblown litter.

13. Proper receptacles to dispose of hazardous wastes shall be provided at each work area.

14. Excess concrete will be collected and disposed of in designated concrete washout facilities.

15. Any sanitary and septic waste facilities provided during project work will be located away from drainage courses and traffic areas. These facilities will be maintained regularly.

16. Staging/storage areas for equipment and materials shall be located outside of the

Colorado River's bed, bank, and channel. No equipment maintenance shall be done within 150 feet of the Colorado River channel where petroleum products or other pollutants from the equipment may enter these areas under any flow.

17. Stationary equipment such as motors, pumps, generators, and welders, located within or adjacent to the Colorado River, shall be positioned over drip pans.

18. Vehicles shall not be driven or equipment operated in water covered portions of the Colorado River or in wetted areas (including but not limited to ponded, flowing, or wetland areas), or where riparian vegetation may be destroyed, except as necessary to complete authorized work as described under the plan.

19. Any equipment or vehicles driven and/or operated within or adjacent to the Colorado River shall be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life, wildlife, or riparian and wetland habitat.

20. Project-related vehicle traffic, construction activity, and equipment storage shall be restricted to established roads, designated access roads, the working strip, storage areas, staging and parking areas, and other designated project areas. All of these areas shall be clearly marked by posting signs.

21. All vehicles and equipment regularly entering and leaving work areas shall be cleaned to reduce material track-out.

22. Vehicles shall not exceed a speed limit of 15 mph in the ROWs or on unpaved roads within sensitive land-cover types.

23. All disturbed portions of the Colorado River shall be restored to as near original condition as possible, except as otherwise indicated to the Department.

24. No vehicles shall be refueled within 100 feet of a wetland, stream, or other water-body unless done within a constructed secondary containment area that includes, at a minimum, a perimeter berm and leak-proof liner.

25. All equipment and vehicles will have federal or state approved spark arrestors. All vehicles will carry an approved fire extinguisher (or backpack pump filled with water) and a shovel.

26. The development of new access and ROW roads by PG&E and vegetation clearing and blading for temporary vehicle access shall be minimized.

27. Covered storage for materials, especially toxic or hazardous materials, shall be provided to prevent exposure of these materials to storm water. Toxic or hazardous materials will be stored or transferred on impervious surfaces that will provide secondary containment for spills. Vehicles and equipment used for

material delivery and storage, as well as all contractor vehicles, shall be parked in designated areas.

28. Trash dumping, firearms, open fires (such as barbecues) not required by the activity, hunting, and pets will be prohibited in O&M work activity sites.

29. The perimeter of the work site shall be adequately flagged to prevent damage to adjacent riparian and wetland habitats. The upstream and downstream limits of the work area, including all areas of impact to existing desert riparian habitat and "Environmentally Sensitive Areas (ESA)", shall be identified with flagging or brightly colored mesh fencing or some other means readily conveyed to the equipment operators. These limits will be identified by a supervisor familiar with the terms of these AMMs, prior to the beginning of activities, and will be confined to the minimal area needed to accomplish the proposed work.

30. If disturbance or removal of riparian habitat is unavoidable the operator shall implement measures outlined in MMRP BIO-1 regarding restoration, rehabilitation and/or replacement of such habitat. Measures to implement MMRP BIO-1 shall be outlined in the notification listed below in measure #33.

31. No herbicides shall be used on vegetation unless specifically authorized, in writing, by the Department.

32. The Operator assumes responsibility for the restoration of any wildlife habitat which may be impaired or damaged, either directly or incidental, to the project, as a result of failure to properly implement or complete the listed mitigative features or from activities which were not included in the Operator's Notification.

33. All project resident engineers, project engineers, project inspectors, and contractors and sub-contractors shall be provided with a copy of the AMMs, and shall abide by the terms and conditions of the AMMs.

34. The Operator shall notify the Department, in writing, at least five (5) days prior to initiation of construction (project) activities and at least five (5) days prior to completion of construction (project) activities. Notification shall be sent to: Department of Fish and Wildlife, Colorado River Program, P.O. 2160, Blythe, California 92226; FAX No. (760) 922-5638.

Clean Water Act Section 404 Best Management Practices and Wetlands Avoidance Measures

The potential impacts to jurisdictional waters associated with implementation of the Soil NTCRA project at the Topock Compressor Station are anticipated to be temporary. Temporary impacts are associated with construction activities that may require removal of vegetation or soil disturbance from construction activities (e.g., access roads) but will not result in permanent modifications to the bed, bank or channel of waterways.

The following wetland avoidance measures and Best Management Practices (BMPs) will be employed for the Soil NTCRA project:

1. A delineation of wetlands and waters of the United States has been prepared for the proposed project area and submitted to DTSC (April 2014). In addition to the mapping of federal jurisdictional wetlands and waters of the U.S., there was also a determination of the areas that are jurisdictional by CDFW under Section 1600. The CERCLA Section 121(e) exemption for the Topock Program obviates the need to secure permits from the U.S. Army Corps of Engineers or from CDFW; however, the substantive requirements of applicable state and federal laws are satisfied. The CDFW exemption from Section 1600 was accompanied by a list of Avoidance and Minimization Measures (AMMs), dated February 15, 2013, that will be implemented during construction of the Soil NTCRA.

2. When planned work activities occur near or within jurisdictional wetlands or waters, a biological monitor will provide Worker Environmental Awareness Training to construction crews. The training will include information on sensitive biological resources that may occur in construction areas and the requirements to protect those resources. The training will also include information about BMPs to avoid potential indirect impacts to water quality at the Project location or in downstream areas as described in the CDFW AMMs. PG&E’s construction foreman will be responsible for verifying that all construction workers completed the training prior to beginning work at the project site.

3. Where boundaries of jurisdictional wetlands or waters are found in close proximity to planned construction activities, these features will be clearly demarcated in the field using flagging or brightly colored mesh fencing in order to ensure that they are not inadvertently impacted. The demarcation will be conducted under the supervision of a qualified biologist. The biologist will also survey any vegetation areas prior to clearing or cutting to ensure that there are no sensitive biological resources (such as active bird nests) that might be affected. The pre-construction survey will also include photographic documentation of pre-project conditions.

4. Access routes that pass through jurisdictional wetlands and waters, if needed, will be identified in order to minimize the impacts to perennial vegetation (e.g., trees and shrubs). Any protected perennial trees or shrubs that are removed as a result of the Soil NTCRA project will be mitigated as part of the revegetation planning process.

5. Pre-construction surveys for listed species or actively nesting birds will be conducted immediately prior to the start of construction and after demarcation. Should any listed individuals or active nests be identified, the PG&E biologist will contact USFWS to determine an appropriate response. Only a biologist with an active Section 10(a) permit will be authorized to remove any individuals from the construction areas to a USFWS-approved release location.

6. The boundaries of the construction work zones and staging (supporting) areas including access routes will follow existing routes as much as possible. All construction work zones will be shown on detailed site maps and demarcated in the field. No construction activities, vehicular access, equipment storage, stockpiling, or significant human intrusion will be allowed outside of the designated construction work zone and staging areas.

7. Equipment will not be operated in areas of ponded or flowing water, and no wet excavations will be performed during construction. Construction vehicles and equipment will be checked periodically to ensure that they are in proper working condition and that there are no apparent oil or fuel leaks. Onsite refueling or lubrication of vehicles and cleaning of equipment, or other activities that involve

the use of fuels, lubricants, or solvents, will occur only in locations that are away from jurisdictional wetlands and waters.

8. Compliance with the above AMMs within jurisdictional waters will be tracked and reported to DOI in the quarterly ARARs compliance reports.
9. At project completion, the designated biological monitor will return to the site to document the post-construction conditions at the site. Information on the pre-and post-construction conditions will be documented in the Removal Action Completion Report. Post-construction conditions will be documented with photographs.

Appendix J
Applied Earthworks Cultural Resources Summary Memorandum

Topock Compressor Station
Non-Time Critical Removal Action Work Plan
Archaeological Resources Constraints Analysis
San Bernardino County, California

Patrick Moloney and Diane L. Douglas

Prepared By

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October 2021
draft

CONTENTS

FIGURES

TABLES

1 INTRODUCTION AND PURPOSE OF THE CURRENT STUDY

As directed by the DOI, PG&E is preparing a Non-Time Critical Removal Action (NTCRA) Work Plan for review and approval by DOI. After DOI's approval, the NTCRA will occur within the 2017 revised APE (Figure 1). In support of the groundwater cleanup, PG&E has previously inventoried the APE for archaeological and historical sites (e.g., Davy et al. 2004; Hearth and Price 2013; McDougall 2004; McDougall et al. 2004; McDougall and Horne 2005; Moloney and Hanes 2016; Moloney and Haydu 2010), with the most recent intensive pedestrian survey undertaken in March and April, 2021 (Moloney et al. 2021) (Figures 2 and 3). Applied Earthworks (Æ), serves as PG&E's qualified professional archaeological contractor for the Project and was asked to review the NTCRA Work Area Boundary for any overlap with known archaeological and historical resources.

1.1 METHODS AND RESULTS

Æ examined the proposed NTCRA Work Area Boundary and a 30 meter buffer around the Target Action Areas (TAA) to determine previous survey coverage and identify locations of known archaeological and historical resources relative to the TTAs. Following review of the Work Area Boundary, Æ concluded that all areas identified within the action plan have been surveyed multiple times within the past twenty years (Table 1 and Figures 2 and 3). The majority of these areas were surveyed as recently as 2021, and most others as recently as 2018. Only one area, (I) the BOR rock quarry, has not been surveyed since 2004. Review of archaeological sites within 30 meters of TAAs revealed that only one isolate, 36-027735 (a flaked chert pebble), is within 30 meters of a TAA G—where actual ground excavations are proposed. Multiple sites are within 30 meters of the larger Work Area Boundary; however, this area is not designated for soils excavation or removal, but for ancillary operations such as vehicle and equipment access, mobilization, and staging, and therefore it is unlikely that any archaeological resources will be physically impacted by proposed work activities.

1.2 RECOMMENDATIONS

To ensure that archaeological or historical resources are not inadvertently damaged during construction repairs to the pipeline, workers will be provided Worker Environmental Awareness Training (including cultural sensitivity) and directed to stay within approved work areas only. The approved work areas will be clearly marked on the construction plan sheets, and Project access, staging and parking areas will also be clearly defined. A qualified archaeologist will also conduct a walkover within TAA—G, in the area where Isolate 36-027735 was previously recorded, and determine if the isolate can be relocated prior to construction activities in this area. If the isolate is relocated, it should be placed immediately outside the 30-meter TAA for the duration of construction and returned to where it was found after construction is completed.

A qualified archaeologist will monitor all construction activity including placement and removal any of ESA fencing or other best management practices (BMPs), to ensure no known or unanticipated archaeological resources are adversely affected by the Project. PG&E will ensure that Tribal monitors are invited to monitor construction activities undertaken for the Project.

Figure 1. **Topock Remedy 2017 APE and NTCRA Target Action Areas.**

Table 1 Previous surveys in the NTCRA work boundary and associated known sites and isolates.

TAA	Relevant Surveys Year, Author, Title (summary)	Sites/Isolates ~ 30 meters of TAA	Sites/Isolates ~ 30 meters of WPB
A	2014 MRPF Construction HQSS 2015 Moloney. Moabi Regional Park Survey. 2018 Phase I Construction Headquarters, pre-construction walkover	None	CA-SBR-28964H (*historical refuse*) 36-028971 (*isolate, ground stone fragment*) CA-SBR-2910H (*NOTH/US 66*)
B	2004 Davey et al., Original and Expanded APE 2014 Moloney and Price, Pre-Construction Field Verification Insp. 2015 Soils Investigation WZMF 2018 Phase I Staging Area 9, pre-construction walkover	None	None
C	2004 Davey et al., Original and Expanded APE 2014 Moloney and Price. Pre-Construction Field Verification Insp. 2018 Phase I Pipeline, pre-construction walkover 2021 Moloney et al., SEIR survey	None	CA-SBR-11862H (*El Rancho Colorado Roadhouse & Features*) CA-SBR-6693H/ CA-SBR-2910H (Segment X) (*A&P/AT&SF/NOTH/US 66*) CA-SBR-11997H (*1890s bridge & culvert*)
D	2004 Davey et al., Original and Expanded APE 2014 Moloney and Price, Pre-Construction Field Verification Insp. 2015 Soils Investigation WZMF 2018 Phase I Pipeline/Access Road Survey, pre-construction walkover 2021 Moloney et al. SEIR survey	None	CA-SBR-6693H/ CA-SBR-2910H-Seg. X (*A&P/AT&SF/NOTH/US 66*) CA-SBR-11997H (*1890s bridge & culvert*) CA-SBR-11932/H (*prehistoric lithic assays & historic features*)
E	2004 Davey et al., Original and Expanded APE 2014 Moloney and Price. Pre-Construction Field Verification Insp. 2015 Soils Investigation WZMF 2016 Phase II Data Gap Soil Sampling AOCs 2018 Phase I Pipeline, pre-construction walkover 2021 Moloney et al. SEIR survey	None	CA-SBR-12642H (*footer for Red Rock Bridge*) 36-021486 (*US 66 Welcome Sign*) CA-SBR-2910H (Segment A and Locus A) (*NOTH/US 66*)

TAA	Relevant Surveys Year, Author, Title (summary)	Sites/Isolates ~ 30 meters of TAA	Sites/Isolates ~ 30 meters of WPB
F	2004 Davey et al., Original and Expanded APE 2014 Moloney and Price, Pre-Construction Field Verification Insp. 2015 Soils Investigation WZMF 2016 Phase II Data Gap Soil Sampling AOCs 2018 Phase I Pipeline, pre-construction walkover 2021 Douglas and Moloney,TW-01 Pipeline Survey 2021 Moloney et al., SEIR survey	None	CA-SBR-29935 (*lithic scatter*) CA-SBR-29936 (*lithic scatter)* Æ-Topock-ISO-61 (*quartzite core*) 36-023219 (isolate, historic brick spheres)
G	2004 Davey et al., Original and Expanded APE 2013 TCS Lost Well #4 Decommissioning & MW-38 Rehabilitation 2014 Moloney and Price, Pre-Construction Field Verification Insp. 2015 Soils Investigation WZMF 2021 Moloney et al., SEIR Survey	36-027735 (isolate)	36-027735 (*isolate, flaked chert pebble*)
H	2004 Davey et al., Original and Expanded APE 2010 Moloney and Haydu, Survey Within the Fence Line of the TCS 2013 Hearth and Price, TCS Built Environment Survey		03-027648 (*Topock Compressor Station*)
I	2004 Davey et al., Original and Expanded APE	None	None
Access Routes	2004 Davey et al., Original and Expanded APE 2014 Moloney and Price, Pre-Construction Field Verification Insp. 2021 Moloney et al., SEIR Survey	None	CA-SBR-2910H (*NOTH/US 66*) CA-SBR-11928 *(lithic scatter*) CA-SBR-17220/H (lithics & historic refuse) CA-SBR-11862H (*El Rancho Colorado Roadhouse & Features*) CA-SBR-11865H (*A&P/AT&SF RR* siding) CA-SBR-11997H (*1890s bridge & culvert)* CA-SBR-11932/H *(lithics & historic features)* CA-SBR-12641/H *(lithics & historic features)* CA-SBR-13791H (*historic refuse*) CA-SBR-11922 (*Aboriginal trail segment*)

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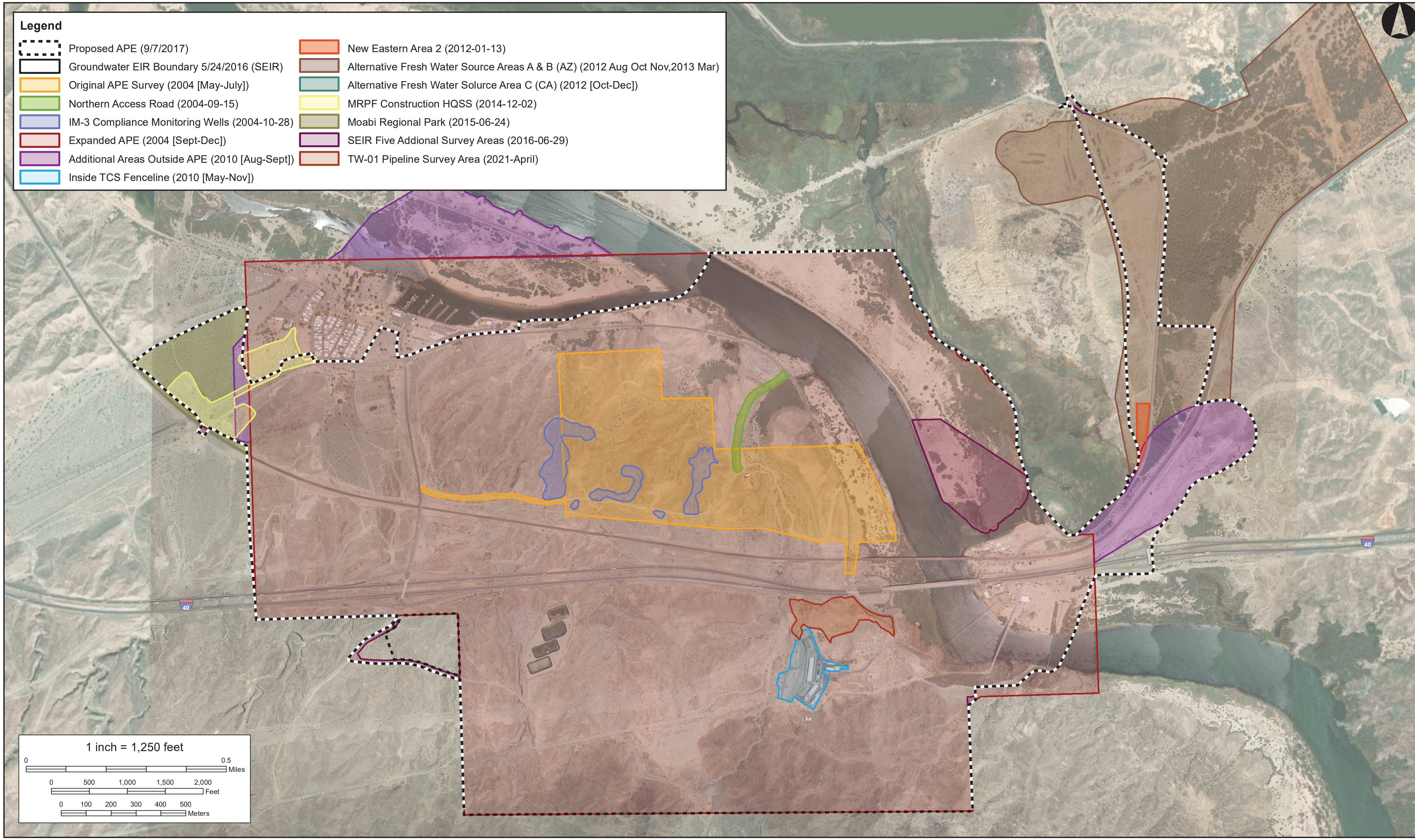

Figure 2 Previous surveys within the APE and SEIR Project Area.

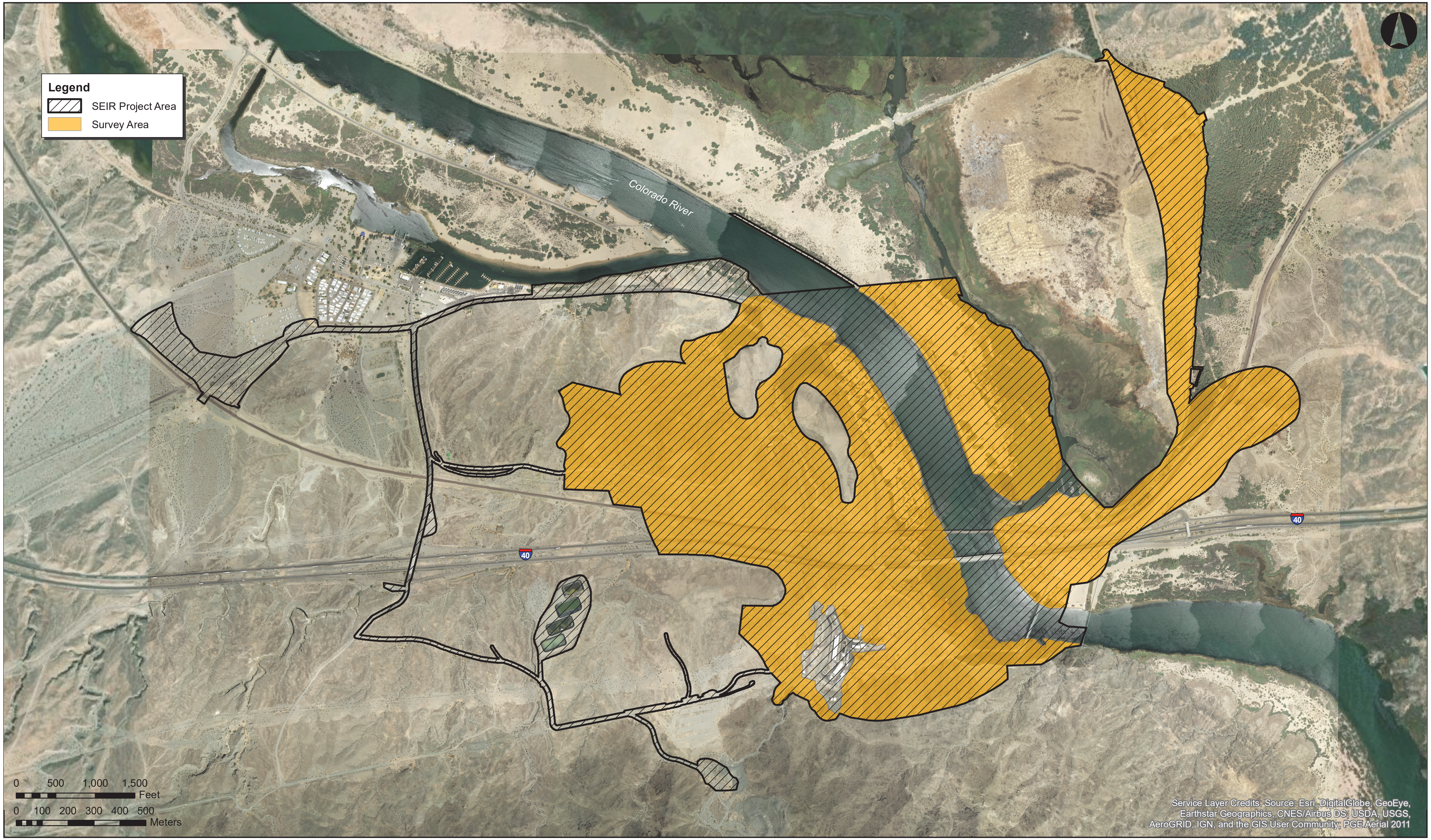

Figure 3 The SEIR Project Area showing the area surveyed in 2021.

2
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Appendix K
Addendum to Soil Management Plan

ADDENDUM TO SOIL MANAGEMENT PLAN (May 28, 2019)
Final Groundwater Remedy
PG&E Topock Compressor Station, Needles, California

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 Tribes 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 and stored separately from other displaced soils (see attached figure). In addition, clay material will only be stockpiled and not containerized in 55-gallon drums/small containers or roll-off bins. The method for stockpiling of clay will be similar to that for other displaced soils as described in Section 3.1 (Methods to Store Soil). 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. In the event clay material is encountered, PG&E will document the event in the monthly progress reports (during construction) or the quarterly compliance reports (during O&M). 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.

NOTES:
1. FOR FENCING AND GRAVEL ROAD DETAILS, SEE SHEETS C-00-05, C-00-06, AND C-00-07.
2. FINAL LAYOUT OF TEMPORARY CONSTRUCTION AND LAYDOWN AREAS TO BE DETERMINED BY CONTRACTOR. REPRESENTATIVE USE OF THE AREA IS DEPICTED HERE.

- FINAL DESIGN -
FOR AGENCY
APPROVAL ONLY

REGISTERED PROFESSIONAL ENGINEER BENJAMIN J. WUERL C 67811 EXP 6/30/17 CIVIL STATE OF CALIFORNIA

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
3	5/18/16	ROAD ALIGNMENT REVISION		AJW	JPB	JPB	RAO
2	11/18/15	FINAL DESIGN		AJW	WLM	BW	RAO
1	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	MSL	JPB	JEF

REVISIONS

APPROVED BY: RAO
SO / SUPV / DSGN / DWN / CHKD / OK / DATE / SCALES

TOPOCK GROUNDWATER REMEDIATION PROJECT

PARK MOABI SOIL STAGING AND STORAGE SITE PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

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Appendix L
Quality Assurance Project Plan

JACOBS

RCRA Facility Investigation/Remedial Investigation for Soil at the Topock Compressor Station

Quality Assurance Project Plan Addendum

Draft Final

July 2019

Pacific Gas and Electric Company

RCRA Facility Investigation/Remedial Investigation for Soil at the Topock Compressor Station

Project No:	707614.01.01
Document Title:	Quality Assurance Project Plan Addendum
Document No.:	BI0320191548BAO
Revision:	Draft Final
Date:	July 2019
Client Name:	Pacific Gas and Electric Company
Project Manager:	Christina Hong
Author:	Mark Fesler
File Name:	PGE Topock Soil Addendum_2019DraftFinal_rev0

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Contents

Tables

(Tables appear at the end of the section in which they are first referenced.)

Exhibit

Acronyms and Abbreviations

Acronym	Description
%D	percent difference or drift
%R	percent recovery
°C	degrees Celsius
µg/kg	microgram(s) per kilogram
µg/L	microgram(s) per liter
µmhos/cm	micromhos per centimeter
BFB	bromofluorobenzene
BHC	benzene hexachloride
CAS	Chemical Abstracts Service
CCB	continuing calibration blank
CCC	calibration check compound
CHHSL	California Human Health Screening Level
CLP	Contract Laboratory Program
CoC	chain-of-custody
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DFTPP	decafluorotriphenylphosphene
DTSC	California Department of Toxic Substances Control
EICP	extracted ion current profile
EPA	U.S. Environmental Protection Agency
g/L	gram(s) per liter
ICAL	initial calibration
ICB	initial calibration blank
ICS	interference check standard

Acronym	Description
ID	identifier
IDW	investigation-derived waste
LCS	laboratory control sample
LT	lower tolerance
MDL	method detection limit
mg/kg	milligram(s) per kilogram
ml	milliliter
MS	matrix spike
MSD	matrix spike duplicate
oz	ounce(s)
PCB	polychlorinated biphenyl
PCDPE	polychlorinated diphenyl ether
PDF	portable document format
PFK	perfluorokerosene
PG&E	Pacific Gas and Electric Company
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RF	response factor
RFI	RCRA Facility Investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
SAP	sampling and analysis plan
SIM	selected ion monitoring

Acronym	Description
SOP	standard operating procedure
SPCC	system performance check compound
SVOC	semivolatile organic compound
TCDD	tetrachlorodibenzodioxin
TCDF	tetrachlorodibenzofuran
TOC	total organic carbon
TPH	total petroleum hydrocarbons
UT	upper tolerance
VOA	volatile organic analysis
VOC	volatile organic compound

1. Introduction

This Quality Assurance Project Plan (QAPP) Addendum presents the project-specific quality assurance/quality control (QA/QC) requirements for the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Remedial Investigation soil activities at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station located near Needles, California. This addendum supplements and supersedes the requirements presented in the *PG&E Program Quality Assurance Project Plan* (Program QAPP) (CH2M, 2014) and the Soil RFI QAPP Addendum (CH2M, 2008). This QAPP Addendum is an integral part of the project-specific Sampling and Analysis Plan (SAP) that governs the sampling and analysis activities for the Soil RFI activities. These plans ensure that data of appropriate quality are collected and meet the project-specific requirements. This QAPP Addendum is intended for use by Jacobs and the subcontractors who provide services associated with the environmental data collection effort.

1.1 QAPP Addendum Objectives

The Program QAPP presents the QA/QC requirements designed to ensure that environmental data collected for the Soil RFI will be of the appropriate quality to achieve the objectives defined in the project-specific SAP or this QAPP Addendum, unless otherwise defined. The SAP also discusses the specific protocols for sampling, equipment decontamination, handling of investigation-derived waste (IDW), sample handling and storage, chain-of-custody (CoC) requirements, and field QC. Requirements for laboratory analyses, data handling, data evaluation and assessment performance evaluations, corrective actions, and preventive maintenance of equipment are specified in the Program QAPP or this QAPP Addendum.

The elements included in this QAPP Addendum are consistent with those specified in *EPA Requirements for Quality Assurance Project Plans* (EPA, 2001a) and *EPA Requirements for Quality Management Plans* (EPA, 2001b) (the latter was reissued March 2006). The objectives of this QAPP Addendum are as follows:

- Ensure that data collection and measurement procedures are standardized among all participants.
- Monitor the performance of the various measurement systems within the PG&E Program to maintain statistical control and provide rapid feedback so that corrective measures, if needed, can be implemented before data quality is compromised.
- Periodically assess the performance of these measurement systems and their components.
- Verify that reported data are sufficiently complete, comparable, representative, unbiased, and precise so that they are suitable for their intended use.

2. Project Organization and Responsibility

2.1 Project/Task Organization

The organization chart and descriptive text identifying task managers and individuals charged with specific responsibilities can be found in the project-specific SAP. Lines of authority and the scope of authority given to each key member of the project team, including the authority to initiate and approve corrective actions, are discussed in the SAP. Subcontractors and scopes of work are also identified in the project-specific SAP.

2.2 Training and Certification Requirements

Personnel engaged in field activities will have completed the Occupational Safety Health Administration 40-hour health and safety training that meets the requirements of Title 29, Code of Federal Regulations, Section 1910.120, and Title 8, Code of California Regulations, Section 5192. Jacobs personnel working on this project will read the applicable project-specific health and safety plan. Documentation will be maintained to demonstrate that all requirements of the plan are followed.

Laboratories contracted for analytical services will be certified under the California Department of Health Environmental Laboratory Accreditation Program, when appropriate and where accreditation is afforded under the California program. No analyses may be performed or reported if accreditation is revoked. Loss or suspension of accreditation must be communicated to Jacobs within 24 hours of notification. Laboratory managers will ensure that laboratory personnel have been properly trained and are qualified to perform the assigned tasks.

3. Sampling Procedures

3.1 Sampling Design

The number and location of samples collected for the Soil RFI are discussed in the project-specific SAP. The SAP also addresses the medium sampled and provides information about the sampling site, the type of data to be collected, and the appropriate use of the data. The Soil RFI will have multiple, large sampling events and will use a field database, planned sample tables, CoC forms, and other database-generated paperwork. Samples collected for offsite laboratories will be documented on a CoC form.

4. Sample Handling and Custody

4.1 Containers and Preservatives

The contracted analytical laboratory will provide the required sample containers for all samples, including QC samples. Sample containers for PG&E projects will be pre-cleaned and certified to U.S. Environmental Protection Agency (EPA) standards. No sample containers will be reused. The contracted laboratory will add preservatives, if required, prior to shipping the sample containers to the field or supply the preservative as appropriate. Upon receipt of the samples, the laboratory will verify and record the adequacy of preservation and will add additional preservative, if necessary. The containers, minimum sample quantities, required preservatives, and maximum holding times for the parameters required for this project are shown in Table 4-1 (tables appear at the end of the section in which they are first referenced).

Table 4-1. Sample Containers, Preservation, and Holding Times
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
Metals (except hexavalent chromium)	SW6010B, SW6020A, SW7470A/7471A	500-mL 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 Preparation methods SW3060 (soil)	Not applicable	4-oz P, G, or T	Chill to ≤6°C	30 days to extraction, 7 days to analysis
Hexavalent Chromium	SW7199 field blanks only	250-mL P	Not applicable	Chill to ≤6°C Laboratory or field filtration within 24 hours After filtration, adjust the pH to 9.3–9.7 by adding $(NH_4)_2SO_4/NH_4OH$ buffer solution	28 days
Purgeable TPH	SW8015B Preparation methods: SW5035B (soil) SW5030B (water)	Three 40-mL G-TLC	Three 40-mL G-TLC	Water: add HCl to pH <2; chill to ≤6°C Soil/sediment: <u>Encores</u> • Frozen in 48 hours • Frozen onsite <u>Terracores</u> • Water (must be frozen onsite or within 48 hours if used) • Sodium bisulfate; chill to ≤6°C • Methanol; chill to ≤6°C	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: <u>Encores</u> • ≤6°C/frozen in 48 hours • Frozen onsite <u>Terracores</u> • Water (must be frozen onsite or in 48 hours if used) • Sodium bisulfate • Methanol
Extractable TPH	SW8015B	Two 1-liter G	8-oz G or T	Chill to ≤6°C	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Pesticides	SW8081A,	Two 1-liter G	8-oz G or T	Chill to ≤6°C	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
PCB	SW8082	Two 1-liter G	8-oz G or T	Chill to ≤6°C	Samples are stable up to 1 year from sample collection

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
VOCs	SW8260B Preparation methods: SW5035B (Soil) SW5030B (Water)	Three 40-mL G-TLC	Three 40-mL G-TLC	Water: add HCl to pH <2; chill to ≤6°C Soil/sediment: Encores • Frozen in 48 hours • Frozen onsite Terracores • Water (must be frozen onsite or within 48 hours if used) • Sodium bisulfate; chill to ≤6°C • Methanol; chill to ≤6°C	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: Encores • ≤6ºC/frozen in 48 hours • Frozen onsite Terracores • Water (must be frozen onsite or in 48 hours if used) • Sodium bisulfate • Methanol
SVOCs	SW8270C	Two 1-liter G	8-oz G or T	Chill to ≤6°C	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
PAHs	SW8270SIM	Two 1-liter G	8-oz G or T	Chill to ≤6°C	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Ammonia	EPA350.1 Revision 2 or SM4500-NH3-D	1-liter P or G	4-oz P, G, or T	Water: add H_2SO_4 to pH <2; chill to ≤6°C Soil/sediment: ≤6°C	28 days
Anions	EPA300.0 or SW9056	500-mL P or G	4-oz P, G, or T	Chill to ≤6°C (none required for chloride and fluoride) ortho-Phosphate requires filtering within 15 minutes of sample collection	Bromide, chloride, fluoride, sulfate, and iodide in 28 days Nitrate and ortho-Phosphate in water 48 hours
pH	SW9045	Not applicable	4-oz P, G, or T	Chill to ≤6°C	7 days
TOC/Dissolved Organic Carbon	SM5310C or SW9060	500-mL G or 40-mL VOA	4-oz P, G, or T	Water: For 500-mL: add H_2SO_4 to pH <2; chill to ≤6°C For 40-mL VOA: add H_2PO_4 to pH <2; chill to ≤6°C Soil/sediment: ≤6°C	28 days
TOC	Walkley Black	Not applicable	4-oz P, G, or T	Chill to ≤6°C	28 days

Analyte	Method	Container and Minimum Quantity		Preservation	Holding Time
		Water	Soil/Sediment		
Sulfide	SM4500-S² or SW9034	500-mL P or G	4-oz P, G, or T	Water: Add zinc acetate and NaOH to pH >9, chill to ≤6°C Soil/sediment: Chill to ≤6°C	Water: 7 days Soil: 30 days
Acid Volatile Sulfide	E821/R-91-100	Check with laboratory prior to sample collection			
Cyanide	EPA335.4 (R1) or SM4500-CN C/D/E (water) SW9010B, SW9012, or SW9014 (soil)	500-mL P or G	4-oz P, G, or T	Water: Add NaOH to pH >12; chill to ≤6°C Soil/sediment: Chill to ≤6°C	Water and soil: 14 days
Dioxins and Furans	SW8290	Two 1-liter amber G	8-oz G	Chill to ≤6°C	Samples are stable up to 1 year from sample collection

Notes:
G = glass
G-TLC = glass with teflon-lined cap
H_2PO_4 = phosphoric acid
H_2SO_4 = sulfuric acid
HCl = hydrochloric acid
HNO_3 = nitric acid
mL = milliliter(s)
NaOH = sodium hydroxide
NH_4 = ammonium
NH_4OH = ammonium hydroxide
$(NH_4)_2SO_4$ = ammonium sulfate
oz = ounce(s)
P = polyethylene
PCB = polychlorinated biphenyl
PAH = polycyclic aromatic hydrocarbon
SIM = selected ion monitoring
SO_4 = sulfate
SVOC = semivolatile organic compound
T = Brass drilling tube
TLC = teflon lined closure
TOC = total organic carbon
TPH = total petroleum hydrocarbons
VOC = volatile organic compounds

5. Method Quality Objectives and Quality Assurance Program

The data quality objectives for the Soil RFI are specified in the project-specific SAP. They are the basis for the design of the data collection plan, and as such, they specify the type, quality, and quantity of data to be collected, and how the data are to be used to make the appropriate decisions for the project. The final output of the process is a data collection design that meets the qualitative and quantitative needs of the project.

5.1 Method Detection Limits and Reporting Limits

5.1.1 Method Detection Limits

Since the initial Program QAPP was issued, EPA has updated several regulations and requirements. To meet these updated requirements, laboratories are required to determine method detection limits (MDLs) in compliance with *Definition and Procedure of the Method Detection Limit* (EPA, 2016c). The policy and its requirements, included on Exhibit 5-1, replace previous Program QAPP requirements regarding MDLs, and is required as part of Tables 5-11 through 5-21 in this QAPP Addendum.

Exhibit 5-1. Updated Calibration and QC Requirements – Method Detection Limit Sections

QC Check	Frequency	Criteria	Corrective Action
MDL Study	New methods or when insufficient data to perform an annual verification LOD check	MDLs will be generated in accordance with *Definition and Procedure of the Method Detection Limit* (EPA, 2016c).	If the MDL study fails to meet criteria, re-evaluate the spike concentration used in the MDL study and perform a new study.
MDL annual verification LOD check standard analyzed at approximately two to three times the calculated MDL	To be performed as part of every MDL study and when instrument changes affect sensitivity	The MDL is verified if the LOD check standard produces a response at 3 times above the instrument's noise level.	If verification response is too low, evaluate the reason and perform the MDL study again, if necessary, and repeat.

Note:

LOD = limit of detection

5.1.2 Reporting Limits

In general, reporting limits (RLs) must be greater than two times the calculated MDL. RLs used by the laboratory should not be greater than the RL objectives listed in Tables 5-1 through 5-9. The final sample-specific reporting limits may be higher than the required project criteria because of matrix effect, dilutions, preparation/digestion weight (solids). Where reporting limits for non-detects are higher than the project criteria, the project team will use this value, as needed, for project decisions.

The following options will be used when reporting data:

- With the exception of dioxin/furan analysis, only analytes at a concentration greater than the project-specific RL will be reported. Analytes detected at less than the RL will be flagged "U" and reported as not detected at the RL.
- For dioxins/furans and IDW samples (when requested), analytes at concentrations greater than the laboratory MDL but less than the RL will be flagged "J" and reported as an estimate. Analytes that are not detected at or above the laboratory MDL will be flagged "U" and reported as not detected at the MDL.

For consistency, RLs and sample results will be reported to two significant figures.

Results will be reported on a dry-weight basis for all soil samples unless otherwise specified.

5.2 Elements of Analytical Quality Control

Laboratory QC checks indicate the state of control that prevailed at the time of sample analysis. QC checks that involve field samples, such as matrix and surrogate spikes and field duplicates, also provide an indication of the presence of matrix effects. Field-originated blanks provide a way to monitor potential contamination to which field samples are subjected. This QAPP Addendum specifies requirements for method blanks, laboratory control samples (LCSs), surrogate spikes, and matrix spikes (MSs)/matrix spike duplicates (MSDs) that must be followed by subcontracting laboratories.

A laboratory QC batch is defined as a method blank, LCS, MS/MSD, or a sample duplicate (depending upon the method) and consists of 20 or fewer environmental samples of similar matrix that are extracted or analyzed together. For gas chromatography/mass spectrometry volatile analyses, a method blank, LCS, and MS/MSD must be analyzed every 24 hours. Each preparation or analytical batch should be identified in a way that will associate environmental samples with the appropriate laboratory QC samples.

5.2.1 Method Blanks

Method blanks are used to monitor each preparation or analytical batch for interference or contamination from glassware, reagents, and other potential contaminant sources in the laboratory. A method blank is an analyte-free matrix (laboratory reagent water for aqueous samples or Ottawa sand for soil samples) to which all reagents are added in the same amount or proportions as are added to samples. It is processed through the entire sample preparation and analytical procedures along with the samples in the batch. There should be at least one method blank per preparation or analytical batch. If a target analyte is found at a concentration that exceeds one half of the RL, corrective action must be performed to identify and eliminate the contamination source. All associated samples must be re-prepared or reanalyzed, or both, after the contamination source has been eliminated if the compounds detected in the associated blank are also present in the field samples. No analytical data may be corrected for the concentration found in the blank (no blank correction).

5.2.2 Laboratory Control Sample

An LCS consists of an analyte-free matrix (laboratory reagent water for aqueous samples and Ottawa sand or glass beads for soil samples) spiked with known amounts of analytes that come from a source other than that used for calibration standards. A **complete target analyte list** for each method specified in this QAPP Addendum will be spiked into the LCS, with the exception of pesticides and PCBs by methods SW8081A and SW8082 (refer to Table 5-18 for analyte list). In addition, if samples in the preparation or analytical batch require the additional Contract Laboratory Program (CLP) parameters, these parameters will be included in the LCS. The spike levels should be less than or equal to the midpoint of the calibration range. If LCS results are outside the specified control limits, corrective action must be taken, including sample re-preparation or reanalysis, or both, if appropriate. Documentation of the re-preparation or reanalysis, or both, must be provided in the analytical report. If more than one LCS is analyzed in a preparation or analytical batch, the results for each of the LCSs analyzed must be reported. LCS recoveries that are above or below the QC limits affect the accuracy for the entire batch and require corrective action. Project specified control limits for LCS recovery are listed in Tables 5-1 through 5-9.

5.2.3 Surrogates

Surrogates are organic analytes that behave as the analytes of interest do but are not expected to occur naturally in the samples. They are spiked into the standards, the samples, and QC samples prior to sample preparation. Surrogate recoveries are used as an indicator of accuracy, method performance, and extraction efficiency. If surrogate recoveries are outside the specified control limits, corrective action must be taken, including sample re-preparation or reanalysis, or both, if appropriate. Documentation of the re-preparation or reanalysis, or both, must be provided in the analytical report. Project-specified control limits for surrogate recovery are listed in Table 5-10.

5.2.4 Matrix Spike/Matrix Spike Duplicate

An MS is a sample matrix fortified with known quantities of specific compounds; it is subjected to the same preparation and analytical procedures as the native sample. Target analytes are spiked into the sample. MS recoveries are used to evaluate the effect of the sample matrix on the recovery of the analytes of interest. An MSD is a second fortified sample matrix. The relative percent difference (RPD) between the results of duplicate MSs measures the precision of sample results. One MS/MSD (MSD where appropriate) for every 20 project-specific samples will be analyzed. A complete target analyte list for each method specified in this QAPP Addendum will be spiked into the MS/MSD, with the exception of pesticides and PCBs by methods SW8081A and SW8082 (refer to Table 5-18 for analyte list). The MS/MSD will be spiked with the same list of target analytes intended for the native sample. Project-specific samples designated on the CoC form will be spiked. The spike levels will be less than or equal to the midpoint of the calibration range. Exceedances of control limits should be flagged in the analytical report. Project-specified control limits for matrix spike recovery are listed in Tables 5-1 through 5-9.

5.2.5 Post-Digestion Spike (Metals Analysis only)

A post-digestion spike is a portion of the sample digestate that is fortified with known quantities of the same list of target analytes intended for the native sample. The post-digestion spike is used to measure either positive or negative interferences that may distort the accuracy of the reported values in the native sample. Accuracy of the analytes should be within 75 to 125 percent of the known concentration added. Post-digestion spikes are only evaluated for metals analyses.

5.2.6 Serial Dilution (Metals Analysis only)

A 1 to 5 serial dilution is performed on a portion of the sample digestate and analyzed for the same list of target analytes intended for the native sample. The serial dilution is used to measure either positive or negative interferences that may distort the precision of the reported values in the native sample. Precision is expressed in terms of the percent difference (%D) between the original sample and the serial dilution results The %D criterion should be less than 10 percent if the concentration of the analyte in the original sample is greater than 25 times the reporting limit. Serial dilutions are only evaluated for metals analyses

5.3 Additional Quality Control Requirements

5.3.1 Holding Time

The holding time requirements specified in this QAPP Addendum (refer to Table 4-1) must be met. For methods requiring both sample preparation and analysis, the preparation holding time will be calculated from the time of sampling to the completion of preparation. The analysis holding time will be calculated from the time of completion of preparation to the time of completion of the analysis, including required dilutions, confirmation analysis, and reanalysis. For methods requiring analysis only, the holding time is calculated from the time of sampling to completion of the analysis, including required dilutions, confirmation analysis, and reanalysis.

5.3.2 Confirmation

Confirmation analysis must be performed as specified for specific organic methods when the result is at or above the RL. Both the primary and confirmation results will be reported. Unless one of the analyses is specifically designated as the confirmation by the method, the more concentrated result will be reported as the sample result and the lesser concentration result as the confirmation. Calibration and QC requirements must be met when confirmation analysis is performed.

5.3.3 Sample Dilution

Dilution of a sample results in elevated RLs and ultimately affects the usability of the data related to potential actions at the sampling site. It is important to minimize dilutions and maintain the lowest possible RLs. When dilutions are necessary because of high concentrations of target analytes, lesser dilutions should also be reported to fully characterize the sample for each analyte. The level of the lesser dilution should be such that it will provide the lowest possible RLs without having a lasting deleterious effect on the analytical instrumentation.

When a sample exhibits characteristics of matrix interference that are identified through analytical measurement or visual observation, appropriate cleanup procedures must be proven ineffective or inappropriate prior to proceeding with dilution and analysis. Analyses conducted at a dilution in which all analytes will be reported as nondetect above the QAPP RL must be discussed with the project chemist prior to finalizing the report.

5.4 Analytical Procedures

This QAPP Addendum specifies the project-specific analytes and analytical methods that differ from the Program QAPP. Method, analyte, or QC parameters specified in this QAPP Addendum that differ from parameters found in the Program QAPP or Soil RFI QAPP Addendum supersede the criteria found in those documents. The analytical methods required are listed in Tables 5-1 through 5-9.

The Soil RFI will use the full CLP list for metals, pesticides, PCBs, VOCs, and SVOCs on 10 percent of the samples collected. The remaining 90 percent will use the target analyte list specified in the analytical methods.

General QC requirements are discussed in Section 5.2. The calibration and QC requirements specified for each method will be followed and are included in Tables 5-11 through 5-22. Appropriate corrective action will be taken when acceptance criteria are not met. If corrective action is not effective, and data quality is potentially degraded, the occurrence must be documented in a corrective action report or in the data package case narrative (refer to Section 10 for more details). The laboratory manager or a designated person must notify the project chemist about the ineffective corrective action.

Table 5-1. Reporting, Accuracy, and Precision Limits for Soil – General Chemistry
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

					EPA Regional Screening Levels - May 2012		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		
Method	Constituent	CAS	Units	QAPP RL	Residential	Commercial	Residential	Commercial	Most Stringent Screening Level	Does RL Exceed Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Precision Soil % RPD
SW9012 or SW9014	Cyanide	57-12-5	mg/kg	0.25	47	610	--	--	47	NO	*	*	*	*	30
Walkley-Black or SW9060	TOC	TOC	mg/kg	50	--	--	--	--	--	NO	75	125	75	125	35
SW9050	Specific conductance	Conductance	µmhos/cm	5	--	--	--	--	--	NO	75	125	75	125	20
SW9045	pH	pH	pH units	0.1	--	--	--	--	--	NO	--	--	--	--	20
SM2540 B or EPA 160.3	Percent moisture	Moist	Percent	--	--	--	--	--	--	NO	--	--	--	--	20
EPA 350.1	Ammonia	7664-41-7	mg/kg	1	--	--	--	--	--	NO	75	125	75	125	20
EPA 300.0 or SW9056	Fluoride	Fluoride	mg/kg	5	--	--	--	--	4,700	NO	70	130	70	130	35
EPA 300.0 or SW9056	Chloride	Chloride	mg/kg	5	--	--	--	--	--	NO	70	130	70	130	35
EPA 300.0 or SW9056	Sulfate	Sulfate	mg/kg	5	--	--	--	--	--	NO	70	130	70	130	35
EPA 821/R-91-100	Sulfide, acid volatile	18496-25-8	mg/kg	80	--	--	--	--	--	NO	70	130	70	130	30
SW7199	Hexavalent chromium	18540-29-9	mg/kg	0.4	0.29	5.6	17	17	0.29	YES	85	115	85	115	20

Notes:
* = Use laboratory established QC limits
-- = Not applicable or available
µmhos/cm = micromhos per centimeter
%R = percent recovery
CAS = Chemical Abstracts Service
CHHSL = California Human Health Screening Level
DTSC = Department of Toxic Substances Control
mg/kg = milligram(s) per kilogram

Table 5-2A. Reporting, Accuracy, and Precision Limits for Soil – Metals (Standard Title 22 List)

PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW6010B/6020A	Antimony	7440-36-0	mg/kg	2	31	410	30	380	30	NO	85	115	75	125	20
SW6010B/6020A	Arsenic	7440-38-2	mg/kg	0.5	0.39	1.6	0.07	0.42	0.07	YES	85	115	75	125	20
SW6010B/6020A	Barium	7440-39-3	mg/kg	1	15,000	190,000	5,200	63,000	5,200	NO	85	115	75	125	20
SW6010B/6020A	Beryllium	7440-41-7	mg/kg	0.5	160	2,000	150	1,700	150	NO	85	115	75	125	20
SW6010B/6020A	Cadmium	7440-43-9	mg/kg	0.5	70	800	1.7	7.5	1.7	NO	85	115	75	125	20
SW6010B/6020A	Calcium	7440-70-2	mg/kg	100	--	--	--	--	--	NO	85	115	75	125	20
SW6010B/6020A	Chromium	7440-47-3	mg/kg	1	--	--	--	--	280	NO	85	115	75	125	20
SW6010B/6020A	Cobalt	7440-48-4	mg/kg	1	23	300	660	3,200	23	NO	85	115	75	125	20
SW6010B/6020A	Copper	7440-50-8	mg/kg	1	3,100	41,000	3,000	38,000	3,000	NO	85	115	75	125	20
SW6010B/6020A	Lead	7439-92-1	mg/kg	1	400	800	150	3,500	150	NO	85	115	75	125	20
SW6010B/6020A	Magnesium	7439-95-4	mg/kg	100	--	--	--	--	--	NO	85	115	75	125	20
SW6010B/6020A	Manganese	7439-96-5	mg/kg	1	--	--	--	--	1,800	NO	85	115	75	125	20
SW7471A	Mercury	7439-97-6	mg/kg	0.1	10	43	18	180	6.7	NO	75	125	75	125	20
SW6010B/6020A	Molybdenum	7439-98-7	mg/kg	1	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW6010B/6020A	Nickel	7440-02-0	mg/kg	1	1,500	20,000	1,600	16,000	1,500	NO	85	115	75	125	20
SW6010B/6020A	Potassium	7440-09-1	mg/kg	100	--	--	--	--	--	NO	85	115	75	125	20
SW6010B/6020A	Selenium	7782-49-2	mg/kg	1	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW6010B/6020A	Silver	7440-22-4	mg/kg	1	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW6010B/6020A	Sodium	7440-23-5	mg/kg	100	--	--	--	--	--	NO	85	115	75	125	20
SW6010B/6020A	Thallium	7440-28-0	mg/kg	2	0.78	10	5	63	0.78	YES	85	115	75	125	20
SW6010B/6020A	Vanadium	7440-62-2	mg/kg	1	--	--	530	6,700	530	NO	85	115	75	125	20
SW6010B/6020A	Zinc	7440-66-6	mg/kg	2	23,000	310,000	23,000	100,000	23,000	NO	85	115	75	125	20

Notes:

-- = Not applicable or available

Table 5-2B. Reporting, Accuracy, and Precision Limits for Soil – Metals (Additional CLP Parameters)

PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil % RPD
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	
SW6010B/6020A	Aluminum	7429-90-5	mg/kg	10	77,000	990,000	--	--	77,000	NO	85	115	75	125	20
SW6010B/6020A	Calcium	7440-70-2	mg/kg	100	--	--	--	--	--	NO	85	115	75	125	20
SW6010B/6020A	Iron	7439-89-6	mg/kg	10	55,000	720,000	--	--	55,000	NO	85	115	75	125	20
SW6010B/6020A	Magnesium	7439-95-4	mg/kg	100	--	--	--	--	--	NO	85	115	75	125	20
SW6010B/6020A	Manganese	7439-96-5	mg/kg	1	--	--	--	--	1,800	NO	85	115	75	125	20
SW6010B/6020A	Potassium	7440-09-1	mg/kg	100	--	--	--	--	--	NO	85	115	75	125	20
SW6010B/6020A	Sodium	7440-23-5	mg/kg	100	--	--	--	--	--	NO	85	115	75	125	20

Note:

-- = Not applicable or available

Table 5-3. Reporting, Accuracy, and Precision Limits for Soil – TPH
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil % RPD
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	
SW8015B	Motor oil	TPH-motor oil	mg/kg	10	--	--	--	--	--	NO	60	120	60	120	50
SW8015B	TPH-diesel	TPH-diesel	mg/kg	10	--	--	--	--	--	NO	51	153	51	153	50
SW8015B	TPH-gasoline	TPH-gasoline	mg/kg	1	--	--	--	--	--	NO	57	146	57	146	50

Note:

-- = Not applicable or available

Table 5-4. Reporting, Accuracy, and Precision Limits for Soil – Chlorinated Pesticides
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW8081A	4,4'-DDD	72-54-8	µg/kg	4	2,000	7,200	2,300	9,000	2,000	NO	50	139	50	139	50
SW8081A	4,4'-DDE	72-55-9	µg/kg	4	1,400	5,100	1,600	6,300	1,400	NO	68	126	68	126	50
SW8081A	4,4'-DDT	50-29-3	µg/kg	4	1,700	7,000	1,600	6,300	1,600	NO	46	135	46	135	50
SW8081A	Aldrin	309-00-2	µg/kg	4	29	100	33	130	29	NO	47	120	47	120	50
SW8081A	alpha-BHC	319-84-6	µg/kg	4	77	270	--	--	77	NO	62	125	62	125	50
SW8081A	alpha-Chlordane	5103-71-9	µg/kg	4	--	--	430	1,700	430	NO	63	121	63	121	50
SW8081A	beta-BHC	319-85-7	µg/kg	4	270	960	--	--	270	NO	62	127	62	127	50
SW8081A	delta-BHC	319-86-8	µg/kg	4	--	--	--	--	--	NO	57	130	57	130	50
SW8081A	Dieldrin	60-57-1	µg/kg	4	30	110	35	130	30	NO	67	125	67	125	50
SW8081A	Endosulfan I	959-98-8	µg/kg	4	--	--	--	--	--	NO	41	147	41	147	50
SW8081A	Endosulfan II	33213-65-9	µg/kg	4	--	--	--	--	--	NO	37	141	37	141	50
SW8081A	Endosulfan sulfate	1031-07-8	µg/kg	4	--	--	--	--	--	NO	62	135	62	135	50
SW8081A	Endrin	72-20-8	µg/kg	4	18,000	180,000	21,000	230,000	18,000	NO	61	133	61	133	50
SW8081A	Endrin aldehyde	7421-93-4	µg/kg	4	--	--	--	--	--	NO	37	147	37	147	50
SW8081A	Endrin ketone	7421-93-4	µg/kg	4	--	--	--	--	--	NO	37	147	37	147	50
SW8081A	gamma-BHC (Lindane)	58-89-9	µg/kg	4	520	2,100	500	2,000	500	NO	59	123	59	123	50
SW8081A	gamma-Chlordane	5103-74-2	µg/kg	4	--	--	430	1,700	430	NO	48	124	48	124	50
SW8081A	Heptachlor	76-44-8	µg/kg	4	110	380	130	520	110	NO	51	140	51	140	50
SW8081A	Heptachlor epoxide	1024-57-3	µg/kg	4	53	190	--	--	53	NO	66	130	66	130	50
SW8081A	Methoxychlor	72-43-5	µg/kg	20	310,000	3,100,000	340,000	3,800,000	310,000	NO	57	143	57	143	50
SW8081A	Toxaphene	8001-35-2	µg/kg	100	440	1,600	460	1,800	440	NO	31	136	31	136	50

Notes:
-- = Not applicable or available
µg/kg = microgram(s) per kilogram
BHC = benzene hexachloride
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethene
DDT = dichlorodiphenyltrichloroethane

Table 5-5A. Reporting, Accuracy, and Precision Limits for Soil – PCBs (Standard List)

PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil % RPD
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	
SW8082	Aroclor 1016	12674-11-2	µg/kg	50	3,900	21,000	--	--	3,900	NO	41	138	41	138	50
SW8082	Aroclor 1221	11104-28-2	µg/kg	50	140	540	--	--	140	NO	45	136	45	136	50
SW8082	Aroclor 1232	11141-16-5	µg/kg	50	140	540	--	--	140	NO	45	136	45	136	50
SW8082	Aroclor 1242	53469-21-9	µg/kg	50	220	740	--	--	220	NO	43	150	43	150	50
SW8082	Aroclor 1248	12672-29-6	µg/kg	50	220	740	--	--	220	NO	44	136	44	136	50
SW8082	Aroclor 1254	11097-69-1	µg/kg	50	220	740	--	--	220	NO	41	141	41	141	50
SW8082	Aroclor 1260	11096-82-5	µg/kg	50	220	740	--	--	220	NO	61	131	61	131	50

Note:

-- = Not applicable or available

Table 5-5B. Reporting, Accuracy, and Precision Limits for Soil – PCBs (Additional CLP Parameters)

PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil % RPD
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	
SW8082	Aroclor 1262	12674-11-2	µg/kg	50	--	--	--	--	--	NO	41	150	41	150	50
SW8082	Aroclor 1268	11096-82-5	µg/kg	50	--	--	--	--	--	NO	41	150	41	150	50

Note:

-- = Not applicable or available

Table 5-6A. Reporting, Accuracy, and Precision Limits for Soil – VOCs (Standard List)
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil % RPD
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	
SW8260B	1,1,1,2-Tetrachloroethane	630-20-6	µg/kg	5	1,900	9,300	--	--	1,900	NO	74	125	74	125	30
SW8260B	1,1,1-Trichloroethane (TCA)	71-55-6	µg/kg	5	8,700,000	38,000,000	--	--	8,700,000	NO	68	130	68	130	30
SW8260B	1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	5	560	2,800	--	--	560	NO	59	140	59	140	30
SW8260B	1,1,2-Trichloroethane	79-00-5	µg/kg	5	1,100	5,300	--	--	1,100	NO	62	127	62	127	30
SW8260B	1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	µg/kg	5	43,000,000	180,000,000	--	--	43,000,000	NO	65	135	65	135	30
SW8260B	1,1-Dichloroethane	75-34-3	µg/kg	5	3,300	17,000	--	--	3,300	NO	73	125	73	125	30
SW8260B	1,1-Dichloroethylene	75-35-4	µg/kg	5	240,000	1,100,000	--	--	240,000	NO	65	136	65	136	30
SW8260B	1,1-Dichloropropene	563-58-6	µg/kg	5	--	--	--	--	--	NO	70	135	70	135	30
SW8260B	1,2,3-Trichlorobenzene	87-61-6	µg/kg	5	49,000	490,000	--	--	49,000	NO	62	133	62	133	30
SW8260B	1,2,3-Trichloropropane	96-18-4	µg/kg	5	5	95	--	--	5	NO	63	130	63	130	30
SW8260B	1,2,4-Trichlorobenzene	120-82-1	µg/kg	5	22,000	99,000	--	--	22,000	NO	65	131	65	131	30
SW8260B	1,2,4-Trimethylbenzene	95-63-6	µg/kg	5	62,000	260,000	--	--	62,000	NO	65	135	65	135	30
SW8260B	1,2-Dibromo-3-chloropropane	96-12-8	µg/kg	5	5.4	69	--	--	5.4	NO	49	135	49	135	30
SW8260B	1,2-Dibromoethane (EDB)	106-93-4	µg/kg	5	34	170	--	--	34	NO	70	124	70	124	30
SW8260B	1,2-Dichlorobenzene	95-50-1	µg/kg	5	1,900,000	9,800,000	--	--	1,900,000	NO	74	120	74	120	30
SW8260B	1,2-Dichloroethane (EDC)	107-06-2	µg/kg	5	430	2,200	--	--	430	NO	72	137	72	137	30
SW8260B	1,2-Dichloropropane	78-87-5	µg/kg	5	940	4,700	--	--	930	NO	71	120	71	120	30
SW8260B	1,3,5-Trimethylbenzene	108-67-8	µg/kg	5	780,000	10,000,000	--	--	47,000	NO	65	133	65	133	30
SW8260B	1,3-Dichlorobenzene	541-73-1	µg/kg	5	--	--	--	--	--	NO	72	124	72	124	30
SW8260B	1,3-Dichloropropane	142-28-9	µg/kg	5	1,600,000	20,000,000	--	--	1,600,000	NO	76	123	76	123	30
SW8260B	1,4-Dichlorobenzene	106-46-7	µg/kg	5	2,400	12,000	--	--	2,400	NO	72	125	72	125	30
SW8260B	2,2-Dichloropropane	594-20-7	µg/kg	5	--	--	--	--	--	NO	67	134	67	134	30
SW8260B	2-Butanone (MEK)	78-93-3	µg/kg	50	28,000,000	200,000,000	--	--	28,000,000	NO	40	135	40	135	30
SW8260B	2-Chlorotoluene	95-49-8	µg/kg	5	1,600,000	20,000,000	--	--	1,600,000	NO	69	128	69	128	30
SW8260B	4-Chlorotoluene	106-43-4	µg/kg	5	1,600,000	20,000,000	--	--	1,600,000	NO	73	126	73	126	30
SW8260B	4-Isopropyltoluene	99-87-6	µg/kg	6	--	--	--	--	1,900	NO	74	125	74	125	30
SW8260B	4-Methyl-2-pentanone	108-10-1	µg/kg	50	5,300,000	53,000,000	--	--	5,300,000	NO	65	135	65	135	30
SW8260B	Acetone	67-64-1	µg/kg	50	61,000,000	630,000,000	--	--	61,000,000	NO	40	141	40	141	30
SW8260B	Acrolein	107-02-8	µg/kg	100	150	650	--	--	150	NO	65	135	65	135	30
SW8260B	Acrylonitrile	107-13-1	µg/kg	50	240	1,200	--	--	240	NO	65	135	65	135	30
SW8260B	Benzene	71-43-2	µg/kg	5	1,100	5,400	--	--	1,100	NO	73	126	73	126	30

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW8260B	Bromobenzene	108-86-1	µg/kg	5	300,000	1,800,000	--	--	94,000	NO	66	121	66	121	30
SW8260B	Bromochloromethane	74-97-5	µg/kg	5	160,000	680,000	--	--	160,000	NO	71	127	71	127	30
SW8260B	Bromodichloromethane	75-27-4	µg/kg	5	270	1,400	--	--	0,270	NO	72	128	72	128	30
SW8260B	Bromoform	75-25-2	µg/kg	6	62,000	220,000	--	--	61,000	NO	66	137	66	137	30
SW8260B	Bromomethane	74-83-9	µg/kg	5	7,300	32,000	--	--	7,300	NO	45	141	45	141	30
SW8260B	Carbon disulfide	75-15-0	µg/kg	5	820,000	3,700,000	--	--	670,000	NO	65	135	65	135	30
SW8260B	Carbon tetrachloride	56-23-5	µg/kg	5	610	3,000	--	--	250	NO	67	133	67	133	30
SW8260B	Chlorobenzene	108-90-7	µg/kg	5	290,000	1,400,000	--	--	290,000	NO	75	123	75	123	30
SW8260B	Chloroethane	75-00-3	µg/kg	5	15,000,000	61,000,000	--	--	15,000,000	NO	41	141	41	141	30
SW8260B	Chloroform	67-66-3	µg/kg	5	290	1,500	--	--	290	NO	72	124	72	124	30
SW8260B	Chloromethane	74-87-3	µg/kg	5	120,000	500,000	--	--	1,700	NO	51	129	51	129	30
SW8260B	cis-1,2-Dichloroethene	156-59-2	µg/kg	5	160,000	2,000,000	--	--	160,000	NO	67	125	67	125	30
SW8260B	cis-1,3-Dichloropropene	10061-01-5	µg/kg	5	--	--	--	--	--	NO	72	126	72	126	30
SW8260B	Dibromochloromethane	124-48-1	µg/kg	5	680	3,300	--	--	0,680	NO	66	130	66	130	30
SW8260B	Dibromomethane	74-95-3	µg/kg	5	25,000	110,000	--	--	25,000	NO	73	128	73	128	30
SW8260B	Dichlorodifluoromethane	75-71-8	µg/kg	5	94,000	400,000	--	--	94,000	NO	34	136	34	136	30
SW8260B	Ethylbenzene	100-41-4	µg/kg	5	5,400	27,000	--	--	5,400	NO	74	127	74	127	30
SW8260B	Hexachlorobutadiene	87-68-3	µg/kg	5	6,200	22,000	--	--	6,200	NO	53	142	53	142	30
SW8260B	Isopropylbenzene (Cumene)	98-82-8	µg/kg	5	2,100,000	11,000,000	--	--	2,100,000	NO	77	129	77	129	30
SW8260B	Methylene Chloride	75-09-2	µg/kg	5	56,000	960,000	--	--	1,100	NO	63	137	63	137	30
SW8260B	Naphthalene	91-20-3	µg/kg	5	3,600	18,000	--	--	3,600	NO	51	135	51	135	30
SW8260B	n-Butylbenzene	104-51-8	µg/kg	5	3,900,000	51,000,000	--	--	3,900,000	NO	65	138	65	138	30
SW8260B	n-Propylbenzene	103-65-1	µg/kg	5	3,400,000	21,000,000	--	--	3,400,000	NO	63	135	63	135	30
SW8260B	sec-Butylbenzene	135-98-8	µg/kg	5	--	--	--	--	--	NO	63	132	63	132	30
SW8260B	Styrene	100-42-5	µg/kg	5	6,300,000	36,000,000	--	--	6,300,000	NO	74	128	74	128	30
SW8260B	tert-Butyl Methyl Ether (MTBE)	1634-04-4	µg/kg	20	43,000	220,000	--	--	39,000	NO	50	135	50	135	30
SW8260B	tert-Butylbenzene	98-06-6	µg/kg	5	--	--	--	--	--	NO	65	132	65	132	30
SW8260B	Tetrachloroethene	127-18-4	µg/kg	5	22,000	110,000	--	--	570	NO	67	139	67	139	30
SW8260B	Toluene	108-88-3	µg/kg	5	5,000,000	45,000,000	--	--	5,000,000	NO	71	127	71	127	30
SW8260B	trans-1,2-Dichloroethene	156-60-5	µg/kg	5	150,000	690,000	--	--	110,000	NO	66	134	66	134	30
SW8260B	trans-1,3-Dichloropropene	10061-02-6	µg/kg	5	--	--	--	--	--	NO	65	127	65	127	30
SW8260B	Trichloroethene	79-01-6	µg/kg	5	910	6,400	--	--	0,910	NO	77	124	77	124	30
SW8260B	Trichlorofluoromethane (Freon 11)	75-69-4	µg/kg	5	790,000	3,400,000	--	--	790,000	NO	49	139	49	139	30

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil % RPD
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	
SW8260B	Vinyl Chloride	75-01-4	µg/kg	5	60	1,700	--	--	60	NO	58	126	58	126	30
SW8260B	Xylenes, Total	1330-20-7	µg/kg	15	630,000	2,700,000	--	--	600,000	NO	65	125	65	125	50
SW8260B	m,p-Xylene	108-38-3/1	µg/kg	10	--	--	--	--	--	--	--	--	--	--	--
SW8260B	o-Xylene	95-47-6	µg/kg	5	690,000	3,000,000	--	--	690,000	NO	77	125	77	125	30

Note:
-- = Not applicable or available

Table 5-6B. Reporting, Accuracy, and Precision Limits for Soil – VOCs (Additional CLP Parameters)
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

					EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	Constituent	CAS	Units	QAPP RL	Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW8260B	2-Hexanone	591-78-6	µg/kg	50	--	--	--	--	--	NO	70	130	70	130	30
SW8260B	Cyclohexane	110-82-7	µg/kg	5	140,000	140,000	--	--	140,000	NO	70	130	70	130	30
SW8260B	Methyl acetate	79-20-9	µg/kg	5	22,086,000	91,530,000	--	--	22,086,000	NO	70	130	70	130	30
SW8260B	Methylcyclohexane	108-87-2	µg/kg	5	2,591,000	8,715,000	--	--	2,591,000	NO	70	130	70	130	30

Note:
-- = Not applicable or available

Table 5-7A. Reporting, Accuracy, and Precision Limits for Soil – SVOCs (Standard List)
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

					EPA Regional Screening Levels - May 2012		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	Constituent	CAS	Units	QAPP RL	Residential	Commercial	Residential	Commercial	Most Stringent Screening Level	Does RL Exceed Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW8270C	1,2,4-Trichlorobenzene	120-82-1	µg/kg	330	22,000	99,000	--	--	22,000	NO	44	125	44	125	30
SW8270C	1,2-Dichlorobenzene	95-50-1	µg/kg	330	1,900,000	9,800,000	--	--	1,900,000	NO	45	125	45	125	30
SW8270C	1,3-Dichlorobenzene	541-73-1	µg/kg	330	--	--	--	--	--	NO	39	125	39	125	30
SW8270C	1,4-Dichlorobenzene	106-46-7	µg/kg	330	2,400	12,000	--	--	2,400	NO	35	125	35	125	30
SW8270C	2,4,5-Trichlorophenol	95-95-4	µg/kg	700	6,100,000	62,000,000	--	--	6,100,000	NO	49	125	49	125	30
SW8270C	2,4,6-Trichlorophenol	88-06-2	µg/kg	330	44,000	160,000	--	--	44,000	NO	43	125	43	125	30
SW8270C	2,4-Dichlorophenol	120-83-2	µg/kg	1,700	180,000	1,800,000	--	--	180,000	NO	45	125	45	125	30
SW8270C	2,4-Dimethylphenol	105-67-9	µg/kg	330	1,200,000	12,000,000	--	--	1,200,000	NO	32	125	32	125	30
SW8270C	2,4-Dinitrophenol	51-28-5	µg/kg	1,700	120,000	1,200,000	--	--	120,000	NO	25	132	25	132	30
SW8270C	2,4-Dinitrotoluene	121-14-2	µg/kg	330	1,600	5,500	--	--	1,600	NO	48	125	48	125	30
SW8270C	2,6-Dinitrotoluene	606-20-2	µg/kg	330	61,000	620,000	--	--	61,000	NO	48	125	48	125	30
SW8270C	2-Chloronaphthalene	91-58-7	µg/kg	330	6,300,000	82,000,000	--	--	6,300,000	NO	45	125	45	125	30
SW8270C	2-Chlorophenol	95-57-8	µg/kg	330	390,000	5,100,000	--	--	390,000	NO	44	125	44	125	30
SW8270C	2-Methylnaphthalene	91-57-6	µg/kg	330	230,000	2,200,000	--	--	230,000	NO	47	125	47	125	30
SW8270C	2-Methylphenol (o-Cresol)	95-48-7	µg/kg	330	3,100,000	31,000,000	--	--	3,100,000	NO	40	125	40	125	30
SW8270C	2-Nitroaniline	88-74-4	µg/kg	1,700	610,000	6,000,000	--	--	610,000	NO	44	125	44	125	30
SW8270C	2-Nitrophenol	88-75-5	µg/kg	700	--	--	--	--	--	NO	42	125	42	125	30
SW8270C	3,3'-Dichlorobenzidine	91-94-1	µg/kg	1,300	1,100	3,800	--	--	1,100	YES	25	128	25	128	30
SW8270C	3-Nitroaniline	99-09-2	µg/kg	1,700	--	--	--	--	18,000	NO	27	125	27	125	30
SW8270C	4,6-Dinitro-2-methylphenol	534-52-1	µg/kg	1,700	4,900	49,000	--	--	4,900	NO	29	137	29	137	30
SW8270C	4-Bromophenyl phenyl ether	101-55-3	µg/kg	330	--	--	--	--	--	NO	46	125	46	125	30
SW8270C	4-Chloro-3-methylphenol	59-50-7	µg/kg	660	6,100,000	62,000,000	--	--	6,100,000	NO	46	125	46	125	30
SW8270C	4-Chloroaniline	106-47-8	µg/kg	700	2,400	8,600	--	--	2,400	NO	10	125	10	125	30
SW8270C	4-Chlorophenyl phenyl ether	7005-72-3	µg/kg	330	--	--	--	--	--	NO	47	125	47	125	30
SW8270C	4-Methylphenol (p-Cresol)	106-44-5	µg/kg	330	6,100,000	62,000,000	--	--	310,000	NO	41	125	41	125	30
SW8270C	4-Nitroaniline	100-01-6	µg/kg	1,700	24,000	86,000	--	--	23,000	NO	34	125	34	125	30
SW8270C	4-Nitrophenol	100-02-7	µg/kg	1,700	--	--	--	--	--	NO	25	138	25	138	30
SW8270C	Acenaphthene	83-32-9	µg/kg	330	3,400,000	33,000,000	--	--	3,400,000	NO	46	125	46	125	30
SW8270C	Acenaphthylene	208-96-8	µg/kg	330	--	--	--	--	--	NO	44	125	44	125	30
SW8270C	Anthracene	120-12-7	µg/kg	330	17,000,000	170,000,000	--	--	17,000,000	NO	53	125	53	125	30
SW8270C	Benzo (a) anthracene	56-55-3	µg/kg	330	150	2,100	--	--	150	YES	52	125	52	125	30
SW8270C	Benzo (a) pyrene	50-32-8	µg/kg	330	15	210	38	130	15	YES	50	125	50	125	30
SW8270C	Benzo (b) fluoranthene	205-99-2	µg/kg	330	150	2,100	--	--	150	YES	45	125	45	125	30

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW8270C	Benzo (g,h,i) perylene	191-24-2	µg/kg	330	--	--	--	--	--	NO	38	126	38	126	30
SW8270C	Benzo (k) fluoranthene	207-08-9	µg/kg	330	1,500	21,000	--	--	1,500	NO	45	125	45	125	30
SW8270C	Benzoic acid	65-85-0	µg/kg	5,000	240,000,000	2,500,000,000	--	--	240,000,000	NO	25	125	25	125	30
SW8270C	Benzyl alcohol	100-51-6	µg/kg	660	6,100,000	62,000,000	--	--	6,100,000	NO	25	125	25	125	30
SW8270C	bis (2-chloroethoxy) methane	111-91-1	µg/kg	330	180,000	1,800,000	--	--	180,000	NO	43	125	43	125	30
SW8270C	bis (2-chloroethyl) ether	111-44-4	µg/kg	330	210	1,000	--	--	190	YES	38	125	38	125	30
SW8270C	bis (2-chloroisopropyl) ether	108-60-1	µg/kg	330	4,600	22,000	--	--	3,500	NO	25	125	25	125	30
SW8270C	bis (2-ethylhexyl) phthalate	117-81-7	µg/kg	330	35,000	120,000	--	--	35,000	NO	47	127	47	127	30
SW8270C	Butyl benzylphthalate	85-68-7	µg/kg	1000	260,000	910,000	--	--	260,000	NO	49	125	49	125	30
SW8270C	Chrysene	218-01-9	µg/kg	330	15,000	210,000	--	--	15,000	NO	53	125	53	125	30
SW8270C	Dibenzo (a,h) anthracene	53-70-3	µg/kg	330	15	210	--	--	15	YES	41	125	41	125	30
SW8270C	Dibenzofuran	132-64-9	µg/kg	330	78,000	1,000,000	--	--	78,000	NO	51	125	51	125	30
SW8270C	Diethyl phthalate	84-66-2	µg/kg	330	49,000,000	490,000,000	--	--	49,000,000	NO	50	125	50	125	30
SW8270C	Dimethyl phthalate	131-11-3	µg/kg	330	--	--	--	--	--	NO	49	125	49	125	30
SW8270C	Di-n-butylphthalate	84-74-2	µg/kg	330	6,100,000	62,000,000	--	--	6,100,000	NO	56	125	56	125	30
SW8270C	Di-n-octylphthalate	117-84-0	µg/kg	1000	--	--	--	--	--	NO	41	132	41	132	30
SW8270C	Fluoranthene	206-44-0	µg/kg	330	2,300,000	22,000,000	--	--	2,300,000	NO	54	125	54	125	30
SW8270C	Fluorene	86-73-7	µg/kg	330	2,300,000	22,000,000	--	--	2,300,000	NO	49	125	49	125	30
SW8270C	Hexachlorobenzene	118-74-1	µg/kg	330	300	1,100	--	--	300	YES	47	125	47	125	30
SW8270C	Hexachlorobutadiene	87-68-3	µg/kg	660	6,200	22,000	--	--	6,200	NO	40	125	40	125	30
SW8270C	Hexachloroethane	67-72-1	µg/kg	330	12,000	43,000	--	--	12,000	NO	34	125	34	125	30
SW8270C	Indeno (1,2,3-c,d) pyrene	193-39-5	µg/kg	330	150	2,100	--	--	150	YES	38	125	38	125	30
SW8270C	Isophorone	78-59-1	µg/kg	330	510,000	1,800,000	--	--	510,000	NO	43	125	43	125	30
SW8270C	Naphthalene	91-20-3	µg/kg	330	3,600	18,000	--	--	3,600	NO	40	125	40	125	30
SW8270C	Nitrobenzene	98-95-3	µg/kg	330	4,800	24,000	--	--	4,800	NO	41	125	41	125	30
SW8270C	n-Nitrosodi-n-propylamine	621-64-7	µg/kg	330	69	250	--	--	69	YES	40	125	40	125	30
SW8270C	n-Nitrosodiphenylamine	86-30-6	µg/kg	330	99,000	350,000	--	--	99,000	NO	49	125	49	125	30
SW8270C	Pentachlorophenol	87-86-5	µg/kg	700	890	2,700	4,400	13,000	890	NO	25	125	25	125	30
SW8270C	Phenanthrene	85-01-8	µg/kg	330	--	--	--	--	--	NO	50	125	50	125	30
SW8270C	Phenol	108-95-2	µg/kg	330	18,000,000	180,000,000	--	--	18,000,000	NO	3	125	39	125	30
SW8270C	Pyrene	129-00-0	µg/kg	330	1,700,000	17,000,000	--	--	1,700,000	NO	46	125	46	125	30

Note:

-- = Not applicable or available

Table 5-7B. Reporting, Accuracy, and Precision Limits for Soil – SVOCs (Additional CLP Parameters)
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW8270C	1,1'-Biphenyl	92-52-4	µg/kg	700	3,014,000	23,340,000	--	--	3,014,000	NO	70	130	70	130	30
SW8270C	1,2,4,5-Tetrachlorobenzene	95-94-3	µg/kg	700	18,300	184,600	--	--	18,300	NO	70	130	70	130	30
SW8270C	1,4-Dioxane	123-91-1	µg/kg	500	44,000	156,700	--	--	44,000	NO	70	130	70	130	30
SW8270C	2,3,4,6-Tetrachlorophenol	58-90-2	µg/kg	700	1,833,000	18,468,000	--	--	1,833,000	NO	70	130	70	130	30
SW8270C	Acetophenone	96-86-2	µg/kg	700	--	--	--	--	--	NO	70	130	70	130	30
SW8270C	Atrazine	1912-24-9	µg/kg	700	2,190	7,700	--	--	2,190	NO	70	130	70	130	30
SW8270C	Benzaldehyde	100-52-7	µg/kg	700	6,110,000	61,560,000	--	--	6,110,000	NO	70	130	70	130	30
SW8270C	Caprolactam	105-60-2	µg/kg	700	30,551,000	100,000,000	--	--	30,551,000	NO	70	130	70	130	30
SW8270C	Carbazole	86-74-8	µg/kg	700	24,000	86,000	--	--	24,000	NO	70	130	70	130	30
SW8270C	Hexachlorocyclopentadiene	77-47-4	µg/kg	700	365,000	3,658,000	--	--	365,000	NO	70	130	70	130	30

Note:
-- = Not applicable or available

Table 5-8. Reporting, Accuracy, and Precision Limits for Soil – PAHs
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW8270SIM	1-methylnaphthalene	90-12-0	µg/kg	5	16,000	53,000	--	--	16,000	NO	30	111	30	111	30
SW8270SIM	2-methylnaphthalene	91-57-6	µg/kg	5	230,000	2,200,000	--	--	230,000	NO	30	111	30	111	30
SW8270SIM	Acenaphthene	83-32-9	µg/kg	5	3,400,000	33,000,000	--	--	3,400,000	NO	28	110	28	110	30
SW8270SIM	Acenaphthylene	208-96-8	µg/kg	5	--	--	--	--	--	NO	23	126	23	126	30
SW8270SIM	Anthracene	120-12-7	µg/kg	5	17,000,000	170,000,000	--	--	17,000,000	NO	28	136	28	136	30
SW8270SIM	Benzo (a) anthracene	56-55-3	µg/kg	5	150	2,100	--	--	150	NO	31	146	31	146	30
SW8270SIM	Benzo (a) pyrene	50-32-8	µg/kg	5	15	210	38	130	15	NO	28	128	28	128	30
SW8270SIM	Benzo (b) fluoranthene	205-99-2	µg/kg	5	150	2,100	--	--	150	NO	30	139	30	139	30
SW8270SIM	Benzo (g,h,i) perylene	191-24-2	µg/kg	5	--	--	--	--	--	NO	21	149	21	149	30
SW8270SIM	Benzo (k) fluoranthene	207-08-9	µg/kg	5	1,500	21,000	--	--	1,500	NO	42	129	42	129	30
SW8270SIM	Chrysene	218-01-9	µg/kg	5	15,000	210,000	--	--	15,000	NO	39	134	39	134	30
SW8270SIM	Dibenzo (a,h) anthracene	53-70-3	µg/kg	5	15	210	--	--	15	NO	30	138	30	138	30
SW8270SIM	Fluoranthene	206-44-0	µg/kg	5	2,300,000	22,000,000	--	--	2,300,000	NO	30	142	30	142	30
SW8270SIM	Fluorene	86-73-7	µg/kg	5	2,300,000	22,000,000	--	--	2,300,000	NO	27	116	27	116	30
SW8270SIM	Indeno (1,2,3-c,d) pyrene	193-39-5	µg/kg	5	150	2,100	--	--	150	NO	17	164	17	164	30
SW8270SIM	Naphthalene	91-20-3	µg/kg	5	3,600	18,000	--	--	3,600	NO	29	106	29	106	30
SW8270SIM	Phenanthrene	85-01-8	µg/kg	5	--	--	--	--	--	NO	32	127	32	127	30
SW8270SIM	Pyrene	129-00-0	µg/kg	5	1,700,000	17,000,000	--	--	1,700,000	NO	28	130	28	130	30

Note:
-- = Not applicable or available

Table 5-9. Reporting, Accuracy, and Precision Limits for Soil – Dioxins/Furans

PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		DTSC CHHSL		Most Stringent Screening Level	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW8290	1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,4,7,8,9-Heptachlorodibenzo	55673-89-7	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	µg/kg	0.012.5	--	--	--	--	--	NO	70	130	--	--	20
SW8290	2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	µg/kg	0.005	--	--	--	--	--	NO	70	130	--	--	20
SW8290	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	µg/kg	0.005	0.0045	0.018	0.019	0.0045	0.0045	YES	70	130	--	--	20
SW8290	Octachlorodibenzofuran	39001-02-0	µg/kg	0.025	--	--	--	--	--	NO	70	130	--	--	20
SW8290	Octachlorodibenzo-p-dioxin	3268-87-9	µg/kg	0.025	--	--	--	--	--	NO	70	130	--	--	20

Note:

-- = Not applicable or available

Table 5-10. Surrogate Recovery for Organic Compounds – SW8000 Series Methods
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Method	Compound	Liquid Matrix % Recovery		Solids Matrix % Recovery	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
SW8015-Extractable compounds[a]	Bromobenzene	50	140	50	150
SW8015-Extractable compounds[a]	Hexacosane	60	140	60	140
SW8015-Extractable compounds[a]	Octacosane	26	152	25	162
SW8015-Extractable compounds[a]	Triacontane	40	140	30	150
SW8015-Extractable compounds[a]	Ortho-Terphenyl	57	132	47	142
SW8015-Extractable compounds[a]	Fluorobenzene	75	125	65	135
SW8015-Purgeable compounds	Bromofluorobenzene	70	130	64	148
SW8015-Purgeable compounds	Chlorobenzene[b]	74	138	64	148
SW8015-Purgeable compounds	Trifluorotoluene	70	130	70	130
SW8082[c]	Decachlorobiphenyl	29	133	26	125
SW8082[c]	Tetrachloro-m-xylene	50	120	48	121
SW8260B[d]	1,2-Dichloroethane-d4	72	119	52	149
SW8260B[d]	4-Bromofluorobenzene	76	119	65	135
SW8260B[d]	Dibromofluoromethane	85	115	65	135
SW8260B[d]	Toluene-d8	81	120	75	125
SW8270C	1,2-Dichlorobenzene-d4[e], [f]	27	100	25	110
SW8270C	2,4,6-Tribromophenol[g]	42	124	36	126
SW8270C	2-Chlorophenol-d4[e], [g]	34	98	30	100
SW8270C	2-Fluorobiphenyl[f]	48	120	43	125
SW8270C	2-Fluorophenol[g]	20	120	37	125
SW8270C	Nitrobenzene-d5[f]	41	120	37	125
SW8270C	Phenol-d5[g]	20	120	40	125
SW8270C	Terphenyl-d14[f]	51	135	32	125

Method	Compound	Liquid Matrix % Recovery		Solids Matrix % Recovery	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
SW8270SIM	1,2-Dichlorobenzene-d4	27	100	25	110
SW8270SIM	2-Fluorobiphenyl	34	135	34	135
SW8270SIM	Nitrobenzene-d5	25	135	25	135
SW8270SIM	Terphenyl-d14	34	167	14	129
SW8081A	Decachlorobiphenyl	29	135	26	125
SW8081A	Tetrachloro-m-xylene	33	138	36	124
SW8151A	2,4-dichlorophenylacetic acid	50	130	51	146
SW8290	13C-1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	40	135	40	135
SW8290	13C-1,2,3,4,6,7,8-Heptachlorodibenzofuran	40	135	40	135
SW8290	13C-1,2,3,4,7,8-Hexachlorodibenzofuran	40	135	40	135
SW8290	13C-1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	40	135	40	135
SW8290	13C-1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40	135	40	135
SW8290	13C-1,2,3,7,8-Pentachlorodibenzofuran	40	135	40	135
SW8290	13C-2,3,7,8-Tetrachlorodibenzo-p-dioxin	40	135	40	135
SW8290	13C-2,3,7,8-Tetrachlorodibenzofuran	40	135	40	135
SW8290	13C-OCDD	40	135	40	135

Notes:

[a]Choose two from the list.

[b]Required by method

[c]Use tetrachloro-m-xylene as a surrogate if DCBP is used as an internal standard.

[d]Choose three from the list.

[e]Approved alternatives

[f]Base fraction

[g]Acid fraction

Table 5-11. Calibration and QC Requirements for Metals – SW6010C and EPA200.7

PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

QC Check	Frequency	Criteria	Corrective Action
All Results Are Calculated from Three Injections	Every analysis	Detected results must have an RSD of 15% or less.	Correct the problem and reanalyze.
ICAL (a blank and at least one standard)	When modifications are made to the system, or when continuing calibration verification fails	If more than one standard is used, correlation coefficient must be >0.995.	Not applicable.
Second-source Calibration Verification	Immediately following each ICAL	All analytes within ±10% of expected value for SW6010C and within ±5% of expected value for EPA200.7.	Correct problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis	No analytes detected at or above ½ the RL.	Correct the problem and reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence	All analytes within ±10% of expected value for SW6010C and EPA200.7.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Low-level Calibration Verification at the RL	Immediately following each ICAL	Result within ±20% of expected value.	Correct the problem and repeat ICAL.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Interference Check Standard (ICS)	At the start and end of each analytical sequence	All analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze ICS and all affected samples.
MS/MSD	One set per 20 project-specific samples (MSD is optional if a laboratory sample duplicate is performed.)	All analytes within limits specified in Tables 5-2A and 5-2B.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed	Concentration of reported analytes are >5 times the RL in either sample; and RPD <20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch	All analytes within limits specified in Tables 5-2A and 5-2B.	Correct the problem, re-prepare and reanalyze the LCS and all samples in the analytical batch.
Post-digestion Spike	For each MS/MSD	Recovery within 75 to 125% of expected value.	None.
Dilution Test	For each MS/MSD	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	None.
Linear Range Calibration Check Standard	Once per quarter	All analytes within +10% of expected value.	Correct problem and reanalyze or reset linear range.

Notes:

ICAL = initial calibration

RSD = relative standard deviation

Table 5-12. Calibration and QC Requirements for Metals – SW6020A and EPA200.8
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

QC Check	Frequency	Criteria	Corrective Action
All Results Are Calculated from Three Injections	Every analysis	Detected results must have an RSD of 15% or less.	Correct the problem and reanalyze.
Multipoint ICAL (a blank and at least three standards)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails	Not applicable.	Not applicable.
Second-source Calibration Verification	Immediately following each ICAL	All analytes within ±10% of expected value.	Correct problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis	No analytes detected at or above ½ the RL.	Correct the problem and reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence	All analytes within ±10% of expected value.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Low-level Calibration Verification at the RL	Immediately following each ICAL	Result within ±20% of expected value.	Correct the problem and repeat ICAL.
Internal Standards	Every standard, sample, method blank, MS/MSD, and LCS	All internal standards in samples, method blank, MS/MSD, and LCS within 30 – 150 percent.	Dilute the sample 5 fold and re-analyze.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Interference Check Standard (ICS)	At the start and end of each analytical sequence	All analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze ICS and all affected samples.
MS/MSD	One set per 20 project-specific samples (MSD is optional if a laboratory sample duplicate is performed.)	All analytes within limits specified in Tables 5-2A and 5-2B.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed	Concentration of reported analytes are >5 times the RL in either sample and RPD <20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch	All analytes within limits specified in Tables 5-2A and 5-2B.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Post-digestion Spike	For each MS/MSD	Recovery within 75 to 125% of expected value.	None.
Dilution Test	For each MS/MSD	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	None.

Notes:

ICAL = initial calibration

RSD = relative standard deviation

Table 5-13. Calibration and QC Requirements for Metals – SW7470, SW7471, and EPA245.1
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails	Correlation coefficient of linear regression is ≥0.995.	Correct the problem and repeat ICAL.
Second-source Calibration Verification	Immediately following each ICAL	All analytes within ±20% of expected value.	Correct the problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis	No analytes detected at or above ½ the RL.	Correct the problem, then reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence	All analytes within ±20% of expected value.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS/MSD	One set per 20 project-specific samples (MSD is optional if a laboratory sample duplicate is performed.)	All analytes within limits specified in Table 5-2.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed	Concentration of reported analytes are >5 times the RL in either sample and RPD <20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch	All analytes within limits specified in Table 5-2A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Post-digestion Spike	For each MS/MSD	Recovery within 85 to 115% of expected value.	None.
Dilution Test	For each MS/MSD	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	None.

Table 5-14. Calibration and QC Requirements for General Chemistry and Other Parameters
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards); Does Not Apply to Titrimetric Method	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails	Correlation coefficient of linear regression is ≥0.995.	Correct the problem and repeat ICAL.
Second-source Calibration Verification	Immediately following each ICAL	Analytes within ±15% of expected value (±10% for SW9056/EPA300.0).	Correct the problem and repeat ICAL.
Calibration Blank; Does Not Apply To Titrimetric Method	After every second-source or continuing calibration verification analysis	No analytes detected at or above ½ the RL.	Correct the problem, then reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence	Within ±15% of expected value (±10% for SW9056/EP300.0).	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS/MSD	One set per 20 project-specific samples (MSD is optional if a laboratory sample duplicate is performed.)	All analytes within limits specified in Table 5-1.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed	Concentration of reported analytes are >5 times the RL in either sample and RPD <20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch	All analytes within limits specified in Table 5-1.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

Table 5-15. Calibration and QC Requirements for Hexavalent Chromium – SW7199
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QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails	Correlation coefficient of linear regression is ≥0.999.	Correct the problem and repeat ICAL.
Second-source Calibration Verification	Immediately following each ICAL	All analytes within ±10% of expected value.	Correct the problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis	No analytes detected at or above 0.02 µg/L.	Correct the problem, then reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence	All analytes within ±10% of expected value for SW7199 and within ±5%.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Low-level Calibration Verification at the RL of 0.2 µg/L	Immediately following each ICAL	Result within ±20% of expected value.	Correct the problem and repeat ICAL.
Duplicate Sample Injections	Every sample	RPD between injections must be <20%.	Correct the problem, re-prepare, and reanalyze all associated samples.
Method Blank	At least one per analytical batch	No analytes detected at or above 0.02 µg/L.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS	One per 20 project-specific samples	All analytes within limits specified in Table 5-1.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed	Concentrations of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch	All analytes within limits specified in Table 5-1.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
pH Buffer Solution Modification	As needed because of sample matrices that cause the analytical column to overload (All QC samples and analyses will use the modified buffered solution when needed.)	A modified pH-adjustment buffer that contains 10 times less ammonium sulfate (33 g/L) but the same concentration of ammonium hydroxide as the buffer prescribed in SW7199/ EPA218.6.	None.

Notes:
µg/L = microgram(s) per liter
g/L = gram(s) per liter

Table 5-16. Soil Preparation Method SW3060A for Method SW7199

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QC Check	Frequency	Criteria	Corrective Action
2.5-gram Sample to a Final Volume of 100 mL Must Be Used for Each Sample	Each sample in the preparation batch	Follow method preparation for all samples, method blank, and QC samples.	None.
Method Blank	One per preparation batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
LCS	One per preparation batch	Spike at concentration specified in method. Recovery range 80 to 120%.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Soluble Matrix Spike	One per preparation batch	Spike at concentration specified in method. Recovery range 75 to 125%.	None.
Insoluble Matrix Spike	One per preparation batch	Spike at concentration specified in method. Recovery range 75 to 125%.	None.
Post-digestion Spike	One per preparation batch	Spike at concentration specified in method. Recovery range 85 to 115%.	None.

Table 5-17. Calibration and QC Requirements for TPH – SW8015B

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QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails	If the %RSD is ≤20%, the average RRF may be used for quantitation; otherwise, use calibration curve with coefficient of correlation or determination ≥0.99.	Correct the problem and repeat ICAL.
Second-source Calibration Verification	Once for each multipoint ICAL	All analytes within ±20% of expected value.	Correct the problem and repeat ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and after every 10 samples, and at the end of the sequence	Analytes within ±15% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD, and LCS	All surrogates in samples, method blank, MS/MSD, and LCS within limits specified in Table 5-10.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 samples	Full target list spike required within limits specified in Table 5-3.	None.
LCS	At least one per analytical batch	Full target list spike required within limits specified in Table 5-3.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Second Detector or Second Column Confirmation (does not apply to SW8015B)	All samples with results above the RL objectives must be confirmed within the holding time	Confirmation to be done using a second detector, or second column of dissimilar phase and retention characteristics (or gas chromatography/mass spectrometry if sample concentration is sufficiently high). All calibration and QC acceptance criteria specified for primary analysis must be met in the confirmation analysis.	Failure to perform confirmation will result in potential resampling and analysis at no cost to the project.

Note:

RRF = relative response factor

Table 5-18. Calibration and QC Requirements for Pesticides and PCBs – SW8081A and SW8082
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QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (minimum 5 points) for Single-response Pesticides – single-point calibration for toxaphene and chlordane; multipoint calibration for Aroclors 1016 and 1260 only, but include midpoint standard for all other Aroclors for pattern recognition; if a specific Aroclor is found in any sample, quantitation for that Aroclor must be done using 5-point calibration	Prior to sample analysis or when calibration verification fails	To use average RRF for quantitation of any analyte, % RSD must be ≤20%; otherwise, use calibration curve with coefficient of correlation or determination ≥0.99.	Correct the problem and repeat ICAL.
Second-source Calibration Verification – single response pesticides and Aroclors 1016 and 1260 (or Aroclors identified in samples)	Once for each multipoint ICAL	All analytes within ±20% of expected value. For PCB Aroclors, an average of 4-6 major peaks.	Correct the problem and repeat ICAL.
Continuing Calibration Verification – single response pesticides and Aroclors 1016 and 1260 (or Aroclors identified in samples)	At the start of each analytical sequence; after every 12 hours or 10 samples, whichever is more frequent; and at the end of the sequence	All analytes within ±15% of expected value. For PCB Aroclors, an average of 4-6 major peaks.	Correct the problem, then recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Endrin/DDT Breakdown Check (not applicable when analyzing for Aroclors/PCBs only)	At start of each 12-hour period	Breakdown of either endrin or DDT ≤15%.	Evaluate injector port and take corrective action; recalibrate and reanalyze affected samples if necessary.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD, and LCS	At least one of the surrogates in samples, method blank, MS/MSD, and LCS within limits specified in Table 5-10.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples	Single response pesticides, toxaphene, and Aroclors 1016 and 1260 spike required within limits specified in Tables 5-4, 5-5A, and 5-5B.	None.
LCS	At least one per analytical batch	Single response pesticides, toxaphene, and Aroclors 1016 and 1260 spike required within limits specified in Tables 5-4, 5-5A, and 5-5B.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Second Column Confirmation	All samples with results above the RL objectives must be confirmed within the holding time	Confirmation to be done using second column of dissimilar phase and retention characteristics (or gas chromatography/mass spectrometry if sample concentration is sufficiently high). All calibration and QC acceptance criteria specified for primary analysis must be met in the confirmation analysis.	Failure to perform confirmation will result in potential resampling and analysis at no cost to the project.

Table 5-19. Calibration and QC Requirements for VOCs – SW8260B
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QC Check	Frequency	Criteria	Corrective Action
BFB Tuning	Prior to ICAL and calibration verification (every 12 hours)	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL (minimum 5 points)	Prior to sample analysis or when calibration verification fails	SPCCs average RRF ≥0.30[a] and %RSD for RRFs for CCCs ≤30% and one of the following options:	Correct the problem and repeat ICAL.
		Option 1 Linear – RSD for each analyte <15%. The mean %RSD for all analytes ≤15% may **not** be used.	
		Option 2 Linear – least squares regression r ≥0.995.	
		Option 3 Nonlinear – coefficient of determination ≥0.99 (6 standards to be used for a second order; 7 standards to be used for a third order).	
Second-source Calibration Verification	Once for each multipoint ICAL	All analytes within ±25% of expected value.	Correct the problem and repeat ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter	SPCCs average RF ≥0.30[a] and %D for RFs for CCCs ≤20%. All other analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte	Relative retention time of each analyte within ±0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD, and LCS	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within -50% to +100% of the internal standard responses in the ICAL midpoint standard. Sample EICP area within -50% to +100% of the daily continuing calibration verification.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD, and LCS	All surrogates in samples, method blank, and LCS within limits in Table 5-10.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples	Full target list spike required within limits specified in Tables 5-6A and 5-6B.	None.

QC Check	Frequency	Criteria	Corrective Action
LCS	At least one per analytical batch	Full target list spike required within limits specified in Tables 5-6A and 5-6B.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

[a]SPCC average RRF ≥0.10 for bromoform, chloromethane, and 1,1-dichloroethane

Notes:
%D = percent difference or drift
BFB = bromofluorobenzene
CCC = calibration check compound
EICP = extracted ion current profile
RF = response factor
SPCC = system performance check compound

Table 5-20. Calibration and QC Requirements for SVOCs – SW8270C

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QC Check	Frequency	Criteria	Corrective Action
DFTPP Tuning	Prior to ICAL and calibration verification (every 12 hours)	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL[a] (minimum 5 points)	Prior to sample analysis or when calibration verification fails	SPCCs average RF ≥0.050 and %RSD for RFs for CCCs ≤30% and one of the following options:	Correct the problem and repeat ICAL.
		Option 1 Linear – RSD for each analyte <15%. The mean %RSD for all analytes ≤15% may **not** be used.	
		Option 2 Linear – least squares regression r ≥0.995.	
		Option 3 Nonlinear – coefficient of determination ≥0.99 (6 standards to be used for a second order; 7 standards to be used for a third order).	
Second-source Calibration Verification	Once for each multipoint ICAL	All analytes within ±25% of expected value.	Correct the problem and repeat ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter	SPCCs average RF ≥0.050 and %D for RFs for CCCs ≤20%. All other analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte	Relative retention time of each analyte within ±0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD, and LCS	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within -50% to +100% of the internal standard responses in the ICAL midpoint standard. Sample EICP area within -50% to +100% of the daily continuing calibration verification.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD, and LCS	At least two surrogates per fraction in samples, method blank, and LCS within limits specified in Table 5-10.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples	Full target list spike required within limits specified in Tables 5-7A and 5-7B.	None.

QC Check	Frequency	Criteria	Corrective Action
LCS	At least one per analytical batch	Full target list spike required within limits specified in Tables 5-7A and 5-7B.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

[a]A minimum of two mass ions must be used to identify each compound.

Note:

DFTPP = decafluorotriphenylphosphene

Table 5-21. Calibration and QC Requirements for Polynuclear Aromatic Hydrocarbons – SW8270C SIM

PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

QC Check	Frequency	Criteria	Corrective Action
DFTPP Tuning	Prior to ICAL and calibration verification (every 12 hours)	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL[a] (minimum 5 points)	Prior to sample analysis, or when calibration verification fails	SPCCs average RF ≥0.050 and %RSD for RFs for CCCs ≤30% and one of the following options:	Correct the problem and repeat ICAL.
		Option 1 RSD for each analyte <15%.	
		Option 2 Least squares regression r ≥0.990.	
		Option 3 Nonlinear – coefficient of determination ≥0.99 (6 standards to be used for a second order; 7 standards to be used for a third order).	
Second-source Calibration Verification	Once for each multipoint ICAL	All analytes within ±25% of expected value.	Correct the problem and repeat ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter	All analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte	Relative retention time of each analyte within +0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD, and LCS	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within -50% to +100% of the internal standard responses in the ICAL midpoint standard. Sample EICP area within -50% to +100% of the daily continuing calibration verification.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.
Method Blank	At least one per analytical batch	No analytes detected at or above ½ the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD and LCS	At least two surrogates in samples, method blank, and LCS within limits specified in Table 5-10.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples	Full target list spike required within limits specified in Table 5-8.	None.
LCS	At least one per analytical batch	Full target list spike required within limits specified in Table 5-8.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

[a]A minimum of two mass ions must be used to identify each compound.

Table 5-22. Calibration and QC Requirements for Method SW8290 – Dioxins and Furans
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QC Check	Frequency	Criteria	Corrective Action
Mass Spectrometer Tuning Check (use PFK)	Before ICAL or calibration verification and after every 12-hour period	Tune the instrument to meet the minimum resolving power of 10,000 at m/z 304.9824. Ensure that the exact mass of m/z 380.9760 is within 5 parts per million of the required value. Monitor the lock mass selected ion current profile.	Retune instrument and verify. Rerun affected samples.
Gas Chromatography Column Performance Check	Before ICAL or calibration verification	Peak separation between 2,3,7,8-TCDD and other TCDD isomers valley of ≤ 25% and first and last eluters of all eight homologue retention time windows identified labeled (F/L) on the chromatogram.	Correct problem then repeat column performance check.
Initial Multipoint Calibration for All Analytes (minimum five standards) (ICAL)	Before sample analysis, as needed by failure of routine calibration verification standard, or when a new lot is used for standard source of continuing calibration verification, sample fortification solution (internal standard), or recovery standards	Ion abundance ratios in accordance with Table 8 of Method SW8290 and S/N ratio ≥10 for all target analyte ion current profiles and % RSD ± 20% for 17 unlabeled standards and % RSD ± 30% for the 9 labeled internal standards.	Correct problem then repeat ICAL.
Initial Calibration Verification	At the beginning of each 12-hour period and at the end of each analytical sequence	Ion abundance specified in the method must be met: For unlabeled standards, RF within ± 20%D of RF established in ICAL and for labeled standards, RF within ± 30%D of the mean of RF established in ICAL.	Correct problem. Rerun initial calibration verification. If that fails, repeat ICAL.
Routine (continuing) Calibration Check (Use HRCC-3 calibration standard) (continuing calibration verification)	At the beginning of each 12-hour period (after successful gas chromatography resolution and mass spectrometer resolution checks), and at the end of 12-hour shift	Ion abundance ratios in accordance with Table 8 of Method SW8290 and RF within ± 20%D for unlabeled standards from mean RF from ICAL and RF within ± 30% for labeled standards from mean RF from ICAL. **End of run continuing calibration verification only:** If the RF for an unlabeled or labeled standard fails by ≤ 5% in the final continuing calibration verification, a new "daily" mean RF may be calculated using the initial and final RF values and used to determine the specific analyte concentrations for all samples analyzed during the shift.	Correct problem, repeat calibration verification standard one more time. If that fails, then repeat ICAL and reanalyze all samples analyzed since the last successful calibration verification. Evaluation of corresponding labeled/unlabeled standards may impact the corrective action required. **End of run continuing calibration verification:** If the RF for an unlabeled or labeled standard fails by > 5% in the final continuing calibration verification, run a new ICAL immediately (within 2 hours) and use the new RF values to process the samples. Alternatively, reanalyze all samples with positive detections.

QC Check	Frequency	Criteria	Corrective Action
Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans Identification	Verify all sample positive detections per Method SW8290	Retention time of sample components in accordance with stated criteria in Method SW8290, Section 11.8.4.1 and ion abundance ratios for all analytes, internal standards, and recovery standards in accordance with criteria in Method SW8290, Table 8, Section 11.8.4.2 and S/N ratio of all labeled analytes ≥ 10 times background noise in Method SW8290, Section 11.8.4.3 and S/N ratio of all remaining analyte ions ≥ 2.5 times background noise in Method SW8290, Section 11.8.4.3 and for polychlorinated dibenzofuran, no signal present having an S/N ratio ≥ 2.5 for the corresponding ether (PCDPE) detected at the same retention time (± 2 seconds, Section 11.8.4.4).	Correct problem, then re-prepare and reanalyze the samples with failed criteria for any of the internal standards or recovery standards. If PCDPE is detected or if sample peaks present do not meet all identification criteria, calculate the estimated maximum possible concentration according to Method SW8290, Section 11.9.5.2.
Internal Standards (or surrogates)	Every sample, standard, and QC sample	%R for each internal standard (before any dilutions) within 40-135% of the ICAL average RF.	Inspect mass spectrometer and gas chromatography for malfunctions. Reanalysis of samples analyzed while the system was malfunctioning is mandatory.
Sample-specific Estimated Detection Limit	Every sample that indicates nondetects or detections that are < 2.5 times background noise	Method 8290, Section 7.9.5 describes the calculation.	None.
Sample Estimated Maximum Possible Concentration	If PCDPE is detected or if sample peaks present do not meet all ion abundance ratio criteria	Method 8290, Section 7.9.5 describes the calculation.	None.
Method Blank	Minimum one per preparation batch; a method blank is required after a calibration run and before any sample run	No analytes detected > ½ limit of quantitation or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Assess data and correct problem. If necessary, re-prepare and reanalyze method blank and all samples processed with the contaminated blank.
LCS	One per preparatory batch	Acceptance criteria: Table 5-9.	Correct problem, then re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.
MS/MSD	One set per 20 project-specific samples, if requested	Acceptance criteria: Table 5-9.	Assess data to determine whether there is a matrix effect or analytical error. Analyze LCS for failed target analytes. Potential matrix effects should be communicated to Jacobs so an evaluation can be made with respect to the project quality objectives.

QC Check	Frequency	Criteria	Corrective Action
Sample Duplicate	One per analytical batch; this may be replaced by the MSD	Acceptance criteria: Table 5-9.	Verify instrument performance, review analytical procedures.
Confirm Low-level Detections	Every sample that meets the criteria	Congeners with results <5 times the background noise (S/N) but are considered detects under the method protocols.	Re-analyze and compare to the original result. Re-analyze the associated blank if it contains a similar low-level detects. If the confirmation results are considered detects, under the method protocols, the more conservative result (higher concentration) will be reported and the result will be qualified as estimated and flagged "J." If the confirmation results are not considered detects, under the method protocols, the results will be reported at the previously detected concentration and flagged "U."

Notes:

Any deviation from the instructions in this table (and from the method) will be summarized in the report case narrative.

m/z = mass to charge ratio

PCDPE = polychlorinated diphenyl ether

PFK = perfluorokerosene

S/N = signal-to-noise

TCDD = tetrachlorodibenzodioxin

6. Data Reduction, Validation, and Reporting

6.1 Laboratory Data Reduction

Laboratory data reduction will be performed in accordance with the Program QAPP. Quantitation procedures specified for each method must be followed. If data reduction is performed manually, the documentation must include the formulas used. Computer software used for data reduction must have been previously verified by the laboratory for accuracy. Documentation of the software verification must be maintained in the laboratory. Data reduction documentation must allow re-creation of the calculations. A final data review will be conducted by the laboratory manager or client services representative to ensure that required analyses were performed and that documentation is complete.

6.2 Laboratory Data Reporting

The hardcopy and electronic data deliverable laboratory reports for all samples and analyses will contain the information necessary to perform data evaluation.

Hardcopy deliverables (and an electronic copy in portable document format) in summary format, equivalent to those specified in the latest versions of EPA Contract Laboratory Program Statements of Work for Organics and Inorganics Analyses (EPA, 2016a, 2016b) are preferred. The laboratory data report should be organized in a format that facilitates identification and retrieval of data. Alternate reporting formats require approval from the program or project chemist. A Level 4 report as outlined in the Program QAPP is required for this project.

6.3 Data Validation and Verification

The validation for this QAPP Addendum will follow the Level 3 designation from the Program QAPP and will be performed by the Jacobs project chemist or designees. The Level 3 designation is defined as follows:

Level 3 Import the laboratory results into the project database; use automated data validation, as applicable, to the project database. Validate the analytical data as described in the following sections without reviewing any raw data or analyte verification. Prepare a summary validation report as needed.

Personnel involved in the data validation function will be independent of any data generation effort. The project chemist will have responsibility for oversight of the data validation effort. Data validation will be performed when the final data packages are received from the laboratory. Data validation will be performed on an analytical batch basis within each analytical report using the summary results of calibration and laboratory QC and the results from associated field samples. Data packages will be reviewed for all constituents of concern. Chromatograms for 100 percent of hexavalent chromium data will be reviewed, and other raw data will be reviewed when deemed necessary by the project chemist. Data validation procedures will include the following:

- Review of the data package for completeness
- Review of CoC records for discrepancies that might degrade data quality
- Review for compliance with holding time and QC frequency requirements
- Evaluation of all calibration and QC summary results against the project requirements
- Verification of analyte identification and calculations for at least 10 percent of the data
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations
- Initiation of corrective actions, as necessary, based on the data review findings

Data validation will be patterned after the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA, 2017a) and *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA, 2017b); however, the calibration and QC requirements specified in this QAPP Addendum will be used instead of those presented in the National Functional Guidelines.

The flagging criteria are presented in Tables 6-1 and 6-2; the qualifier flags are defined in Table 6-3. Qualifier flags, if required, will be applied to the electronic sample results. A summary table of the data qualifications will be provided in the validation report. If multiple flags are required for a result, the most severe flag will be applied to the electronic result. The hierarchy of flags, from the most severe to the least severe, will be as follows: R, UJ, J, U.

A validation report will be generated for each method and sample delivery group. A copy of the validation report will be retained with the data package in the project chemistry file. The project chemist will be notified of any significant data quality problems.

Table 6-1. Flagging Conventions for Organic Methods

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Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	Holding time exceeded for extraction or analysis	J = positive results, UJ = nondetects	Sample
	Holding time exceeded by a factor of two	J = positive results; for nondetects, use professional judgment – UJ or R	
Sample Preservation SW8260B	Sample not preserved	J = positive results, UJ = nondetects	Sample
Sample Integrity SW8260B	Bubbles in VOA vial used for analysis	J = positive hits, UJ = nondetects	Sample
Temperature	>6°C	J = positive results, UJ = nondetects	All samples in same cooler
	Not frozen within 48 hours (purgeable TPH or VOCs only)	J = positive results, UJ = nondetects	All samples in same cooler
Mass Calibration/Mass Spectrometer Resolution SW8290	Mass spectrometer resolution is <10,000	R = positive results (or use professional judgment) (no qualification necessary for nondetects)	Sample
Gas Chromatography Column Performance Check SW8290	Gas chromatography resolution %Valley >25% (TCDD/TCDF through HxCDD/HxCDF and HpCDF congeners)	J = positive results (or use professional judgment) (no qualification necessary for nondetects)	Sample
ICAL	RRF <0.050, <0.010 for poor responders (SW8260B and SW8270C)	J = positive results, R = nondetects	All associated samples in analysis batch
	%RSD >15.0% (SW8260B and SW8270C), or >20.0% (SW8015B, SW8081A, and SW8082), **AND** calibration curve not used; **OR** calibration curve used, but with coefficient of correlation or determination <0.99	J = positive results, UJ = nondetects	
ICAL SW8290	Ion abundance ratio not within ±15% window	J = positive results, R = nondetects	All associated samples in analysis batch
	S/N ratio <10 for all target analytes	J = positive hits; for nondetects, use professional judgment – UJ or R	
	The %RSD for the relative response >20% (applicable target analytes); %RSD for the RRF >35% (non-2,3,7,8-substituted CDD/CDF analytes and labeled compounds.	J = positive results, UJ = nondetects	
	RRF <0.050, <0.010 for poor responders (SW8260B and SW8270C)	J = positive results, R = nondetects	All associated samples in analysis batch

Quality Control Check	Evaluation	Flag	Samples Affected
Calibration Verification (second-source and continuing calibration verification)	Initial calibration verification: %D >25.0% (SW8260B and SW8270C) or >20.0% (SW8015B, SW8081A, and SW8082) Continuing calibration verification: %D >20.0% (SW8260B and SW8270C) or >15.0% (SW8015B, SW8081A, and SW8082)	J = positive results; for nondetects, use professional judgment – UJ or R	
Calibration Verification SW8290	Ion abundance ratio not within ±15% window	J = positive results, R = nondetects	All associated samples in analysis batch
	S/N ratio <10 for all target analytes	J = positive hits; for nondetects, use professional judgment – UJ or R	
	The %D for the relative response >25% (applicable target analytes); %D for the RRF >35% (non- 2,3,7,8-substituted CDD/CDF analytes and labeled compounds	J = positive results, UJ = nondetects	
LCS	%R >UT	J = positive results, no action for nondetects	All samples in preparation batch
	%R <LT	J = positive results, UJ = nondetects	
	%R <10% Analyte not included in LCS	J = positive results; for nondetects, use professional judgment – UJ or R J = positive results, UJ = nondetects	
Method Blank	Convert blank concentration to soil units, if applicable; multiply the highest blank concentration by five (10 for common lab contaminants)	U = positive sample results <5x highest blank concentration No action for positive sample results >5x highest blank concentration (10 for common lab contaminants)	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank or calibration blank
Equipment Blank Field Blank Ambient Blank			All samples, same site, matrix and date (water); or all samples, same site, matrix (soil) associated with equipment blank
Trip Blank			All samples shipped in the same cooler as the trip blank
MS/MSD %R	%R >UT	J = positive results, no action for nondetects	MS analytes in parent sample and field duplicate, if any
	%R <LT	J = positive results, UJ = nondetects	
	%R <10%	J = positive results; for nondetects, use professional judgment – UJ or R	
	Sample concentration >4x spike concentration	No flags required	
RPDs	RPD >UT	J = positive results, no action for nondetects	.
	Analyte not included in MS or MSD	J = positive results, UJ = nondetects	

Quality Control Check	Evaluation	Flag	Samples Affected
Surrogates SW8260B, SW8015B, SW8015B SW8081, SW8082, SW8270CSIM	%R >UT	J = positive results, no action for nondetects	All analytes in sample
	%R <LT and none <10%	J = positive results, UJ = nondetects	
	%R <10%	J = positive results; for nondetects, use professional judgment – UJ or R (review dilutions, LCS, matrix spike, and other surrogate recovery data to help determine matrix issues)	
SW8270C	Two or more surrogates in same fraction with %R >UT	J = positive results, no action for nondetects	All analytes in same fraction in sample
	Two or more surrogates in same fraction with %R <LT but not <10%	J = positive results, UJ = nondetects	
	Two or more surrogates in same fraction with %R <LT and <10%	J = positive results; for nondetects, use professional judgment – UJ or R (review LCS, matrix spike, and other surrogate recovery data to help determine matrix issues)	
Internal Standards (SW8260B, SW8270C, SW8270CSIM, SW8290)	Area >UT	J = positive results, UJ = nondetects	Associated analytes in sample
	Area <LT but not <10%	J = positive results, no action for nondetects	
	Area <10%	J = positive results; for nondetects, use professional judgment – UJ or R	
Field Duplicates	Concentration of reported analytes is >5 times the RL in either sample and RPD >UT (30% for water samples; 50% for soil samples)	J = positive results	Field duplicate pair
	One or both sample results <5 times the RL and a difference of ±2 times the RL for water (±4 times for soil)	J = positive, UJ = nondetect	
Confirmation (SW8081A, SW8082)	RPD between primary and confirmation results >40%	J = positive results	Sample

Notes:

All QA/QC criteria are included in Tables 5-1 through 5-22 and will be used for validation criteria.

Organic methods include SW8015B, SW8081A, SW8082, SW8260B, SW8270C, SW8270C SIM, and SW8290.

Spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of four or more.

For methods requiring confirmation, the qualifications apply to primary analysis results (either of the two columns/detectors may be designated as the primary column/detector).

Where one MS recovery meets acceptance criteria and the other MS of the pair does not, professional judgment may be used to determine whether the parent sample should be qualified for matrix effects by comparing the MS recoveries to other QC results within the batch or sample site.

Qualifier may not apply in cases where a surrogate coelutes with a nontarget analyte.

Qualifier may not apply in cases where low surrogate recoveries are the result of sample dilution.

LT = lower tolerance

TCDF = tetrachlorodibenzofuran

UT = upper tolerance

Table 6-2. Flagging Conventions – Minimum Data Evaluation Criteria for Inorganic Methods
PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	Holding time exceeded for extraction, digestion, or analysis	J = positive results; for nondetects, use professional judgment – UJ or R for mercury; UJ = nondetects for all other analytes	Sample
	Holding time for digestion or analysis exceeded by a factor of two	J = positive results; for nondetects, use professional judgment – UJ or R	
Sample Preservation	Sample preservation requirements not met (If sample preservation was not done in the field, but was performed at the laboratory upon sample receipt, no flagging is required)	J = positive results; for nondetects, use professional judgment – UJ or R	Sample
Temperature	> 6°C (not applicable to metals except mercury)	J = positive results, UJ = nondetects	Samples in same cooler
ICAL (multipoint only)	Correlation coefficient ≤0.995	J = positive, UJ = nondetects	All associated samples in analytical batch
Calibration Verification (ICAL verification, continuing calibration verification, low-level calibration verification)	%R >UT	J = positive results, no action for nondetects	All associated samples in analytical batch
	%R <LT	J = positive results, UJ = nondetects	
Interference Check Sample (SW6010C/SW6020A only)	%R >UT %R <LT	J = positive results, no action for nondetects J = positive results, UJ = nondetects	All associated samples in analytical batch
Internal Standards (SW6020A)	Area >UT Area <LT but not <30% Area <30%	J = positive results, UJ = nondetects J = positive results, no action for nondetects R = positive results; for nondetects, use professional judgment – UJ or R	Associated analytes in sample
LCS	%R >UT	J = positive results, no action for nondetects	All samples in preparation batch
	%R <LT	J = positive results, UJ = nondetects	
	%R <10%	J = positive results; for nondetects, use professional judgment – UJ or R	
	Analyte not included in LCS	J = positive results, UJ = nondetects	
Method Blank	Multiply the highest blank concentration by five	U = positive sample results <5x highest blank concentration	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank

Quality Control Check	Evaluation	Flag	Samples Affected
Equipment Blank		No action for positive sample results >5x highest blank concentration	All samples, same site, matrix and date
Calibration Blank (ICB,CCB)	Convert blank concentration to soil units, if applicable; multiply the highest blank concentration by 5	Positive blank detections: U detected sample results <5x highest blank concentration Negative blank detections: J = positive sample result <10x |-ccb| (absolute value) "None" positive sample result >10x |-ccb| (absolute value) UJ nondetects	All samples that are either before or after the ICB/ CCB
MS/MSD[a]	%R >UT %R <LT	J = positive results, no action for nondetects J = positive results, UJ = nondetects	MS analytes in all samples in the associated preparation batch
	%R <10%	J = positive results; for nondetects, use professional judgment – UJ or R	
	RPD >UT	J = positive results	
	Sample concentration >4x spike concentration	No flags required	
	Analyte not included in MS or MSD	J = positive results, UJ = nondetects	
Post-digestion Spikes (metals only)	%R >UT	J = positive, no action for nondetects	Analytes in all samples in the associated preparation batch
	%R <LT	J = positive results, UJ = nondetects	
Dilution Test	If concentration is >25 times the RL and %D >UT	J = positive results UJ = nondetects	Analytes in all samples in the associated preparation batch
Field Duplicates	Concentration of reported analytes are >5 times the RL in either sample and RPD >UT (30% for water samples; 50% for soil samples)	J = positive results, UJ = nondetects	Field duplicate pair
	One or both sample results <5 times the RL and a difference of ±2 times the RL	J = positive results, UJ = nondetects	
Laboratory Sample Duplicates	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%	J = positive results, UJ = nondetects	Sample

Quality Control Check	Evaluation	Flag	Samples Affected
	One or both sample results <5 times the RL and a difference of ±2 times the RL	J = positive results, UJ = nondetects	

[a] When the pre-digestion spike recovery falls outside of the control limits, a post-digestion spike will be performed for those analytes that do not meet the recovery criteria. **Note:** Post-digestion spikes are not required for silver.

Notes:

All QA/QC criteria included in Tables 5-1 through 5-22 will be used for validation criteria.

Spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of four or more.

For the MS/MSD the spike %R will be within the established acceptance limits. However, spike recovery limits do not apply when the sample concentration is >4x the spike added. In such an event, the data will be reported unflagged, even if the %R does not meet the acceptance criteria.

CCB = continuing calibration blank

ICB = initial calibration blank

Table 6-3. Qualifier Flag Definitions

PG&E Topock Soil RFI Quality Assurance Project Plan Addendum

Flag	Definition
J	Analyte was present but reported value may not be accurate or precise.
R	The result has been rejected.
U	Analyte was analyzed for but not detected at the specified detection limit.
UJ	Analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and might not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

7. Performance Evaluations

To assess sample and data collection procedures, performance evaluations will be conducted that include technical systems audits and performance audits as outlined in the Program QAPP.

8. Preventive Maintenance

The primary objective of preventive maintenance is to promote the timely and effective completion of a data collection effort. The maintenance program should be designed to minimize downtime caused by component failures of crucial sampling and analytical equipment, as outlined in the Program QAPP.

9. Data Assessment

9.1 Data Quality Assessment

Laboratory data will be evaluated according to the QA acceptance criteria specified in Tables 5-1 through 5-22. Limitations regarding data usability will be assigned, if appropriate, in accordance with the validation process described in Section 6. Field data will be evaluated according to the appropriate standard operating procedure (SOP).

9.2 Reconciliation with Project Objectives

The PG&E Program includes projects and sites with varying tasks and objectives. The procedure for data reconciliation will be a function of the project-specific objectives and will be addressed in the project-specific documents.

10. Corrective Action

Corrective action may be required as a result of deviations from field or analytical procedures. Deficiencies identified in audits and data quality evaluations may also call for corrective action. All project personnel are responsible for identifying and reporting the need for corrective action, and soliciting approval for corrective actions to resolve conditions that are adverse to data quality.

Tables 5-11 through 5-22 specify the corrective actions to be taken when deviations from calibration and QC acceptance criteria occur. Field and laboratory staff may encounter conditions requiring immediate corrective action that are not addressed in the SAPs or QAPP addenda. These staff will document conditions and the results of corrective actions in a field logbook or laboratory nonconformance report and communicate their actions as soon as feasible to the appropriate people (field team leader, laboratory supervisor, project chemist, project manager, and if necessary, the PG&E Program quality manager) for immediate input. A mechanism must be in place to allow for supervisory review or client input, or both, for deviations or deficiencies. A corrective action reporting system that requires immediate documentation of deviations or deficiencies and for supervisory review of the actions taken to correct them will be established. At a minimum, the corrective action report should include the following information:

- Type of deviation or deficiency
- Date of occurrence
- Impact of the deviation or deficiency, such as samples affected
- Corrective action taken
- Documentation that the process has been returned to control

There are times when documenting QAPP deviations within the laboratory case narrative is sufficient in lieu of documenting the deviation in a corrective action report, such as when a deviation or deficiency is immediately corrected and its impact is precluded, or there is no adverse effect on data quality. Some examples are as follows:

- An unacceptable ICAL is repeated before samples are analyzed.
- QC criteria are exceeded with a high bias, but associated sample results are nondetect.
- QC criteria are exceeded, but insufficient sample material exists to perform corrective action, or holding time has expired prior to corrective action.

Each corrective action report must be reviewed and approved by a person of authority, such as the field team leader or laboratory supervisor. The ultimate responsibility for the laboratory corrective action process is the QC manager, who must ensure that proper documentation, approval, and closeout of all out-of-control or nonconformance events is performed. A nonconformance report will summarize each nonconformance condition. Corrective action reports that could potentially affect data quality must be brought to the attention of the project chemist. Report disposition will be the responsibility of the project chemist. The project manager may be notified about a particular report at the project chemist’s discretion. Copies of corrective action reports must be maintained in the laboratory or field project files.

11. Quality Assurance Reports

Where specified in the SAP, Work Plan, or this QAPP Addendum, a QA report or data quality evaluation will be submitted by the project chemist to the project manager on a predetermined interval established in the SAP or this QAPP Addendum. The report will summarize the results of the data validation and the data assessment. The results should be presented in a manner that facilitates decision making. For example, temporal data may be more effectively presented if supplemented by a time plot. Significant quality problems and recommended solutions should be included in the report. Limitations on data usability identified during data validation should be highlighted. Results of the data assessment should be reconciled with the project objectives.

12. Data Management

Electronic data associated with this project will be used to generate validation reports, risk assessment calculations, modeling results, data summary tables, maps, and other figures. The data management will follow Jacobs' standard procedures for environmental data collection. Other consultants or contractors may use other electronic data management programs, which will be described in the SAP or this QAPP Addendum. However, any system used must be capable of storing and managing the information as follows:

- Simple procedures to get rapid access to stored data
- Data entry methods of known accuracy and efficiency
- Well-documented validation procedures for electronic databases
- Sampling data management using unique sample identifiers (IDs)
- A sampling inventory of newly collected data and methods of sample inventory reconciliation
- Sample-specific attributes, including location IDs, sample type and media, and sample date
- Reporting and delivery formats to support data analysis and reduction

12.1 Archiving

Hardcopy and electronic versions will be archived in project files for the duration of the project, as specified in contractual agreements, or for a minimum of 5 years. Electronic data will be subject to routine backup until it is archived for long-term retention.

12.2 Data Flow and Transfer

The data flow from the laboratory and field to the project staff and data users will be sufficiently documented to ensure that data are properly tracked, reviewed, and validated.

12.3 Record Keeping

In addition to the data management procedures for analytical data (provided in Section 6.1), the laboratory will maintain electronic and hardcopy records sufficient to re-create each analytical event. At a minimum, the laboratory will maintain the following records:

- Raw data, including instrument printouts, bench worksheets, and chromatograms, with compound identification and quantitation reports
- Laboratory-specific, written SOPs for each analytical method and QA/QC function implemented during the analysis of project samples

13. References

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