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May 31, 2021

Ms. Pamela Innis
U.S. Department of the Interior (DOI)
CHF Remedial Project Manager
One North Central Avenue, Suite 800
Phoenix, AZ 85004-4427

Mr. Aaron Yue
California Department of Toxic Substances Control (DTSC)
5796 Corporate Avenue
Cypress, CA 90630

Subject: Revised Draft RCRA Facility Investigation and Remedial Investigation Report, Volume 3 – Results of Soil and Sediment Investigation

PG&E Topock Compressor Station, Needles, California
(Document ID: Topock_RFI-RI_Vol3_2021.05.31_Revised_Draft)

Dear Ms. Innis and Mr. Yue:

In accordance with the *1996 Corrective Action Consent Agreement* (CACA) and the 2005 Administrative Consent Agreement (ACA), PG&E agreed to conduct a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial investigation (RI) to identify and evaluate the nature and extent of contamination at the Topock Compressor Station (TCS). This report is the final volume in a three-volume RFI/RI Report detailing these findings.

This Volume 3 Soil RFI/RI Report presents the soil characterization results for all areas of the TCS site including:

- Areas outside the compressor station fence line (Part A investigation areas)
- Areas inside the compressor station fence line (Part B investigation areas)
- Perimeter areas adjacent to the compressor station fence line
- Storm drains leading from the compressor station to areas outside the fence line

In addition to the summary of the soil investigation program, this document also presents the data summary and data quality objective evaluations, the soil human health and ecological risk assessment (HHERA) summary, and conclusions and recommendations based on the presented data.

An initial draft Volume 3 Soil RFI/RI Report was submitted to DOI, DTSC, and Stakeholders for review on December 9, 2019. Comments on the initial draft Volume 3 RFI/RI Report were received from DOI, DTSC, Fort Mojave Indian Tribe, Fort Yuma Quechan Indian Tribe, Cocopah Indian Tribe, and the Metropolitan Water District of Southern California. A responses to comments (RTCs) table, a revised Table of Contents on a proposed restructured Volume 3 report, and a draft example “strawman” summary report section for the SWMU 1/AOC 1 investigation area were prepared and sent to Agencies and Stakeholders on October 30, 2020. A comment resolution meeting was held on December 9, 2020. Prior to the December 9, 2020 meeting, an updated RTCs table was submitted on December 2, 2020. The attached revised Draft Volume 3 RFI/RI Report incorporates the comments and comment responses as presented in the updated RTCs table, located in Appendix H of the revised Draft report.

Please contact me at (760) 791-5884 if you have any questions or comments regarding this submittal.

Sincerely,

Curt Russell
Topock Project Manager

Topock Project Executive Abstract

Document Title: *Draft RCRA Facility Investigation and Remedial Investigation Report - Volume 3 – Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California* Submitting Agency: DOI, DTSC Final Document? Yes _X_ No	Date of Document: Initial submittal:12/09/2019; Revised Submittal: May 2021 Who Created this Document?: (i.e. PG&E, DTSC, DOI, Other) PG&E
Priority Status: __ HIGH _X_ MED __LOW	Is this time critical? __ Yes X No
Action Required: __ Information Only _X Review and Input __ Other / Explain:	Type of Document: __ Draft X Report __ Letter __ Memo __ Other / Explain:
What does this information pertain to? __ Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)/Preliminary Assessment (PA) X RCRA Facility Investigation (RFI)/Remedial Investigation (RI) (including Risk Assessment) __ Corrective Measures Study (CMS)/Feasibility Study (FS) __ Corrective Measures Implementation (CMI)/ Remedial Action (RA) __ California Environmental Quality Act (CEQA)/ Environmental Impact Report (EIR) __ Interim Measures __ Other / Explain:	Is this a Regulatory Requirement? X Yes __ No If no, why is the document needed?
What is the consequence of NOT doing this item? What is the consequence of DOING this item? The consequence for not doing this item is PG&E will be out of compliance with the 1996 Corrective Action Consent Agreement (CACA) and 2005 Administrative Consent Agreement (ACA)	Other Justification/s: __ Permit __ Other / Explain:

Brief Summary of attached document:

This Volume 3 Soil RFI/RI Report presents the soil characterization results for all areas of the TCS site including:

- Areas outside the compressor station fence line (Part A investigation areas)
- Areas inside the compressor station fence line (Part B investigation areas)
- Perimeter areas adjacent to the compressor station fence line
- Storm drains leading from the compressor station to areas outside the fence line

In addition to the summary of the soil investigation program, this document also presents the data summary and data quality objective evaluations, the soil human health and ecological risk assessment (HHERA) summary, and conclusions and recommendations based on the presented data.

Written by: Pacific Gas and Electric Company

Recommendations:
Provide input to PG&E.

How is this information related to the Final Remedy or Regulatory Requirements?
This submittal is required in compliance with the CACA and the ACA.

Other requirements of this information?
None.

JACOBS®

RCRA Facility Investigation and Remedial Investigation Report, PG&E Topock Compressor Station, Needles, California

Volume 3 – Results of Soil and Sediment Investigation--DRAFT

Revised Draft

Original Submittal December 2019

Revised Submittal May 2021

Pacific Gas and Electric Company

RCRA Facility Investigation and Remedial Investigation Report, PG&E Topock Compressor Station, Needles, California

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Project Manager:	Liesbeth Magna
Author:	Keith Sheets, Patrick Terhune, Tory Boyd
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Document History and Status

Revision	Date	Description	By	Review	Approved
0	12/9/19	Review Draft to DTSC and DOI			
1	5/28/21	Revised Draft to DTSC and DOI	Pat Terhune; Tory Boyd	L. Magna	K. Sheets

RCRA Facility Investigation and Remedial Investigation Report, PG&E Topock Compressor Station, Needles, California

Volume 3 – Results of Soil and Sediment Investigation

Revised Draft

Original Submittal December 2019; Revised Submittal May 2021

Prepared for

California Environmental Protection Agency,
Department of Toxic Substances Control
and

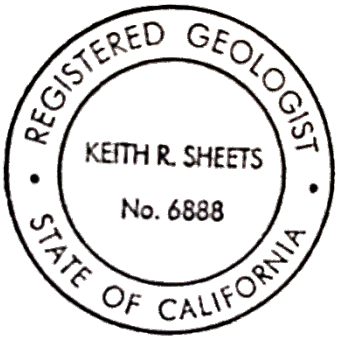
United States Department of the Interior

on behalf of

Pacific Gas and Electric Company

May 2021

This work plan was prepared under supervision of a California Professional Geologist:



Keith Sheets, P.G. No. 6888
Project Geologist

Executive Summary

Pacific Gas and Electric Company (PG&E) is conducting investigative and remedial activities at the Topock Compressor Station (TCS) located in San Bernardino County, approximately 15 miles to the southeast of Needles, California. These activities are being carried out as directed by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) and United States Department of the Interior (DOI) under the authority of Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In February 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement (CACA) pursuant to Section 25187 of the California Health and Safety Code (DTSC, 1996). In July 2005, PG&E and the federal agencies entered into an Administrative Consent Agreement (ACA) (DOI, 2005). Under the terms of the CACA and ACA, PG&E agreed to conduct the RCRA facility investigation (RFI) and CERCLA remedial investigation (RI) to identify and evaluate the nature and extent of contamination at the compressor station. This report is the final volume in a three-volume RFI/RI Report detailing these findings. The previous volumes are: *Revised Final RCRA Facility Investigation and Remedial Investigation Report, Volume 1 – Site Background and History* (CH2M HILL, Inc. [CH2M], 2007a) and *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).

This soil RFI/RI Report presents the soil characterization results for all areas of the TCS site including:

- Areas outside the compressor station fence line (Part A investigation areas)
- Areas inside the compressor station fence line (Part B investigation areas)
- Perimeter areas adjacent to the compressor station fence line
- Storm drains leading from the compressor station to areas outside the fence line

In addition to the summary of the soil investigation program, this document also presents the data summary and data quality objective evaluations, the soil human health and ecological risk assessment (HHERA) summary, and conclusions and recommendations based on the presented data.

ES.1 Overview

The TCS is an active natural gas compressor station located in the southern portion of the Mohave Valley, along the California-Arizona border in eastern San Bernardino County, California. It is located about 15 miles southeast of Needles and is approximately 1,500 feet from the Colorado River and 2,000 feet from the California/Arizona state border. The compressor station occupies approximately 15 acres of a 65-acre parcel of PG&E-owned land. The compressor station property is immediately surrounded by the land of the Havasu National Wildlife Refuge (HNWR). The HNRW was established in 1941 to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. The area surrounding the HNWR includes land owned and/or managed by a number of government agencies and private entities including the U.S. Bureau of Land Management (BLM), U.S. Bureau of Reclamation (BOR), U.S. Fish and Wildlife Service, San Bernardino County, California Department of Transportation, BNSF Railway, the Metropolitan Water District of Southern California, and the Fort Mojave Indian Tribe.

Land uses near the TCS are predominantly open space, interspersed with industrial facilities, recreational uses, and transportation infrastructure. The surrounding land lies within an area of significant cultural, archaeological, and historical resources. The nearest communities are mobile home parks at Topock, Arizona and Moabi Regional Park, California. The Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes (CRIT), Fort Mojave Indian Tribe, Fort Yuma Quechan Indian Tribe, Hualapai Tribe, Havasupai Tribe, Twenty-nine Palms Band of Mission Indians, and the Yavapai-Prescott Indian Tribe all have traditional and cultural ties to the project area. The Tribes believe that the area known as Topock, and specifically the immediate Project area, is part of a broader cultural landscape.

Representatives from the Chemehuevi Indian Tribe, Cocopah Indian Tribe, CRIT, Fort Mojave Indian Tribe, Fort Yuma-Quechan Indian Tribe, and the Hualapai Indian Tribe are actively involved in project workgroups (e.g., the Clearinghouse Task Force, the Consultative Work Group, and the Technical Work Group) and are kept informed of the project activities and are invited to review and comment on key project documents. In addition, as stated in Section 4.2.2 of DOI's 2012 Community Involvement Plan, "the BLM, on behalf of DOI, has and will continue to consult with the Tribes pursuant to the stipulations of the Programmatic Agreement Consultation Protocol...Further, DOI will continue to engage in government-to-government consultation with the Tribes in advance of key decision points associated with the CERCLA clean-up which may have an adverse effect to the cultural resource properties." Throughout the process the Tribes have supported minimizing disturbances to sensitive resources and have requested that minimal sampling be performed and only that which is necessary to characterize the Site for the remedial investigation.

The TCS compresses natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California. From 1951 to 1985, PG&E added chromium to the water used in the cooling towers and other equipment to prevent equipment corrosion. From 1951 to 1964, cooling tower wastewater containing hexavalent chromium (CrVI) was discharged into a natural wash adjacent to the facility. Later, treated wastewater was discharged into lined ponds for storage and evaporation, until chromium use was discontinued in 1985. PG&E implemented use of a phosphate-based non-toxic additive as a replacement. It is anticipated that the compressor station will remain an active facility into the foreseeable future.

Investigative and remedial activities at the TCS date to the 1980s with the identification of solid waste management units through a RCRA facility assessment. Closure activities associated with former hazardous waste management facilities and the former oily water treatment system at the compressor station were performed between 1988 and 1993. The RFI began in 1996 with the signing of the CACA, and numerous phases of data collection and evaluation have been completed under the CACA. Since 2005, investigative and remedial activities have been performed pursuant to both RCRA corrective action and CERCLA. To date, major portions of the RFI/RI have been completed, several Interim Measures (IMs) and a groundwater remedy have been implemented, and work to evaluate potential human health threats and ecological risks posed by contamination in soil is progressing to assist risk management decision making on the need for soil remediation.

ES.2 Summary of Soil Investigation Program

The RFI/RI Report Volume 1 identified 19 solid waste management units (SWMUs), areas of concern (AOCs), and other undesignated areas (UAs) at the TCS to be carried forward in the soil RFI/RI. Thirteen additional units were added after the RFI/RI Report Volume 1 in the *Revised Final Addendum to the RFI/RI, Volume 1* (CH2M, 2014a). All investigations areas were categorized into two groups: those outside the compressor station fence line (Part A investigation units) and those inside the compressor station fence line (Part B investigation units). The purpose of this categorization was to group units by their accessibility to potential receptors, which in turn dictates the applicable cleanup goals and screening levels. Workplans were developed and approved for the collection of additional soil data to complete site characterization activities at the SWMUs, AOCs, and UAs identified in the RFI/RI Report Volume 1. The draft investigation work plan was initially developed as two separate documents for Part A and Part B investigation areas but was combined into a single work plan after the completion of the initial Phase 1 Part A investigation. All workplan documents were provided to agencies, Tribes and stakeholders for review and comment prior to PG&E implementation. Comments on the Work Plan from agencies and Tribes have been documented in (Hualapai Department of Cultural Resources, 2011; Hargis and Associates, 2011; DOI, 2011a; DTSC, 2011a). An Environmental Impact Report (EIR) was also developed and approved to inform regulatory agency decision makers and the public of the significant adverse environmental effects of the investigation of soil and sediment at the site, and any feasible mitigation measures that may substantially reduce or avoid the significant impacts.

The first phase of sampling was initiated in August 2008 and included soil sampling outside of the TCS fence line (Part A) per Draft Soil Part A Work Plan (CH2M, 2006). The results of the 2008 Phase 1 site investigation were presented in the Soil RFI/RI Work Plan (CH2M, 2013a), and a data gaps analysis was

conducted to evaluate the need for any subsequent investigation. Data results were evaluated against the following data quality objectives (DQOs) for Part A:

- **Decision 1 (Nature and Extent).** Determine the nature and extent of residual soil and/or sediment concentrations resulting from historical TCS practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or Corrective Measures Study/Feasibility Study (CMS/FS).
- **Decision 2 (Data Sufficiency Evaluation).** Determine representative exposure point concentrations (EPCs) for residual soil and/or sediment contamination resulting from historical TCS practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.
- **Decision 3 (Potential Threat to Groundwater).** Determine whether residual soil concentrations resulting from historical TCS practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.
- **Decision 4 (Data Sufficiency Evaluation).** Determine the site-specific soil property and contaminant distribution information necessary to support the CMS/FS decisions and remedial design. If full determination of site-specific soil property and contaminant distribution information based on sample data is not feasible, address uncertainties in the CMS/FS and remedial design.

The data gaps evaluation in the Soil RFI/RI Work Plan was extended to cover all new units, including the units added subsequent to the completion of the RFI/RI Report Volume 1 resulting in proposing 11 investigation areas located outside of the TCS fence line for further investigation (CH2M, 2013a).

Part B of the soil investigation focused on 27 investigation units inside the TCS fence line and was initiated in November 2015. DQOs for Part B were the same as Decision 1-3 for Part A with the following additional DQOs:

- **Decision 4 (Offsite Migration Assessment).** Determine whether residual soil concentrations inside the fence line resulting from past TCS practices pose a potentially unacceptable risk to receptors outside the TCS fence line via the surface migration pathway. If a potentially unacceptable risk to receptors outside fence line exists, or if determination of potential risk to receptors outside fence line based on sample data is not feasible, develop controls to eliminate migration pathways or remove contaminated soil.
- **Decision 5 (Data Sufficiency Evaluation).** Determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design and IMs, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, then document impediments and address uncertainties in the risk assessment and/or CMS/FS or IMs.

Data collected during the field implementation of the Soil RFI/RI Work Plan were reviewed to assess potential data gaps in meeting the project DQOs, and additional field investigation were conducted to address the data gaps in three separate investigations and work plans (CH2M, 2016a-c).

Other investigation areas in this report include the Perimeter Area, the storm drain system, and TCS Well #4 (TCS-4), which is located in AOC 1.

ES.3 Data Summary and Data Quality Objective Evaluation

This volume of the RFI/RI Report considers analytical data for soil and sediment samples collected at the Topock Compressor Station. The data collected comprises three validated data sets:

- Data collected during implementation of the Soil RFI/RI Work Plan (CH2M, 2013a) and subsequent data gap work plans (CH2M, 2016a-c)
- Part A, Phase 1 soil investigation data (CH2M, 2012)

- Historical data collected prior to 2008 (CH2M, 2008b)

The resulting combined data set is referred to in this report as the Combined Soil RFI/RI Data Set. The Combined Soil RFI/RI Data Set spans a wide range of dates, analytical parameters, and data quality. This report presents Sample Results tables as organized by unit and by the following appropriate analytical groups such as metals or dioxins and furans. Data for the Part A investigation units (including Perimeter Area samples) were screened against selected residential and ecological screening levels and background values. Data for the Part B investigation units were screened against selected commercial screening levels and background values. For AOC 4 – Debris Ravine, which is unique in that some samples fall outside the fence line and some fall inside the fence line, two sets of Sample Results tables are presented—one set screens outside the fence line results against the Part A Investigation screening levels and one set screens inside the fence line results against the Part B Investigation screening levels.

In addition to the Sample Results tables, a “Constituent Concentrations in Soil Compared to Screening Values” table is presented for each unit with analytical data. These tables provide a statistical summary of the number of locations sampled, frequency of detection, maximum detected value, and the number of screening level exceedances for each analyte evaluated.

The Combined Soil RFI/RI Data Set and soil parameter data were evaluated against the Part A and Part B DQOs. The purpose of this evaluation is to evaluate data completeness and identify any remaining data gaps to be addressed in the CMS/FS and/or Interim Measure(s). Different data quality categories were used for the different DQOs. Category 1 are suitable for all uses, including risk assessment and remedial action decisions. Data quality Category 2 data are suitable for use in characterization of the constituents of potential concern (COPCs) at the facility and to help define the nature and extent of contamination. Data quality Category 3 data are suitable only for use in qualitative characterization of the nature and extent of contamination.

Additional data were collected to gather information on the storm drain and industrial floor drain line alignments and evaluate potential discharges from storm drains to soil.

ES.4 Remedial Investigation Summaries for Investigation Areas

Investigation summaries for the SWMUs, AOCs, and UAs in the Part A and Part B investigation areas are presented. Investigation summaries include unit setting, history, field observations, comparison of analytical data to relevant screening levels, discussions of the nature and extent of contamination, contaminant sources, fate and transport of contamination, evaluation of results against the DQOs, and updated conceptual site models are included. Exhibits ES-1 and ES-2 present summaries of the evauations against each of the DQOs for the Part A and Part B investigation areas, respectively. The results of the storm drain investigation and Perimeter Area Investigation are also presented. The data gaps identified during the evaluations are summarized in Exhibit ES-3.

Exhibit ES-1. Summary of Evaluation Against Data Quality Objectives – Part A Investigation
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Investigation Unit	Decision 1 (Nature and Extent Determination)[1]		Decision 2 (Data Sufficiency for EPC Calculation)[2]		Decision 3 (Threat to Groundwater Determination)[3]		Decision 4 (Data Sufficiency to Support CMS/FS and/or IMs)[4]		Summary of Evaluation[5]
	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	
SWMU 1: Former Percolation Bed	Yes	No	Yes	No	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 1: Area Around Former Percolation Bed	Yes	Yes	Yes	No	Yes	No	Yes	No	Data gap identified, additional sampling difficult due to site limitations; data gap may be filled during remedial design if remediation necessary
AOC 4: Debris Ravine	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
AOC 9: Southeast Fence Line	No	Yes	Yes	No	Yes	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 10: East Ravine	No	Yes	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
AOC 11: Topographic Low Areas	No	Yes	Yes	No	Yes	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 12: Fill Areas	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
AOC 14: Railroad Debris Site	Yes	No	Yes	No	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 27: MW-24 Bench	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
AOC 28: Pipeline Drip Legs	Yes	No	Yes	No	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 29: IM-3 Treatment Plant	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	DQOs deferred until area is available for sampling
AOC 30: MW-20 Bench	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	DQOs deferred until area is available for sampling
AOC 31: Former Teapot Dome Oil Pit	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
UA-1: Pipeline Disposal Area	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UA-2: Former 300B Pipeline Drip Tank	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary

Notes:

CMS/FS = Corrective Measures Study/Feasibility Study

DQO = data quality objective

EPC = exposure point concentration

IM = interim Measure

N/A = Not applicable; data not collected

Deferred = Analysis deferred until after the groundwater remedy decommissioning sampling is completed (for AOC 30) and after confirmation sampling to be conducted as part of the IM-3 decommissioning and removal is completed (for AOC 29).

This exhibit summarizes the results of the Combined Soil RFI/RI Data Set and soil parameter data evaluated against the Soil Part A Data Quality Objectives. The technical memorandum *Data Quality Objectives – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M, 2010) describes the following decision statements that were identified for this evaluation, as reflected in the columns of this table: Conditions that would require recalculation of the EPC could include detection of new compounds not evaluated or COPC concentrations that are significantly higher than currently detected concentrations.

[1] **Decision 1 (Nature and Extent Determination):** Determine the nature and extent of residual soil and/or sediment concentrations resulting from historical compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.

[2] **Decision 2 (Data Sufficiency for EPC Calculation):** Determine representative EPCs for residual soil and/or sediment contamination resulting from historical compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

[3] **Decision 3 (Threat to Groundwater Determination):** Determine whether residual soil concentrations resulting from historical compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.

[4] **Decision 4 (Data Sufficiency to Support CMS/FS and/or IMs):** Determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design, and IMs, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, then document impediments and address uncertainties in the risk assessment and/or CMS/FS or IMs.

[5] Details provided in individual investigation unit writeups in Section 4.1 and in Section 4.5, Exhibit 4-37.

Exhibit ES-2. Summary of Evaluation Against Data Quality Objectives – Part B Investigation
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Investigation Units	Decision 1 (Nature and Extent Determination)[1]		Decision 2 (Data Sufficiency for EPC Calculation)[2]		Decision 3 (Threat to Groundwater Determination)[3]		Decision 4 (Offsite Migration Assessment)[4]			Decision 5 (Data Sufficiency to Support CMS/FS and/or IMs) [5]		Summary of Evaluation[6]
	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Potential Risk to Off-site Receptors?[7]	Data Gaps?	DQO Satisfied?	Data Gaps?	
SWMU 5: Sludge Drying Beds	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
SWMU 6: Chromate Reduction Tank	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
SWMU 8: Process Pump Tank	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
SWMU 9: Transfer Pump	Yes	No	Yes	No	Yes	No	N/A	N/A	N/A	Yes	No	DQO 4 not assessed; no surface soil samples collected
SWMU 11: Former Sulfuric Acid Tanks	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 5: Cooling Tower A	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 6: Cooling Tower B	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 7: Haz. Materials Storage Area	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 8: Paint Shed	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 13: Unpaved Areas within the TCS	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 15: Aux. Jacket Cooling Water Pumps	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 16: Former Sandblast Shelter	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 17: Onsite Septic System	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 18: Combine Wastewater Transference Pipelines	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 19: Former Cooling Liquid Mixing and Hotwell Area	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 20: Industrial Floor Drains	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 21: Round Depression near Sludge Drying Bed	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 22: Unidentified Three-Sided Structure	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 23: Former Water Conditioning Bldg.	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 24: Stained Area and Former API Oil/Water Separator	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 25: Compressor and Generator Engine Basements	Deferred	Deferred	Yes	No	Deferred	Deferred	Yes	No	No	Yes	No	DQOs 1 and 3 deferred until area is available for sampling
AOC 26: Former Scrubber Oil Sump	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 32: Oil Storage Tanks and Waste Oil Sump	Deferred	Deferred	Yes	No	Deferred	Deferred	Yes	No	No	Yes	No	DQOs 1 and 3 deferred until area is available for sampling
AOC 33: Potential Former Burn Area near AOC 17 (See AOC 17)	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
Unit 4.3 - Unit 4.5	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
Portions of AOC 4 Inside the Fence Line (See Section 4.1.2)	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied

Notes:

CMS/FS = Corrective Measures Study/Feasibility Study

DQO = data quality objective

EPC = exposure point concentration

IM = interim Measure

N/A = Not applicable; data not collected

Deferred = Analysis deferred because of substantial access constraints, active use of buildings, and physical dangers. Soil data will be collected when the area become available.

This exhibit summarizes the results of the Combined Soil RFI/RI Data Set and soil parameter data evaluated against the Soil Part B Data Quality Objectives (DQOs). The technical memorandum *Data Quality Objectives – Part B Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M, 2011b) describes the following decision statements that were identified for this evaluation, as reflected in the columns of this table:

Conditions that would require recalculation of the EPC could include detection of new compounds not evaluated or COPC concentrations that are significantly higher than currently detected concentrations.

[1] **Decision 1 (Nature and Extent Determination):** Determine the nature and extent of residual soil and/or sediment concentrations resulting from historic compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.

[2] **Decision 2 (Data Sufficiency for EPC Calculation):** Determine representative EPCs for residual soil and/or sediment contamination resulting from historical compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

[3] **Decision 3 (Threat to Groundwater Determination):** Determine whether residual soil concentrations resulting from historical compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.

[4] **Decision 4 (Offsite Migration Assessment):** Determine whether residual soil concentrations inside the fence line resulting from past compressor station practices pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway. If a potentially unacceptable risk to receptors outside fence line exists, or if determination of potential risk to receptors outside fence line based on sample data is not feasible, develop controls to eliminate migration pathways or remove contaminated soil.

[5] **Decision 5 (Data Sufficiency to Support CMS/FS and/or IMs):** Determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design, and IMs, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, then document impediments and address uncertainties in the risk assessment and/or CMS/FS or IMs.

[6] Details provided in individual investigation writeups in Section 4.2 and in Section 4.5, Exhibit 4-37.

[7] **Potential Risk to Offsite Receptors:** Yes = Concentrations in this unit may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway.

Exhibit ES-3. Summary of Data Gaps in Part A and Part B Investigation Units, Storm and Floor Drain Systems, and Perimeter Area
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Unit	Data Gap Identified[1]	Description of Data Gap[2]
Part A Investigation		
AOC 4: Debris Ravine	DQO 4	• No samples analyzed for soil physical parameters
AOC 9: Southeast Fence Line	DQO 1]	• Vertical extent not defined for mercury, PAHs, PCBs, and dioxins/furans
AOC 10: East Ravine	DQO 1 & 4	• Vertical extent not defined for copper, mercury, molybdenum, and dioxins/furans • No samples analyzed for soil physical parameters
AOC 11: Topographic Low Areas	DQO 1	• Vertical extent not defined for barium, CrVI, copper, zinc, lead, and molybdenum at specific locations • Lateral extent not defined for zinc
AOC 12 – Fill Areas	DQO 4	• No samples analyzed for soil physical parameters
AOC 27: MW-24 Bench	DQO 4	• No samples analyzed for soil physical parameters
AOC 29: IM-3 Treatment Plant	DQO 1 through 4 deferred	• Data gap analysis has been deferred until after confirmation sampling to be conducted as part of the IM-3 decommissioning and removal is completed.
AOC 30: MW-20 Bench	DQO 1 through 4 deferred	• Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed
AOC 31 – Former Teapot Dome Oil Pit	DQO 4	• No samples analyzed for soil physical parameters
UA-2 – Former 300B Pipelines Liquid Tanks	DQO 4	• No samples analyzed for soil physical parameters
Part B Investigation		
SWMU 6: Chromate Reduction Tank	DQO 1	• Vertical extent not defined for dioxins/furans
AOC 13: Unpaved Areas within the TCS	DQO 1	• Vertical extent not defined for dioxins/furans, CrVI, lead, B(a)P equivalents, copper, and molybdenum • Lateral extent not defined for dioxins/furans, B(a)P equivalents, CrVI, total chromium, copper, lead, zinc, and PCBs
AOC 15: Aux. Jacket Cooling Water Pumps	DQO 1	• Vertical extent not defined for total chromium, lead, and molybdenum • Lateral extent not defined for CrVI, total chromium, copper, lead, molybdenum, and zinc
AOC 18: Combine Wastewater Transference Pipelines	DQO 1	• Vertical extent not defined for dioxins/furans • Lateral extent not defined for B(a)P equivalents and dioxins/furans

Unit	Data Gap Identified[1]	Description of Data Gap[2]
AOC 19: Former Cooling Liquid Mixing and Hotwell Area	DQO 1	• Vertical extent not defined for CrVI, total chromium, lead, mercury, and molybdenum • Lateral extent not defined for CrVI, total chromium, and lead
AOC 20: Industrial Floor Drains	DQO 1	• Vertical extent not defined for molybdenum and zinc • Lateral extent not defined for CrVI, total chromium, copper, and lead
AOC 23: Former Water Conditioning Bldg.	DQO 1	• Vertical extent not defined for sample location AOC23-3
AOC 25: Compressor and Generator Engine Basements	DQO 1 deferred DQO 3 deferred	• Soil data will be collected when AOC 25 is available for sampling
AOC 32: Oil Storage Tanks and Waste Oil Sump	DQO 1 deferred DQO 3 deferred	• Soil data will be collected in AOC 32 is available for sampling
Storm Drain Line 6	DQO 1	• Vertical extent not defined for CrVI or copper at SD-08

Notes:

[1] For the purposes of this exhibit, "DQO" refers to the Data Quality Objective Decisions, as follows:

Decision 1 (Nature and Extent Determination): Determine the nature and extent of residual soil and/or sediment concentrations resulting from historic compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.

Decision 2 (Data Sufficiency for EPC Calculation): Determine representative EPCs for residual soil and/or sediment contamination resulting from historic compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

Decision 3 (Threat to Groundwater Determination): Determine whether residual soil concentrations resulting from historic compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.

Decision 4 (Data Sufficiency to Support CMS/FS and/or IMs): Determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design and IMs, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, then document impediments and address uncertainties in the risk assessment and/or CMS/FS or IMs

[2] Data gap may be filled during remedial design if remediation necessary.

ES.5 Summary of PG&E's Risk Assessment

A Soil HHERA was completed for the TCS site in October 2019 (Arcadis, 2019). The objectives of the Soil HHERA were to:

- Help determine the need for remedial action with respect to soil conditions
- Provide a basis for determining levels of constituents that can remain in soil at the TCS site and still be adequately protective of public health and the environment

Risk Based Concentrations (RBCs) were also developed and presented in Appendix RBC of the HHERA. The RBCs were developed for the Soil Management Plan to be used to support decisions for the handling, management, and storage of potentially contaminated and displaced soil at the site during implementation of a groundwater remedy at the site to address chromium contamination in groundwater.

The Soil HHERA was conducted using methodology presented in the associated agency-approved HHERA Work Plans (Arcadis, 2008a, 2009a, 2015) and included evaluating all constituents evaluated during the RFI/RI soil investigations to identify COPCs and/or constituent of potential ecological concern (COPECs) that could potentially pose an unacceptable risk to human health or the ecological environment.

Data used for the Soil HHERA were in the highest quality category (Category 1). Data were grouped into datasets by individual potential exposure areas (for example, Bat Cave Wash or AOC 10) and into combined exposure areas (for example, all exposure areas outside the Compressor Station [OCS]). Data for each potential exposure area were also grouped according to exposure depth. Additionally, for the two soil potential exposure areas encompassing wash areas (Bat Cave Wash and AOC 10), two scouring scenarios were evaluated.

Several complete pathways of exposure to COPCs/COPECs are present at the TCS site, both now and potentially in the future. The Soil HHERA generally found no unacceptable risk for most human and ecological receptors. Of the potential human receptors, no unacceptable risk was identified for all relevant potential exposure areas for tribal users, hunters, and commercial and short- and long-term maintenance workers based on the exposure scenario defined in the HHERA work plan. Of the potential ecological receptors, no unacceptable risk was identified for all relevant potential exposure areas for special-status species, large home-range receptors, herbivorous and insectivorous birds, and herbivorous small mammals.

The Soil HHERA (Arcadis, 2019) presents risk-based remedial goals (RBRGs) for COPCs/COPECs in soil that most significantly contribute to estimates of unacceptable risk to human health and/or ecological receptors (that is, "risk drivers" or constituents of concern). The RBRGs were used to identify the locations associated with unacceptable risk and risks above *de minimis* levels for consideration in remedial decision making. The potential for unacceptable risk was identified for the camper, hiker, off-highway vehicle (OHV) rider, and desert shrew receptors, driven by a limited number of compounds (dioxin/furan toxicity equivalent (TEQ) and CrVI for human health; dioxin/furan TEQ, total chromium, and copper for ecological receptors) in areas within SWMU 1, AOC 9, and AOC 10.

The Soil HHERA notes that the locations identified using this approach are intended to help focus remedial planning efforts on those areas and COPCs/COPECs that contribute most significantly to levels of calculated unacceptable risk for ecological receptors and risks above *de minimis* levels for potential human receptors. The overall results of the Soil HHERA support the conclusion that focusing remedial planning on these locations, as demonstrated by the hypothetical remediation, should be effective in reducing overall calculated risks to levels that are protective of human health and potential ecological receptors.

ES.6 Summary of Conclusions and Recommendations

This Volume 3 RFI/RI Report considers analytical data for soil and sediment samples collected at the Topock Compressor Station. The data collected comprise multiple validated data sets referred to in this report as the Combined Soil RFI/RI Data Set which spans a wide range of dates, analytical parameters, and data quality. The Combined Soil RFI/RI Data Set was evaluated against the Part A and Part B DQOs for the appropriate investigation areas and units at the site. The evaluation indicates that DQOs have been satisfied for all investigation areas but also identifies some areas where full nature and extent of contamination is not feasible or warranted at this time. Although the DQOs have been satisfied for many of the investigation areas, there are active, operational areas that will be evaluated in the future through the corrective action process for the soil investigation to be completed. These may include newly identified AOCs as well as areas with active operations including beneath the compressor building, IM-3 treatment plant, and MW-20 bench, and beneath other structures on site currently in use by PG&E. As determined necessary to inform specific decisions related to the CMS/FS, IMs, and/or remediation, uncertainties regarding the nature and extent of impacts can be addressed during future CMS/FS or remediation activities.

The Soil HHERA determined that there is minimal unacceptable risk to most human and ecological receptors exposed to COPCs/COPECs in soil at the site, both within the TCS and exposure areas outside the TCS. Estimated risks were determined to be acceptable for all relevant exposure areas for most human and ecological receptors. The potential for unacceptable risk was identified for the camper, hiker, OHV rider, and desert shrew receptors, driven by a limited number of compounds (dioxin TEQ and CrVI for human health; dioxin TEQ, total chromium, and copper for ecological receptors) in areas within SWMU 1, AOC 9, and AOC 10. Focusing remedial planning on these locations will be effective in reducing overall risks to levels that are protective of human health and ecological receptors. It is recommended that these areas be carried forward into the CMS/FS, or mitigated via interim measures.

In addition to the areas identified within the Soil HHERA, several unpaved areas inside the compressor station have surficial contaminant concentrations in soil that may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway. Additional evaluation of measures for the control and prevention of migration of soil from inside the TCS fence line to outside the TCS fence line is recommended. Areas Recommended to be carried forward to CMS/FS are presented in Exhibit ES-4.

Under direction of the U.S. Department of the Interior (DOI), an Engineering Evaluation/Cost Analysis (EE/CA) has been prepared to evaluate the need for potential removal action in areas with significant contaminant concentrations outside of the compressor station, including the locations identified in the Soil HHERA as contributing to unacceptable risk (DOI, 2018). 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. Consultation is an ongoing process and will continue. DOI has reviewed and considered stakeholder comments on the draft EE/CA. DOI directed PG&E to prepare a final EE/CA based on comments received. DOI will be issuing a Non-Time-Critical Removal Action (NCTRA) Action Memorandum. If a NTCRA is determined to be needed, DOI will direct PG&E to prepare a detailed workplan for implementation of DOI's selected alternative. Conclusions from the final EE/CA and associated potential non-time critical removal action will be incorporated into the overall remedial planning and decisions for soil at the Topock site. An RFI/RI Addendum and/or HHERA Addendum may be warranted to summarize/discuss conditions subsequent to a potential NTCRA.

Exhibit ES-4. Areas Recommended to be Carried Forward to CMS/FS
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California

Investigation Area	Justification	Action
SWMU 1: Former Percolation Bed Sample location: SWMU1-25	Unacceptable risk to human recreators	Evaluate remediation options
AOC 4: Debris Ravine	Soil accumulates above the dam or the gabion after rainfall events	Evaluate removal of accumulated sediment Measures may be considered as part of an administrative control
Exposure Unit AOC 9: Southeast Fence Line Sample locations: #10, AOC10-20, AOC10-21, AOC10-23, PA-20, and PA-21[1]	Unacceptable risk to human recreators and desert shrew	Evaluate remediation options
Exposure Unit AOC 10: East Ravine Sample locations: MW-58BR_S and AOC10c-4	Unacceptable risk to human recreators and desert shrew Presence of debris	Evaluate remediation options Evaluate removal of hazardous debris
AOC 14: Railroad Debris Site	Presence of debris	Evaluate removal of hazardous debris
AOC 27: MW-24 Bench	Presence of debris	Evaluate removal of hazardous debris
AOC 13: Unpaved Areas within the TCS	Presence of debris on slope between upper and lower yards Data gaps on slope between upper and lower yards requiring further investigation	Evaluate removal of hazardous debris Collect additional soil samples and/or evaluate remediation options
Potential Offsite Migration Areas[2]	Contaminant concentrations in soil in unpaved areas inside the station may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway	Evaluate measures for the control and prevention of migration of soil from unpaved areas inside the TCS fence line to outside the TCS fence line
Storm Drain System	Presence of damaged pipes Presence of potential pathway from inside to outside the station fence line	Evaluate measures to repair damaged portions of Storm Drain system Evaluate implementation of storm drain monitoring, regular cleaning, and/or stormwater Best Management Practices
Perimeter Area[3] Associated with AOC 1: PA-02, AOC13-19, AOC13-20, AOC13-21, PA-15, AOC16-4, AOC16-grit, AOC18-11, and AOC21-OS2 Associated with AOC 10: PA-18, PA-19, PA-20, and PA-21 Associated with AOC 11: SD-24, PA-09, PA-10, PA-11, and PA-12	The Perimeter Area is a potential source of contamination to downgradient Part A investigation units	Evaluate run-off and erosion control measures and/or removal of contaminated soil

Notes:

[1] Samples locations AOC10-20, AOC10-21, AOC10-23, PA-20, and PA-21 are located in AOC 10 but were used as part of the AOC 9 exposure unit in the HHERA.

[2] Investigation units in the Potential Offsite Migration Areas (i.e., from inside the TCS fenceline to outside the TCS fenceline) with potentially unacceptable risk via the surface migration pathway are: AOC 1, AOC 4, AOC 7, AOC 8, AOC 9, AOC 10, AOC 11, AOC 13, AOC 16, AOC 18, AOC 21, AOC 22,AOC 31, and SWMU 5.

[3] The Perimeter Area is defined as the area immediately outside the TCS to the toe of the slope. Sample locations are assigned to the downgradient investigation units.

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Acronyms and Abbreviations

µg/kg	micrograms per kilogram
µg/m^3	microgram(s) per cubic meter
95UCL	95% upper confidence limit
ACA	Administrative Consent Agreement
AJCW	auxiliary jacket cooling water
AOC	area of concern
API	American Petroleum Institute
AST	aboveground storage tank
BAF	bioaccumulation factor
B(a)P	benzo(a)pyrene
bgs	below ground surface
BK	background
BLM	U.S. Bureau of Land Management
BOR	U.S. Bureau of Reclamation
CACA	Corrective Action Consent Agreement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CH2M	CH2M HILL, Inc.
CHHSL	California Human Health Screening Level
CLP	Contract Laboratory Program
CMS	Corrective Measures Study
COC	constituent of concern
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CrIII	trivalent chromium
CrVI	hexavalent chromium

CSL	commercial screening level
CSM	conceptual site model
DGWP	Data Gap Work Plan
DOI	U.S. Department of the Interior
DQO	data quality objective
DTSC	California Department of Toxic Substances Control
DTSC-SL	DTSC screening level
E&E	Ecology & Environment, Inc.
ECV	ecological comparison value
EE/CA	Engineering Evaluation/Cost Analysis
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ERA	ecological risk assessment
ESL	environmental screening level
FOE	factor of evidence
FS	Feasibility Study
GANDA	Garcia and Associates
HHERA	human health ecological risk assessment
HMW	high molecular weight
HNWR	Havasu National Wildlife Refuge
HQ	hazard quotient
I-40	Interstate 40
IDW	investigation-derived waste
ILCR	incremental lifetime cancer risk
IM	Interim Measure
IM-2	Interim Measure No. 2
IM-3	Interim Measure No. 3

ISL	interim screening level
JCW	jacket cooling water
LOAEL	lowest observable adverse effect level
MEK	methyl ethyl ketone
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NTCRA	non-time critical removal action
OHV	off-highway vehicle
OCS	outside the Compressor Station
OWS	oil/water separator
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
PMP	Performance Monitoring Program
ppm	parts per million
PVC	polyvinyl chloride
RAO	remedial action objective
RBRG	risk based remedial goal
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RI	remedial investigation
ROD	record of decision
ROW	right-of-way
RRSL	residential regional screening level
RWQCB	California Regional Water Quality Control Board
Soil Part B DQOs TM	*Final Data Quality Objectives Steps 1 through 5 Part B Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M, 2011b)
SSL	soil screening level

STLC	soluble threshold limit concentration
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCLP	toxicity characteristic leaching procedure
TCS	Topock Compressor Station
TEC	threshold effect concentration
TEQ	toxicity equivalent
TCRA	time-critical removal action
TM	technical memorandum
TPH	total petroleum hydrocarbon
TPH-d	total petroleum hydrocarbons as diesel
TPH-mo	total petroleum hydrocarbons as motor oil
TRV	toxicity reference value
TRPH	total recoverable petroleum hydrocarbons
UA	undesignated area
UTL	upper tolerance limit
VOC	volatile organic compound
XRF	x-ray fluorescence

1. Introduction

Pacific Gas and Electric Company (PG&E) is conducting investigative and remedial activities at the Topock Compressor Station (TCS) located in San Bernardino County approximately 15 miles to the southeast of Needles, California. These activities are being carried out as directed by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) and United States Department of the Interior (DOI) under the authority of Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In February 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement (CACA) pursuant to Section 25187 of the California Health and Safety Code (DTSC, 1996). In July 2005, PG&E and the federal agencies entered into an Administrative Consent Agreement (ACA) (DOI, 2005). Under the terms of the CACA and ACA, PG&E agreed to conduct the RCRA facility investigation (RFI) and CERCLA remedial investigation (RI) to identify and evaluate the nature and extent of contamination at the compressor station. This report is the final volume in a three-volume RFI/RI Report detailing these findings. The previous volumes are: *Revised Final RCRA Facility Investigation and Remedial Investigation Report, Volume 1 – Site Background and History* (CH2M HILL, Inc. [CH2M], 2007a) and *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). Addenda and supplemental documents to the Volume 1 and 2 reports are mentioned in Section 1.3.2.

1.1 Purpose of Report

This Volume 3 Soil RFI/RI Report presents the soil characterization results for all areas of the TCS site including:

- Areas outside the compressor station fence line (Part A investigation areas)
- Areas inside the compressor station fence line (Part B investigation areas)
- Perimeter areas adjacent to the compressor station fence line
- Storm drains leading from the compressor station to areas outside the fence line

An initial draft Volume 3 Soil RFI/RI Report was submitted to DOI, DTSC, and Stakeholders for review on December 9, 2019. Comments on the initial draft Volume 3 RFI/RI Report were received from DOI, DTSC, Fort Mojave Indian Tribe, Fort Yuma Quechan Indian Tribe, Cocopah Indian Tribe, and the Metropolitan Water District of Southern California. A responses to comments (RTCs) table, a revised Table of Contents on a proposed restructured Volume 3 report, and a draft example “strawman” summary report section for the SWMU 1/AOC 1 investigation area were prepared sent to Agencies and Stakeholders on October 30, 2020. A comment resolution meeting was held on December 9, 2020. This revised Draft Volume 3 RFI/RI Report incorporates the comments and comment responses as presented in the updated RTCs table, located in Appendix H of this revised Draft report.

1.2 Site Location and Description

The PG&E TCS is located in eastern San Bernardino County, California, approximately 15 miles southeast of Needles, California, south of Interstate 40 (I-40), in the north end of the Chemehuevi Mountains. It is located approximately 2,000 feet from the California-Arizona state border and approximately 1,500 feet from the Colorado River (Figure 1-1; figures and tables are presented at the end of this document). The TCS is currently surrounded by fencing and security gates that limit accessibility.

1.2.1 Topock Compressor Station History and Operations

The TCS began operations in December 1951. The station compresses natural gas supplied from the southwestern United States for transport through pipelines to PG&E’s service territory in central and northern California. As natural gas is compressed at the TCS, its temperature increases, and it must be cooled. From 1951 to 1985, PG&E added chromium to the water used in the cooling towers and other equipment to prevent equipment corrosion. From 1951 to 1964, cooling tower wastewater containing

hexavalent chromium (CrVI) was discharged into a natural wash adjacent to the facility. Later, treated wastewater was discharged into lined ponds for storage and evaporation, until chromium use was discontinued in 1985. PG&E implemented use of a phosphate-based non-toxic additive as a replacement. Additional waste disposal practices that were implemented included burning of waste, use of wastewater injection wells, on- and off-site waste/sludge disposal, and oiling of roads for dust suppression.

Other than changes in general waste management and pollution prevention activities that have evolved with industry practice, current operations at the compressor station are very similar to the operations that occurred from the start of facility operations in 1951. The operations at the compressor station consist of:

- Water conditioning
- Compression of natural gas
- Cooling of the compressed natural gas and compressor lubricating oil
- Wastewater treatment (primarily treatment of discharge from cooling-tower blowdown, but also treatment of discharge from facility operation and maintenance activities)
- Facility and equipment maintenance
- Miscellaneous operations

Additional operations and associated waste management details are provided in Section 4.

It is anticipated that the compressor station will remain an active facility into the foreseeable future. The main structures at the TCS currently include the Compressor Building, Cooling Towers A and B, and the Auxiliary Building (Figure 1-2). Various auxiliary structures, including an office, a warehouse, a vehicle garage, maintenance buildings, equipment and chemical storage buildings, and a water-softening building, are adjacent to or near the main structures. The facility also has aboveground tanks used for storage of water, water treatment chemicals, odorant, new and used compressor oil, gasoline and diesel, and wastewater. All of these structures are located within a fence that surrounds the TCS.

1.2.2 Land Ownership

The compressor station occupies approximately 15 acres of a 65-acre parcel of PG&E-owned land. The compressor station property is immediately surrounded by the land of the Havasu National Wildlife Refuge (HNWR). Prior to construction of the compressor station in 1951, the surrounding area was largely undeveloped land. The Teapot Dome restaurant and gas station occupied a small portion of the property at the very northern edge of the facility. The property on which the compressor station was built was owned by the State of California. PG&E leased the property from the State from 1951 until 1965, at which point PG&E purchased the property from the State.

Land ownership near the compressor station is shown on Figure 1-3. The surrounding area includes land owned and/or managed by a number of government agencies and private entities including the U.S. Bureau of Land Management (BLM), U.S. Bureau of Reclamation (BOR), U.S. Fish and Wildlife Service, San Bernardino County, California Department of Transportation, BNSF Railway, the Metropolitan Water District of Southern California, and the Fort Mojave Indian Tribe.

1.2.3 Land Use and Nearby Communities and Development

The compressor station is located in a sparsely populated, rural area. The surrounding land lies within an area of significant cultural, archaeological, and historical resources. Land uses near the TCS are predominantly open space, interspersed with industrial facilities, recreational uses, and transportation infrastructure. Open space near the compressor station is characterized primarily by sparse desert vegetation on steep, rocky slopes. The area is bisected by several steep-sided ephemeral streams, including Bat Cave Wash and several unnamed washes that flow north to the confluence of the Colorado River. Open space on the California portion of the Colorado River floodplain is characterized predominantly by shifting sand dunes and associated riparian vegetation, primarily non-native tamarisk (salt cedar).

The nearest communities include a few residents at Topock, Arizona as well as mobile home parks at Topock, Arizona and Moabi Regional Park, California, as shown in Figure 1-4; the Pirate Cove development in Moabi Regional Park recently expanded into a resort and has become a popular attraction for recreational boaters. Similarly, recent upgrades at the Topock Marina have made it a popular tourist destination. Topock is located on the Arizona (or eastern) side of the Colorado River, about 0.5 mile east-northeast of the compressor station. Moabi Regional Park is located on the California (or western) side of the Colorado River about 1 mile northwest of the compressor station. The community of Golden Shores, the largest nearby community, is approximately 5 miles north of the compressor station on the eastern side of the Colorado River.

A major gas utility and transportation corridor is located within the project site. This corridor includes six natural gas transmission pipelines, a BNSF Railway line, and the I-40 freeway. Other developed land uses within the project site are shown in Figure 1-4; these include National Trails Highway, former Route 66, and various unnamed access roads. A BOR gravel quarry is located approximately 1,500 feet southwest of the TCS. Evaporation ponds associated with TCS operations are located approximately 3,000 feet west of the compressor station. In addition, an interim remedial measures groundwater treatment plant and numerous groundwater wells related to the ongoing groundwater investigation and remedial activities are located at the site. The groundwater interim measures are described in Section 1.3.3.3 and the final groundwater remedy construction is described in Section 1.3.5. The TCS project area and infrastructure described above are shown on Figure 1-4 (the recently installed groundwater remedy infrastructure is not shown on Figure 1-4).

1.2.4 Cultural Significance

The Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes (CRIT), Fort Mojave Indian Tribe, Fort Yuma Quechan Indian Tribe, Hualapai Tribe, Havasupai Tribe, Twenty-nine Palms Band of Mission Indians, and the Yavapai-Prescott Indian Tribe all have traditional and cultural ties to the project area. The Tribes believe that the area known as Topock, and specifically the immediate Project area, is part of a broader cultural landscape.

Representatives from the Chemehuevi Indian Tribe, Cocopah Indian Tribe, CRIT, Fort Mojave Indian Tribe, Fort Yuma Quechan Indian Tribe, and the Hualapai Indian Tribe are actively involved in project workgroups (e.g., the Clearinghouse Task Force, the Consultative Work Group, and the Technical Work Group) and are kept informed of the project activities and are invited to review and comment on key project documents. In addition, as stated in Section 4.2.2 of DOI's 2012 Community Involvement Plan, "the BLM, on behalf of DOI, has and will continue to consult with the Tribes pursuant to the stipulations of the Programmatic Agreement Consultation Protocol...Further, DOI will continue to engage in government-to-government consultation with the Tribes in advance of key decision points associated with the CERCLA clean-up which may have an adverse effect to the cultural resource properties." Throughout the process the Tribes have supported minimizing disturbances to sensitive resources and have requested that minimal sampling be performed and only that which is necessary to characterize the Site for the remedial investigation.

1.3 History of Investigative and Remedial Activities

Investigative and remedial activities at the TCS date to the 1980s with the identification of solid waste management units through a RCRA facility assessment. Closure activities associated with former hazardous waste management facilities and the former oily water treatment system at the compressor station were performed between 1988 and 1993. The RFI began in 1996 with the signing of the CACA, and numerous phases of data collection and evaluation have been completed under the CACA. Since 2005, investigative and remedial activities have been performed pursuant to both RCRA corrective action and CERCLA.

To date, major portions of the RFI/RI have been completed, several soil and groundwater Interim Measures (IMs) and a groundwater remedy have been implemented, and work to evaluate potential human health threats and ecological risks posed by contamination in soil was completed to assist risk

management decision making on the need for soil remediation. The status of the investigative and remedial activities are summarized briefly below.

1.3.1 Incidental Release History

During the operational history of the compressor station, some incidental releases of chemicals or waste products have occurred. When incidental releases occurred, the proper authorities were notified and the releases cleaned up. Although the investigation and cleanup of incidental releases has not been performed under the RFI, the reporting of releases is required under the terms of the CACA (DTSC 1996). These incidental releases were reported to the appropriate regulatory agency (as described for each release, below). These minor cleanup activities are typically performed as maintenance activities and do not require, nor have they received, agency approval. Seventeen incidental releases have been documented at the facility since 1995, as summarized in Table 1-1. The location of each release is depicted in Figure 1-5. Details of each release are provided below. Although the site history has been extensively researched, quantities, precise dates, and follow-up information regarding spills that may have occurred prior to 1995 are generally not available.

1.3.2 RCRA Facility Investigation/Remedial Investigation

Since the signing of the CACA in 1996, there have been multiple phases of investigation at the Topock site to collect data to evaluate the nature and extent of contamination at the Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and Undesignated Areas (UAs).

As directed by DTSC (DTSC, 2006), the Final RFI/RI Report has been separated into three volumes. This separation is intended to efficiently manage the large amount of information associated with the RFI/RI, and to accelerate site remediation by allowing earlier remediation of the groundwater plume. The following is a brief description of each volume:

- **RFI/RI Report Volume 1 — Site Background and History**. The *Revised Final RCRA Facility Investigation and Remedial Investigation Report, Volume 1 – Site Background and History* (CH2M, 2007a) was completed in August 2007 and approved by DTSC (DTSC, 2007) and DOI (DOI, 2007). Volume 1 of the RFI/RI Report identifies the 20 SWMUs, AOCs, and other undesignated areas at the TCS to be carried forward in the Final RFI/RI. An addendum to the RFI/RI Report Volume 1 was completed in May 2014 (CH2M, 2014a). It provides additional site background and history information for SWMUs and AOCs that were identified subsequent to the original RFA. The addendum was approved by DTSC (DTSC, 2014) and DOI (DOI, 2014) in 2014. PG&E will continue to document any new units discovered in the future and promptly notify agencies regarding the discovery.
- **RFI/RI Report Volume 2 — Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigation.** The *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) and its addendum were completed in February and June 2009, respectively. They were approved by DTSC (2009) and DOI (2009a). This document completes the RFI/RI requirements for groundwater impacts associated with the past discharge of wastewater to Bat Cave Wash (SMWU 1/AOC 1) and injection well PGE-8 (SWMU 2). It contains information on the hydrogeologic characterization and results of groundwater, surface water, pore water, and river sediment investigations to evaluate and characterize the nature and extent of groundwater contamination resulting from past discharge of wastewater from the TCS. Additionally, the *Summary of Findings Associated with the East Ravine Groundwater Investigation* (CH2M 2009d) and its addendum (CH2M, 2013b) were completed in October 2009 and June 2013 respectively. The report documents the groundwater investigation and associated activities in the ravine area east of the TCS designated as AOC 10. It contains the results of drilling, well installation, and initial groundwater sampling to refine the understanding of regional hydrogeology and groundwater occurrence in bedrock, and to characterize the nature and extent of contamination in groundwater.
- **RFI/RI Report Volume 3 — Results of Soil and Sediment Investigation.** Volume 3 of the RFI/RI Report (this document) includes final characterization data for all but fourinvestigation units to complete the RFI/RI requirements for remaining TCS operations, including the results of soil

investigations and the storm drain alignment investigation. The RFI/RI has not concluded unit investigtions in areas that are inaccessible or have active site activities preventing investigation. These areas will be evaluated in the future through the corrective action process. The areas with incomplete evaluations include:

- AOC 25: Compressor and Generator Engine Basements
- AOC29: Interim Measure No. 3 Treatment Plant
- AOC 30: MW-20 Bench
- AOC 32: Oil Storage Tanks and Waste Oil Sump

1.3.3 Unit Closures, Soil Removal Actions, and Interim Measures

A series of unit closures and soil removal actions and IMs have been implemented at the TCS to control, stabilize, and/or mitigate migration of contaminants via soil and groundwater. Unit closures, soil removal actions and IMs, and groundwater IMs conducted at the site are described below.

The SWMUs, AOCs, and other undesignated areas identified at the Topock Compressor Station have been identified at different times during the history of the RCRA Corrective Action process. Therefore, the status of many of the areas differs significantly, and ranges from those where no investigation has yet been performed to sites where remediation and closure have already been completed.

The RCRA Corrective Action and CERCLA closure processes are considered to be complete at eight SWMUs and AOCs. They are:

- SWMU 2 – Inactive Injection Well (PGE-08) (soil only)
- SWMU 3 – Inactive Well PGE-06
- SWMU 4 – Inactive Well PGE-07
- SWMU 7 – Precipitation Tank
- SWMU 10 – Old Evaporation Ponds
- Unit 4.6 – Waste Oil Storage Tank
- AOC 2 – Area Around Inactive Injection Well (PGE-08)
- AOC 3 – Area Around Inactive Wells #6 and #7 (PGE-06 and PGE-07)

Previously closed SWMUs and AOCs for which further investigation was requested include the following nine SWMUs and AOCs:

- SWMU 5 (Sludge Drying Beds)
- SWMU 6 (Chromate Reduction Tank)
- SWMU 8 (Process Pump Tank)
- SWMU 9 (Transfer Sump)
- AOC 18 (Former Two-step Wastewater Treatment System Piping)
- Unit 4.3 (Oil/Water Holding Tank)
- Unit 4.4 (Oil/Water Separator)
- Unit 4.5 (Portable Waste Oil Holding Tank)
- Former 300B Pipeline Liquids Tank

Five of these SWMUs and AOCs (SWMU 5, SWMU 6, SWMU 8, SWMU 9, and AOC 18) were part of the former wastewater treatment system. PG&E performed closure activities of this system between November 1988 and November 1993. Closure activities included removal of equipment and foundations, removal of impacted soil, and confirmation soil sampling. Closure activities were performed in accordance with an approved closure plan, and a closure certification acceptance letter was issued by DTSC on June 26, 1995. The piping (AOC 18) was not identified as a separate unit, but was included as part of the closure of the entire system. In a letter dated July 13, 2006 DTSC requested additional investigation at these five SWMUs and AOCs.

Similarly, DTSC also requested additional investigation of Units 4.3, 4.4, and 4.5, which were part of the former oily water treatment system. PG&E performed closure activities at the oily water treatment system

between November 1989 and March 1990 that included removal of equipment, removal of impacted soil, and confirmation soil sampling.

DTSC, with concurrence from DOI, has further requested additional investigation at the Former 300B Pipeline Liquids Tank. Closure activities at this former aboveground tank were performed in 1995 and 1996 and included removal of the tank and associated piping, removal of impacted soil, and confirmation soil sampling. San Bernardino County issued a closure certification letter on June 9, 1997.

1.3.3.1 Unit Closures and Soil Removal Actions

Unit closures and soil removal actions have occurred at various investigation units. A short description of these actions is provided in Exhibits 1-1 and 1-2. Details are provided in individual investigation unit summaries provided in Section 4.

Exhibit 1-1. Unit Closures
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Investigation Unit	Date	Description
UA-2: Former 300B Pipeline Liquids Tank Area	1996	Removal and closure for Former 300B Pipeline Liquids Tank Soil excavated to approximately 5.5 feet bgs as part of removal process
SWMU 5: Sludge Drying Bed	1988-199	Demolition, removal, and disposal of an estimated 95 cubic yards of concrete from the walls and floors of the Sludge Drying Beds
SWMU 6: Chromate Reduction Tank	1989-1990	Removal of Chromate Reduction Tank plus 1 foot of soil across footprint of tank
SWMU 8: Process Pump Tank	1988-1990	Removal of Process Pump Tank and approximately 0.25 cubic yards of soil
SWMU 9: Transfer Sump	1989-1990	Removal of the Transfer Sump and approximately 2 cubic feet of stained soil
AOC18: Combined Wastewater Transference Pipelines	Late 1980s	Closure of the hazardous waste management system and related piping Removal of pipes and surrounding stained soil
AOC 19: Former Cooling Liquid Mixing and Hotwell Area	Early 1990s	Removal of the remnants of the old hot well
AOC 26: Former Scrubber Oil Sump	1996	Removal of Former Scrubber Oil Sump Soil removed to 10 feet bgs
Unit 4.3: Oily Water Holding Tank	1988-1989	Removal of Oily Waste Holding Tank
Unit 4.4: Oil/Water Separator	1989-1990	Removal of Oil/Water Separator and 19 cubic yards of stained soil
Unit 4.5: Portable Waste Oil Holding Tank	1989	Removal of Portable Waste Oil Holder Tank

bgs = below ground surface

Exhibit 1-2. Soil Removal Actions
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Investigation Unit	Date	Description
AOC 9: Southeast Fence Line	2000	Excavation of 1.5 cubic yards of stained soil
AOC 14: Railroad Debris Site	Mid-1990s	Removal of debris and white powder
	1999	Removal of asbestos containing material
AOC 5: Cooling Tower A	2000	Removal of approximately 4 ft x 4 ft of stained soil beneath the former chemical shed
AOC 6: Cooling Tower B	2001	Removal of 5 drums worth of stained soil beneath former chemical shed
AOC 15: Auxiliary Jacket Cooling Water Pumps	2020	Removal of approximately 280 tons of soil and concrete when the jacket cooling water system was updated

1.3.3.2 Soil Interim Measures

In June 2009, the DOI issued an Action Memorandum time-critical removal action (TCRA) at the AOC 4 - Debris Ravine at the TCS (DOI, 2009b); this memorandum directed PG&E to initiate activities necessary to implement and perform TCRA activities at AOC 4. The TCRA was conducted in accordance with CERCLA and, as an interim remedial action, was intended to stabilize and mitigate the threat of release of contaminated material. The history of previous investigations and agency direction leading up to the AOC 4 TCRA are described in the approved *Final Work Plan for Time-Critical Removal Action at AOC 4 Debris Ravine, PG&E Topock Compressor Station, Needles, California* (Alisto et al., 2009).

AOC 4 is located in the southern portion of the TCS and is a narrow, steep-sided arroyo that drains into Bat Cave Wash at the southwestern corner of the TCS. AOC 4 is located on PG&E property, except for a small portion of the westernmost end that extends onto HNWR. The operational history at AOC 4 is not well documented; however, over the years, fill material and debris were deposited in the ravine and burning of trash appears to have occurred within AOC 4. Chemicals of potential concern (COPCs), which pose a risk to human receptors, and chemicals of potential ecological concern (COPECs), which pose a risk to ecological receptors, for AOC 4 identified in the RFI/RI Report Volume 1 (CH2M, 2007a) and the *Revised Final Soil RCRA Facility Investigation / Remedial Investigation Work Plan, PG&E Topock Compressor Station, Needles, California* (Soil RFI/RI Work Plan; CH2M, 2013a) include Title 22 metals, CrVI, polycyclic aromatic hydrocarbons (PAHs), asbestos, dioxins and furans, and polychlorinated biphenyls (PCBs).

TCRA activities were performed from December 2009 through December 2010 in compliance with the TCRA Work Plan (Alisto et al., 2009). The effort and results were documented in the *Implementation Report for the Time-Critical Removal Action at AOC4, Pacific Gas & Electric Company, Topock Compressor Station, Needles, CA* (PG&E, 2011) and summarized below. The TCRA removed approximately 11,799 tons of waste from safely accessible areas of AOC 4. A total of 116 confirmation surface soil samples were collected. The confirmation soil sample analytical results for all analytes were below applicable target endpoint concentrations (TEC), except for dioxins equivalent TCDD TEQ. Area-wide average concentrations for TCDD TEQ were calculated as the 95th percent upper confidence limit (UCL) of the mean. The 95th percent UCLs were below the applicable TECs and therefore, the TCRA objective was met by the removal action.. The excavation, screening, and confirmation approach followed the TCRA Work Plan, including the quality criteria established in the data quality objectives (DQOs) and quality assurance program addendum. Based on the confirmation data set and installation of erosion control measures, the substantial threat of release of contaminated material from AOC 4 has been stabilized and mitigated. A rock gabion structure was installed in the ravine outfall to Bat Cave Wash prior to TCRA soil removal activities. The gabion acts as a sediment filter, its purpose is to retain debris and soil that is washed out of the drainage during seasonal rains.

The AOC 4 TCRA interim action was not intended as a substitute for additional investigative or remedial activities required under RCRA or CERCLA and may not be the final remedy for AOC 4. The TCRA is expected to be consistent with and contribute to any subsequent remedial action selected to respond to soils that are the subject of the ongoing RFI/RI.

In April 2000, a small amount of discolored surface soil was discovered on the southeast side of the facility and is thought to have been uncovered by erosion. The discovery was reported to the DTSC and the area was designated AOC 9. The source of the green staining is believed to be spills from an auxiliary jacket cooling water system, and/or runoff from a steam-cleaning area, into a broken stormwater discharge pipe leading to a storm drain at AOC 9. Per a corrective action agreement with the DTSC, approximately 1.5 cubic yards of soil were excavated and shipped offsite for disposal. Additional soil removal was not feasible at the time due to the extremely steep slope at AOC 9. A new stormwater drainage pipe was installed, and the area was backfilled with clean soil to prevent erosion of the slope.

1.3.3.3 Groundwater Interim Measures

Beginning in 2004, DTSC directed PG&E to undertake certain measures, known as Interim Measures, to ensure that CrVI in the groundwater did not reach the Colorado River. IMs Number 1, 2, and 3 (IM-1, IM-2, and IM-3), collectively, involved the construction of treatment facilities and installation of four extraction wells to pump contaminated water out of the aquifer for treatment and disposal. More importantly, these IMs were designed to pull contaminated groundwater away from the Colorado River until a permanent remedy could be selected (DTSC, 2010a).

Initially, groundwater was extracted from a monitoring well cluster located on a bench above and to the west of the river floodplain (commonly referred to as “the MW-20 bench”). This operation was eventually replaced by the existing extraction well system. Groundwater extraction began at wells TW-2S and TW-2D in May 2004, well TW-3D in December 2005, and well PE-1 in January 2006. Prior to the construction and operation of the current groundwater treatment and injection systems, a batch treatment plant was located on the MW-20 bench, and treated groundwater was transported offsite for disposal at a permitted facility.

Currently, PG&E is implementing IM-3 at the Topock site. IM-3 facilities include a groundwater extraction system consisting of four extraction wells (TW-2D, TW-3D, TW-2S, and PE-1), conveyance piping, a groundwater treatment plant, and an injection well field for the discharge of the treated groundwater. Of the four extraction wells, one is currently in operation (TW-3D). PE-1 was disconnected from IM-3 on December 6, 2019, in order to facilitate groundwater remedy construction on the MW-20 Bench. The IM-3 groundwater treatment system is a continuous, multi-step process that involves reduction of CrVI to the less soluble trivalent form (CrIII); precipitation and removal of precipitate solids by clarification and microfiltration; and lowering the naturally occurring total dissolved solids using reverse osmosis. Treated groundwater is returned to the aquifer through an injection system consisting of two injection wells (IW-2 and IW-3). The Interim Measures Performance Monitoring Program (PMP) evaluates the performance of IM-3 to achieve the prescribed performance standard. The results of the PMP are published in quarterly monitoring reports. The performance standard has been achieved for all monitoring periods since the current standard was established in February 2005. IM-3 will be decommissioned after the groundwater remedy has met the criteria set forth in the IM-3 decommissioning work plan (CH2M, 2015a).

1.3.4 Corrective Measures Study/Feasibility Study

A groundwater Corrective Measures Study (CMS)/Feasibility Study (FS) for SWMU 1/AOC 1 and AOC 10 was completed in 2009 (CH2M, 2009b). The CMS/FS identified the remedial action objectives (RAOs) for the groundwater remedial action, identified nine remedial alternatives to address the RAOs, and evaluated each of the alternatives against RCRA Corrective Action and CERCLA-defined criteria. As part of the CMS/FS, the DOI identified the Applicable or Relevant and Appropriate Requirements for the action. Based on the evaluation of the alternatives against the criteria, Alternative E, “In-situ Treatment with Fresh Water Flushing,” was recommended as the alternative that provided the best balance of advantages and tradeoffs for the groundwater remedial action. DTSC and DOI approved the CMS/FS in December 2009.

If needed, a soil CMS/FS will be completed after approval of this RFI/RI Report Volume 3. Similar to the groundwater CMS/FS, the objective of the soil CMS/FS will be to develop and evaluate corrective measure alternatives and recommend the most appropriate alternative to manage contaminated soil and sediment where required. The soil CMS/FS will define media cleanup levels that will be protective of human health and the environment, evaluate potential cleanup technologies, and develop and recommend an alternative that is both protective of human health and the environment and consistent with remedial objectives.

1.3.5 Remedial Design/Groundwater Remedy

In a coordinated effort, DOI and the DTSC selected the groundwater remedy *(In-situ Treatment with Fresh Water Flushing)* to address chromium in groundwater at SWMU 1/AOC 1 and AOC 10. The DOI decision is presented in the Record of Decision (DOI, 2010a); the DTSC decision is presented in a decision package that includes the certification of the Final Environmental Impact Report (EIR), the Final Statement of Basis, the Statement of Decision, and the Resolution of Approval (DTSC, 2011b, 2011c). The *Revised Groundwater Corrective Measure Implementation/Remedial Design Work Plan for SWMU 1/AOC 1 and AOC 10 at PG&E Topock Compressor Station, Needles, California* was subsequently completed in November 2011 (CH2M, 2011a), and approved by DOI (DOI, 2011b).

Phase 1 of the groundwater remedy construction began in October, 2018. Phase 1 groundwater remedy startup is tentatively scheduled for Fall 2021.

1.4 Soil Engineering Evaluation/Cost Analysis (EE/CA)

Concurrent with evaluation of the RFI/RI soil investigation data, the U.S. Fish and Wildlife Service (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 conduct an Engineering Evaluation/Cost Analysis (EE/CA) for a potential non-time-critical removal action (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. Consultation is an ongoing process and will continue. DOI has reviewedand considered stakeholder comments on the draft EE/CA. DOI directed PG&E to prepare a final EE/CA based on comments received.

The EE/CA evaluated and selected technologies and remedial alternatives to address contaminated soil. The EE/CA cited the following National Contingency Plan (NCP) factors as the reasons an NTCRA is being considered:

- Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants
- Actual or potential contamination of drinking water supplies or sensitive ecosystems
- High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate
- Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released

Based on these NCP factors, conclusions of the HHERA, and comparison of soil concentrations to numerical removal action goals, removal action objectives were developed and preliminary potential action areas were identified.

Several removal action alternatives were identified and based on the comparative analysis of the removal action alternatives against the criteria of effectiveness, implementability, and cost, a recommended alternative was proposed.

DOI will be issuing an NCTRA Action Memorandum. If a Non-Time-Critical Removal Action (NTCRA) is determined to be needed, DOI will direct PG&E to prepare a detailed workplan for implementation of DOI's selected alternative.

Conclusions from the final EE/CA and associated potential non-time critical removal action will be incorporated into the overall remedial planning and decisions for soil at the Topock site.

1.5 Objectives of RFI/RI Report

The objective of the three-volume RFI/RI Report document is to present required elements for completion of the RFI and CERCLA RI. The objectives of the RFI, as specified in Attachment 4 of the CACA (DTSC, 1996), are to determine the nature and extent of releases of contamination from regulated units, SWMUs, and other source areas at the compressor station, and to gather all data necessary to support the CMS.

The purpose of the RI, as specified in the National Contingency Plan, Title 40 *Code of Federal Regulations* Part 300, is to collect data necessary to adequately characterize the site for developing and evaluating effective remedial alternatives. Title 40 *Code of Federal Regulations* Section 300.430(d) requires that the RI adequately characterize the nature of and threat posed by the hazardous substances and materials, and assess the extent to which the release poses a threat to human health and the environment.

1.6 Report Organization

This document is Volume 3 of the RFI/RI Report for the TCS and presents the results of the soil investigation and related activities. The report is organized as follows:

- **Section 1, Introduction**, contains regulatory framework, scope, purpose, and background information, as well as objectives, and report organization.
- **Section 2, Summary of Soil Investigation Program**, provides an overview and history of the soil investigation program.
- **Section 3, Data Summary and Data Quality Objective Evaluation**, presents a summary of the overall data evaluation process for Part A, Part B and the Perimeter Area investigation, and describes the storm drain system investigation program.
- **Section 4, Remedial Investigation Summaries for Investigation Areas,** presents an evaluation of the Combined Soil RFI/RI Data Set and soil parameter data against the Part A and Part B DQOs, and investigation summaries for the SWMUs, AOCs, and UAs in the Part A and Part B investigation areas and identifies and summarizes Data Gaps.
- **Section 5, Summary of PG&E's Risk Assessment,** presents a summary of the human health and ecological risk assessments conducted by PG&E.
- **Section 6, Conclusions and Recommendations**, recommends investigation units for consideration in the CMS/FS, if needed, based on the DQO evaluation and the risk management decisions by DTSC and DOI. It includes potential areas for remedial action, media, constituents of concern (COCs), and remedial action objectives. It also provides an updated list of potential remedial technologies listed in the soil CMS/FS Work Plan (CH2M, 2008a), potential treatability studies needed for CMS/FS, and investigation units that will not be carried forward to CMS/FS.
- **Section 7, References**, presents a list of works cited when preparing this document.
- **Appendix A, Historical Aerial Photographs** presents aerial photographs of the Topock Compressor Station and the surrounding area.
- **Appendix B, Field Investigation Summary**, consists of a table of deviations from the Soil RFI/RI Work Plan (CH2M, 2013a), boring and trench logs, a description of the AOC 1 North (mouth of Bat Cave Wash) vegetation removal activities, the AOC 10 (mouth of East Ravine) investigation summary, the results of the stormwater and industrial drain survey, the geophysical survey results, the asbestos survey data, and a summary of soil that has been retained onsite waiting for

development of cleanup levels and soil that was disposed of offsite as investigation-derived waste (IDW).

- **Appendix C, Threat to Groundwater Modeling Results**, presents results of modeling assessing the potential threat to groundwater from constituents detected in soil.
- **Appendix D, Laboratory Reports,** presents laboratory reports and chain of custody forms for all data presented herein.
- **Appendix E, Data Quality Evaluation**, presents the data quality of analytical results collected during implementation of the Soil Data Gaps Work Plan (CH2M, 2013a).
- **Appendix F, Groundwater Remedy Baseline Soil Sampling and Opportunistic Soil Sampling Results**, presents soil data collected to document baseline soil conditions prior to groundwater remedy implementation.
- **Appendix G, Historical Documents,** presents a work order for the installation of water treatment and disposal facilities at the Topock Compressor Station.
- **Appendix H, Responses to Comments on the Initial Draft Volume 3 RFI/RI Report,** presents the table summarizing the responses to comments from DOI, DTSC, and Stakeholders on the initial draft Volume 3 Soil RFI/RI Report.

2. Summary of Soil Investigation Program

The following sections present a history and description of the soil investigation program.

2.1 History of the Soil Investigation Program

The RFI/RI Report Volume 1, identified 19 SWMUs, AOCs, and other UAs at the TCS to be carried forward in the soil RFI/RI:

- SWMU 1 – Former Percolation Bed
- SWMU 5 – Sludge Drying Beds
- SWMU 6 – Chromate Reduction Tank
- SWMU 8 – Process Pump Tank
- SWMU 9 – Transfer Pump
- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 5 – Cooling Tower A
- AOC 6 – Cooling Tower B
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Shed
- AOC 9 – Southeast Fence Line
- AOC 10 – East Ravine
- AOC 11 – Topographic Low Areas
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 14 – Railroad Debris Area
- AOC 15 – Auxiliary Jacket Cooling Water Pumps
- AOC 16 – Former Sandblast Shelter
- AOC 17 – Onsite Septic System
- AOC 18 – Combine Wastewater Transference Pipelines
- AOC 19 – Former Cooling Liquid Mixing and Hotwell Area
- AOC 20 – Industrial Floor Drains
- Units 4.3, 4.4, and 4.5 – Oily Water Holding Tank, Oil/Water Separator, Portable Waste Oil Holding Tank
- UA-1 – Pipeline Disposal Area
- UA-2 – Former 300B Pipeline Liquids Tank

Thirteen units were added after the RFI/RI Report Volume 1. The *Revised Final Addendum to the RFI/RI, Volume 1* (CH2M, 2014a) provides a description and site history of all “new” units:

- SWMU 11 – Former Sulfuric Acid Tanks
- AOC 21 – Round Depression near Sludge Drying Bed
- AOC 22 – Unidentified Three-Sided Structure

- AOC 23 – Former Water Conditioning Building
- AOC 24 – Stained Area and Former API Oil/Water Separator
- AOC 25 –Compressor and Generator Engine Basements
- AOC 26 – Former Scrubber Oil Sump
- AOC 27 – MW-24 Bench
- AOC 28 – Pipeline Drip Legs
- AOC 29 – Interim Measure No. 3 Treatment Plant
- AOC 30 – MW-20 Bench
- AOC 31 – Former Teapot Dome Oil Pit
- AOC 32 – Oil Storage Tanks and Waste Oil Sump
- AOC 33 – Potential Former Burn Area near AOC 17

All investigation areas were categorized into two groups: those outside the compressor station fence line (Part A investigation units) and those inside the compressor station fence line (Part B investigation units). The purpose of this categorization was to group units by their accessibility to potential receptors, which in turn dictates the applicable cleanup goals and screening levels. For units outside the fence line (Part A investigation units), where access is not limited, residential and ecological screening levels apply. For units inside the fence line (Part B investigation units), where access is limited and ecological receptors are not assumed to be present, only commercial screening levels apply. Background values are relevant to all units for assessing nature and extent of contamination.

Two draft work plans were initially prepared to describe collection of additional soil data to complete site characterization activities at the SWMUs, AOCs, and UAs identified in the RFI/RI Report Volume 1. Investigation units outside the TCS fence line were addressed in the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A, PG&E Topock Compressor Station, Needles, California* (Draft Soil Part A Work Plan) (CH2M, 2006). Investigation units within the TCS fence line were addressed in the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part B, PG&E Topock Compressor Station, Needles, California* (Draft Soil Part B Work Plan) (CH2M, 2007b).

Based on a DTSC letter dated January 4, 2011 (DTSC, 2011d), the Parts A and B investigations were combined into a single work plan that also incorporated the 13 units identified subsequent to the Soil RFI/RI Work Plan (CH2M, 2013a). Approval of the Soil RFI/RI Work Plan was granted by DTSC and DOI following consultation with nine Native American Tribes (comments were received from the Fort Mojave and Hualapai Tribes) (DTSC, 2015a; DOI, 2015a). Comments on the Work Plan from agencies and Tribes have been documented in (Hualapai Department of Cultural Resources, 2011; Hargis and Associates, 2011; DOI, 2011a; DTSC, 2011a). Tribal comments include the concept of minimizing the number of samples and disturbances to sensitive resources and requested that minimal sampling be performed and only that which is necessary to characterize the Site for the remedial investigation. Historical information pertinent to the additional units (SWMU 11 and AOCs 22 - 33) was summarized in the *Addendum to RCRA Facility Investigation/Remedial Investigation Report, Volume 1* (CH2M, 2014a). Summaries of the Soil RFI/RI Work Plan investigations and subsequent data gap investigations are provided in the following sections.

2.2 Soil Investigation Environmental Impact Report

As part of the evaluation of the Soil RFI/RI Work Plan, the *PG&E Topock Compressor Station Soil Investigation Project Final Environmental Impact Report* (Soil Investigation EIR; DTSC, 2015b) for the PG&E Topock soil investigation project was prepared by DTSC, in accordance with the California Environmental Quality Act (CEQA). An EIR is a document that evaluates the environmental effects of a proposed project (in this instance, the investigation of soil and sediment at the site), and any feasible

mitigation measures that may reduce or avoid the significant impacts. It also discusses alternatives to the proposed project that could accomplish most of the primary project objectives while substantially reducing or avoiding significant environmental impacts.

A Notice of Preparation of a draft EIR was released to the public on November 28, 2012. The draft Soil Investigation EIR (DTSC, 2015b) was released for public notice on July 7, 2014, for a 60-day public comment period. Public meetings were held in Needles, California, and Golden Shores, Arizona, during the comment period. Comments received on the draft Soil Investigation EIR and new information on the biological receptors at the site prompted an update of the biology section of the draft Soil Investigation EIR. A partially recirculated draft Soil Investigation EIR was released for public notice on April 15, 2015, for a 45-day public comment period. Over 750 individual comments were received by DTSC from the two public comment periods. DTSC certified the final Soil Investigation EIR on August 24, 2015.

The Soil RFI/RI Work Plan was approved under the conditions that PG&E shall follow the Mitigation Monitoring Reporting Program and all the conditions of approval identified in the Statement of Decision and Resolution of Approval (DTSC, 2015a).

2.3 Soil Part A Investigation (Outside the Station Fence Line)

Part A of the soil investigation focused on investigation areas outside of the TCS fence line, as shown on Figure 2-1. The first phase of Part A soil sampling was initiated in August 2008 and performed in accordance with the Draft Soil Part A Work Plan (CH2M, 2006). The results of the 2008 Phase 1 site investigation were presented in the Soil RFI/RI Work Plan (CH2M, 2013a), and a data gaps analysis was conducted to evaluate the need for any subsequent investigation. The sampling needs identified as a result of the data gaps analysis (Phase 2 sampling) were outlined in the Soil RFI/RI Work Plan.

To ensure consistent and systematic evaluation of the Phase 1 data, a series of meetings was held between June 2008 and February 2010 to draft project-specific DQOs for the Soil Part A investigation. The DQO process is a recognized procedure for defining project objectives and decisions, and optimizing sampling and other information-gathering programs to balance uncertainty, site disturbances, and cost in an acceptable manner. The process includes the following steps (U.S. Environmental Protection Agency [EPA], 2000, 2006a-b):

- Step 1 – State the Problem
- Step 2 – Identify the Decision(s)
- Step 3 – Identify the Inputs to the Decision
- Step 4 – Define the Study Boundaries
- Step 5 – Develop a Decision Rule
- Step 6 – Specify Tolerable Limits on Decision Errors
- Step 7 – Optimize the Design

Part A DQO Steps 1 through 5 are presented in the technical memorandum *Data Quality Objectives – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M, 2010). As detailed in that document, the following decision statements were identified:

- **Decision 1 (Nature and Extent).** Determine the nature and extent of residual soil and/or sediment concentrations resulting from historical TCS practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.
- **Decision 2 (Data Sufficiency Evaluation).** Determine representative exposure point concentrations (EPCs) for residual soil and/or sediment contamination resulting from historical TCS practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

- **Decision 3 (Potential Threat to Groundwater).** Determine whether residual soil concentrations resulting from historical TCS practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.
- **Decision 4 (Data Sufficiency Evaluation).** Determine the site-specific soil property and contaminant distribution information necessary to support the CMS/FS decisions and remedial design. If full determination of site-specific soil property and contaminant distribution information based on sample data is not feasible, address uncertainties in the CMS/FS and remedial design.

Part A DQO Steps 6 and 7 were subsequently completed through two meetings with DTSC, DOI, Tribes, other stakeholders, and PG&E in 2010. The two meetings were held at the TCS on October 6 and 7, 2010, and November 2 and 3, 2010. In these meetings, data were reviewed with stakeholders, the AOCs were visited, and preliminary data gaps evaluations were discussed.

A meeting was held on December 7, 2010, between DOI, DTSC, and Tribes to discuss UA-1/UA-1 Alternate, combining the soil investigation into one document, and sampling at the mouth of Bat Cave Wash. On December 13, 2010, DTSC issued direction to PG&E on UA-1 and UA-1 Alternate (DTSC, 2010b). On December 15, 2010, DOI issued direction to PG&E on sampling at the mouth of Bat Cave Wash (DOI, 2010b). On January 13, 2011, a meeting was held to discuss Tribes' comments on the preliminary data gaps evaluation. Additional direction to PG&E on the Part A data gaps evaluation was issued in a joint letter from DTSC and DOI, dated February 25, 2011. Based on the Part A data gaps evaluation, it was determined that no further investigations were needed at the following two areas:

- AOC 12 – Fill Areas
- UA-2 – Former 300B Pipeline Liquids Tank

The data gaps evaluation in the Soil RFI/RI Work Plan was extended to cover all new units, including the units added subsequent to the completion of the RFI/RI Report Volume 1. In 2013, following the Part A data gaps evaluation, 11 investigation areas located outside of the TCS fence line were proposed for further investigation (CH2M, 2013a). The Part A investigation areas were:

- SWMU 1 – Former Percolation Bed
- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 9 – Southeast Fence Line
- AOC 10 – East Ravine
- AOC 11 – Topographic Low Areas (including the two new areas)
- AOC 14 – Railroad Debris Area
- AOC 27 – MW-24 Bench
- AOC 28 – Pipeline Drip Legs
- AOC 31 – Former Teapot Dome Oil Pit (investigated in conjunction with the Perimeter Area sampling program; see Section 2.5.1)
- UA-1 – Potential Pipe Disposal Area

Sampling at AOC 29 – IM-3 Treatment Plant and AOC 30 – MW-20 Bench was not proposed. Investigation of these AOCs was scheduled to be conducted as part of the decommissioning and removal activities for these areas, as proposed in IM-3 Decommissioning, Removal, and Restoration Work Plan (CH2M, 2014b), and as part of the baseline sampling during the Topock groundwater remedy system installation, as proposed in the Groundwater Remedy Implementation – Baseline Sampling and Analysis Plan (CH2M, 2015c). A portion of AOC 30 - MW-20 Bench is being used to support the groundwater remedy, so this AOC will not be fully investigated until groundwater remedy decommissioning sampling is

conducted. Sampling activities described in the Soil RFI/RI Work Plan were initiated in November 2015. XRF screening and evaluation of XRF data was conducted to help refine sampling locatons. Details are presented in Appendix B.

Further investigation and management of UA-1, Potential Pipe Disposal Area was described in letters from DTSC to DOI (DTSC, 2016b), and from FMIT to DOI (FMIT, 2016). Based on the results of a geophysical survey conducted in 2015 and historical accounts from a former PG&E employee, DTSC recommended trenching/potholing at UA-1A. However, DTSC also noted, that because of the proximity of UA-1 to the Topock Maze and other archaeological features, additional investigation requiring ground disturbance was not appropriate at the time (DTSC, 2016b)

CSMs were developed for each Part A investigation unit at the time of the Soil RFI/RI Work Plan. During implementation of the Soil RFI/RI Work Plan, minor updates to the CSMs for AOC 1, AOC 10, and AOC 11 were identified.

2.4 Soil Part B Investigation (Inside the Station Fence Line)

Part B of the soil investigation focused on investigation units inside the TCS fence line, as shown on Figure 2-2. The Soil Part B DQO Steps 1 through 5 are documented in the technical memorandum *Data Quality Objectives – Part B Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Soil Part B DQO Tech Memo) (CH2M, 2011b). Steps 6 and 7 were completed as part of the data gaps evaluation carried out during the implementation of the soil investigation. The following decision statements were developed:

- **Decision 1**. Determine the nature and extent of residual soil concentrations resulting from historical TCS practices. If determination of the nature and extent of soil concentrations based on sample data is not feasible or warranted, address uncertainties in the risk assessment and/or CMS/FS or IMs.
- **Decision 2**. Determine representative EPCs for residual soil contamination resulting from historical TCS practices. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment.
- **Decision 3**. Determine whether residual soil concentrations resulting from historical TCS practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.
- **Decision 4**. Determine whether residual soil concentrations inside the fence line resulting from past TCS practices pose a potentially unacceptable risk to receptors outside the TCS fence line via the surface migration pathway. If a potentially unacceptable risk to receptors outside fence line exists, or if determination of potential risk to receptors outside fence line based on sample data is not feasible, develop controls to eliminate migration pathways or remove contaminated soil.
- **Decision 5**. Determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design and IMs, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, then document impediments and address uncertainties in the risk assessment and/or CMS/FS or IMs.

The Soil RFI/RI Work Plan identified 27 investigation units inside the TCS fence line, as shown on Figure 2-2. The Part B investigation units are:

- SWMU 5 – Sludge Drying Beds
- SWMU 6 – Chromate Reduction Tank
- SWMU 8 – Process Pump Tank
- SWMU 9 – Transfer Sump
- SWMU 11 – Former Sulfuric Acid Tanks

- AOC 5 – Cooling Tower A
- AOC 6 – Cooling Tower B
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Locker
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 15 – Auxiliary Jacket Cooling Water Pumps
- AOC 16 – Sandblast Shelter
- AOC 17 – Onsite Septic System
- AOC 18 – Combined Hazardous Waste Transference Pipelines
- AOC 19 – Former Cooling Liquid Mixing and Former Hotwell Area
- AOC 20 – Industrial Floor Drains
- AOC 21 – Round Depression near Sludge Drying Bed
- AOC 22 – Unidentified Three-sided Structure
- AOC 23 – Former Water Conditioning Building
- AOC 24 – Stained Area and Former API Oil/Water Separator
- AOC 25 –Compressor and Generator Engine Basements
- AOC 26 – Former Scrubber Oil Sump
- AOC 32 – Oil Storage Tanks and Waste Oil Sump (this is an active unit)
- AOC 33 – Potential Former Burn Area near AOC 17 (investigated as part of AOC 17)
- Unit 4.3 – Oily Water Holding Tank
- Unit 4.4 – Oil/Water Separator
- Unit 4.5 – Portable Waste Oil Storage Tank

Sampling activities described in the Soil RFI/RI Work Plan for the investigation units inside the fence line were initiated in November 2015. XRF screening and evaluation of XRF data was conducted to help refine sampling locatons. Details are presented in Appendix B.

CSMs were developed for each Part B investigation area as part of the Soil RFI/RI Work Plan. During implementation of the Soil RFI/RI Work Plan, minor updates to the CSM for AOC 13 were made. The CSMs, including the updates for AOC 13, are included in Appendix A.

2.5 Other Investigation Areas

In addition to the units described above, other investigation areas in this report include the Perimeter Area, the storm drain system, and TCS Well #4 (TCS-4), which is located in AOC 1.

2.5.1 Perimeter Area Investigation

The Perimeter Area is defined as the area immediately outside the TCS to the toe of the slope. The storm drain system consists of active and inactive storm drain inlets and pipes that originate within the TCS and flow to discharge points outside the fence line.

Perimeter sampling locations were identified in areas with visible discoloration or other potential direct impacts, and/or that may experience or have experienced surface water runoff through sheet flow. The majority of the TCS is currently bermed or curbed. Some of the areas that are currently bermed with soil

are known to be, or were likely to have been, unbermed in the past. Perimeter sampling locations were originally selected during a field walk with DTSC and DOI on October 18, 2007. The proposed locations were modified following the site walk with DTSC, DOI, and the Tribes on December 15, 2011. In addition, while berms and curbs are present along most of the TCS fence line, historical sheet flow pathways could have been different than current pathways along the perimeter. DTSC and DOI, therefore, directed PG&E to collect perimeter samples along the entire perimeter, regardless of the location of current or historical berms/curbs (CH2M, 2013a). The proposed Perimeter Area investigation program was included as Appendix C of the Soil RFI/RI Work Plan.

Perimeter sampling was conducted in a phased manner, as directed by DTSC and DOI, and consistent with the phased sampling approach for the investigation within the fence line. To focus sampling at areas with the highest potential for contamination and to minimize the total number of soil samples, x-ray fluorescence (XRF) screening was performed every 50 feet in all areas along the perimeter, except the areas addressed by sampling for certain AOCs, where topography would have precluded migration (along a portion of the southern fence line), and in areas near the main office building because TCS industrial operations have never historically occurred and are not currently occurring in these areas. The Main Office operations have been limited to administrative activities only.

XRF screening and evaluation of XRF data were conducted in November 2015, as described in Appendix B. Conventional soil samples were collected for laboratory analysis at XRF locations where the XRF results exceeded Part A screening levels. If screening levels were not exceeded, a sample was still collected at least every 100 feet along the perimeter, except as outlined above. The locations for soil samples required as a result of XRF screening was determined in conjunction with the agencies. The need for step-out samples further downslope was based on initial perimeter sample results.

The Perimeter Area investigation data were used to evaluate whether human and ecological receptors outside the fence line could be exposed to surface soil impacted by chemicals originating within the fence line of the TCS through the offsite migration pathway. The specific pathways through which receptors outside the fence line could be exposed to constituents that migrated outside the facility fence line are defined in the *Risk Assessment Work Plan, PG&E Topock Compressor Station Needles, California* (Arcadis, 2008a) and the Soil Part A DQO Tech Memo (CH2M, 2010). The decision process for the offsite migration[1] evaluation is described in the Soil Part B DQO Tech Memo (CH2M, 2011b).

The location of the former Teapot Dome oil pit (AOC 31) overlaps with the Perimeter Area investigation. To simplify review of the work plan and planning of the investigation effort, investigation of AOC 31 was conducted as part of the Perimeter Area investigation. However, evaluation of the sampling results and potential risks will be conducted separately for each area.

2.5.2 Storm Drain System Investigation

DTSC directed PG&E to conduct a comprehensive evaluation of the facility storm drain system in its October 5, 2010, comments on the Draft Soil Part B DQO Tech Memo (DTSC, 2010c). Prior investigation associated with the storm drain system had been limited to investigations conducted at AOC 9, AOC 10a, and low areas that received stormwater runoff outside the fence line. A records review for storm drain locations was conducted for the RFI/RI Report Volume 1 (CH2M, 2007a) and during subsequent phases of soil investigation work plan preparation. The proposed storm drain system investigation program was described in Appendix D of the Soil RFI/RI Work Plan.

A goal of the storm drain investigation was to assess and identify alignments of various storm drain lines, and collect soil data along storm drain alignments outside the fence line. Information on storm drain line alignments is required to satisfy Decision 4 of the Part B DQOs (CH2M, 2011b).

In addition, to satisfy Part A and Part B DQO Decision 1, data were needed to characterize potential discharges from storm drains to soil. These data were also required to address assessment of Part A

[1] Throughout this document, offsite migration refers to movement of contaminants from inside the TCS fenceline to outside the TCS fenceline.

human and ecological risk assessment (Decision 2). Finally, both types of information were required to satisfy Part A Decision 4 and Part B DQO Decisions 4 and 5 (that is, to ensure that there is sufficient information to evaluate the potential for offsite migration via the storm drains and proceed with the development of the CMS/FS, remedial design, and/or IMs). The primary transport pathway associated with the storm drain system would be discharge of contaminants into the storm drains, followed by runoff from the storm drains to areas outside the fence line. It is also possible that discharge could have occurred at joints or breaks in the storm drain lines. Drainage pathways are important considerations in the storm drain alignment investigation to allow evaluation of which storm drains discharge to specific outfalls.

The storm drain system investigation consisted of an expanded records search and visual field verification of the information from the records search, to the degree feasible, and the information obtained was then incorporated into the storm drain investigation program in Appendix D of the Soil RFI/RI Work Plan. Additional steps consisted of flow testing video camera tracing, as feasible, and soil sampling, which were conducted in November 2015 and February 2016. The methods are described in Appendix A of the RFI/RI. The results, conclusions, and recommendations are presented in Section 4.3.

2.5.3 TCS Well #4 (Located Within AOC 1)

The RFI/RI Report Volume 1 presents information (in Section 4.1.1.2) regarding a TCS employee who reported that he was personally responsible for welding a cap onto an approximately 12-inch-diameter vertical pipe located in Bat Cave Wash. During file reviews of historical Topock documents, a work order was found with handwritten notes showing 650 feet of steel pipe extending from a “water treatment chamber” at the former sludge drying bed area to an “abandoned water well” in the bottom of the wash. The date of the work order is March 12, 1964, and the date completed is shown as November 1, 1964. The discovery of the work order and the previous report from the plant employee of an abandoned well in Bat Cave Wash prompted additional historical file reviews. The description of the sludge dying beds (SWMU-5) in RFI/RI Report Volume 1 also states that a single-step wastewater treatment pond was constructed in one of the former sludge drying beds in 1964, which is consistent with the date and the scope of work described on this work order. The work order is included as Appendix G.

In addition to the work order, two large format blueprints, dated 1956 and 1957, showing topography around the Topock site were located. These blueprints show a well, referred to as “Well #4”, in the bottom of Bat Cave Wash. Based on this information, a surface geophysical survey was performed on April 2, 3, and 4, 2013, in the suspected area of the old well. The survey identified a linear arrangement of weak anomalies (identified as a “possible pipeline or buried cable alignment”), extending down Bat Cave Wash and terminating at a feature identified as “suspected shallowly buried metal debris.” The location of the northern end of this linear feature is approximately 650 feet from the sludge drying bed, along the estimated route that the pipe was shown to take on the work order. It was inferred that this location corresponds to the location of “Well #4” (now referred to as Well TCS-4).

As part of TCS maintenance activities, a pothole was installed July 30, 2013, to positively locate the well. The capped well was found at approximately 4 feet below ground surface (bgs). A steel pipe leading into the well was also confirmed at approximately 7 feet bgs. This horizontal pipe, which is understood to have been used for the injection of wastewater into TCS-4 (CH2M, 2015c), was approximately 3 inches in diameter, was wrapped or covered with a tarlike material, and entered the side of the well via a welded intersection. Once the well location was confirmed, the pothole was backfilled using the same material removed.

The well was uncovered again on September 11, 2013, to assess the downhole condition of the well and gather information needed to prepare a well decommissioning plan. Two soil samples were opportunistically collected from the excavation around the well and a polyvinyl chloride extension was added to the well casing, so it extended to the surface. The excavation area was backfilled to grade with originally excavated material, and a downhole video log was performed. This initial video log encountered an obstruction in the well at approximately 59 feet bgs. During the week of March 24, 2014, a rotosonic drill rig was used to clear the obstruction, which was determined to be unconsolidated fill material. The well casing was cleared of the fill material to a depth of approximately 158 feet bgs, where a hard bottom

was encountered. On April 1, 2014, a second downhole video log was performed. During the second video log, it was determined that the well had filled back in with unconsolidated material to a depth of approximate 127 feet bgs.

The well was decommissioned between February 24, 2016, and March 9, 2016, in accordance with the *Decommissioning Plan for Topock Compressor Station Well Number 4 (TCS-4)* (CH2M, 2015b). Soil sample results are discussed in Section 4.1.1.

2.6 Additional Data Gap Investigations

As laid out in the Soil RFI/RI Work Plan (CH2M, 2013a), data collected during the field implementation of the Soil RFI/RI Work Plan were reviewed to assess potential data gaps in meeting the project DQOs. As data gaps were identified, PG&E conducted additional field investigation to address the data gaps. These additional soil sampling activities were presented in a series of three data gap work plans (CH2M, 2016a, 2016b, 2016c). The workplans were provided by BLM to the Tribes for the purpose of consultation in accordance with the Programmatic Agreement. The work plans were also provided to the stakeholders for review and comment prior to implementation. Consistent with previous comments, Tribal comments include the concept of minimizing the number of samples and disturbances to sensitive resources and requested that minimal sampling be performed and only that which is necessary to characterize the Site for the remedial investigation.The sampling activities proposed in these data gap work plans are summarized below. Details regarding field investigation activities are presented in Appendix B.

2.6.1 Data Gap Work Plan 1

The first data gap work plan, *Topock Soil RFI/RI—Plan to Address Data Gaps Identified during Work Plan Implementation (DGWP-01)* (CH2M, 2016a), provided information for an additional 22 soil sampling locations and activities to be conducted at five investigation areas to address data gaps. These investigation areas are:

- AOC 10 – East Ravine (5 additional locations)
- AOC 14 – Railroad Debris Site (2 additional locations)
- AOC 19 – Former Cooling Liquid Mixing and Hotwell Area (1 additional location)
- AOC 27 – MW-24 Bench (7 additional locations)
- Storm Drain Assessment (7 additional locations)

AOC 19 is located inside the TCS fence line. The others are located outside of the fenced area.

The data gaps addressed in DGWP-01 were identified following review of data collected during initial field surveys, including XRF analysis of surface soil samples, geophysical/underground utility surveys, and recent field observations. Additional soil sampling locations were identified in known investigation units. DGWP-01 also presented clarification on the approach to field work at originally planned sample locations at AOC 14, AOC 27, and as part of the storm drain assessment. Data were collected to resolve data gaps related to: Part A and Part B DQO Decision Statements #1—Determine the nature and extent of residual soil concentrations; Part A and Part B DQO Decision Statements #2—Determine representative EPCs for residual soil and/or sediment contamination; and Part A DQO Decision Statement #4—Determine site-specific soil property and contaminant distribution. Supplemental storm drain data were collected to assess soil that may have been affected by newly discovered or confirmed outfalls or breaks in storm drains.

Conditional approval of the DGWP-01, including consideration of comments received from the Fort Mojave Indian Tribe, the Hualapai Indian Tribe, and the Cocopah Indian Tribe, was provided by the agencies on February 2, 2016 (DOI and DTSC, 2016a).

2.6.2 Data Gap Work Plan 2

The second data gap work plan, *Topock Soil RFI/RI—Plan to Address Data Gaps Identified during Work Plan Implementation (DGWP-02)* (CH2M, 2016b), provided information for an additional five soil sampling locations and activities to be conducted at the two investigation areas. The investigation areas are outside the fence line, and are:

- AOC 1 – Bat Cave Wash (4 additional locations)
- AOC 10 – East Ravine (1 additional location)

The data gaps addressed in DGWP-02 were identified following review at the time of DGWP-02 preparation and data collected in Bat Cave Wash subsequent to finalizing the Soil RFI/RI Work Plan. Data were collected to resolve data gaps related to Part A DQO Decision Statement #1—Determine nature and extent of residual soil and/or sediment concentrations resulting from historical TCS practices.

Conditional approval was provided by the agencies with responses to questions from the Fort Mojave Indian Tribe and Cocopah Indian Tribe, as well as additional directions to PG&E, including a request for more specific descriptions of proposed sampling locations (DOI and DTSC, 2016b).

2.6.3 Data Gap Work Plan 3 and Data Gap Prioritization

Once sample collection associated with the Soil RFI/RI Work Plan and DGWP-1 and -2 was completed, the entirety of the validated laboratory analytical results were evaluated in accordance with the DQOs defined in the Soil RFI/RI Work Plan for each investigation unit, to determine if data gaps remained. Approximately 297 remaining data gaps were identified that required collection of additional data at both existing and new locations, both inside and outside the TCS. In response to tribal input regarding the sensitivity of the project area, PG&E and the agencies conducted a detailed prioritization of the remaining data gaps with the goal of reducing additional sampling. As a result of this prioritization, 87 of the 297 data gaps were classified as a lower priority, when factors such as existing data density and level of exceedance were considered. In addition, it was determined that existing archived soil samples, could be analyzed to address data gaps at 141 locations without the collection of additional samples. Of the remaining 69 data gaps, it was determined that 23 would be addressed by collecting deeper samples at existing sample locations, and 46 would be addressed by collecting samples at new contingency locations. The following graphic summarizes this information:

The third data gap work plan, *Topock Soil RFI/RI—Plan to Address Data Gaps Identified during Work Plan Implementation (DGWP-03)* (CH2M, 2016c) provided information for analysis of archived samples, collection and analysis of additional samples from existing and new locations, and collection and analysis of two debris samples from the ground surface. Sampling activities were conducted at the following investigation units:

- AOC 1 – Area Around Former Percolation Bed (7 new locations)
- AOC 4 – Debris Ravine (4 existing locations, 12 new locations, and 1 debris sample)
- AOC 5 – Cooling Tower A (3 existing locations)
- AOC 6 – Cooling Tower B (2 existing locations)
- AOC 9 – Southeast Fence Line (2 new locations)
- AOC 10 – East Ravine (4 new locations)
- AOC 13 – Unpaved Areas within Compressor Station (2 new locations)
- AOC 14 – Railroad Debris Site (2 new locations)
- AOC 15 – Auxiliary Jacket Cooling Water Pump (1 existing location)
- AOC 16 – Sandblast Shelter (1 new location and 1 debris sample)
- AOC 19 – Former Cooling Liquid Mixing and Former Hotwell Area (2 existing and 4 new locations)
- AOC 21 – Round Depression near Sludge Drying Beds (1 existing location)
- AOC 22 – Unidentified Three-sided Structure (1 existing location and 1 new location)
- AOC 23 – Former Water Conditioning Building (1 new location)
- AOC 27 – MW-24 Bench (1 new location)
- Perimeter Area (7 existing locations)
- SWMU 1 – Former Percolation Bed (4 new locations)
- SWMU 5 – Sludge Drying Beds (1 existing location)
- SWMU 6 – Chromate Reduction Tank (1 existing location)
- Storm Drains (5 new locations)

DTSC provided approval and DOI provided conditional approval of DGWP-03 in November 2016, in letters that included responses to questions from the Fort Mojave Indian Tribe, the Cocopah Indian Tribe, and the Hualapai Indian Tribe (DTSC, 2016a; DOI, 2016). As part of their conditional approval, DOI directed PG&E to establish ambient/background values for dioxins and furans on federal land to assist with future risk assessment/risk management decision making. The lack of a dioxin and furan ambient/background study was noted in comments on DGWP-3 from the Fort Mojave Tribe. A separate work plan for sampling and analysis activities related to this data gap, *Revised Work Plan for Ambient/Background Study of Dioxins and Furans at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M, 2017a) and was implemented in March 2017. Activities described in DGWP-03 plan included analysis of archived samples (approximately 235 archived samples from 141 locations), collection and analysis of samples from new locations of interest in determining ambient soil concentrations of dioxins and furans, calculation of toxicity equivalent (TEQ) values, statistical analysis to determine distribution and outliers, and calculation of ambient threshold values for each TEQ value.

2.7 Soil Management

Displaced soil from the soil RFI/RI investigation was managed in accordance with the Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, CA of the Soil RCRA Facility Investigation/ Remedial Investigation Work Plan.

Typically, soil was returned to its original borehole for hand tool borings, trenches, and potholes. During other activities that generated soil waste, such as drilling and vacuum truck work, soil was collected in a bin or vacuum tank and transferred to a soil staging area located at the TransWestern Bench and put into roll-off bins. The soil was characterized to assess whether it was hazardous or non-hazardous waste. Investigation derived waste analytical results are presented in Table B-4b in Attachment B4.

Waste soil was generated from various sources and AOCs, as shown in Table B-1 of Appendix B. An estimated 58 cubic yards (39 tons) of non-hazardous soil waste, 8 cubic yards of non-Resource Conservation and Recovery Act hazardous soil waste, and 11 cubic yards of Resource Conservation and Recovery Act hazardous soil waste was generated and stored in roll-off bins onsite (Table B-2). Four-point composite samples were collected and analyzed from each soil bin, and results compared to the interim screening levels (ISLs) in the Soil Management Protocol and hazardous waste levels. Hazardous waste was shipped to US Ecology's approved disposal/receiving faculty in Beatty, Nevada, on April 21, 2016 within 90 days of the accumulation start and shipping. 39 tons of non-hazardous soil that exceeded the groundwater remedy soil management plan interim screening levels were shipped to US Ecology's approved disposal/receiving faculty in Beatty, Nevada,on August 4 and August 11, 2020.Waste manifests are presented as Attachment B5. Approximately 200 gallons of water generated during decontamination of sample tools, excavating tools, and drilling/vacuum equipment were stored on the decontamination pad at the TransWestern Bench staging area and transferred to the Topock Interim Measure Number 3 Treatment Plant. Unregulated solid waste (general construction debris) was disposed of in the onsite PG&E dumpsters.

Displaced soil generated during implementation of the the investigation was placed in a total of 5 roll-off bins and stored onsite. Four-point composite samples were collected and analyzed from each bin, and results compared to the interim screening levels (ISLs) in the Soil Management Protocol. Soil in all 5 bins exceeded the ISLs and therefore, was unable to be reused on site. 39.6 tons of investigation derived IDW soil was transported for disposal to US Ecology in Beatty, NV.

3. Data Summary and Data Quality Objective Evaluation

This volume of the RFI/RI Report considers analytical data for soil and sediment samples collected at the Topock Compressor Station. Samples from soil that has been removed as part of a removal action are not included. In addition, data for a small number of samples of other matrices (asphalt, concrete, debris, tar, white powder, and wood) are included. Laboratory reports for data presented herein are included in Appendix D. Data collected during implementation of the Soil RFI/RI Work Plan (CH2M, 2013a) and subsequent data gap work plans (CH2M, 2016a-c) were validated as described in Appendix E. Validated data were combined with the following existing, validated data sets:

- **Part A, Phase 1 soil investigation data (2008)**. These data were collected in 2008 during implementation of the Draft Soil Part A Work Plan (CH2M, 2006). These data were validated as presented in the *Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California* (CH2M, 2012), and in Appendix E of this report.
- **Historical data collected prior to 2008**. Historical data collected prior to the soil RFI/RI were evaluated in the *Final Soil and Sediment Data Usability Technical Memorandum, PG&E Topock Compressor Station, Needles, California* (CH2M, 2008b).

The resulting combined data set is referred to in this report as the Combined Soil RFI/RI Data Set. The Combined Soil RFI/RI Data Set spans a wide range of dates, analytical parameters, and data quality. During data validation, the data were classified using three data categories based on data quality. Category 1 are suitable for all uses, including risk assessment and remedial action decisions. Data quality Category 2 data are suitable for use in characterization of the COPCs at the facility and to help define the nature and extent of contamination; however, the quantitative results should not be used for future critical decision-making purposes. Data quality Category 3 data are suitable only for use in qualitative characterization of the nature and extent of contamination.

3.1 Part A, Part B, and Perimeter Area Investigations

Data collected during the Part A, Part B, and Perimeter Area Investigations were tabulated and evaluated against the Part A and Part B DQOs on a unit-by-unit basis. Perimeter Area samples were assigned to Part A or Part B investigation units and evaluated with these units. Perimeter Area samples assigned to Part A investigation units were screened against residential and ecological screening levels, which are more conservative than commercial screening levels. Perimeter Area data outside of the TCS fence line were also addressed as a discrete set of data as part of Part B DQO Decision 4 – Offsite migration assessment[3]. It is important to note that comparison against screening levels in this RFI/RI is for purposes of DQOs evaluation (i.e., nature and extent characterization, data sufficiency evaluation, evaluation of potential threat to groundwater, and offsite migration assessment) and not for the purposes of risk assessment. The approach to the offsite migration assessment applied in this RFI/RI is consistent with the approach to evaluate offsite migration that was specified in Appendix C of the RFI/RI Work Plan and summarized in Section 3.3 of the 2015 Risk Assessment Work Plan Addendum 2. A summary of the Soil HHERA is presented in Section 5 of this report.

3.1.1 Data Summary

The Combined Soil RFI/RI Data Set is presented in a series of “Sample Results” and “Constituent Concentrations in Soil Compared to Screening Values” tables designated Tables 3-1 through 3-35. The Sample Results tables are organized by unit and by the following analytical groups (as appropriate):

- Metals
- Contract Laboratory Program (CLP) inorganics
- PAHs
- Semivolatile organic compounds (SVOCs) and volatile organic compounds (VOCs)
- Total petroleum hydrocarbons (TPH)
- General chemistry parameters

[3] Throughout this document, offsite migration refers to movement of contaminants from inside the TCS fenceline to outside the TCS fenceline.

- Pesticides
- PCBs
- Dioxins and furans
- Asbestos

Sample locations for data presented in these tables are shown on Figure 3-1.

Data for the Part A investigation units (including Perimeter Area samples) were screened against the following residential and ecological screening levels and background values:

- EPA residential regional screening levels (RRSLs) (EPA, 2017)
- Residential DTSC screening levels (DTSC-SLs) (DTSC, 2017, 2018)
- Ecological comparison values (ECVs) (Arcadis, 2008b, 2009a)
- Threshold effect concentrations (TECs) that were obtained from MacDonald et al. (2000) for comparison with sediment results, in accordance with the approved Risk Assessment Work Plan (Arcadis, 2008a).
- Background values (CH2M, 2009c, 2017b)
- California Regional Water Quality Control Board (RWQCB) environmental screening levels (ESLs) (RWQCB, 2016) (TPH only)

In addition, an interim screening level (ISL) was selected for each analyte for Part A investigation units. For metals and CLP inorganics, which have robust background datasets, the background value was selected as the ISL. If a background value was not available then the lower of the ECV, residential DTSC-SL, or EPA RRSL (as available) was selected as the ISL. For TPH, the RWQCB ESL was selected as the ISL. For all other analytes, the lower of the ECV, residential DTSC-SL, or EPA RRSL (as available) was selected as the ISL, unless the background value is higher.

Data for the Part B investigation units were screened against the following commercial screening levels and background values (established for metals and CLP inorganics, only):

- Commercial screening level (lower of commercial DTSC-SL [DTSC, 2018] or EPA Commercial RSL [EPA, 2017])
- RWQCB ESL (RWQCB, 2016) (TPH only)
- Background (CH2M, 2009c, 2017)

Where applicable, data are discussed in Section 4 in terms of their factor of exceedance (FOE), calculated by dividing a sample concentration by the applicable screening level.

AOC 4 – Debris Ravine is unique in that some samples fall outside the fence line and some fall inside the fence line. For this unit, two sets of Sample Results tables are presented—one set screens outside the fence line results against the Part A Investigation screening levels (Tables 3-3a through 3-3f) and one set screens inside the fence line results against the Part B Investigation screening levels (Tables 3-4a through 3-4j).

In addition to the Sample Results tables, a “Constituent Concentrations in Soil Compared to Screening Values” table is presented for each unit with analytical data. These tables provide a statistical summary of the number of locations sampled, frequency of detection, maximum detected value, and the number of screening level exceedances for each analyte evaluated. Only soil and sediment samples are considered in the stastical summary tables. Samples from other matrices such as wood, debris, tar, and white powder are included in the Sample Results tables but are not part of the comparison analyses because they are not necessarily representative of underlying soil conditions. Soil sample counts presented in the statistical summary tables do not include duplicate (quality control) soil samples. At locations where duplicate samples were collected, the higher of the two values were included in the statistical summary tables. The number of exceedances is the number of detections that are equal to or exceed the respective

screening/comparison values. For background/ambient values, exceedances are the number of detections exceeding the background/ambient value (that is, if a detected concentration is equal to the background/ambient value, it is considered to be within background or ambient concentrations).

Data are presented on Figures 3-2 through 3-17. For the Part A investigation units, a figure is included if an analyte was detected at concentrations exceeding the ISL four or more times in a unit. For the Part B investigation units, a figure is included if an analyte was detected above the commercial screening level, RWQBC ESL, or background four or more times in a unit.

Soil parameter data collected to support future CMS/FS decisions and remedial action design, including Atterberg limits and particle size distribution, are presented in Table 3-36 for Part A Investigation units and Table 3-37 for Part B Investigation units.

3.2 Storm Drain System Investigation

The two primary goals of the storm drain investigation were (a) to gather information on the storm drain and industrial floor drain line alignments, and (b) to gather samples to evaluate potential discharges from storm drains to soil. The investigation was conducted in phases over 2016 and 2017 and consisted of the following steps:

1. Visual field verification of the previous record search
2. Flow testing
3. Video camera tracing
4. Storm drain soil investigation

The steps were performed in sequence, and in some cases over multiple iterations, so that each step benefited from the information collected during the previous step. Each of the tasks is described in Appendix B. During flow testing, samples of the water discharged from the storm drains were captured and retained for analysis. Analytical results for these flush water samples are presented in Table 3-39. Investigated storm drain and industrial floor drain alignments are shown on Figures 3-19 and 3-20, respectively.

Where available, sediment in catch basins associated with the storm drains was sampled for analysis (most of the catch basins contained very little sediment). Analytical results for the catch basin sediment samples are presented in Table 3-40 and screened against appropriate ISLs. Sediment from the catch basins was removed during the investigation and is no longer present on site. To support the evaluation of potential impacts to soil from storm drains, soil samples were collected at the outfalls of known storm drains. Analytical results for these soil samples are included in the Combined Soil RFI/RI Data Set and have been assigned to relevant Part A and Part B investigation units. Analytical results are presented with data for the relevant units in Tables 3-1 through 3-35.

The results of the storm drain and floor drain investigations, including soil samples collected and identification/fulfillment of data gaps, are summarized in Table 3-41 and Table 3-42, respectively.

3.3 Hazardous Waste Assessment

All samples in the combined soil RFI/RI Data Set were compared to State of California total threshold limit concentration (TTLC) hazardous waste concentrations. If concentration in solid waste (e.g., soil) is greater than the TTLC, then it is classified as hazardous in the State of California. All soil, debris, and catch basin sediment samples collected during the Part A, Part B, Storm Drain and and Perimeter Area Investigations were screened against the TTLCs in order to identify areas where in-situ soil, sediment and/or debris may exceed hazardous waste limits and require special handling if removed. Samples with concentrations exceeding the TTLCs are presented in Table 3-43 and on Figure 3-21.

There were TTLC exceedances of total chromium, CrVI, copper, mercury, and lead. TTLC exceedances are discussed in more detail in the investigation units corresponding to the samples.

4. Remedial Investigation Summaries for Investigation Areas

This section presents an evaluation of the Combined Soil RFI/RI Data Set and soil parameter data against the Part A and Part B DQOs (introduced in Sections 2.3 and 2.4). The purpose of this evaluation is to evaluate data completeness and identify any remaining data gaps to be addressed in the CMS/FS and/or Interim Measure(s). The evaluation considers either Category 1 data only or Category 1 and Category 2 data, depending on the DQO (data categories are defined in Section 3.0).

Sections 4.1 and 4.2 present the investigation summaries for the SWMUs, AOCs, and UAs in the Part A and Part B investigation areas, respectively. Unit setting, history, field observations, comparison of analytical data to relevant screening levels, discussions of the nature and extent of contamination, contaminant sources, fate and transport of contamination, evaluation of results against the DQOs, and updated conceptual site models are included in these sections. The results of the storm drain investigation are provided in Section 4.3. The results of the Perimeter Area Investigation are provided in Section 4.4. The data gaps identified during this evaluation are summarized in Section 4.5.

For the Part A units, the following DQO decisions and data have been considered:

- **Decision 1 – Nature and extent determination**. Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set (presented in Tables 3-1 through 3-35) were evaluated to determine the completeness of the data for determining nature and extent of residual soil and/or sediment concentrations resulting from historical TCS practices.
- **Decision 2 – Data sufficiency for EPC calculation**. Category 1 data from the Combined Soil RFI/RI Data Set (presented in Tables 3-1 through 3-35) were evaluated to determine sufficiency of the data to support the EPC calculation.
- **Decision 3 – Threat to groundwater determination**. Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set (presented in Tables 3-1 through 3-35) were used to determine whether residual soil concentrations resulting from historical TCS practices may threaten groundwater as described in Appendix C.
- **Decision 4 – Data sufficiency to support CMS/FS and/or IMs**. Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set (presented in Tables 3-1 through 3-35), which describe contaminant distribution, were evaluated for data sufficiency to support the CMS/FS and/or IMs if required. In addition, soil property data (presented in Tables 3-36 and 3-37) were evaluated for data sufficiency to support the CMS/FS and/or IMs.

For the Part B units, the following DQO decisions and data have been considered:

- **Decision 1 – Nature and extent determination**. Category 1 and Category 2 data were evaluated as described for Part A DQO Decision 1.
- **Decision 2 – Data sufficiency for EPC calculation**. Category 1 data were evaluated as described for Part A DQO Decision 2.
- **Decision 3 – Threat to groundwater determination**. Category 1 and Category 2 data were evaluated as described for Part A DQO Decision 3.
- **Decision 4 – Offsite migration assessment**. Category 1 data for surface soil (collected between 0 and 1 foot bgs) from the Combined Soil RFI/RI Data Set were evaluated to determine whether concentrations inside the TCS fence line may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway. The subset of data considered in this evaluation are presented in Tables 3-38a though 3-38i and summarized in Table 3-38j and Figure 3-18.
- **Decision 5 – Data sufficiency to support CMS/FS and/or IMs**. Category 1 and Category 2 data were evaluated as described for Part A DQO Decision 4.

A summary of the data evaluation compared against the DQOs for Part A and Part B is presented in Exhibits 4-1 and 4-2, respectively. The results of the evaluation indicate that DQOs have been satisfied for most investigation areas but also identified some areas where determination of the full nature and extent of contamination is not feasible or warranted. Uncertainties regarding the nature and extent of impacts can be addressed during the CMS/FS, IMs, and/or during remedial design or remediation, if necessary to inform specific discussions.

Exhibit 4-1. Summary of Evaluation Against Data Quality Objectives – Part A Investigation
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Investigation Unit	Decision 1 (Nature and Extent Determination)[1]		Decision 2 (Data Sufficiency for EPC Calculation)[2]		Decision 3 (Threat to Groundwater Determination)[3]		Decision 4 (Data Sufficiency to Support CMS/FS and/or IMs)[4]		Summary of Evaluation[5]
	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	
SWMU 1: Former Percolation Bed	Yes	No	Yes	No	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 1: Area Around Former Percolation Bed	Yes	Yes	Yes	No	Yes	No	Yes	No	Data gap identified, additional sampling difficult due to site limitations; data gap may be filled during remedial design if remediation necessary
AOC 4: Debris Ravine	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
AOC 9: Southeast Fence Line	No	Yes	Yes	No	Yes	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 10: East Ravine	No	Yes	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
AOC 11: Topographic Low Areas	No	Yes	Yes	No	Yes	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 12: Fill Areas	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
AOC 14: Railroad Debris Site	Yes	No	Yes	No	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 27: MW-24 Bench	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
AOC 28: Pipeline Drip Legs	Yes	No	Yes	No	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 29: IM-3 Treatment Plant	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	DQOs deferred until area is available for sampling
AOC 30: MW-20 Bench	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	Deferred	DQOs deferred until area is available for sampling
AOC 31: Former Teapot Dome Oil Pit	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary
UA-1: Pipeline Disposal Area	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UA-2: Former 300B Pipeline Drip Tank	Yes	No	Yes	No	Yes	No	No	Yes	Data gap identified, may be filled during remedial design if remediation necessary

Notes:

CMS/FS = Corrective Measures Study/Feasibility Study

DQO = data quality objective

EPC = exposure point concentration

IM = interim Measure

N/A = Not applicable; data not collected

Deferred = Analysis deferred until after the groundwater remedy decommissioning sampling is completed (for AOC 30) and after confirmation sampling to be conducted as part of the IM-3 decommissioning and removal is completed (for AOC 29).

This exhibit summarizes the results of the Combined Soil RFI/RI Data Set and soil parameter data evaluated against the Soil Part A Data Quality Objectives. The technical memorandum *Data Quality Objectives – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M, 2010) describes the following decision statements that were identified for this evaluation, as reflected in the columns of this table:

Conditions that would require recalculation of the EPC could include detection of new compounds not evaluated or COPC concentrations that are significantly higher than currently detected concentrations.

[1] **Decision 1 (Nature and Extent Determination):** Determine the nature and extent of residual soil and/or sediment concentrations resulting from historical compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.

[2] **Decision 2 (Data Sufficiency for EPC Calculation):** Determine representative EPCs for residual soil and/or sediment contamination resulting from historical compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

[3] **Decision 3 (Threat to Groundwater Determination):** Determine whether residual soil concentrations resulting from historical compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.

[4] **Decision 4 (Data Sufficiency to Support CMS/FS and/or IMs):** Determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design, and IMs, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, then document impediments and address uncertainties in the risk assessment and/or CMS/FS or IMs.

[5] Details provided in individual investigation unit writeups in Section 4.1 and in Section 4.5, Exhibit 4-37.

Exhibit 4-2. Summary of Evaluation Against Data Quality Objectives – Part B Investigation
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Investigation Units	Decision 1 (Nature and Extent Determination)[1]		Decision 2 (Data Sufficiency for EPC Calculation)[2]		Decision 3 (Threat to Groundwater Determination)[3]		Decision 4 (Offsite Migration Assessment)[4]			Decision 5 (Data Sufficiency to Support CMS/FS and/or IMs) [5]		Summary of Evaluation[6]
	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Data Gaps?	DQO Satisfied?	Potential Risk to Off-site Receptors?[7]	Data Gaps?	DQO Satisfied?	Data Gaps?	
SWMU 5: Sludge Drying Beds	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
SWMU 6: Chromate Reduction Tank	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
SWMU 8: Process Pump Tank	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
SWMU 9: Transfer Pump	Yes	No	Yes	No	Yes	No	N/A	N/A	N/A	Yes	No	DQO 4 not assessed; no surface soil samples collected
SWMU 11: Former Sulfuric Acid Tanks	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 5: Cooling Tower A	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 6: Cooling Tower B	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 7: Haz. Materials Storage Area	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 8: Paint Shed	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 13: Unpaved Areas within the TCS	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 15: Aux. Jacket Cooling Water Pumps	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 16: Former Sandblast Shelter	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 17: Onsite Septic System	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 18: Combine Wastewater Transference Pipelines	No	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 19: Former Cooling Liquid Mixing and Hotwell Area	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 20: Industrial Floor Drains	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 21: Round Depression near Sludge Drying Bed	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 22: Unidentified Three-Sided Structure	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 23: Former Water Conditioning Bldg.	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	Data gap identified, may be filled during remedial design if remediation necessary
AOC 24: Stained Area and Former API Oil/Water Separator	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 25: Compressor and Generator Engine Basements	Deferred	Deferred	Yes	No	Deferred	Deferred	Yes	No	No	Yes	No	DQOs 1 and 3 deferred until area is available for sampling
AOC 26: Former Scrubber Oil Sump	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
AOC 32: Oil Storage Tanks and Waste Oil Sump	Deferred	Deferred	Yes	No	Deferred	Deferred	Yes	No	No	Yes	No	DQOs 1 and 3 deferred until area is available for sampling
AOC 33: Potential Former Burn Area near AOC 17 (See AOC 17)	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
Unit 4.3 - Unit 4.5	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No data gaps identified; all DQOs satisfied
Portions of AOC 4 Inside the Fence Line (See Section 4.1.2)	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No data gaps identified; all DQOs satisfied

Notes:

CMS/FS = Corrective Measures Study/Feasibility Study

DQO = data quality objective

EPC = exposure point concentration

IM = interim Measure

N/A = Not applicable; data not collected

Deferred = Analysis deferred because of substantial access constraints, active use of buildings, and physical dangers. Soil data will be collected when the area become available.

This exhibit summarizes the results of the Combined Soil RFI/RI Data Set and soil parameter data evaluated against the Soil Part B Data Quality Objectives (DQOs). The technical memorandum *Data Quality Objectives – Part B Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M, 2011b) describes the following decision statements that were identified for this evaluation, as reflected in the columns of this table:

Conditions that would require recalculation of the EPC could include detection of new compounds not evaluated or COPC concentrations that are significantly higher than currently detected concentrations.

[1] **Decision 1 (Nature and Extent Determination):** Determine the nature and extent of residual soil and/or sediment concentrations resulting from historical compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.

[2] **Decision 2 (Data Sufficiency for EPC Calculation):** Determine representative EPCs for residual soil and/or sediment contamination resulting from historical compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

[3] **Decision 3 (Threat to Groundwater Determination):** Determine whether residual soil concentrations resulting from historical compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.

[4] **Decision 4 (Offsite Migration Assessment):** Determine whether residual soil concentrations inside the fence line resulting from past compressor station practices pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway. If a potentially unacceptable risk to receptors outside fence line exists, or if determination of potential risk to receptors outside fence line based on sample data is not feasible, develop controls to eliminate migration pathways or remove contaminated soil.

[5] **Decision 5 (Data Sufficiency to Support CMS/FS and/or IMs):** Determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design, and IMs, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, then document impediments and address uncertainties in the risk assessment and/or CMS/FS or IMs.

[6] Details provided in individual investigation writeups in Section 4.2 and in Section 4.5, Exhibit 4-37.

[7] **Potential Risk to Offsite Receptors:** Yes = Concentrations in this unit may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway.

4.1 Part A Investigation

4.1.1 SWMU 1/AOC 1 – Former Percolation Bed and Area Surrounding SWMU 1

4.1.1.1 Setting

SWMU 1, the Former Percolation Bed, is located outside the facility fence line west of the compressor station in the bed of Bat Cave Wash, a north-south oriented dry wash adjacent to the TCS. AOC 1 consists of the area that surrounds SWMU 1 and extending to the north toward the Colorado River. The SWMU 1 and AOC 1 investigation areas are addressed as a single investigation area and are depicted on Figures 2-1 and 4-1a through 4-1i. AOC 1 is divided into northern and southern regions (AOC 1 north and AOC 1 south) by railroad tracks immediately north of I-40. AOC 1 also includes TCS Well # 4 (TCS-4) (Figure 4-1a). TCS-4 was a temporary water supply well that was later converted into a waste injection well located within AOC 1 south, west of the TCS and north of SWMU 1 (Figures 4-1b and 4-1c).

About half of SWMU 1 is located on PG&E property; the remainder of SWMU 1 is located on property owned by the Havasu National Wildlife Refuge (HNWR) and managed by USFWS. AOC 1 is located partially on PG&E property, partially on the HNWR, partially on BOR property (managed by BLM), partially on BNSF Railway land, and partially on Fort Mojave Indian Tribe property with PG&E as the easement holder.

An ephemeral stream flows within Bat Cave Wash following intense rainfall events and drains north to the Colorado River approximately 1 mile downstream from the TCS. Bat Cave Wash is bounded by steep sidewalls, with the TCS at an elevation of approximately 630 feet and the SWMU 1/AOC 1 area 90 feet lower at an elevation of approximately 540 feet at the drainage floor. The study area is comprised of Quaternary alluvial sediments consisting of unconsolidated sandy gravel and silty/clayey gravel, which overlay Tertiary alluvial deposits consisting of moderately-consolidated sandy gravel and silty/clayey gravel.

The obstruction of stream flow by National Trails Highway just before the wash enters the Colorado River has resulted in widening of the channel near the end of Bat Cave Wash. The obstruction of stream flow greatly reduces the energy of flow during runoff events, resulting in deposition of entrained soil within the highly vegetated area in AOC 1 north. The blockage at National Trails Highway pre-dates the compressor station. The BNSF railroad bridge that crosses the wash and associated culvert also pre-dates the compressor station. I-40 was built in the 1960s, resulting in construction of the I-40 bridge and culverts across the wash.

Surface elevations within the Bat Cave Wash are expected to continue to rise due to the blockage of the mouth of the wash by the Natural Trails Highway. Based on the elevation differential between the top of TCS-4 and ground surface, it appears a net deposition of up to 4 to 5 feet of sediment has occurred since installation of TCS-4 in 1950.

Graphical CSMs and cross-sections showing topography and subsurface geology at SWMU 1/AOC 1 are shown on Figures 4-1b through and 4-1i.

4.1.1.2 Unit History

From 1951 to approximately 1971, the facility discharged wastewater containing chromium (cooling tower blowdown) into Bat Cave Wash.

Based on historical aerial photographs provided on the following pages and in Appendix A, it appears that during the 1950s the facility discharged wastewater into the wash without any impoundment. Wastewater was released to the wash through two pipes that ran from the water-softener sludge-drying bed area in the compressor station lower yard down the slope into Bat Cave Wash (only the eastern sludge-drying bed was in existence at this time). These pipes are shown on the May 19, 1955 photographs presented

below and also on Figures 4-1b and 4-1c as “historical discharge piping.” 1955 aerial photographs show a light-colored flow in the wash that originates at the discharge point and, at times, extends to the railroad tracks about 1,600 feet downstream. The light-colored flow does not extend beyond the railroad tracks. The railroad tracks and associated culverts pre-date construction of the compressor station. I-40 was constructed in the 1960s and is not present on the 1955 photographs.

Based on aerial photograph and document review, in about 1964 a percolation bed (SWMU 1) was created in Bat Cave Wash west of the former sludge-drying beds area, now referred to as SWMU 5. PG&E documentation indicates that the percolation bed had an area of approximately 17,600 square feet (PG&E, 1968). Wastewater was discharged to this area from two pipelines (one 10-inch-diameter pipe and one 4-inch-diameter pipe) that ran from the lower yard down into Bat Cave Wash (Figures 4-1b and 4-1c). The bed was not lined and discharged wastewater was allowed to percolate into the ground and/or evaporate in this area. A former employee reported that the percolation bed sometimes crusted over, and that it was periodically moved within the wash, but was within the general area depicted in Figure 2-1 (Russell, 2006a). Ponded water can be seen in this general area of the percolation bed in aerial photographs from 1967 and 1969 (Appendix A). In these photographs, the remnants of the 4-inch-diameter discharge pipe are also present on the slope above Bat Cave Wash.

As described in RFI/RI Volume 1, continuous discharge of wastewater to Bat Cave Wash ceased in May 1970 when injection well PGE-08 was brought online. However, between May 1970 and September 1971 (when Pond No. 1 of the Old Evaporation Ponds was completed), some treated wastewater may have been temporarily discharged to the percolation bed in Bat Cave Wash when injection well PGE-08 was offline for repairs or maintenance.

Wastewater discharged to Bat Cave Wash consisted primarily of cooling tower blowdown (about 95 percent) and a minor volume of effluent from an oil/water separator (OWS) and other facility maintenance operations (about 5 percent) (PG&E, 1993). Based on information from PG&E (1968), during the late 1960s, an average of about 48,500 gpd of cooling water blowdown were discharged to Bat Cave Wash, with a high of about 64,300 gpd in July and a low of about 25,600 gpd in February.

From 1951 until 1964, cooling water blowdown was not treated prior to being released to the wash. The cooling water blowdown contained chromium, including CrIII and CrVI. From 1964 to 1969, the cooling water blowdown was treated with a one-step system to reduce CrVI in the wastewater to CrIII prior to discharge to the wash. Although the process converted CrVI to CrIII, the concentration of CrT was apparently not reduced.

White powder material was encountered during early investigations along the eastern slope of SWMU 1, below the sludge-drying beds. Two possible sources of white powder material are residual mineral salts from the percolation pond and water-conditioning (lime treatment) sludge from the sludge-drying beds. Lime treatment is a process involving addition of lime (calcium hydroxide) and soda ash and sometimes other flocculants or caustic chemicals to remove hardness (calcium and magnesium ions) from water. Both lime and soda ash were used at the compressor station. The water-conditioning sludge is primarily calcium carbonate with smaller quantities of magnesium hydroxide, both of which are poorly soluble at normal pH (American Water Works Association, 1981). Water-conditioning sludge is generally low in contaminant concentrations, whereas residual mineral salts from the percolation bed may contain higher concentrations of chromium. Additionally, white water-softener conditioning sludge could have been contaminated by chromium discharges and yield high chromium values.

A summary of major structural projects and regulatory changes at the TCS, including those that may have impacted Bat Cave Wash is included in Exhibit 4-3.

Exhibit 4-3. Chronology of Major Operational Changes
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Year	Action
1951	Topock Compressor Station begins operation with six compressor units (K-1 through K-6), three generator units (P-1 through P-3), and one four-cell cooling tower (Cooling Tower A). Cooling tower blowdown discharged directly to Bat Cave Wash.
1953	Two additional compressor units (K-7 and K-8) and one additional generator unit (P-4) are installed.
1954	Another compressor unit (K-9) is installed. Cooling Tower B constructed (two cells).
1957	Another compressor unit (K-10) is installed.
1958	Cooling Tower B expanded to four cells.
1960 to 1961	Use of water production wells PG&E Nos. 1 and 2 ceases; water for the facility is procured from wells across the Colorado River in Topock, Arizona (Topock Wells Nos. 1 and 2).
1962	Original Permutit water-conditioning unit is removed from service; canister-type water-conditioning system is installed.
1964	Single-step treatment system to reduce CrVI in cooling water blowdown installed; a percolation bed for impoundment of treated cooling tower blowdown constructed in Bat Cave Wash.[a]
1964 to 1966	I-40 is constructed. Wells PG&E Nos. 1 and 2 are destroyed, and new standby wells PGE-06 and PGE-07 are installed.
1969	Two-step treatment system to reduce CrVI and remove chromium from cooling tower blowdown isinstalled. Injection well PGE-08 also installed at this time.
1970	Use of injection well PGE-08 for underground injection of facility wastewater begins. From May 1970 to September 1971, wastewater is diverted to percolation bed when injection well PGE-08 is out of service.Gas scrubbers removed from service between mid-1960s and 1970.
1971	Construction of single-lined evaporation Pond No. 1 is completed. From September 1971 to August 1973, Pond No. 1 receives facility wastewater only when injection well PGE-08 is out of service. Between Augustand December 1973, wastewater disposal alternates on a 3-day cycle between PGE-08 and Pond No. 1.
1974	Single-lined evaporation Pond Nos. 2 through 4 are completed and all facility wastewater is conveyed directly to these ponds. PGE-08 is permanently taken out of service.
1974	Topock Well No. 3 is installed.
1980	Topock Well No. 1 is removed from service. Topock Well No. 2a replaces Topock Well 2. Topock Well Nos. 2a and 3 are used to supply water to the compressor station.
1985	Chromium-based cooling water additives are replaced with phosphate-based additives for the open system, and molybdate-based system for the closed-loop systems. Operation of the two-step chromiumtreatment unit ceases.
1989	Four new double-lined evaporation ponds are completed and all facility wastewater is directed to theseponds. The four single-lined evaporation ponds (i.e., the Old Evaporation Ponds) are removed from service.
1989 to 1990	The two-step chromium treatment unit is closed and removed. The original oily wastewater treatmentsystem is removed and replaced with a new system.
2001	The original coil shed Cooling Tower A is replaced with a new cooling tower/heat exchanger unit.
2002	The original coil shed Cooling Tower B is replaced with a new cooling tower/heat exchanger unit.

Notes:

[a] The exact date for construction of the percolation pond is unknown, but based on aerial photographs, it appears to have been constructed in 1964 (i.e., with the single-step treatment system).

TCS-4

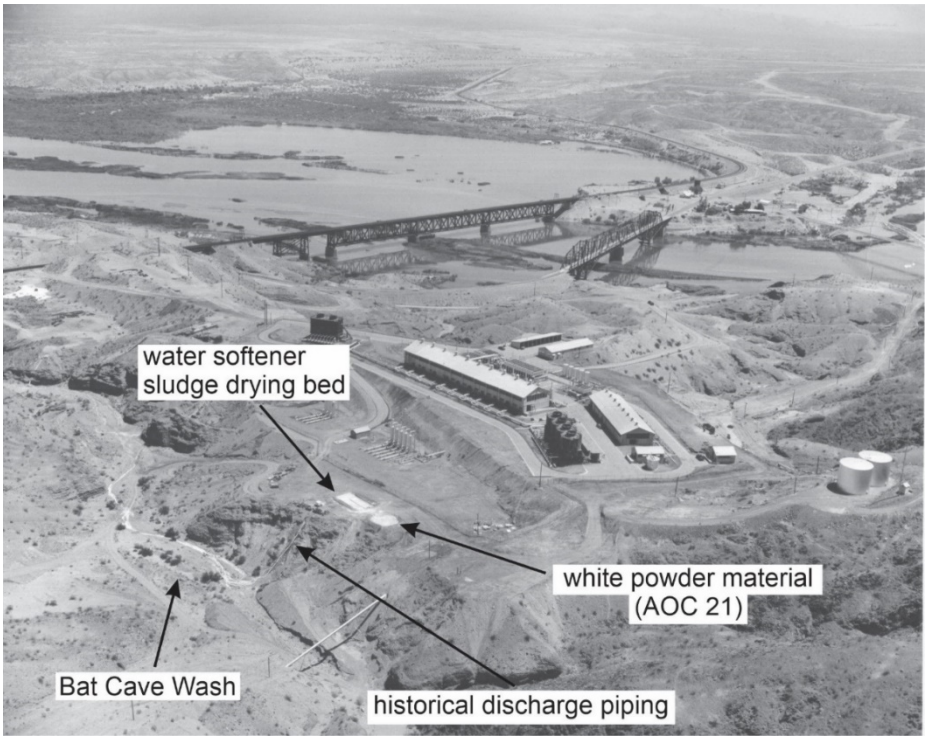
TCS-4 was likely one of the exploratory borings installed in 1950 to evaluate the potential water supply for the Topock Compressor Station (PG&E 1950). Photos dated March 5, 1951, show installation of a "temporary water pump" in a well that appears to be TSC Well #4 (Photograph 4-3).

RFI/RI Report Volume 1 presented information (Section 4.1.1.2) regarding a TCS employee who reported that he was personally responsible for welding a cap onto an approximately 12-inch-diameter vertical pipe located in Bat Cave Wash, assumed to be TCS-4. The casing only extended a small amount above the ground, and the area where the pipe was located was later covered by an additional 18 to 24 inches of soil. Prior to welding the cap, the pipe had been covered with a wooden cover and gravel, and there were no materials of any kind visible in the pipe (Russell, 2006a). During file reviews of historical Topock documents, a work order was found that contained handwritten notes showing "650 feet of steel pipe" extending from a "water treatment chamber" at the former sludge-drying bed area to an "abandoned water well" in the bottom of the wash. The work order also indicated a completion date of November 1, 1964. A copy of the work order is included in Appendix F.

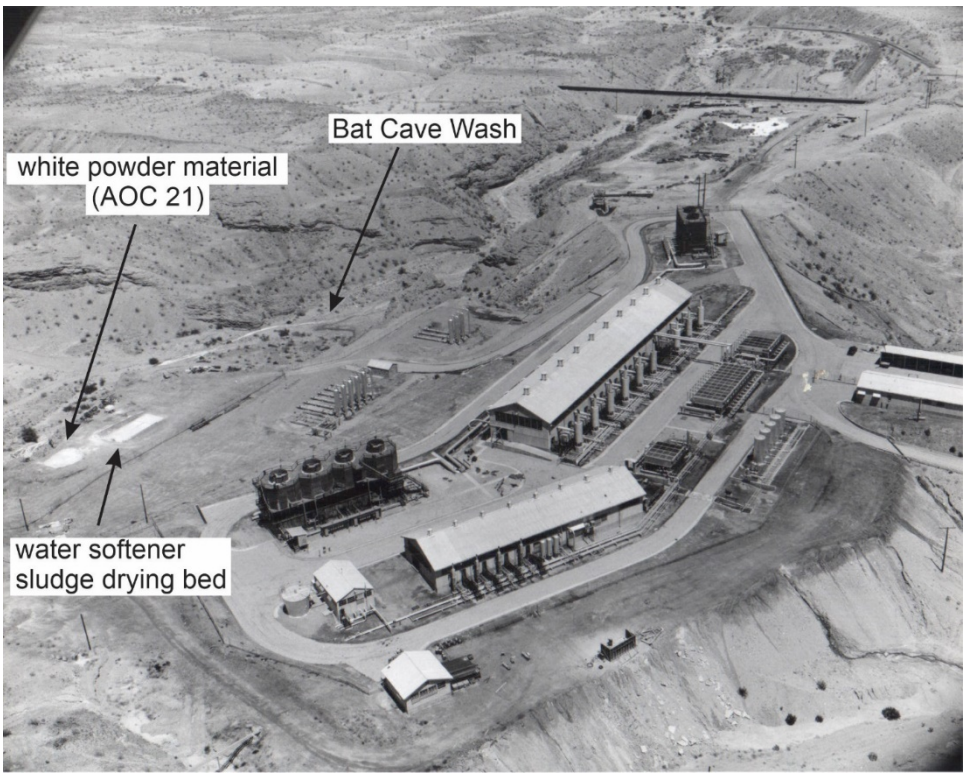
Based on the new information, surface geophysical surveys, including a vertical magnetic gradient survey and a pseudo-terrain conductivity survey was performed on April 2, 3, and 4, 2013, in the suspected area of the old well (TCS Well #4) in an attempt to locate the well and piping. The results of the geophysical surveys are shown on Figure 4-1a. The vertical magnetic gradient survey identified a linear arrangement of weak anomalies (identified as a "possible pipeline or buried cable alignment"), extending down Bat Cave Wash and terminating at a feature identified as "suspected shallowly buried metal debris." The linear feature is inferred to be the TCS-4 pipeline. The location of the northern end of this linear feature is approximately 650 feet from the sludge-drying bed, along the estimated route that the pipe was shown to take on the work order. It was inferred that this location corresponds to the location of TCS-4. The TCS-4 pipeline was not identified during the pseudo-terrain conductivity survey.

A pothole investigation was implemented in July 2013 to uncover TCS-4. The capped well was found at approximately 4 feet below ground surface (bgs) (Photographs 5 and 6). A steel pipe leading into the well was also confirmed at approximately 7 feet bgs. This horizontal pipe was approximately 3 inches in diameter, was wrapped or covered with a tar-like material, and entered the side of the well via a welded intersection. A downhole video log was performed later that same year, an obstruction in the well was encountered at approximately 59 feet bgs. The obstruction was determined to be unconsolidated fill material. The well casing was cleared of the fill material to a depth of approximately 158 feet bgs, where a hard bottom was encountered. Samples of the material were collected from inside the casing at 59 and 113 feet below the top of the casing. In April 2014, a second downhole video log was performed, during which it was determined that the well had filled back in with unconsolidated material to a depth of approximate 127 feet bgs. The well was decommissioned in 2016 and the sampled material was removed.

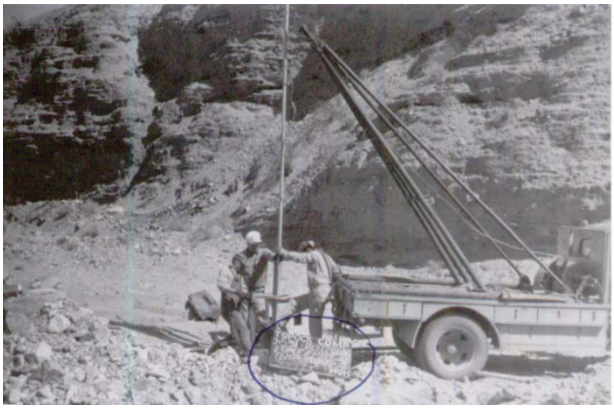
The dates and duration TCS-4 was used for wastewater injection is not known. It appears about 4 feet of deposition has occurred since the well was capped.



Photograph 4-1: May 19, 1955 Aerial Photograph 1. Looking northeast. Historical discharge piping and water are visible in Bat Cave Wash in the bottom left of the photograph.



Photograph 4-2: May 19, 1955 Aerial Photograph 2. Facing northwest. An apparent round impoundment area with white powder material is located in the lower yard of the compressor station, south of the water-softener sludge-drying bed.



Photographs 4-3 and 4-4: March 5, 1951 photographs showing installation of a temporary water pump in a well believed to be TCS Well #4.

Photographs 4-5 and 4-6: September 2013 photographs showing TCS Well # 4 during excavation activities. Photo on the left was taken facing north. Photo on the right was taken facing south.

4.1.1.3 Field Observations

Field observations made during the RFI/RI investigation provided additional information about the investigation area historical use and potential sources of contamination:

- A broken pipe was observed protruding from the eastern slope of Bat Cave Wash in the approximate location of the northern historical discharge piping shown on Figures 4-1b and 4-1c. At the request of Department of Toxic Substances Control (DTSC), PG&E sampled soil at the toe of the slope below the pipe in Bat Cave Wash (sample location SWMU1-25). Below the protruding pipe there were large pieces of concrete on the slope, and at the toe of the slope. During an April 24, 2012, site walk, PG&E and the agencies concluded that the large piece of green stained concrete and pipe near the

floor of Bat Cave Wash should be removed in order to allow soil sample collection beneath the concrete. The concrete was removed and treated as investigation derived waste prior to sample collection.

- White powdery material was observed along the east bank of Bat Cave Wash during the Phase 1 investigation. The material was located approximately 6 feet above the floor of the wash. However, this area of the wash has been eroding and the floor of the wash was as much as 2 to 3 feet higher in the early 1990s. The white material is adjacent to the area that formerly contained the percolation bed and may have been at an elevation consistent with the percolation bed when the percolation bed was in use. Two possible sources of the white powder material are residual mineral salts from the percolation pond and water-conditioning (lime treatment) sludge from the sludge-drying beds. Samples were collected from multiple locations (WP-1 through WP-6) and depths by trenching and hand digging along the floor and side of the wash.

Periodic storm (high runoff) events occur in Bat Cave Wash, making it difficult to assess the precise nature of erosion and deposition patterns. A 2006 storm event resulted in substantial erosion and deposition in portions of the wash in SWMU 1/AOC 1 south, and a January 2010 storm event resulted in the movement of large gravel and cobbles from the upstream portion of Bat Cave Wash above the area near where the Debris Ravine (AOC 4) enters Bat Cave Wash to as far north as the L-300A pipeline overcrossing (in the vicinity of SSB-1). A site reconnaissance of Bat Cave Wash was completed after the 2006 and 2010 storm events. Based on the site reconnaissance conducted following the 2006 event, data from surface and near-surface soil sample locations collected prior to the 2006 storm event may no longer be representative of site conditions. However, deeper soil samples (below 2 to 3 feet bgs) did not appear to be affected by the 2006 storm event, are still considered reliable, and were used in the data gaps evaluation.

While there was considerable movement of rock south of SWMU 1 during the 2010 storm event, there appeared to be limited scouring in the wash and erosion of the wash walls within SWMU 1/AOC 1 south. Although there was damage to well MW-38 (installed within Bat Cave Wash), most of the 2008 sample location survey markers (1/8-inch lathe stakes) were still in place following the 2010 runoff event. MW-38 is also located immediately downstream of a sizable feeder wash on the west side of Bat Cave Wash. Based on the visual reconnaissance of Bat Cave Wash following the 2010 storm event, most of the soil samples collected during the 2008 Phase 1 investigation are still considered to be representative. Surficial samples collected from locations within areas of highest energy during the 2010 event may not be representative of current conditions. This exemplifies that Bat Cave Wash is and will continue to be an active wash with periodic transport of noticeable quantities of rocks and soil along the floor of the wash including some of its tributaries.

4.1.1.4 SWMU 1 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for SWMU 1 are presented in Tables 3-1a through 3-1i and sampling locations and results are shown on Figures 3-3a through 3-3u. Screening level exceedances are summarized in the following paragraphs. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section.

Metals: Samples were collected from 60 locations at depths ranging from 0 to 90 feet bgs. The interim screening levels (ISLs) were exceeded for one or more metals including antimony (ECV), arsenic (background [BK]), barium (BK), hexavalent chromium (BK), total chromium (BK), cobalt (ECV), copper (ECV), lead (BK), molybdenum (ECV), nickel (BK), selenium (BK), vanadium (BK) and/or zinc (BK) at locations across SWMU 1. The highest concentrations were typically found between depths of 0 to 15 feet bgs as shown in Table 3-1a and Figures 3-3a through 3-3o. The analytes most frequently detected over the ISLs were CrVI, total chromium, cobalt, copper, mercury, molybdenum, nickel, vanadium, and zinc.

- Hexavalent chromium was detected above its ISL (0.83 mg/kg) in 50 samples taken from depths between 0 and 15 feet bgs (Table 3-1a). The highest CrVI concentration of 47.5 mg/kg was detected

at sample location WP-1 at 0 feet bgs. Sample location WP-1 was collected at the toe of the slope, in an area of white powder above the former percolation bed (Figure 3-3e).

- Total chromium was detected above its ISL (39.8 mg/kg) in 91 samples taken from depths between 0 and 40 feet bgs (Table 3-1a). The highest total chromium concentration of 3,200 mg/kg was detected at sample location SWMU1-1 at 5 to 6 feet bgs. Sample SWMU1-1 is located at the northern end of the former percolation bed (Figure 3-3f). Several samples collected within SWMU 1 have the highest total chrome concentrations at 5 to 6 feet bgs, including SWMU-1, SWMU-3, SWMU-8. This may be the result of deposition of up to 5 feet of non-impacted soils within the SWMU 1 area, and the 5 to 6 foot samples represent the former surface of Bat Cave Wash at the time when the percolation beds were in operation.
- Cobalt was detected above its ISL (12.7 mg/kg) in 21 samples taken from depths between 0 and 69 feet bgs (Table 3-1a). The highest cobalt concentration of 19 mg/kg was detected at sample location SWMU1-WP-6h at 2 to 3 feet bgs. Sample location SWMU1-WP-6h was collected at the toe of the slope, in an area of white powder above the former percolation bed (Figure 3-3g).
- Copper was detected above its ISL (16.8 mg/kg) in 56 samples taken from depths between 0 and 79 feet bgs (Table 3-1a). The highest copper concentration of 61 mg/kg was detected at sample location SWMU1-WP-6h at 2 to 3 feet bgs. Sample location SWMU1-WP-6h was collected at the toe of the slope, in an area of white powder above the former percolation bed (Figure 3-3h).
- Mercury was detected above its ISL (0.0125 mg/kg) in 13 samples taken from depths between 0 and 79 feet bgs (Table 3-1a). The highest mercury concentration of 0.35 mg/kg was detected at sample location SWMU1-18 at 14 to 15 feet bgs. Sample location SWMU1-18 was collected in the southern portion of the former percolation bed (Figure 3-3j).
- Molybdenum was detected above its ISL (1.37 mg/kg) in 23 samples taken from depths between 0 and 59 feet bgs (Table 3-1a). The highest molybdenum concentration of 20 mg/kg was detected at sample location SWMU1-25 at 0 to 1 foot bgs. Sample location SWMU1-25 was collected adjacent to the former wastewater transference pipeline to TCS-4 (Table 3-3k).
- Nickel was detected above its ISL (27.3 mg/kg) in 24 samples taken from depths between 0 and 59 feet bgs (3-1a). The highest nickel concentration of 51 mg/kg was detected at sample location SWMU1-WP-9 at 11 to 12 feet bgs. Sample location SWMU1-WP-9 was collected along the western edge of the former percolation bed (3-3l).
- Vanadium was detected above its ISL (52.2 mg/kg) in 10 samples taken from depths between 0 and 49 feet bgs (3-1a). The highest vanadium concentration of 57 mg/kg was detected at sample location SWMU1-15 at 49 to 50 feet bgs. Sample location SWMU1-15 was collected in the southern portion of the former percolation bed (Figure 3-3n).
- Zinc was detected above its ISL (58 mg/kg) in 51 samples taken from depths between 0 and 79 feet bgs (Table 3-1a). The highest zinc concentration of 673 mg/kg was detected at sample location T-3-B at 0 feet bgs. Sample location T-3-B was collected at the toe of the slope, in an area of white powder above the former percolation bed (Figure 3-3o).

The lateral extent of the exceedances has been defined by samples with results below ISLs, not detected above reporting limits, or confined by topographic features (e.g., topography surrounding the wash confined wastewater and surface water flows to the bed of the wash). The vertical extent of the exceedances is defined by samples with results below ISLs or not detected above reporting limits, or by collocated borings and/or nearby samples, except at the samples discussed below. Surface samples (0 to 1 foot bgs) with exceedances were not considered vertical extent data gaps.

The deepest samples at the following locations had results that slightly exceeded their respective ISL and were not defined by nearby or collocated samples, with factors of exceedances up to 3.2 times the ISL. These minor exceedances are not considered a data gap:

- SWMU1-6 (zinc)
- SWMU1-17 (copper)

- SWMU1-WP-6a (nickel)
- SWMU1-WP-T3a (copper)
- SSB-5 (zinc)
- SWMU1-WP-3a (copper)
- SWMU1-14 (copper)
- MW-09 (copper, zinc)
- SWMU1-29 (total chromium, zinc)
- SWMU1-WP-10 (hexavalent chromium, total chromium)
- WP-5 (total chromium)
- WP-4 (total chromium)
- SSB-4 (zinc)

The deepest sample at SWMU1-19 had mercury results that exceeded the ISL at a factor of exceedance of 21.6 times the ISL. This may be considered a data gap requiring further investigation. However, the ISL for mercury is low (0.0125 mg/kg) and no background value has been established, and collecting deeper samples at this location would require significant disturbance for a relatively low result (0.27 mg/kg).

CLP Inorganics: Samples were collected from 31 locations at depths ranging from 0 to 87 feet bgs. The ISLs for calcium (BK), magnesium (BK), manganese (BK), and potassium (BK) were exceeded at one or more of the following locations: MW-9, SWMU1-17, SWMU1-WP-7, WP-BANK 1, WP-BANK 2, WP-Floor, P-2Soil (Table 3-1b). The analytes most frequently detected over the ISLs were calcium and magnesium.

- Calcium was detected above its ISL (66,500 mg/kg) in five samples taken from depths between 0 to 3.5 feet bgs (Table 3-1b). The highest calcium concentration of 344,000 mg/kg was detected at sample location WP-Floor at an unknown depth. Sample location WP-Floor was collected in the floor of Bat Cave Wash, in the former percolation bed, and in an area of white powder, indicating the white powder at this location is likely lime treatment sludge.
- Magnesium was detected above its ISL (12,100 mg/kg) in three samples taken from depths between 0 and 3.5 feet bgs (Table 3-1b). The highest magnesium concentration of 15,500 mg/kg was detected at sample location WP-Floor at an unknown depth. Sample location WP-Floor was collected in the floor of Bat Cave Wash, in the former percolation bed, and in an area of white powder.

The vertical extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits. The deepest sample at location MW-09 had results for manganese that slightly exceeded the ISL with a factor of exceedance of 1.3 times the ISL. This minor exceedance is not considered a data gap. Surface soil samples (0 to 1 foot bgs) with exceedances for CLP inorganics were not considered a data gap.

PAHs: Samples were collected from 31 locations and none had detected results that exceeded their respective ISLs (110 to 18,000,000 micrograms per kilogram [µg/kg]) (Table 3-1c).

TPH: Samples were collected from 29 locations and none had detected results that exceeded their respective ISLs (TPH as diesel [TPH-d]: 230 mg/kg; TPH as motor oil [TPH-mo]: 11,000 mg/kg) (Table 3-1d).

General Chemistry: Samples were collected from 50 locations and none had detected results that exceeded their respective ISLs (Table 3-1e).

Pesticides: Samples were collected from 19 locations and none had detected results that exceeded their respective ISLs (2.1 to 470,000 µg/kg) (Table 3-1f).

PCBs: Samples were collected from 24 locations and none had detected results that exceeded their respective ISLs (170 to 4,100 µg/kg) (Table 3-1g and Figures 3-2r, 3-2q, 3-3q, and 3-3r).

Dioxins and Furans: Samples were collected from 12 locations at depths ranging from 0 to 20 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. The ISLs for TEQ hHuman (RRSL), TEQ avian (ECV), and TEQ mammal (ECV) were exceeded at one or more of the following locations: SWMU1-18 through SWMU1-27 and SWMU1-29, as shown in Table 3-1h.

- TEQ avian samples were detected above its ISL (16 nanograms per kilogram [ng/kg]) at 15 locations between depths 0 to 15 feet bgs (Table 3-1h). The highest TEQ avian concentration of 11,000 ng/kg was detected at sample location SWMU1-25 at 0 to 1 feet bgs adjacent to a former wastewater transference pipeline (Figure 3-3s).
- TEQ human samples were detected above its ISL (50 ng/kg) at 12 locations between depths 0 to 15 feet bgs (Table 3-1h). The 15-foot sample was at location AOC1-T5D, located just south of the I-40 culvert, and may represent mixing and/or deposition at this location. The highest TEQ human concentration of 12,000 ng/kg was detected at sample location SWMU1-25 at 0 to 1 foot bgs adjacent to a former wastewater transference pipeline (Figure 3-3t).
- TEQ mammal samples were detected above its ISL (5.58 ng/kg) at 25 locations between depths of 0 to 15 feet bgs (Table 3-1h). The highest TEQ mammal concentration of 12,000 ng/kg was detected at sample location SWMU1-25 at 0 to 1 foot bgs adjacent to a former wastewater transference pipeline (Figure 3-3u).

The lateral and vertical extents of exceedances of TEQ avian and human are defined by samples with results below ISLs, not detected above reporting limits, or confined by topographical features.

The lateral and vertical extents of where TEQ mammal exceeds the mammal ISL have not been defined by samples, as shown in Figures 3-3s through 3-3u. These exceedances of the mammal ISL are not considered a data gap requiring further investigation because, as agreed upon during the investigation process, the avian and human ISLs were used to define nature and extent for dioxin and furans because the TEQ mammal ISL of 5.58 ng/kg, based on background, is very conservative and extremely low. Using the lower TEQ mammal ISL value to define extent would also have resulted in many additional sample locations and intrusions. Further investigation to assess the vertical extent of TEQ mammal was not proposed in order to minimize impacts to cultural resources.

4.1.1.5 AOC 1 Analytical Results

Analytical results for AOC 1 are presented in Tables 3-3a through 3-13l and sampling locations and results are shown on Figures 3-2a through 3-2u (AOC 1 north) and Figures 3-3a through 3-3u (AOC 1 south). A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in subsequent sections.

Metals: Sediment samples were collected from 20 locations at depths ranging from 0 to 3 feet bgs. The ISLs for arsenic (TEC), CrVI (BK), and total chromium (TEC) were exceeded at AOC1-BCW6. This location is an area where soil is transitioning into sediment at the mouth of Bat Cave Wash.

- Arsenic, CrVI and total chromium were detected above their respective ISLs (9.79 mg/kg, 0.83 mg/kg, and 43.4 mg/kg, respectively) in a sediment sample collected at AOC 1-BCW6 from 0 to 0.5 foot bgs (Figures 3-2b, 3-2e, and 3-2f). The arsenic value for this sample is 13 mg/kg, CrVI is 2.63 mg/kg and total chromium is 71 mg/kg (Table 3-2a).

The lateral and vertical extents of exceedances have been defined by samples with results below ISLs or not detected above reporting limits.

Soil samples were collected from up to 112 locations at depths ranging from 0 to 80 feet bgs. Soil samples were also collected from the unconsolidated fill material within the former well, TCS-4 at 59 and 113 feet bgs. This material within the well likely fell into the well from the surface, so should not be used to assess vertical impacts the ISLs were exceeded for one or more of the following metals [antimony

(ECV), arsenic (BK), barium (BK), calcium (BK), CrVI (BK), total chromium (BK), cobalt (BK), copper (BK), lead (BK), mercury (ECV), molybdenum (BK), nickel (BK), selenium (BK), thallium (RRSL), vanadium (BK) and zinc (BK)] were exceeded at 25 locations as shown in Table 3-2b and Figures 3-2a through 3-2o and 3-3a through 3-3o. The most frequently detected metal analytes in soil at concentrations exceeding the ISLs were CrVI, total chromium, copper, lead, mercury, molybdenum, and zinc. Exceedances are mostly clustered in the vicinity of TCS-4 (former water supply well), near the I-40 culvert, and at the mouth of Bat Cave Wash.

- Hexavalent chromium was detected above its ISL (0.83 mg/kg) in 38 locations from depths between 0 and 60 feet bgs (Table 3-2b). The highest CrVI concentration of 80 mg/kg was detected at sample location Old Well-BCW-1 at 7 to 8 feet bgs. Sample location Old Well-BCW-1 was collected in the floor of Bat Cave Wash near the TCS-4 well (Figure 3-3e).
- Total chromium was detected above its ISL (39.8 mg/kg) in 60 samples taken from depths between 0 and 10 feet bgs (Table 3-2b). The highest total chromium concentration of 4,400 mg/kg was detected at sample location Old Well-BCW-2 at 4 to 5 feet bgs. Sample location Old Well-BCW-2 was collected in the floor of Bat Cave Wash near the TCS-4 well (Figure 3-3f).
- Copper was detected above its ISL (16.8 mg/kg) in 45 samples taken from depths between 0 and 60 feet bgs (Table 3-2b). The highest copper concentration of 64 mg/kg was detected at sample location SD-14 at 5 to 6 feet bgs. Copper was also detected at 580 mg/kg in the sample collected from soil within TCS-4 at 113 feet bgs. This result is not representative of surrounding soil. Sample location TCS-4 was collected in the floor of Bat Cave Wash near the Old Well-BCW1 and Old Well-BCW2 (Figure 3-3h).
- Lead was detected above its ISL (8.39 mg/kg) in 60 samples taken from depths between 0 and 6 feet bgs (Table 3-2b). The highest lead concentration of 120 mg/kg was detected at sample location SD-14 at 5 to 6 feet bgs. Sample location SD-14 was collected in the floor of Bat Cave Wash near the outfall of Storm Drain Line 10 (Figure 3-3i), which captures drainage from the lower yard and slopes leading up to the northern cooling tower.
- Mercury was detected above its ISL (0.0125 mg/kg) in 21 samples taken from depths between 0 and 70 feet bgs (Table 3-2b). The highest mercury concentration of 0.26 mg/kg was detected at sample location AOC1-T2g at 9 to 10 feet bgs. Sample location AOC1-T2g was collected in Bat Cave Wash near the TCS-4 well (Figure 3-3j).
- Molybdenum was detected above its ISL (1.37 mg/kg) in 35 samples taken from depths between 0 and 6 feet bgs (Table 3-2b). The highest molybdenum concentration of 15 mg/kg was detected at sample location TCS4-N at 5 to 6 feet bgs, collected from the area around well TCS-4. Molybdenum was also detected at 35 mg/kg in the sample collected from soil within TCS-4 at 113 feet bgs. This result is not representative of surrounding soil. (Figure 3-3k).
- Zinc was detected above its ISL (58 mg/kg) in 56 samples taken from depths between 0 and 15 feet bgs (Table 3-2b). The highest zinc concentration of 660 mg/kg was detected at sample location SD-14 at 5 to 6 feet bgs. Sample location SD-14 was collected in the floor of Bat Cave Wash near the outfall of Storm Drain Line 10 (Figure 3-3o), which captures drainage from the lower yard and slopes leading up to the northern cooling tower.

The lateral extent of exceedances has been defined by samples with results below ISLs, not detected above reporting limit or confined by topographical features. The vertical extent of exceedances has been defined by samples with results below ISLs or not detected above reporting limits, or by nearby and/or collocated samples, except at the locations discussed.

The deepest samples at locations AOC16-5 and SD-17 had results for copper and zinc respectively that were slightly above their respective ISLs with a maximum factor of exceedance of 2.3 times the ISL. These minor exceedances are not considered a data gap.

The deepest sample at AOC1-T6D had results that exceeded the ISL for thallium by a factor of exceedance of 2.8 times the ISL. The only other metals exceedance at AOC1-T6D was zinc from 0 to 0.5

foot bgs. The thallium exceedance may be considered a data gap, however, collecting additional deeper samples at this location would require a significant disturbance for the relatively low exceedance (2.2 mg/kg).

The deepest samples at the following locations had results that exceeded their respective ISLs and were not defined by nearby or collocated samples, with factors of exceedances ranging from 2.7 to 12.8 times the ISL:

- TCS-4 (CrVI, lead)
- AOC1-4 (barium)
- XMW-9 (barium, copper)
- AOC1-T2f (molybdenum)
- AOC1-T2g (mercury)
- SD-19 (mercury)
- AOC1-T1e (mercury)

The exceedances at TCS-4 were detected at a depth of 113 feet bgs within the well, and are not representative of the surrounding soil and therefore are not considered a data gap. As discussed above, mercury exceedances may be considered a data gap, however, the ISL for mercury is low (0.0125 mg/kg) and no background value has been established, and collecting additional samples would require significant disturbance for relatively low exceedances (maximum concentration of 0.16 mg/kg). The barium, copper, and molybdenum exceedances may be considered a data gap, however collecting samples at these locations would require a significant disturbance for the relatively low factor of exceedances (Table 3-2b).

CLP Inorganics: Samples were collected from up to 28 locations at depths ranging from 0 to 82 feet bgs. The ISLs for calcium (BK), manganese (BK), and sodium (BK) were exceeded at one or more of the following locations: AOC1-BCW6, SD-14, and SD-16 (Table 3-2c). AOC1-BCW6 is a location where soil is transitioning to sediment. CLP contamination is likely associated with lime softener and sludge treatment materials. Manganese was the most frequently detected CLP inorganic.

- Manganese was detected above its background value and/or ISL (402 mg/kg) in two samples taken from depths between 0 and 3 feet bgs (Table 3-2c). The highest manganese concentration of 720 mg/kg was detected at sample location SD-16 at 2 to 3 feet bgs. Sample location SD-16 was collected in Bat Cave Wash near the outfall of Storm Drain Line 12.

The lateral extents of the exceedances have been defined by samples with results below ISLs or not detected above reporting limits. The vertical extents of the exceedances have been defined by samples with results below ISLs.

PAHs: Samples were collected from 70 locations at depths ranging from 0 to 79 feet bgs. PAHs were evaluated by calculating benzo(a)pyrene (B[a]P) equivalents for human health and low molecular weight and high molecular weight (HMW) PAH values for ecological receptors. PAHs were not detected or detected below their respective ISL in all but five samples collected in AOC 1. The ISLs for B(a)P equivalent (RRSL) and HMW PAHs (ECV) were exceeded at one or more of the following locations: AOC1-T4c, PA-03, PA-15, and SD-14 as shown in Table 3-38c and Figures 3-2p and 3-3p. These locations are located near AOC-27, perimeter area, and a storm drain on the western side of the compressor station. PAHs are ubiquitous in the environment and have been detected at low concentrations in most RFI/RI soil investigation units. Potential sources of PAHs in the vicinity of the TCS may include historical industrial activities such as fire suppression exercises and burning of garbage, and exhaust from cars and trucks.

- B(a)P equivalent exceeded the ISL (110 µg/kg) in five samples taken from depths between 0 and 5 feet bgs (Table 3-2d). The highest B(a)P equivalent concentration of 490 µg/kg was detected at sample location PA-15 at 0 to 1 foot bgs. Sample location PA-15 is located along the compressor station fence line at the top of the slope, above the access road from the compressor station to the floor of Bat Cave Wash (Figure 3-3p).

- HMW PAHs exceeded the ISL (1,160 µg/kg) in three samples taken from depths between 0 and 5 feet bgs (Table 3-2d). The highest HMW PAH concentration of 2,856 µg/kg was detected at sample location AOC1-T4c at 5 to 6 feet bgs. Sample location AOC1-T4c is on the floor of Bat Cave Wash near the access road from AOC 27 – MW24 Bench.

The lateral and vertical extents of the exceedances have been defined by nearby samples with results below ISLs or not detected above reporting limits.

Volatile organic compounds (VOCs): Samples were collected from 16 locations at depths ranging from 2 to 3 feet bgs (Table 3-2e). The only VOC detected was methyl acetate at two locations. Both detections were 6 orders of magnitude below the ISL (California Human Health Screening Level [CHHSL]). The analytical results for AOC 1 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time.

SVOCs: Samples were collected from 39 locations at depths ranging from 0 to 79 feet bgs (Table 3-2e). The only SVOCs detected was bis (2-ethylhexyl) phthalate. No samples had detected results that exceeded the ISL (ECV).

TPH: Samples were collected from 43 locations at depths ranging from 0 to 9 feet bgs. The ISL for TPH-d (CHHSL) was exceeded at one location: SD-14.

- TPH as diesel was detected at a concentration of 300 mg/kg at 5 to 6 feet bgs at sample location SD-14. This concentration is above the TPH-d ISL (58 mg/kg). Sample location SD-14 was collected in the floor of Bat Cave Wash near the outfall of Storm Drain Line 10.

The lateral and vertical extents of the exceedance have been defined by nearby samples where TPH was not detected above reporting limits.

General Chemistry: Samples were collected from 46 locations at depths ranging from 0 to 82 feet bgs (Table 3-2g). The only ISL for general chemistry parameters is for fluoride. No samples had detected results that exceeded this ISL (RRSL).

Pesticides: Samples were collected from 31 locations at depths ranging from 0 to 69 feet bgs (Table 3-2h). No samples had detected results that exceeded their respective ISLs (ECVs, RRSLs, CHHSLs).

PCBs: Samples were collected from 64 locations at depths ranging from 0 to 69 feet bgs (Table 3-2i). PCBs were evaluated as individual Aroclors and as total PCBs. They were not detected or detected below their respective ISL in 53 samples collected in AOC 1. The ISLs for Aroclor 1254 (RRSL), Aroclor 1260 (RRSL), and total PCBs (ECV) were exceeded at one or more of the following 11 locations: AOC16-5, AO1-BCW10, AOC1-T5D, AOC4-GB10, AOC4-GB11, AOC4-GB12, PA-01, PA-16, SD-14, SD-25, and SD-26, as shown in Table 3-2i and Figures 3-2q through 3-2r and 3-3q through 3-3r. These locations are on the western slope of the compressor station, at the gabbions at the end of AOC 4 Debris Ravine, at the I-40 culvert, and one location at the mouth of Bat Cave Wash, indicating the source of PCBs is likely from the compressor station. PCBs were detected at elevated concentrations at several locations on the compressor station, including around the northern cooling tower (AOC 6), in low laying areas around the station including AOC 10, AOC 11, AOC 4, and near the storm drain outfalls. Aroclor 1254 and 1260 are predominantly found in electrical transformers.

- Aroclor 1254 were detected above the ISL (240 µg/kg) in 10 samples taken from depths between 0 and 2 feet bgs (Table 3-2i). The highest Aroclor 1254 concentration of 1,000 µg/kg was detected at sample location SD-14 at 0 to 1 foot bgs. Sample location SD-14 was collected near the floor of Bat Cave Wash by the outfall of Storm Drain Line 10 (Figure 3-3q), which captures drainage from the lower yard and slopes leading up to the northern cooling tower (AOC 6).
- Aroclor 1260 were detected above the ISL (240 µg/kg) in one sample at 0 and 1 foot bgs (Table 3-2i). The Aroclor 1260 concentration of 320 µg/kg was detected sample location SD-14 at 0 to 1 foot bgs. Sample location SD-14 was collected in the floor of Bat Cave Wash near the outfall of Storm Drain

Line 10, which captures drainage from the lower yard and slopes leading up to the northern cooling tower.

- Total PCBs were detected above the ISL (204 µg/kg) in 11 samples taken from depths between 0 and 2 feet bgs (Table 3-2i). The highest total PCBs concentration of 1,337 µg/kg was detected at sample location SD-14 at 0 to 1 foot bgs. Sample location SD-14 was collected in the floor of Bat Cave Wash near the outfall of Storm Drain Line 10 (Figure 3-3r), which captures drainage from the lower yard and slopes leading up to the northern cooling tower.

The lateral extent of the exceedances has been defined by samples with results below ISLs, not detected above reporting limits, or by topographical features. The vertical extent of the exceedances has been defined by samples with results below ISLs, not detected above reporting limits, or bedrock, except at: AOC1-T5D. Total PCBs at AOC1-T5D were detected at 3 feet bgs at a calculated concentration of 248 µg/kg, slightly above the ISL. This exceedance does not represent data gaps warranting further investigation. Deeper samples were not feasible at AOC4-GB10, AOC4-GB11, AOC4-GB12, SD-25 and SD-26 due to refusal.

Dioxins and Furans: Samples were collected from 64 locations at depths ranging from 0 to 113 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. The ISLs for TEQ avian (ECV), TEQ human (RRSL), and TEQ mammals (ECV) were exceeded at one or more of the following locations: AOC1-1, AOC1-3, AOC1-5 through AOC1-8, AOC16-5, AOC1-BCW6 through AOC1-BCW16, AOC1-BCW18 through AOC1-BCW26, AOC1-BCW28 through AOC1-BCW30, AOC1-T1e, AOC1-T1f, AOC1-T1g, AOC1-T2g through AOC1-T2j, AOC1-T5D, AOC1-T6D, AOC1-T7, AOC1-T8, AOC4-GB10 through AOC4-GB12, Old Well-BCW-1, Old Well-BCW-2, PA-14, PA-15, SD-14, SD-15, SD-26, TCS-4, TCS4-E, TCS4-N, and TCS4-S as shown in Table 3-2j and Figures 3-2s through 3-2u and 3-3s through 3-3u. These locations are clustered around TCS-4, on the western slope of the compressor station, at the gabions at the end of AOC-4 Debris Ravine, at the I-40 culvert, and at the mouth of Bat Cave Wash.

The occurrence of dioxins and furans is typically associated with the burning or combustion of organic materials such as trash, wood/trees, and petroleum fuels. Potential sources of dioxins and furans in the vicinity of the TCS may include historical industrial activities such as fire suppression exercises and burning of garbage. Other sources may include unauthorized dumping and burning; regional wildfires; combustion of diesel and leaded gas; and exhaust from cars, trucks, and trains.

- TEQ avian exceeded the ISL (16 ng/kg) in 50 samples taken from depths between 0 and 20 feet bgs (Table 3-2j). The highest TEQ avian concentration of 600 ng/kg was detected at sample location TCS4-E at 4 to 5 feet bgs. Sample location TCS4-E was collected in the floor of Bat Cave Wash near TCS-4, the Old Well-BCW1 and Old Well-BCW2 (Figure 3-3s).
- TEQ human exceeded the ISL (50 ng/kg) in 32 samples taken from depths between 0 and 20 feet bgs (Table 3-2j). The highest TEQ human concentration of 1,100 ng/kg was detected at sample location AOC1-T5D at 2 to 3 feet bgs. AOC1-T5D is located at the culvert that goes beneath Interstate-40 (Figure 3-3t).
- TEQ mammal exceeded the ISL (5.58 ng/kg) in 89 samples taken from depths between 0 and 20 feet bgs (Table 3-2j). The highest TEQ human concentration of 1,100 ng/kg was detected at sample location AOC1-T5D at 2 to 3 feet bgs. AOC1-T5D is located at the culvert that goes beneath Interstate-40 (Figure 3-3u).

The lateral extents of the TEQ avian exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or by topographical features

Results of TCS-4 Opportunistic Samples

During preparation for TCS-4 well decommissioning, a sample was collected from the tar-like pipe wrap that covers the lateral pipe connected to TCS-4, to evaluate whether the dioxins detected in the soil samples around TCS-4 may have originated from the pipe wrap material (CH2M, 2015c). The section of

pipe that was sampled was exposed at the edge of Bat Cave Wash, about 200 feet south of TCS-4 and near the location of SWMU 1-25, and appeared to have been exposed at the surface for a significant length of time, as compared to the buried pipe unearthed at the TCS-4 wellhead. This sample was collected with support from asbestos-certified TCS staff and analyzed for dioxins and asbestos. Analytical results for the sample (SWMU1-PipeWrap-01) are presented in Table 4 of the *Decommissioning Plan for Topock Compressor Station Well Number 4 (TCS-4)* (CH2M, 2015c). The following is a summary of the laboratory analytical results:

- The sample was found to be asbestos-containing material with 12% by area reported as chrysotile asbestos fibers by polarized light microscopy bulk analysis.
- Dioxin and furans were detected at concentrations of 390 nanograms per kilogram (ng/kg) for TEQ human, 480 ng/kg for TEQ avian, and 390 ng/kg for TEQ mammals. These concentrations are above the TEQs for humans, avians, and mammals.

4.1.1.6 SWMU 1/AOC 1 Conceptual Site Model

Graphical CSMs for SWMU 1, AOC 1 south, and AOC 1 north were developed based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a). The graphical CSMs for SWMU 1, AOC 1 south, and AOC 1 north are shown on Figures 4-1b, 4-1c, and 4-1d respectively. A graphical CSM of SWMU 1/AOC 1 south including a series of cross-sections through Bat Cave Wash is shown on Figures 4-1e through 4-1i. The CSM was updated to reflect findings of investigations to date. Exhibits 4-4 and 4-5 presents the primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for SWMU 1 and AOC 1. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential human and ecological receptors is included in the *Data Quality Objectives Technical Memorandum – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Soil Part A DQOs TM) (CH2M, 2010), and is summarized in the following paragraphs, with updated new information. TCS-4 is included in the CSM for AOC 1 south.

For both SWMU 1 and AOC 1 south, the primary source of contamination is historical direct discharge of untreated chromium-bearing wastewater into Bat Cave Wash, the Former Percolation Bed (SWMU 1), and TCS-4, potential overflow or discharges from the SWMU 1 percolation bed, and discharges from TCS-4 Injection well. Metals contamination (including barium, chromium, copper, lead, nickel, and zinc) are likely associated with wear metals from industrial equipment and galvanized coatings. Incidental spills and stormwater runoff from the western side of the compressor station (storm drains and/or sheet flow) may have contributed to metals, PCBs, PAHs, CLP inorganics, and dioxins and furans contamination in Bat Cave Wash. The discharge of water-softener treatment sludge from the Compressor Station to Bat Cave Wash likely contributed to CLP inorganics and metals contamination at AOC 1 and SWMU 1. Stormwater runoff from AOC 14 north of I-40 may have contributed to wear metals and dioxins/furans contamination in Bat Cave Wash. Contamination released from debris and burn material located in AOC 27 could potentially have been transported to the lower portions of AOC 1 through surface runoff, contributing to metals, PAHs, and dioxins and furans contamination. Discharge from the Debris Ravine (AOC 4) may be partly responsible for contamination in AOC 1 south and SWMU 1; dioxins/furans and metals contamination in fill/debris and surface soil in AOC 4 could have been entrained in surface water runoff and deposited in portions of AOC 1 and SWMU 1.

Surface and shallow soils are the primary source media. From surface soil, contaminants could have migrated to shallow and deeper soils. Shallow soils may act as a secondary source medium to subsurface soil, and subsurface soil may act as a secondary source medium to groundwater. Contaminated wastewater infiltrated through the vadose zone to affect subsurface soil and groundwater, as CrVI contamination is present in groundwater underneath AOC 1 and SWMU 1. The majority of the chromium groundwater plume originated from releases from AOC 1 and SWMU 1. Injection of wastewater into TCS-4 and overflows at the wellhead could account for contamination present in deeper subsurface soil and groundwater.

Exhibit 4-4. Conceptual Site Model – SWMU 1
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Discharge of wastewater from compressor station to Bat Cave Wash/percolation bed **COCs Include:** • Metals • CLP Inorganics	Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Shallow Soil • Potential Sediments • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation • Potential discharge of groundwater to surface water [a]	**Human:** • Recreational User • Tribal User • Maintenance Worker • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals
Runoff from compressor station, stormwater discharge, AOC 4 **COCs Include:** • Metals • CLP Inorganics • PAHs • TPH • PCBs • Dioxins/Furans	Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Shallow Soil • Potential Sediments • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation • Potential discharge of groundwater to surface water [a]	
Discharge of water treatment softener sludge to Bat Cave Wash **COCs Include:** • CLP Inorganics • Metals	Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Shallow Soil • Potential Sediments • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation	

Note:

[a] Discharge to surface water is an insignificant transport pathway as evaluated in the groundwater risk assessment (Arcadis, 2009c).

Exhibit 4-5. Conceptual Site Model – AOC 1
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Runoff from compressor station, storm drains, AOC 4, SWMU 1, AOC-27, and potentially AOC 14 **COCs Include:** • Metals • CLP Inorganics • PAHs • TPH • PCBs • Dioxins/Furans	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Shallow Soil • Potential Sediment • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion • Potential discharge of groundwater to surface water [a]	**Human:** • Recreational User • Tribal User • Maintenance Worker • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals
Discharge of wastewater and water-softener sludge from compressor station to Bat Cave Wash/TCS-4 **COCs Include:** • Metals • CLP Inorganics	• Surface Soil • Shallow Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Shallow Soil • Potential Sediment • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion • Potential discharge of groundwater to surface water [a] • Potential wastewater injection to groundwater	

Note:

[a] Discharge to surface water is an insignificant transport pathway as evaluated in the groundwater risk assessment (Arcadis, 2009c).

Historically, COPCs or COPECs in surface soil in SWMU 1 and AOC 1 south have been eroded and entrained in stormwater/surface water runoff during flow events and have been subsequently re-deposited downstream (further north) in Bat Cave Wash (AOC 1 north). Repeated erosion and deposition of soil at SWMU 1/AOC 1 has likely resulted in mixing of surface and near-surface soils in the unit. The thick vegetation, widening of the channel near the end of Bat Cave Wash, and obstruction of flow by National Trails Highway greatly reduce the energy of flow during runoff events, resulting in deposition of entrained soil within the vegetated area in AOC 1 north. The blockage at National Trails Highway pre-dates the compressor station. The railroad bridge and associated culvert also pre-date the compressor station. I-40 was built in the 1960s, which resulted in construction of the I-40 bridge and culverts across the wash.

Other potential secondary sources of contamination, which are not included in Exhibits 4-4 and 4-5, are as follows:

- Stormwater runoff from I-40 and the railroad (from culverts discharging to Bat Cave Wash) could have resulted in the release of TPH, PAHs, lead, and wear metals and galvanized coatings into AOC 1 adjacent and north of these transportation routes.
- Dioxin/furan and PAHs contamination is likely in part related to historical dumping, burning of garbage, wildfires, vehicle and locomotive exhaust, and military activities in the vicinity of Bat Cave Wash.
- Runoff from the former Workman's Roadhouse and service station, a vehicle maintenance shop, may have contributed to TPHs, PAHs, and metals contamination near the mouth of Bat Cave Wash.

Because chromium-containing wastewater from the Topock Compressor Station was discharged to Bat Cave Wash and topography surrounding the wash confined wastewater and surface water flows to the bed of the wash, the potential lateral extent of soil contamination associated with SWMU 1/AOC 1 is constrained within the boundaries of the banks of the wash except where discharges or runoff along slope would have occurred. The vertical extent of soil contamination within SWMU 1 and AOC 1 has been sufficiently defined, as described in the analytical results sections above.

Contamination associated with SWMU 1/AOC 1 south may also exist on the eastern sidewall of Bat Cave Wash east of SWMU 1 based on results of samples collected from white powder material observed on the eastern sidewall. Additionally, water-softener conditioning sludge could have been contaminated by chromium discharges.

Windblown contamination from within the wash around SWMU 1/AOC 1 is influenced by the topography of the wash. Windblown contaminant deposition, if any, is expected to be limited to surface soils.

4.1.1.7 Evaluation of Data Against Data Quality Objectives SWMU 1 and AOC 1

Decision 1 (Nature and Extent Determination): Nature and extent has been sufficiently defined laterally and vertically given laboratory results and current data density, with the possible exception of the following in AOC 1: thallium at AOC1-T6D, barium and copper and XMW-9, and molybdenum at AOC1-T2f. Additional sampling for vertical extent delineation where the deepest sample exceeded the ISL is not required nor recommended as it will cause substantial disturbance and is not needed to understand the nature and extent of contamination. Analytical results for SWMU 1 are presented in Tables 3-1a through 3-1i, and analytical results for AOC 1 are presented in Tables 3-2a through 3-2k. Analytical results for AOC 1 north are shown on Figures 3-2a through 3-2u, and analytical results for SWMU 1 and AOC 1 south are shown on Figures 3-3a through 3-3u. Summaries of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value for SWMU 1 and AOC 1 are presented in Tables 3-1i and 3-l respectively.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 291 samples were collected from 62 locations ranging from 0 to 90 feet bgs for SWMU 1. For AOC 1, 426 samples were collected from 113 locations ranging from 0 to 82 feet bgs. The samples

were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, TPH, general chemistry parameters, pesticides, dioxins and furans, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data for both SWMU 1 and AOC 1 are sufficient to estimate representative EPCs. No data gaps were identified in the Soil RFI/RI Work Plan (CH2M, 2013a).

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach is provided in Appendix C. The results for the SWMU 1 and AOC 1 investigation units are presented here. Note that for purposes of the groundwater evaluation, SWMU 1 was combined with the southern portion of AOC 1:

- **SWMU 1/AOC 1 South**: of the 13 chemicals of potential concerns (COPC)/COPECs with concentrations that exceed background, only CrVI, molybdenum, and vanadium concentrations exceed the calculated SSLs for this unit. Figure C-2 of Appendix C shows the forecast groundwater concentrations for the COPCs/COPECs evaluated using the screening model. The figure shows that none of the modeled COPC/COPEC concentrations are forecast to exceed the UTL for groundwater over the 100-year simulation period.
- **AOC 1 North:** of the 13 COPCs/COPECs with concentrations that exceed background, only CrVI, molybdenum, and vanadium concentrations exceed the calculated SSLs for this unit. Figure C-4 of Appendix C shows the forecast groundwater concentrations for the COPCs/COPECs evaluated using the screening model. The figure shows that none of the modeled COPC/COPEC concentrations are forecast to exceed the UTL for groundwater over the 100-year simulation period.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and/or IMs. During implementation of the RFI/RI Work Plan, soil characteristic samples were collected at the following locations in SWMU 1: SWMU1-18 and SWMU1-19. AOC 1: AOC1-BCW7, AOC1-BCW13, AOC1-BCW25, AOC1-T2h, AOC1-T5D, and AOC1-T6D. Results are presented in Table 3-36. These data along with the nature and extent data collected are sufficient to support CMS/FS and/or IMs.

4.1.2 AOC 4 – Debris Ravine

4.1.2.1 Setting

AOC 4 - Debris Ravine, is located in the southern portion of the Topock Compressor Station immediately south of the facility fence line and is shown on Figure 2-1. AOC 4 is a narrow, steep-sided arroyo that drains into Bat Cave Wash at the southwest corner of the compressor station. AOC 4 is located on PG&E property, except for a small portion of the westernmost end that extends onto HNWR. Laterally, the western edge of AOC 4 extends from the toe of the western slope of the ravine at a point directly south of the water tanks to the junction with Bat Cave Wash. The eastern edge extends from the water tanks north along the access road to a line parallel with the southern-most fence line of the compressor station, and west along the fence line to the edge of the slope above Bat Cave Wash. AOC 4 includes the slope between the eastern and western boundaries to a point directly downslope of the southwestern corner of the facility fence line.

4.1.2.2 Unit History

The operational history at AOC 4 is not well documented; however, over the years, fill material and debris had been deposited on the ravine's northern and eastern slopes along the southern facility fence line, with some debris accumulating in the bottom of the ravine. The burning of trash occurred within AOC 4, as confirmed by the presence of burnt waste material in the ravine. In June 2009, DOI issued an Action Memorandum for a time-critical removal action (TCRA) at AOC 4 (DOI, 2009b) and directed PG&E to initiate activities necessary to implement and perform the TCRA. The history of previous investigations, pre-TCRA soil contaminant concentrations, and Agency direction leading to the AOC 4 TCRA are described in the *Final Work Plan for Time-Critical Removal Action at AOC 4 Debris Ravine, PG&E Topock Compressor Station, Needles, California* (Alisto et al., 2009), hereafter referred to as the Final

TCRA Work Plan. Dioxins were a primary COC driving the removal action, along with CrVI (up to 1,560 mg/kg), lead (up to 11,000 mg/kg), PCBs (up to 1,900 µg/kg [total PCBs]), PAHs, and asbestos.

The TCRA was conducted from December 2009 through December 2010 as an interim remedial action in accordance with CERCLA with the intent to stabilize and mitigate the threat of imminent release of the contaminated material. The TCRA interim action was not intended as a substitute for additional investigative or remedial activities that may be required under RCRA, or to be the final remedy for AOC 4. An implementation report (Alisto et al., 2011) for the TCRA at AOC 4 was prepared to document the field work and present the results of the field activities for the project. The conclusions of the TCRA at AOC 4 are summarized in the following paragraphs.

The TCRA objectives were met by the removal action. Removal was conducted in safely accessible areas of AOC 4, additional erosion controls were installed, and confirmation data were collected following the removal action. For areas on PG&E property, the TCRA target end point concentrations were based on commercial/industrial CHHSL and/or RSLs. In order to comply with the stated intent and objectives of the AOC 4 TCRA, the target end point concentrations for native alluvial material were based on ten times the commercial/industrial CHHSL and/or RSLs. This reduced the amount of native alluvium to be removed, but removed material that may have presented an imminent and substantial endangerment to public health or welfare, or the environment. For areas of AOC 4 on HNWR property, the target endpoints for the removal were background levels for metals and ECVs for organics, which align with the Part A Phase 1 RFI/RI ISLs.

Based on the confirmation data set and installation of erosion control measures, the substantial threat of release of contaminated material from AOC 4 has been stabilized and mitigated. AOC 4 confirmation soil data have been carried forward to the RFI/RI process and are used in this data gaps evaluation.

Additional post-construction activities are ongoing at this AOC and include inspection and maintenance of SoilTac soil stabilization and the gabion at the downstream end of the Debris Ravine. SoilTac soil stabilizer will be reapplied as necessary, based on inspections. Slopes in the former Debris Ravine are generally stable and resistant to erosion. Inspection will also include examining steep slopes in native alluvium for indications of slope movement or instability. Run-on controls were left in place above the upper slope. Concrete barriers were also installed above the upper slope to keep Topock Compressor Station personnel activities at a safe distance from steeper areas of the slope.

The check dam and the gabion below the slot canyon are maintained under a periodic inspection program, with special attention to pre- and post-rainfall inspections. Soil that accumulates above the check dam or the gabion after rainfall events are characterized for proper disposal and removed periodically.

The Combined RFI/RI Data Set includes confirmation samples collected to characterize soil conditions upon completion of the TCRA and samples collected subsequently during fulfillment of the Soil RFI/RI Work Plan and subsequent data gap work plans. These include samples collected north of the AOC boundary depicted on Figures 3-4a through 3-4w. At the time these samples were collected, they were outside the compressor station fence line. Since collection of these samples, the southern portion of the fence line was relocated and now incorporates a larger portion of property south of the compressor station (it was previously located just south of the compressor station buildings between about 80 and 250 feet north of the current location depicted on Figure 2-1). Because of this change, some AOC 4 samples are now located inside the fence line. All AOC 4 samples are considered in this DQO evaluation and, where appropriate, the distinction is made between AOC 4 samples currently located inside or outside the fence line.

4.1.2.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 4 are presented in Tables 3-3a through 3-3f (outside the fence line) and Tables 3-4a through 3-4j (inside the fence line) and sampling locations and results are shown on Figures 3-4a through 3-4w. Screening level exceedances are summarized in the following paragraphs. A discussion of the nature and extent of

contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section.

Metals: *AOC 4 – Outside Fenceline*. Samples were taken from 98 locations that are outside the current fence line and ranged from 0 to 10 feet bgs. The ISLs for antimony (ECV), barium (BK), cadmium (BK), CrVI (BK), total chromium (BK), cobalt (BK), copper (BK), lead (BK), mercury (ECV), nickel (BK), vanadium (BK), and zinc (BK) were exceeded in up to 49 samples within AOC 4 – Outside as shown in Table 3-3a and on Figures 3-4a through 3-4w. The following metals exceeded the ISL 10 or more times and are discussed below: barium, CrVI, total chromium, cobalt, copper, lead, nickel, and vanadium.

- Barium was detected above its ISL (410 mg/kg) in 14 samples collected from depths between 0 and 10 feet bgs (Table 3-3a). The highest detected concentration was 1,300 mg/kg at sample location AOC4-B03 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4a).
- Hexavalent chromium was detected above its ISL (0.83 mg/kg) in 14 samples collected from depths between 0 and 10 feet bgs (Table 3-3a). The highest detected concentration was 16 mg/kg at sample location AOC4-K05 at 0 feet bgs. This sample was collected in the center of AOC 4 near the top of the slope.
- Total chromium was detected above its ISL (39.8 mg/kg) in 49 samples collected from depths between 0 and 10 feet bgs (Table 3-3a). The highest detected concentration was 160 mg/kg at sample location AOC4-D04 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4c).
- Cobalt was detected above its ISL (12.7 mg/kg) in 17 samples collected from depths between 0 and 10 feet bgs (Table 3-3a). The highest detected concentration was 20 mg/kg at sample location AOC4-D03 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4d).
- Copper was detected above its ISL (16.8 mg/kg) in 51 samples collected from depths between 0 and 10 feet bgs (Table 3-3a). The highest detected concentration was 790 mg/kg at sample location AOC4-B03 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4e).
- Lead was detected above its ISL (8.39 mg/kg) in 17 samples collected from depths between 0 and 10 feet bgs (Table 3-3a). The highest detected concentration was 220 mg/kg at sample location AOC4-B03 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Table 3-4f).
- Nickel was detected above its ISL (27.3 mg/kg) in 42 samples collected from depths between 0 and 10 feet bgs (Table 3-3a). The highest detected concentration was 75 mg/kg at sample location AOC4-D02 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4h).
- Vanadium was detected above its ISL (52.2 mg/kg) in 30 samples collected from depths between 0 and 10 feet bgs (Table 3-3a). The highest detected concentration was 100 mg/kg at sample location AOC4-D02 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4i).

The lateral extents of exceedances outside the compressor station fence line have been defined by samples below ISLs, samples not detected above reporting limits, or by topographical features (i.e. the north facing wall of the ravine). Lead concentrations in samples from locations AOC4-20 and AOC4-22 (8.8 and 8.7 mg/kg, respectively) located in the southeast portion of AOC 4 slightly exceed the lead ISL (8.39 mg/kg). These are minor exceedances of the ISL (BK) that are consistent with background concentrations and therefore are not considered a data gap. The vertical extent of exceedances outside the compressor station fence line has been defined by samples with results not detected above reporting limits and/or by bedrock.

AOC 4 – Inside Fenceline. Samples were taken from up to 57 locations that are inside the current fence line and ranged from 0 to 40 feet bgs. The commercial screening level (CSL) for CrVI (6.3 mg/kg) was

exceeded at one location: AOC4-P04 at 0 feet bgs where the concentration was 11 mg/kg. Background values were exceeded for barium, cadmium, CrVI, total chromium, cobalt, copper, lead, nickel, vanadium, and zinc. The following metals exceeded the background value 10 or more times and are discussed below: total chromium, copper, lead, nickel, vanadium, and zinc.

- Total chromium was detected above the background value (39.8 mg/kg) in 33 samples collected from depths between 0 and 40 feet bgs (Table 3-4a). The highest detected concentration was 120 mg/kg at sample location AOC4-40, at 0.5 to 1 foot bgs. This sample was collected in a drainage area east of the water tanks (Figure 3-4c).
- Copper was detected above the background value (16.8 mg/kg) in 33 samples collected from depths between 0 and 40 feet bgs (Table 3-4a). The highest detected concentration was 270 mg/kg at sample location AOC4-27, at 5 to 5.5 feet bgs. This sample was collected along the access road to the water tanks (Figure 3-4e).
- Lead was detected above the background value (8.39 mg/kg) in 11 samples collected from depths between 0 and 40 feet bgs (Table 3-4a). The highest detected concentration was 34 mg/kg at sample location AOC4-O06, at 0 feet bgs. This sample was collected along the new fence line at the top of the former slope (Figure 3-4f).
- Nickel was detected above the background value (27.3 mg/kg) in 33 samples collected from depths between 0 and 40 feet bgs (Table 3-4a). The highest detected concentration was 69 mg/kg at sample location AOC4-40, at 0.5 to 1 foot bgs. This sample was collected in a drainage area east of the water tanks (Figure 3-4h).
- Vanadium was detected above the background value (52.2 mg/kg) in 18 samples collected from depths between 0 and 40 feet bgs (Table 3-4a). The highest detected concentration was 82 mg/kg at sample location AOC4-40, at 0.5 to 1 foot bgs. This sample was collected in a drainage area east of the water tanks (Figure 3-4i).
- Zinc was detected above the background value (58 mg/kg) in 10 samples collected from depths between 0 and 40 feet bgs (Table 3-4a). The highest detected concentration was 440 mg/kg at sample location AOC4-32, at 0 to 1 foot bgs. This sample was collected along the former fence line (Figure 3-4j).

The lateral extent of exceedances inside the compressor station fence line have been defined by samples below background values/CSLs, samples not detected above reporting limits, or by topographical features. Two samples in the eastern portion of AOC 4-Inside had results that slightly exceeded background concentrations: AOC4-38 (copper and nickel) and AOC4-40 (total chromium, copper, lead, nickel, vanadium, and zinc). These samples had only minor exceedances of the background values are therefore not considered a data gap. The vertical extent of exceedances outside the compressor station fence line has been defined by samples with results not detected above reporting limits, by topographical features, and/or by bedrock.

CLP Inorganics: *AOC 4 – Outside*. No samples collected from locations outside the current fence line were analyzed for CLP inorganics.

AOC 4 – Inside. Samples were taken from three locations at depths ranging from 0 to 40 feet bgs. No samples had detected results that exceeded their respective CSLs. Background values were exceeded for aluminum, calcium, iron, magnesium, manganese, potassium, and sodium at all locations, and are discussed below.

- Aluminum was detected above the background value (16,400 mg/kg) in six samples collected from depths between 0 and 30 feet bgs (Table 3-4b). The highest detected concentration was 20,000 mg/kg at sample location BH-69 at 5 to 6 feet bgs and 9 to 10 feet bgs. This sample was collected from the installation of a monitoring well near the former fence line south of AOC 5 (Figure 3-4k).
- Calcium was detected above the background value (66,500 mg/kg) in three samples collected from depths between 0 and 40 feet bgs (Table 3-4b). The highest detected concentration was 100,000 mg/kg at sample location AOC4-37 at 0 to 0.5 foot bgs.

- Iron was detected above the background value (29,303 mg/kg) in four samples collected from depths between 0 and 40 feet bgs (Table 3-4b). The highest detected concentration was 32,000 mg/kg at sample location BH-69 at 29 to 30 feet bgs. This sample was collected from the installation of a monitoring well near the former fence line south of AOC 5 (Table 3-4l).
- Magnesium was detected above the background value (12,100 mg/kg) in six samples collected from depths between 0 and 40 feet bgs (Table 3-4b). The highest detected concentration was 16,000 mg/kg at sample location BH-69 at 5 to 6 feet bgs, 9 to 10 feet bgs, and 29 to 30 feet bgs. This sample was collected from the installation of a monitoring well near the former fence line south of AOC 5 (Figure 3-4m).
- Manganese was detected above the background value (402 mg/kg) in five samples collected from depths between 0 and 40 feet bgs (Table 3-4b). The highest detected concentration was 520 mg/kg at sample location BH-69 at 5 to 6 feet bgs. This sample was collected from the installation of a monitoring well near the former fence line south of AOC 5 (Figure 3-4n).
- Potassium was detected above the background value (4,400 mg/kg) in two samples collected from depths between 0 and 40 feet bgs (Table 3-4b). The highest detected concentration was 5,500 mg/kg at sample location BH-69 at 29 to 30 feet bgs. This sample was collected from the installation of a monitoring well near the former fence line south of AOC 5.

The lateral and vertical extents of exceedances have been defined by samples with results not detected above reporting limits, by topographical features and/or by bedrock. There are two locations where the deepest samples exceed background values (AOC4-36 [calcium] and BH-69 [magnesium and potassium]). However, this does not represent a data gap requiring further investigation because the concentrations in the deepest sample likely represent background values as they only slightly exceed their respective background values by a factor of exceedance less than or equal to 1.5 times the background value (Table 3-4b).

PAHs: *AOC 4 – Outside*. Samples were taken from 101 locations at depths ranging from 0 to 10 feet bgs. PAHs were evaluated by calculating B(a)P equivalents for human health and low molecular weight and HMW PAH values for ecological receptors. The ISLs for B(a)P equivalent (RRSL) and HMW PAHs (ECV) were exceeded at one or more of the following locations: AOC4-A01, AOC4-A01minus, AOC4-A01S, AOC4-A02, AOC4-A03, AOC4-B01, AOC4-B01S, AOC4-B02, AOC4-B03, AOC4-C01, AOC4-C02, AOC4-C03, and AOC4-D01 as shown in Table 3-3b and in Figures 3-4o and 3-4p. These locations are located directly west-southwest of the water tanks and the access road and parking lot adjacent to the water tanks.

- B(a)P equivalents were detected above its ISL (110 µg/kg) at 13 locations from depths between 0 and 10 feet bgs (Table 3-3b). The highest B(a)P equivalent concentration of 1,100 µg/kg was detected at sample location AOC4-C01 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4o).
- HMW PAHs were detected above its ISL (1,160 µg/kg) at 12 locations from depths between 0 and 10 feet bgs (Table 3-3b). The highest HMW PAH concentration of 10,163 µg/kg was detected at sample location AOC4-B02 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4p).

The lateral extents of exceedances outside the compressor station fence line have been defined by samples below ISLs, samples not detected above reporting limits, or by topographical features.

AOC 4 – Inside. Samples were taken from 52 locations at depths ranging from 0 to 40 feet bgs. The CSLs for B(a)P equivalent was exceeded at the following locations: AOC4-28, AOC4-40, and AOC4-tar as shown in Table 3-4c.

- B(a)P equivalent was detected above the CSL of 2,100 µg/kg in three samples (Table 3-4c). The highest concentration of 4,700,000 µg/kg was detected at sample location AOC4-tar. This was a debris sample collected from a piece of tar, in a drainage area east of the water tanks. The second highest B(a)P equivalent concentration was 2,900 µg/kg and was detected at sample location AOC4-

40 at 0 to 0.5 fooot bgs. This sample was collected in a drainage area east of the water tanks and further down the drainage from the AOC4-tar sample (Figure 3-4o).

The lateral extents of exceedances inside the compressor station fence line have been defined by samples below CSLs or not detected above reporting limits, with the possible exception of the area south/southeast of AOC4-40. However, the area south/southeast of AOC4-40 does not represent a data gap requiring further investigation at this time; additional sampling of this area may occur during the remedial design, if necessary.

The vertical extent of exceedances has been defined by samples with results not detected above reporting limits. There are many locations within AOC 4 where the deepest sample result exceeds the CSL for B(a)P equivalents (Figure 3-4o). This does not represent a data gap requiring further investigation because bedrock/refusal was encountered at these locations preventing the collection of deeper samples.

VOCs and SVOCs: *AOC 4 – Outside*. No VOCs or SVOCs were detected in AOC 4 – Outside samples.

AOC 4 – Inside. Samples were collected from four locations within AOC 4 – Inside. Dibenzofuran and methyl acetate were detected in one sample each (Table 3-4d) at 1 order of magnitude and 7 orders of magnitude less than their respective CSLs (background values are not established). The analytical results for AOC 4 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time.

TPH: *AOC 4 – Outside*. A sample was collected from one location (PA-17) at 0 to 1 foot bgs. No ISLs were exceeded (Table 3-3c).

AOC 4 – Inside. Eight samples were collected from one location (BH-69) between 0 and 40 feet bgs. No CSLs were exceeded (Table 3-4e).

General Chemistry: *AOC 4 – Outside*. No outside samples were analyzed for general chemistry parameters.

AOC 4 – Inside. Samples were collected from three locations between 0 and 40 feet bgs and analyzed for pH and total organic carbon. No CSLs or background values are established for these parameters (Table 3-4f).

Pesticides: No samples were analyzed for pesticides.

PCBs: *AOC 4 – Outside*. Samples were taken from up to 101 locations at depths ranging from 0 to 10 feet bgs. PCBs were evaluated as individual Aroclors and as total PCBs. The ISLs for Aroclor 1254 (RRSL), Aroclor 1260 (RRSL), and total PCBs (ECV) were exceeded at up to 39 locations within AOC 4 Outside the fence line as shown in Table 3-3d. Exceedances were detected throughout the south-southwest facing slope of the ravine beneath the access road, and at the gabions where contamination may be accumulating (Figures 3-4q through 3-4t).

- Aroclor 1254 was detected above the ISL (240 µg/kg) in 23 samples collected from depths between 0 and 1.5 feet bgs (Table 3-3b). The highest Aroclor 1254 concentration of 5,900 µg/kg was detected at sample location AOC4-H04 at 0 feet bgs. This sample was collected on the bedrock slope, west of the access road to the water tanks (Figure 3-4r).
- Aroclor 1260 was detected above the ISL (240 µg/kg) in two samples collected from depths between 0 and 1.5 feet bgs (Table 3-3b). The highest Aroclor 1260 concentration of 640 µg/kg was detected at sample location AOC4-G06 at 0 feet bgs. This sample is located on the bedrock slope, west of the access road to the water tanks (Figure 3-4s).
- Total PCBs were detected above the ISL (204 µg/kg) in 27 samples collected from depths between 0 and 1.5 feet bgs (Table 3-3b). The highest total PCBs concentration of 6,281 µg/kg was detected at sample location AOC4-H04 at 0 feet bgs (Figure 3-4t).

The lateral extent of exceedances outside the compressor station fence line have been defined by samples below ISLs, not detected above reporting limits, or by topographical features. The vertical extent of exceedances has been defined by samples with results below the ISL or not detected above reporting limits. There are many locations where the deepest sample result exceeds the ISL for PCBs. This does not represent a data gap requiring further investigation because bedrock/refusal was encountered at these locations preventing the collection of deeper samples.

AOC 4 – Inside. Samples were taken from 52 locations at depths ranging from 0 to 40 feet bgs. The CSLs for Aroclor 1248, Aroclor 1254, Aroclor 1260, were exceeded in shallow soils at one or more of the following locations: AOC4-24, AOC4-25, AOC4-27, AOC4-28 AOC4-39, and AOC4-40.

- Aroclor 1248 was detected above the CSL (950 µg/kg) in four samples collected from depths between 0 and 3 feet bgs (Table 3-4c). The highest detected concentration was 2,900 µg/kg. Aroclor 1254 was detected above the CSL (970 µg/kg) in 14 samples collected from depths between 0 and 3 feet bgs. The highest detected concentration was 6,600 µg/kg. Aroclor 1260 was detected above the CSL (990 µg/kg) in 10 samples collected from depths between 0 and 1 foot bgs. The highest detected concentration was 4,300 µg/kg. The highest detected concentrations were from sample location AOC4-28 at 0 to 1 foot bgs. This sample was collected southwest of the water tanks along the access road (Figure 3-4q).

The lateral extent of exceedances inside the compressor station fence line has been defined by samples below CSLs, not detected above reporting limits, or by topographical features, with the possible exception of the area south/southeast of AOC4-40. However, the area south/southeast of AOC4-40 does not represent a data gap requiring further investigation at this time, but additional sampling of this area may occur during the remedial design, if necessary

The vertical extent of exceedances has been defined by samples with results below the CSL or not detected above reporting limits. There are many locations where the result for the deepest sample exceeds the CSL for PCBs. This does not represent a data gap requiring further investigation because bedrock/refusal was encountered at these locations preventing the collection of deeper samples.

Dioxins and Furans: *AOC 4 – Outside*. Samples were collected from 101 locations at depths ranging from 0 to 10 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. The ISLs for TEQ avian (ECV), TEQ human (RRSL), and TEQ mammals (ECV) were exceeded up to 60 times and are discussed below.

- TEQ avian samples were detected above its ISL (16 ng/kg) at 28 locations from depths between 0 and 1 foot bgs (Table 3-3e). The highest TEQ avian concentration of 280 ng/kg was detected at sample location AOC4-B03 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4u).
- TEQ human samples were detected above its ISL (50 ng/kg) at 10 locations from depths between 0 and 1 foot bgs (Table 3-3e). The highest TEQ human concentration of 250 ng/kg was detected at sample location AOC4-B03 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4v).
- TEQ mammal samples were detected above its background value (5.58 ng/kg) at 60 locations from depths between 0 and 1 foot bgs (Table 3-3e). The highest TEQ human concentration of 1,100 ng/kg was detected at sample location AOC4-B03 at 0 feet bgs. This sample was collected in the southern portion of AOC 4, west of the access road and water tanks (Figure 3-4w).

These exceedances are found throughout AOC 4 along the south-southwest facing slope of the ravine beneath the access road and west towards Bat Cave Wash. The primary source of dioxins/furans in AOC 4 is the burning and subsequent dumping of compressor station waste.

The lateral extents of TEQ avian and TEQ human exceedances outside the compressor station fence line have been defined by samples below ISLs, not detected above reporting limits, or by topographical features. The vertical extents of TEQ avian and TEQ human exceedances outside the compressor station fence line have been defined by samples with results below the ISL or not detected about reporting limits.

There are many locations where the deepest sample result exceeds the ISL for TEQ avian and/or TEQ human. This does not represent a data gap requiring further investigation because bedrock/refusal was encountered at these locations preventing the collection of deeper samples.

The lateral and vertical extents of the TEQ mammal exceedances outside the compressor station fence line have not been defined by samples with results below ISLs or not detected above reporting limits, as shown on Figures 3-4a through 3-4w. These exceedances of the ISLs do not represent a data gap requiring further investigation because the TEQ mammal ISL (5.58 ng/kg) is the most conservative and lowest screening level for dioxin TEQ. Further investigation to assess the vertical extent of TEQ mammal is not warranted.

AOC 4 – Inside. Samples were collected from 56 locations at depths from 0 to 7.5 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. The CSL for TEQ human (220 ng/kg) was exceeded at AOC4-39, as shown in Table 3-4i.

- TEQ human was detected above its CSL in two samples collected at AOC4-39 from depths between 0 and 0.5 foot bgs (Table 3-4f). The highest TEQ human concentration of 470 ng/kg was detected at sample location AOC4-39 at 0 to 0.5 foot bgs. This sample was collected north of the water tanks (Figure 3-4v).

The lateral extent of TEQ human exceedances has been defined by samples below its CSL, not detected above reporting limits, or by topographical features, with the possible exception of the area south/southeast of AOC4-40. However, the area south/southeast of AOC4-40 does not represent a data gap requiring further investigation at this time; additional sampling of this area may occur during the remedial design, if necessary. The vertical extent of TEQ human exceedances has been defined by samples with results below the CSL or not detected about reporting limits. There are several locations where TEQ human exceed the CSL at the deepest sample level. This does not represent a data gap requiring further investigation because bedrock/refusal was encountered at these locations preventing the collection of deeper samples.

4.1.2.4 AOC 4 Conceptual Site Model

A graphical CSM and cross section have been developed for AOC 4 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figures 4-2a through 4-2c. Exhibit 4-6 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 4. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential human and ecological receptors is included in the Soil Part A DQOs TM (CH2M, 2010), and is summarized in the following paragraphs, with updated information.

The primary sources of contamination for metals and PCBs at AOC 4 are historical disposal of debris (including asbestos-containing material) from the compressor station into the ravine. The primary source of PAHs and dioxins/furans are residuals from apparent historical burning of compressor station waste in and around the ravine. Many of the primary source materials were removed during the AOC 4 TCRA.

The presence of metals and PCBs at AOC 4 is likely related to the disposal of debris and trash. Potential sources of PAHs and dioxin/furans in the vicinity of the TCS may include historical industrial activities such as fire suppression exercises, burning of garbage, and exhaust from cars and trucks. PCBs are likely sourced from the compressor station; Aroclor 1254 and 1260 are predominantly found in electrical transformers. Incidental spills along the southern side of the compressor station and subsequent discharge into the AOC 4 ravine via surface water runoff could also have resulted in the release contaminants into the ravine. CLP inorganics contamination, limited to sample location BH-69, may be associated with white powder material from lime treatment sludge observed at the compressor station or may be reflective of background conditions. In general, the highest contaminant concentrations are found on the bedrock slopes along the south-southwest facing walls of the ravine beneath the water towers and at the check dam in the lower ravine.

Exhibit 4-6. Conceptual Site Model – AOC 4 – Debris Ravine
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Disposal of Debris (including asbestos-containing material) **COCs Include:** • Metals • PCBs	• Surface soil • Subsurface soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Recreational User[a] • Tribal User[a] • Maintenance Worker [a,b] • Commercial Worker [b] **Ecological:** • Plants[a] • Invertebrates[a] • Birds[a] • Mammals[a]
Burnt Material **COCs Include:** • Dioxins/Furans • PAHs	• Surface soil • Subsurface soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil	

Notes:

[a] Outside the TCS fence line

[b] Inside the TCS fence line

The primary release mechanisms are direct releases of contaminated particulates or the leaching of contaminants from the historical debris and/or burned material remaining after the AOC 4 TCRA (Figure 4-2a). Contaminants present in the primary source materials could have been deposited on surface soil as particulates or entered surface soil as dissolved constituents through infiltration of rainfall/surface water before the primary source materials were removed during the TCRA. Contaminated media may have been transported downhill into the ravine through depositional processes. Contaminants released from the historical debris located on the slopes of AOC 4 prior to the TCRA could also have been transported westward into Bat Cave Wash and SWMU 1/AOC 1 during surface water flow events. Contamination in sediment has likely accumulated at the check dam in the lower ravine where some of the highest contaminant concentrations are found (Figures 3-4e [copper], 3-4r [Aroclor 1254], 3-4s [Aroclor 1260], and 3-4t [total PCBs]). Primary source media consist of surface and subsurface soils. Contaminants could have leached from surface soils and shallow soil into underlying deeper soils. Across much of the AOC 4 ravine, leaching of contaminants to deeper soils is prevented by shallow bedrock (Figure 4-2b). Migration from subsurface soil to groundwater is highly unlikely as a potential secondary pathway due to the presence of shallow bedrock well above the water table beneath AOC 4 (Figures 4-2b and 4-2c).

Windblown dust contamination from small particles of debris or contaminated surface soil within AOC 4 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils. There is a potential for windblown transportation of contaminants from AOC 4 to nearby areas of the ravine. Surface runoff from AOC 4 to Bat Cave Wash could also have transported small pieces of debris from AOC 4 to Bat Cave Wash.

4.1.2.5 Evaluation of Data Against Data Quality Objectives for AOC 4

Decision 1 (Nature and Extent Determination): Nature and extent has been sufficiently defined laterally and vertically given laboratory results, current data density, and site conditions. AOC 4 was split into two parts for the nature and extent evaluation: locations outside the fence line (AOC 4 – Outside) and locations inside the fence line (AOC 4 – Inside). AOC 4 – Outside locations were screened against Part A Investigation screening values. AOC 4 – Inside locations, were screened against Part B Investigation screening levels, since these locations are no longer accessible to human (non-commercial) and ecological receptors outside the fence line.

Analytical results are presented in Tables 3-3a through 3-3e for AOC 4 – Outside sample locations and Tables 3-4a through 3-4i for AOC 4 – Inside sample locations. Results are also presented on Figures 3-4a through 3-4w. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-3f for inside locations and Table 3-4j for outside locations.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 241 samples were collected from 169 locations ranging from 0 to 12 feet bgs for AOC 4. The samples were analyzed for one or more of the following analyte categories: metals, CLP organics, PAHs, VOCs, SVOCs, TPH, general chemistry, pesticides, PCBs, dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. No data gaps were identified in the Soil RFI/RI Work Plan (CH2M, 2013a).

Decision 3 (Threat to Groundwater Determination): Samples from AOC 4 were not analyzed for a threat to groundwater because this site is situated directly on bedrock and the depth to groundwater between approximately 130 and 200 feet bgs (based on average water table elevation of 456’ above mean sea level). (Figure 4-2b). Thus, AOC 4 does not represent a threat to groundwater.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are insufficient to support CMS/FS and/or IMs. The following data gap was identified in the Soil RFI/RI Work Plan:

- Soil physical parameters to support the CMS/FS

No samples from AOC 4 were analyzed for soil characteristics during implementation of the RFI/RI Work Plan. This data gap will be addressed during remedial design if necessary at AOC 4.

4.1.3 AOC 9 – Southeast Fence Line

4.1.3.1 Setting

AOC 9 is located in the southeast portion of Topock Compressor Station east of the facility fence line and just south of the visitor parking lot, as shown on Figure 2-1 It is located entirely on PG&E-owned property. The original extent of AOC 9 consisted of a small area of discolored soil that had become exposed in 2000 due to erosion. A broken stormwater discharge pipe was located in the same area of the stained soil, and information from former employees indicated that the pipe trench leading to the storm drain may have received runoff from leaks originating near the Auxiliary Building.

The approximate locations of the stormwater drain pipe and the April 2000 excavation are shown on Figure 4-3a. These locations are based on historical employee interviews, site walk observations of a depression in the excavation area where backfill had settled, and the April 2000 excavation letter report (PG&E, 2000a). However, subsequent employee interviews revealed a possible alternate location for this storm drain pipe located further south of the original location. This alternate location of the storm drain pipe is also shown on Figure 4-3a.

4.1.3.2 Unit History

The broken stormwater drain pipe received runoff from the compressor station. The drain may have also captured incidental leaks or spills from the compressor station, including water from auxiliary jacket water system.

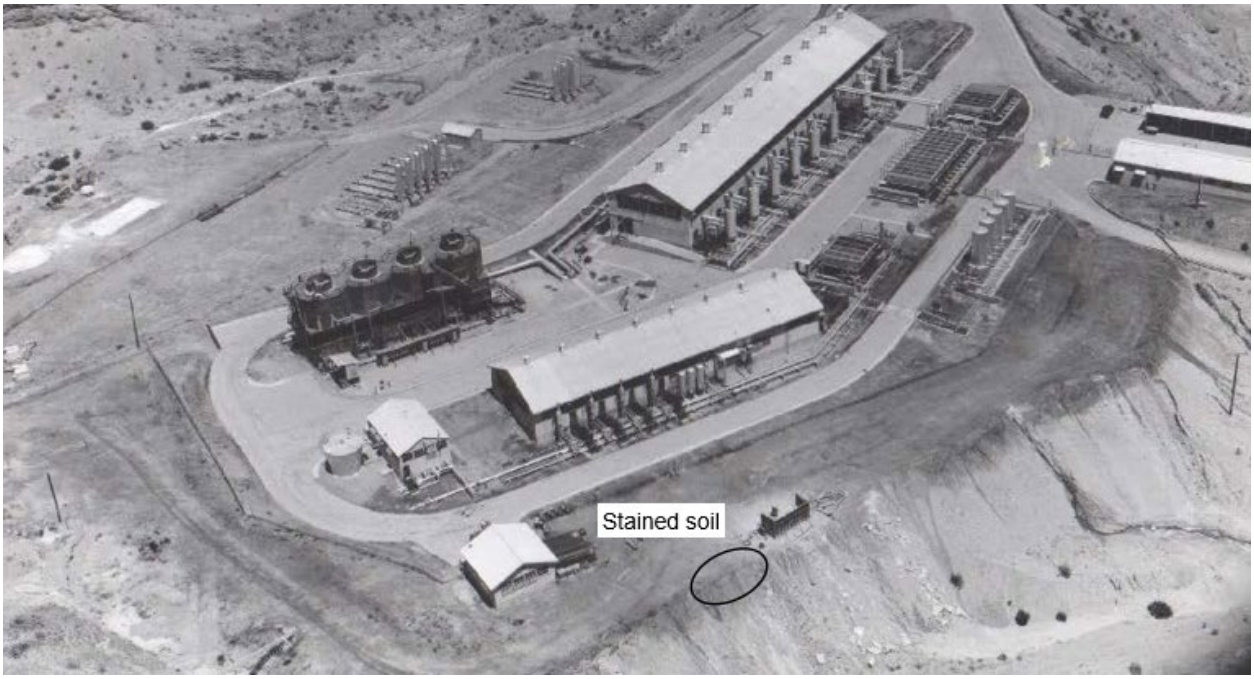
In the same area as the approximate location of the broken stormwater drain pipe, dark soil—what appears to be stained soil—is present along the west side of AOC 9 in a May 19, 1955, aerial photograph. This area is shown on Figure 4-3a and Photograph 4-7. This is a secondary source of contamination, likely a result of using oil on for dust suppression.

The drain was in use until 2000, when a new stormwater drain pipe was installed. Discharge of compressor station runoff through the broken stormwater drain pipe would have continued until 2000.

While the actual depth of the pipe break is not known with certainty, based on similar site facilities and the limitations of the steep slope at this location, it is expected to have been between 1 to 3 feet bgs.

On April 6, 2000, approximately 1.5 cubic yards of the stained soil were excavated and shipped offsite for disposal. The approximate location and size of the excavation is shown on Figure 4-3a. After the majority of the stained soil was removed, a new stormwater drainage pipe was installed, and the area was backfilled with 1 to 2 feet of clean soil to prevent erosion of the slope (PG&E, 2000a). Sampling was conducted after the majority of the stained soil had been removed (PG&E, 2000a). Because of the extremely steep slope at AOC 9, removal of additional soil was not feasible at the time.

The AOC 9 boundary was enlarged to include additional sampling locations in response to DTSC comments on the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Part A, PG&E Topock Compressor Station, Needles, California,* referred to as the Soil Part A Work Plan (CH2M, 2006).



Photograph 4-7: May 19, 1955 Aerial Photograph 2. Facing northwest. Dark soil is visible along the ridge.

4.1.3.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 9 are presented in Tables 3-5a through 3-5j and sampling locations are shown on Figures 3-5a through 3-5n. Screening level exceedances are summarized in the following paragraphs. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section.

Metals: Samples were collected from 33 locations at depths ranging from 0 to 15 feet bgs, with the majority of samples collected from 0 to 3 feet bgs. The ISLs were exceeded for one or more of the following metals at locations across AOC 9: arsenic (background [BK]), CrVI (BK), total chromium (BK), cobalt (BK), copper (ECV), lead (BK), mercury (ECV), molybdenum (ECV), nickel (BK), thallium (RRSL), and zinc (BK). The most frequently detected analytes exceeding the ISLs were CrVI, total chromium, copper, lead, mercury and zinc as seen in Table 3-5a and Figures 3-5a through 3-5f. The highest concentrations CrVI, total chromium, copper, and relatively high concentrations of zinc were detected in confirmation samples collected from 0 to 3 feet bgs after the 2000 excavation. These locations were later covered with 1 to 2 feet of clean fill and therefore do not represent true surface conditions at the site.

- Hexavalent chromium was detected above its ISL (0.83 mg/kg) in 18 soil samples taken from depths between 0 and 10 feet bgs (Table 3-5a). The highest CrVI concentration of 114 mg/kg was detected at sample location #10 at 0 to 3 feet bgs. Sample location #10 was collected in the former removal area at the top of the slope near the TCS fence line (Figure 3-5a) and was later covered with 1 to 2 feet of clean fill.
- Total chromium was detected above its ISL (39.8 mg/kg) in 14 soil samples taken from depths between 0 and 6 feet bgs. The highest total chromium concentration of 398 mg/kg was detected at sample location #10 at 0 to 3 feet bgs. Sample location #10 was collected in the former removal area at the top of the slope near the TCS fence line and was later covered with 1 to 2 feet of clean fill.
- Copper was detected above its ISL (16.8 mg/kg) in 16 soil samples taken from depths between of 0 and 6 feet bgs. The highest copper concentration of 50.4 mg/kg was detected at sample location #9 at 0 to 3 feet bgs. Sample location #9 was collected in the former removal area at the top of the slope near the TCS fence line and was later covered with 1 to 2 feet of clean fill.

- Lead was detected above its ISL (8.39 mg/kg) in 30 soil samples taken from depths between 0 and 10 feet bgs. The highest lead concentration of 59 mg/kg was detected at sample location AOC9-8 at 2.5 to 3 feet bgs. Sample location AOC9-8 was collected in the former removal area at the top of the slope near the TCS fence line.
- Mercury was detected above its ISL (0.0125 mg/kg) in 14 samples taken from depths between 0 and 10 feet bgs. The highest mercury concentration of 0.75 mg/kg was detected at sample location AOC9-18 at 9 to 10 feet bgs. Sample location AOC9-18 was collected at the top of the slope near the TCS fence line to the southeast of the former removal area.
- Zinc was detected above its ISL (58 mg/kg) in 20 soil samples taken from depths between 0 and 3 feet bgs. Of these 20 samples, 8 were collected from locations later covered with 1 to 2 feet of clean fill and therefore do not represent true surface conditions. The highest zinc concentration of 1,000 mg/kg was detected at sample location AOC9-8 at 0 to 0.5 foot bgs. Sample location AOC9-8 was collected in the former removal area at the top of the slope near the TCS fence line.

The lateral extents of exceedances have generally been defined by samples with results below ISLs, not detected above reporting limits, or by topographical features. There are several locations that have detected metals results slightly above (up to 2 times) their respective ISLs. These minor exceedances of the ISLs are not considered a data gap that requires filling because to the factors if exceedance of the respective ISLs are so low.

The vertical extent of the exceedances has been defined for most metals by samples with results below ISLs, or not detected above reporting limits, as shown in Table 3-5a. Although there are locations where the deepest samples exceeded ISLs, this does not represent a data gap requiring further investigation because the concentrations in the deepest samples only slightly exceed (by 2 times or less) their respective ISLs, nearby samples define vertical extent, or the concentrations exceeding the ISLs are decreasing with depth. Numerous additional deeper borings would need to installed in order to define the vertical extent to the ISL values. Additional borings were not proposed in order to limit disturbances. Due to the steep slope of AOC 9, drill deeper samples can only be reached using an excavator, as a drill rig is unable to access the AOC 9 area.

The vertical extent of mercury near AOC9-18 has not been defined. The highest mercury concentration was detected at the deepest AOC9-18 sample (9-10 feet bgs) and exceeded the ISL by a factor of 60. Deeper samples would be difficult to collect in this area because of the steep slope, and would cause substantial disturbance, but the data gap may be filled during remediation if implemented in this area.

CLP Inorganics: Samples were collected from four locations at depths ranging from 0 to 0.5 foot bgs. No samples had detected results that exceeded their respective ISLs, as shown in Table 3-5b.

PAHs: Samples were collected from 23 locations at depths ranging from 0 to 10 feet bgs. PAHs were evaluated by calculating benzo(a)pyrene equivalents for human health and low molecular weight and HMW PAH values for ecological receptors. The ISLs for B(a)P equivalent (RRSL) and HMW PAHs (ECV) were exceeded at one or more of the following locations: AOC9-5, 6, 15, 18, 20, and 22, as shown in Table 3-5c and Figures 3-5g and 3-5h.

- B(a)P equivalent exceeded the ISL (110 µg/kg) in 10 samples taken from depths between 0 and 5 feet bgs. The highest B(a)P equivalent concentration of 980 µg/kg was detected at sample location AOC9-22 at 2 to 3 feet bgs. Sample location AOC9-22 is located in a depression basin located to the south of AOC 9, across an access road. Runoff from AOC 9 may have collected in this depression.
- HMW PAHs exceeded the ISL (1,160 µg/kg) in five samples taken from depths between 0 and 5 feet bgs. The highest HMW PAH concentration of 7,840 µg/kg was detected at sample location AOC9-22 at 2 to 3 feet bgs. Sample location AOC9-22 is located in a depression basin located to the south of AOC 9, across an access road.

The lateral extents of exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or topographical features.

The vertical extent of the exceedances has not been defined for sample AOC9-22. Although there were ISL exceedances in the deepest samples at AOC9-15 and 18, the detected concentrations were less than double the ISLs and therefore, do not constitute a data gap that requires filling. Deeper samples were not feasible at AOC9-15, 18, and 22 because the borings had reached the depth limit of vacuum or hand sampling. Rotosonic drilling was not feasible at these locations. Vertical extent data gaps at AOC9-22 may be filled during remediation if implemented in this area.

TPH: Samples were collected from 16 locations at depths ranging from 0 to 3 feet bgs. No samples had detected results that exceeded their respective ISLs as seen in Table 3-5d.

General Chemistry: Samples were collected from 22 locations at depths ranging from 0 to 6 feet bgs (Table 3-5e). There are no ISLs for general chemistry parameters.

Pesticides: Samples were collected from eight locations at depths ranging from 0 to 10 feet bgs. The ISL for 4,4-DDE (ECV) was exceeded at one location, as shown on Table 3-5f.

- 4,4-DDE was detected about its ISL (2.1 µg/kg) at AOC9-11 from 0 to 0.5 foot bgs. Sample location AOC9-11 was collected in the former removal area near the bottom of the slope.

The lateral extent of exceedance has been defined by samples with results below ISLs or not detected above reporting limits. The vertical extent of exceedance has been defined by samples with results below ISLs or not detected above reporting limits. Although the deepest sample collected at AOC9-11 had a detected result of 4,4-DDE exceeding the ISL in the 0 to 0.5 foot bgs sample, nearby locations downgradient of AOC9-11 had deeper samples with no detections of 4,4-DDE.

4,4-DDE is the daughter product of 4,4-DDT, a site-wide evaluation of pesticides was conducted as part of the Soil RFI/RI Work Plan (CH2M, 2013a) to assess potential patterns of pesticides that were used for pest control at the station. After review of pesticides and other compounds detected in the soils samples where pesticides were detected, there does not appear to be a discernable pattern or correlation between the other compounds detected at these locations and the detected pesticides (CH2M, 2013a). Based on this evaluation, pesticides were not defined as a new COPC/COPEC at AOC 9 and further evaluation of pesticides is not warranted. Therefore, this does not represent a data gap requiring further investigation.

PCBs: Samples were collected from 12 locations at depths ranging from 0 to 10 feet bgs. PCBs were evaluated as individual Aroclors and as total PCBs. The ISLs for Aroclor 1254 (RRSL), Aroclor 1260 (RRSL), and total PCBs (ECV) were exceeded at one or more of the following locations: AOC9-15, -16, and -22, as shown in Table 3-5g and Figures 3-5i to 3-5k.

- Aroclor 1254 was detected above its ISL (240 µg/kg) in five samples taken from depths between 0 and 3 feet bgs. The highest Aroclor 1254 concentration of 1,400 µg/kg was detected at sample location AOC9-22 at 2 to 3 feet bgs. Sample location AOC9-22 is located in a depression basin located to the south of AOC 9, across an access road.
- Aroclor 1260 was detected above its ISL (240 µg/kg) in four samples taken from depths between 0 and 3 feet bgs. The highest Aroclor 1260 concentration of 930 µg/kg was detected at sample location AOC9-22 at 2 to 3 feet bgs. Sample location AOC9-22 is located in a depression basin located to the south of AOC 9, across an access road.
- Total PCBs were detected above the ISL (204 µg/kg) in five samples taken from depths between 0 and 3 feet bgs. The highest total PCBs concentration of 2,330 µg/kg was detected at sample location AOC9-22 at 2 to 3 feet bgs. Sample location AOC9-22 is located in a depression basin located to the south of AOC 9, across an access road.

The lateral extent of exceedances has been defined by samples with results below RRSL/ECV, not detected above reporting limits, or topographical features.

The vertical extent of exceedance has not been defined for sample AOC9-15. Deeper samples were not feasible at AOC9-15, where Aroclor 1254, Aroclor 1260, and total PCBs exceeded their respective

screening levels in the deepest samples. Vertical extent data gaps in the area of AOC9-15 be filled during remediation if implemented in this area.

Dioxins and Furans: Samples were collected from 10 locations at depths ranging from 0 to 6 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. The ISLs for TEQ avian (ECV), TEQ human (RRSL), and TEQ mammals (ECV) were exceeded at one or more of the following locations: AOC9-8, 15, 16, 18, 20, 21, 22, and PA-23, as seen in Table 3-5h and Figures 3-5l to 3-5n.

- TEQ avian samples were detected above its ISL (16 ng/kg) in 10 samples taken from depths between 0 to 6 feet bgs. The highest TEQ avian concentration of 95 ng/kg was detected at sample location AOC9-15 at 2 to 3 feet bgs. Location AOC9-15 is located in a depression basin located to the south of AOC 9, across an access road.
- TEQ human samples were detected above its ISL (50 ng/kg) in seven samples taken from depths between 0 to 6 feet bgs. The highest TEQ human concentration of 190 ng/kg was detected at sample location AOC9-16 at 0 to 0.5 foot bgs. AOC9-16 is located below the former removal area, at the bottom of the slope along the access road.
- TEQ mammal samples were detected above its ISL (5.58 ng/kg) in 17 samples taken from depths between 0 to 6 feet bgs. The highest TEQ mammal concentration of 190 ng/kg was detected at sample location AO9-16 at 0 to 0.5 foot bgs. AOC9-16 is located below the former removal area, at the bottom of the slope along the access road.

The lateral extent of exceedances has not been defined for the TEQ values for avian or human receptors. TEQ values for avian receptors exceed the ISL by more than a factor of 2 near the TCS fence line, near the southern boundary of AOC 9, and downgradient of AOC 9 (AOC9-16 and 15). ISL exceedances for human receptors show a similar pattern This data gap may be filled during remediation if implemented in this area.

The vertical extent of exceedances has not been defined for TEQ values for avian and human receptors, particularly at locations AOC9-15 and AOC9-18. Deeper samples were not feasible at AOC9-15 and 18, where TEQ avian and TEQ human exceeded their respective ISLs in the deepest samples. Vertical extent data gaps in the area of these may be filled during remediation if implemented in this area.

The lateral and vertical extents of the TEQ mammal exceedances have not been defined by samples with results below ISLs or not detected above reporting limits. These exceedances of the ISLs do not represent a data gap requiring further investigation because the TEQ mammal ISL (5.58 ng/kg) is the most conservative and lowest screening level for dioxin TEQ. Further investigation to assess the vertical extent of TEQ mammal is not warranted.

Asbestos: A small area of surficial white powder material was observed in AOC 9 in the immediate vicinity of AOC9-14. White powder material was encountered only in this one location and only in the surface sample. The white powder sample and the underlying soil sample were analyzed for asbestos. Bulk samples analyzed by polarized light microscopy indicated that asbestos fibers were present in both samples. To confirm the presence of asbestos fibers, the white powder sample was also analyzed by California Air Resource Board Method 435 and transmission electron microscopy. California Air Resource Board Method 435 did indicate that very low levels of asbestos were present in the soil sample (detected concentration of less than 0.1 percent, where the detection limit was less than 0.1 percent); however, the transmission electron microscopy analysis indicated that asbestos was not detected above the detection limit. Based on these results, a very small percentage of asbestos fibers (less than 0.1 percent) are present in the white powder and soil samples.

The lateral and vertical extent of exceedances have been defined by the white powder only being located at a single location.

4.1.3.4 AOC 9 Conceptual Site Model

A graphical CSM and cross section have been developed for AOC 9 based on the above site history and background, as shown in Figures 4-3a through 4-3c. Primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 9 are presented in Exhibit 4-7. A detailed discussion of the migration pathways, exposure media, exposure routes, and human and ecological receptors is included in *Data Quality Objectives Technical Memorandum – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Soil Part A DQOs TM) (CH2M, 2010), and is summarized in the following paragraphs, with updated information.

The primary source of contamination at AOC 9 is historical liquid discharge of runoff from the compressor station from a broken storm drain pipe to shallow soil. The presence of CrVI and total chromium at AOC 9 is likely related to the release of auxiliary jacket cooling water while the presence of wear metals (zinc, copper, and lead), PAHs, and PCBs is likely related to compressor station runoff and/or incidental leaks or spills. A pre-1995 release of mercury in the northern side of the Auxiliary Building (CH2M, 2007a) may be the source of mercury detected at AOC 9. The primary source of dioxins/furans at the site are residuals from apparent historical burning of compressor station waste.

The highest concentrations of total chromium, CrVI, copper, and zinc were detected in the area identified as the approximate location of the broken storm drain pipe, consistent with the broken storm drain pipe being the source of these contaminants. The highest concentrations of PAHs and PCBs were detected in the depressions across the access road downgradient of AOC 9. PAHs and PCBs likely accumulated in these two low lying areas from overland flow down the access road or from the station.

The stormwater drain pipe break was estimated to be between 1 to 3 feet bgs. The quantity of liquid released is expected to be relatively small since—with the exception of storm events—the drain would have only captured small incidental leaks or spills from various systems at the Topock Compressor Station.

The primary source media at AOC 9 are surface and shallow soils. Liquids released to these areas could have infiltrated to deeper soils and/or flowed downhill in surface or shallow subsurface runoff. These flows would have entered depressions across the access road from AOC 9, or East Ravine (AOC 10). Because of the steep angle of the slope at AOC 9, infiltration is likely to be a lesser pathway than surface runoff; however, COPCs in residual contamination in the area of the former broken stormwater discharge pipe appear to have migrated to deeper soils.

For AOC 9, a potential secondary release pathway is windblown dust contamination, which could have occurred as a result of dust being transported from the AOC. Windblown contamination, if any, would be limited to surface soils.

Exhibit 4-7. Conceptual Site Model – Area of Concern 9
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Runoff from compressor station; incidental spills and releases **COCs Include:** • Metals • PCBs • PAHs	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation]	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals
Discharge from compressor station via broken stormwater/ trench drain pipe **COCs Include:** • Metals	• Shallow Soil	• Percolation and/or infiltration	• Surface Soil • Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil Potential volatilization and atmospheric dispersion/enclosed space accumulation	

4.1.3.5 Evaluation of Data Against Data Quality Objectives for AOC 9

Decision 1 (Nature and Extent Determination): Nature and extent has not been sufficiently defined laterally and/or vertically for the following compounds and associated areas:

- Vertical extent of mercury has not been defined within AOC 9
- Vertical extent of PAHs has not been defined in depression areas across access road from AOC 9
- Vertical extent of PCBs has not been defined in depression areas across access road from AOC 9
- Vertical and lateral extent of dioxins/furans has not been defined within and in depression areas across access road from AOC 9

Analytical results are presented in Tables 3-5a through 3-5i and on Figures 3-5a through 3-5n. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-5j.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 69 samples were collected from 33 locations ranging from 0 to 15 feet bgs for AOC 9. The samples were analyzed for one or more of the following analyte categories: metals, CLP organics, PAHs, general chemistry, pesticides, PCBs, and asbestos.

Decision 2 (Data Sufficiency for EPA Calculation): Data are sufficient to estimate representative EPCs. No data gaps were identified in the Soil RFI/RI Work Plan (CH2M, 2013a).

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and/or IMs. A data gap was identified in the Soil RFI/RI Work Plan (2013): soil physical parameters to support the CMS/FS.During implementation of the RFI/RI Work Plan, soil characteristics samples were collected at the following locations in AOC 9: AOC9-16 and AOC9-19. Results are presented in Table 3-36. These data addressed the data gap identified in the Soil RFI/RI Work Plan (2013) and along with the nature and extent data collected are sufficient to support CMS/FS and/or IMs.

4.1.4 AOC 10 – East Ravine

4.1.4.1 Setting

AOC 10 – East Ravine is a small ravine located on the southeast side of the compressor station, as shown on Figure 2-1. The ravine runs eastward toward the Colorado River. Portions of the East Ravine are on PG&E property outside the facility fence line, and other portions of the ravine are located on property owned by HNWR.

The East Ravine is approximately 1,600 feet long and is bisected by three constructed berms (one constructed berm and two dirt roads that are also constructed berms) (Figures 4-4a and 4-4b). The constructed berm was built circa early 1950s, the Southern California Gas Pipeline road was built in the 1950s, and the lower dirt road was built in 1916 and is associated with the old Route 66. The lower dirt road is the only berm that contains a culvert. Because of the berms, surface flow from most of the length of this ravine (west of the lower dirt road that forms the eastern boundary of Subarea AOC 10d) does not typically reach the Colorado River. The drainage for this ravine includes runoff from the compressor station access road, however, a curb was installed along the access road in 2006 preventing station

runoff from entering the ravine, runoff from the mountains to the south, and runoff from the compressor station itself.

4.1.4.2 Unit History

The primary potential sources of contamination to the East Ravine are: 1) runoff from the compressor station, the access road to the compressor station, and AOC 9; 2) discharge from stormwater drain pipes; 3) incidental overflows of chromium-containing hot well (AOC 19) cooling water via the former trench drain at the top of the station access road; and 4) debris disposed of on the slopes of the ravine.

During a site visit in May 2006, a storm drain was noted leading from the southeastern portion of the compressor station and discharging into the East Ravine. A small area (Subarea 10a), approximately 3 feet by 3 feet, of stained soil (possibly old hydrocarbon staining) was noted at the discharge of the storm drain. While discharge from the steam-cleaning area has always been directed to the oily water treatment system, this storm drain may have captured some runoff from the steam-cleaning area before the steam-cleaning area was fully bermed (CH2M, 2006).

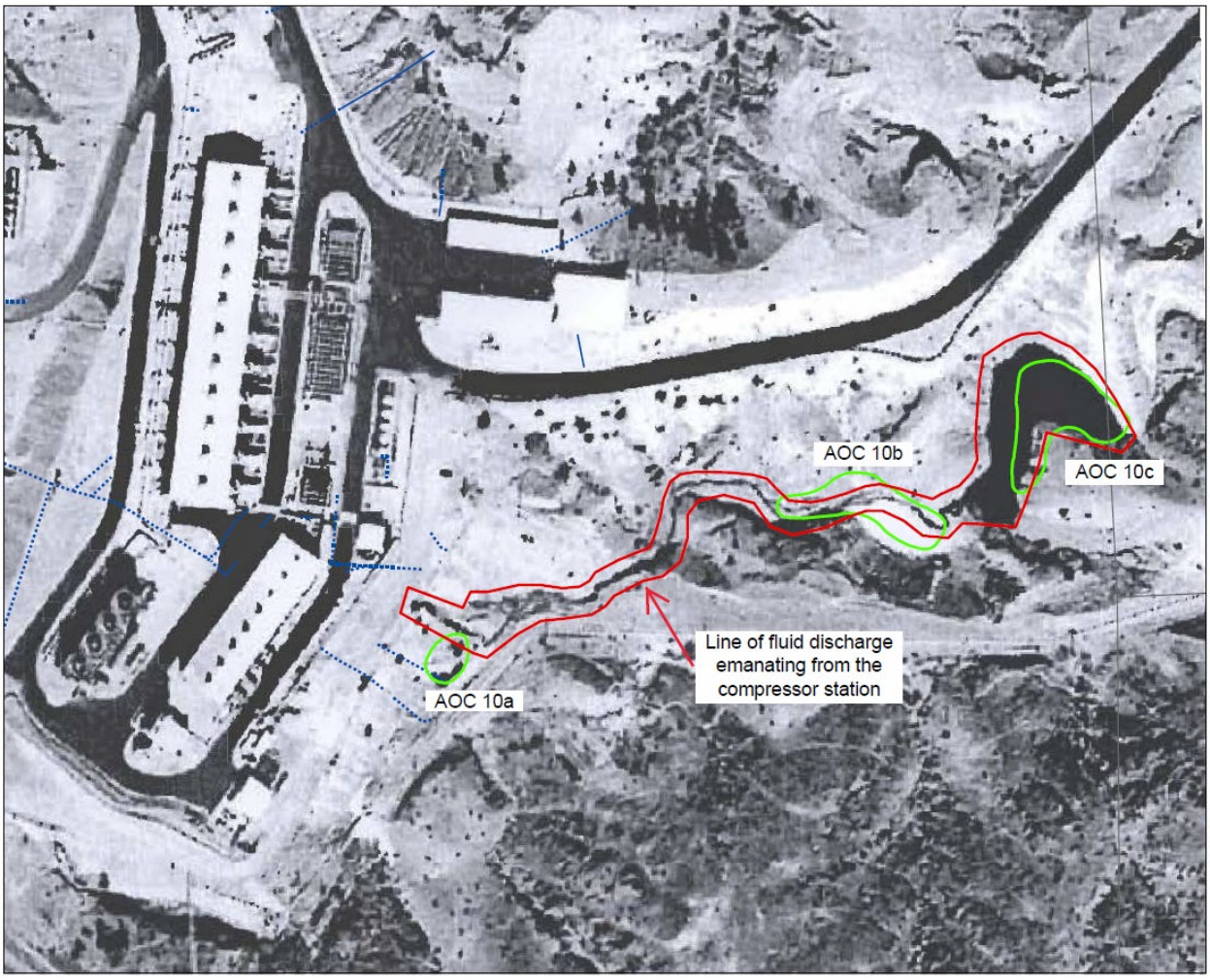
Three additional subareas (Subareas 10b, 10c, and 10d) where water and soil collect (either within lower-lying areas along the ravine course or behind berms) have been identified within the East Ravine and are shown in Figure 4-4a. Subarea 10b, a natural drainage depression in the upper portion of the ravine, is located in a flat area of the ravine. These three subareas are downstream from Subarea 10a.

In 2008, during a site walk, California Environmental Protection Agency, DTSC observed a layer of white powder material in the floor of the wash in three locations between Subareas 10c and 10d and collected samples from this area (sample locations DTSC-AOC10d-1 through DTSC-AOC10d-3). The material was approximately 1 inch wide, 15 inches long, and 0.25 inch thick and was similar in appearance to the white material in Bat Cave Wash and at the Railroad Debris Site. Samples collected from the powder indicated it contains elevated concentrations of calcium, chromium, copper, magnesium, sodium, and zinc.

In 2009, in response to DTSC's request in the conditional approval of the Soil Part A Work Plan (CH2M, 2006), PG&E mapped white powder and debris in the East Ravine. Miscellaneous debris consisted of pieces of metal, cans, tires, concrete rubble, tiles, and bricks. Furthermore, after a January 2010 storm event, three additional white powder areas were discovered on the northern face of the East Ravine. Per DTSC's request, these three white powder areas are included in this data summary.

In January 2011, additional historical aerial photographs of the compressor station were located and provided to DTSC. One photo (date unknown) indicated potential runoff of fluids from the station into East Ravine (Photograph 4-8). Runoff can be seen originating from a point upslope of Subarea 10a and flowing into East Ravine, and water appears to be impounded in Subarea 10c.

Per direction from DTSC, soil samples collected at AOC 10 as part of the 2015 through 2016 sampling effort included locations along this apparent line of runoff. Porewater and sediment sampling along the western shore of the Colorado River in the vicinity of the East Ravine was also conducted in response to comments from the DTSC and DOI on the RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Part A, PG&E Topock Compressor Station, Needles, California (CH2M, 2006).



Photograph 4-8: Historical aerial photograph of AOC 10 from unknown date showing potential fluid discharge from the compressor station to AOC 10.

4.1.4.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 10 are presented in Tables 3-6a through 3-6u and sampling locations are shown on Figures 3-6a through 3-6u. Screening level exceedances are summarized in the following paragraphs. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section.

Soil Results

Metals: Samples were collected from 74 locations at depths ranging from 0 to 60 feet bgs. The ISLs were exceeded for one or more of the following metals at locations across AOC 10: arsenic (background [BK]), barium (BK), cadmium (BK), CrVI (BK), total chromium (BK), cobalt (BK), copper (BK), lead (BK), mercury (BK), molybdenum (BK), nickel (BK), selenium (BK), thallium (residential regional screening level [RRSL]), and zinc (BK). The most frequently detected analytes exceeding the ISLs were CrVI, total chromium, copper, lead, mercury, molybdenum, nickel, and zinc as shown in Table 3-6a and Figures 3-6a through 3-6l. Sample locations along the northern face of the ravine were generally free of ISL exceedances while the samples within the ravine bottoms and corresponding flow paths (e.g., from the former trench drain) had the majority of the ISL exceedances.

- Hexavalent chromium was detected above its ISL (0.83 mg/kg) in 54 samples taken from depths between 0 and 10 feet bgs (Table 3-6a). The highest CrVI concentration of 2,700 mg/kg was detected at sample location AOC10-20 at 0 to 0.5 foot bgs. Sample location AOC10-20 was collected on the slope just below the compressor station fence line and the visitor parking lot (Figure 3-6c).
- Total chromium was detected above its ISL (39.8 mg/kg) in 66 samples taken from depths between 0 and 15 feet bgs (Table 3-6a). The highest total chromium concentration of 4,000 mg/kg was detected at sample location MW-58BR_S at 1.5 to 2 feet bgs. Sample location MW-58BR_S is a monitoring well in the bottom of the ravine, behind the impoundment that was constructed across the ravine (Figure 3-6d).
- Copper was detected above its ISL (20.6 mg/kg) at 65 samples taken from depths between 0 and 60 feet bgs (Table 3-6a). The highest copper concentration of 3,100 mg/kg was detected at sample location AOC10-21 at 0 to 0.5 foot bgs. Sample location AOC10-21 was collected on the slope just below the compressor station fence line and the visitor parking lot (Figure 3-6f).
- Lead was detected above its ISL (8.39 mg/kg) in 56 samples taken from depths between 0 and 10 feet bgs (Table 3-6a). The highest lead concentration of 920 mg/kg was detected at sample location AOC10-21 at 0 to 0.5 foot bgs. Sample location AOC10-21 was collected on the slope just below the compressor station fence line and the visitor parking lot on the compressor station (Figure 3-6g).
- Mercury was detected above its ISL (0.0125 mg/kg) in 11 samples taken from depths between 0 and 9 feet bgs (Table 3-6a). The highest mercury concentration of 35 mg/kg was detected at sample location AOC10-21 at 0 to 0.5 foot bgs. Sample location AOC10-21 was collected on the slope just below the compressor station fence line and the visitor parking lot (Figure 3-6h).
- Molybdenum was detected above its ISL (1.37 mg/kg) in 25 samples taken from depths between 0 and 18 feet bgs (Table 3-6a). The highest molybdenum concentration of 19 mg/kg was detected at sample location AOC10a-1 at 0 to 0.5 foot bgs. Sample location AOC10a-1 was collected near the outfall of a storm drain line near AOC-9 (Figure 3-6i).
- Nickel was detected above its ISL (27.3 mg/kg) in 11 samples taken from depths between 0 and 9 feet bgs (Table 3-6a). The highest nickel concentration of 51 mg/kg was detected at sample location AOC10-22 at 1 to 2 feet bgs. Sample location AOC10-22 was collected on the slope just below the compressor station fence line and the visitor parking lot (Figure 3-6j).
- Zinc was detected above its ISL (58 mg/kg) in 64 samples taken from depths between 0 and 30 feet bgs (Table 3-6a). The highest zinc concentration of 1,000 mg/kg was detected at sample location AOC10a-1 at 0 to 0.5 foot bgs. Sample location AOC10a-1 was collected near the outfall of a storm drain line near AOC-9 (Figure 3-6l).

The lateral extent of the exceedances has generally been defined for metals by samples with results below ISLs, not detected above reporting limits, or topographical features. The exceedances on the western side of AOC 10 are defined by the sources of contamination: runoff from the compressor station and discharges from storm drain pipes and the former trench drain. The exceedances on the northern slopes of the ravine and within the base of the ravine are defined by the flow path through AOC 10. There are locations that have detected metals results slightly above (up to 2 times) their respective ISLs. These minor exceedances of the ISLs are not considered a data gap that requires filling because to the factors of exceedance of the respective ISLs are so low.

The vertical extent of the exceedances are generally defined for CrVI, total chromium, lead, nickel, and zinc by samples with results below ISLs, not detected above reporting limits, or bedrock. Although there are locations where the deepest samples exceeded ISLs, this does not represent a data gap requiring further investigation because the concentrations in the deepest samples only slightly exceed (by 2 times or less) their respective ISLs, nearby samples define vertical extent, or the concentrations exceeding the ISLs are decreasing with depth.

The vertical extent of exceedances has not been defined for copper (MW-58BR_S, AOC10-5), mercury (AOC10a-3), and molybdenum (AOC10-OS1 and MW-57BR). Deeper samples would be difficult to collect in these areas (e.g., steep slope, bedrock), and would cause significant disturbance, but vertical extent may be further defined during remediation if implemented in this area.

CLP Inorganics: Samples were collected from 13 locations (a subset of the total AOC 10 locations) at depths ranging from 0 to 3 feet bgs. The ISLs were exceeded for one or more of the following metals: for aluminum (BK), calcium (BK), iron (BK), magnesium (BK), manganese (BK), and sodium (BK). Manganese was the only analyte detected over the ISL more than once, as shown in Table 3-6b.

- Manganese was detected above its ISL (402 mg/kg) in two samples taken from depths between 0 and 0.5 foot bgs (Table 3-6b). The highest manganese concentration of 1,300 mg/kg was detected at sample location AOC10-5 at 0 to 0.5 foot bgs. Sample location AOC10-5 was collected in the impoundment area between the two access roads in eastern part of the ravine.

Only two surface samples were collected, limiting the definition of lateral extent. Only one sample was collected below 1 foot bgs, limiting the definition of vertical extent. This limited definition for CLP inorganics is not considered a data gap requiring further investigation.

PAHs: Samples were collected from 58 locations at depths ranging from 0 to 60 feet bgs. PAHs were evaluated by calculating B(a)P equivalents for human health and low molecular weight and HMW PAH values for ecological receptors. The ISLs for B(a)P equivalents (RRSL) and HMW PAHs (ECV) were exceeded at one or more locations, as shown in Table 3-6c and Figures 3-6m and 3-6n. The highest concentrations of PAHs were detected at the top of the slope near the compressor station.

- B(a)P equivalent exceeded the ISL (110 µg/kg) in 16 samples taken from depths between 0 and 3 feet bgs (Table 3-6c). The highest B(a)P equivalent concentration of 8,200 mg/kg was detected at sample location PA-19 at 0 to 1 foot bgs. Sample location PA-19 was collected at the top of the slope near the compressor station fence line (Figure 3-6m).
- HMW PAHs exceeded the ISL (1,160 mg/kg) in 10 samples taken from depths between 0 and 3 feet bgs (Table 3-6c). The highest HMW PAH concentration of 32,900 µg/kg was detected at sample location PA-19 at 0 to 1 foot bgs. Sample location PA-19 was collected at the top of the slope near the compressor station fence line (Figure 3-6n).

The lateral extents of the exceedances have mostly been defined by samples with results below ISLs, not detected above reporting limits, or topographical features. There are several locations that have detected PAH results slightly above (less than 2 times) their respective ISLs. These minor exceedances of the ISLs are not considered a data gap that requires filling because the factors of exceedance of the respective ISLs are so low.

The vertical extents of the exceedances have been defined by samples with results below ISLs, except at SD-02, where B(a)P equivalents and HMW PAHs exceeded their respective ISLs. Deeper samples could not be collected at this location because of bedrock refusal; therefore, these exceedances are defined by bedrock and do not represent a data gap requiring further investigation.

VOCs and SVOCs: Samples were collected from 37 locations at depths ranging from 0 to 60 feet bgs and no samples had detected results that exceeded their respective ISLs (Table 3-6d).

TPH: Samples were collected from 43 locations at depths ranging from 0 to 60 feet bgs. The ISL for TPH as diesel (RWQCB environmental screening level [ESL]) was exceeded at the following locations: AOC10-21, 22, 23, and SD-02, as shown in Table 3-6e and Figure 3-6o.

- TPH as diesel was detected above its ISL (230 mg/kg) in five samples taken from depths between 0 and 3 feet bgs (Table 3-6e). The highest TPH as diesel concentration of 4,000 mg/kg was detected at

sample location AOC10-21 at 0 to 0.5 foot bgs. Sample location AOC10-21 was collected on the slope just below the compressor station fence line and the visitor parking lot (Figure 3-6o).

The lateral extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits. The vertical extent of exceedances has been defined by samples with results below ISLs or not detected above reporting limits except at SD-02, where TPH as diesel exceeded the ISL in the deepest sample. Deeper samples could not be collected at this location because of bedrock refusal; therefore, the exceedance in the deepest sample at this location is defined by bedrock and does not represent a data gap requiring further investigation.

General Chemistry: Samples were collected from 45 locations at depths ranging from 0 to 11.5 feet bgs (Table 3-6f). There are no ISLs for general chemistry parameters.

Pesticides: Samples were collected from 16 locations at depths ranging from 0 to 10 feet bgs. No samples had detected results that exceeded their respective ISLs (Table 3-6g).

PCBs: Samples were collected from 39 locations at depths ranging from 0 to 15 feet bgs. PCBs were evaluated as individual Aroclors and as total PCBs. The ISLs for Aroclor 1248 (RRSL), Aroclor 1254 (RRSL), and total PCBs (ECV) were exceeded at one or more of the following locations: AOC10-15, AOC10a-3, and PA-18.

- Aroclor 1248 was detected above the ISL (230 µg/kg) in one sample: AOC10-15 at 2 and 3 feet bgs (Table 3-6h). Aroclor 1248 was detected at 320 µg/kg. Sample location AOC10-15 was collected in a debris pile.
- Aroclor 1254 were detected above the ISL (240 µg/kg) in three samples taken from depths between 0 and 2 feet bgs (Table 3-6h). The highest Aroclor 1254 concentration of 990 µg/kg was detected at sample location AOC10-15 at 0 to 1 foot bgs. Sample location AOC10-15 was collected in a debris pile.
- Total PCBs were detected above the ISL (204 µg/kg) in five samples taken from depths between 0 and 6 feet bgs (Table 3-6h). The highest total PCB concentration of 1,007 µg/kg was detected at sample location AOC10-15 at 0 to 1 foot bgs. Sample location AOC10-15 was collected in a debris pile (Figure 3-6p).

The lateral and vertical extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits.

Dioxins and Furans: Samples were collected from 28 locations at depths ranging from 0 to 15 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. The ISLs for TEQ human (RRSL), TEQ avian (ECV), and TEQ mammal (ECV) were exceeded at one or more locations as shown in Table 3-6i and Figures 3-6r and 3-6s.

- TEQ avian exceeded the ISL (16 ng/kg) in 27 samples taken from depths between 0 and 6 feet bgs (Table 3-6i). The highest TEQ avian concentration of 1,100 ng/kg was detected at sample location PA-20 at 0 to 1 foot bgs. Sample location PA-20 was collected on the slope just below the compressor station fence line and the visitor parking lot (Figure 3-6q).
- TEQ human exceeded the ISL (50 ng/kg) in 22 samples taken from depths between 0 and 9 feet bgs (Table 3-6i). The highest TEQ human concentration of 1,600 ng/kg was detected at sample location PA-20 at 0 to 1 foot bgs. Sample location PA-20 was collected on the slope just below the compressor station fence line and the visitor parking lot (Figure 3-6r).
- TEQ mammal exceeded the ISL (5.58 ng/kg) in 43 samples taken from depths between 0 and 9 feet bgs (Table 3-6i). The highest TEQ mammal concentration of 1,600 ng/kg was detected at sample location PA-20 at 0 to 1 foot bgs. Sample location PA-20 was collected on the slope just below the compressor station fence line and the visitor parking lot (Figure 3-6s).

The lateral extents of TEQ avian and human exceedances have been defined by samples with results below ISLs, not detected above reporting limits or topographical features.

The vertical extents of TEQ avian and human exceedances has been defined by samples with results below ISLs or not detected above reporting limits except for the following sample locations: AOC10-12, AOC10-24, AOC10-26, AOC10b-1, PA-20, and PA-21. Deeper samples could not be collected at AOC10-12, AOC10-24, AOC10-26, and AOC10b-1 because of bedrock refusal; therefore, these exceedances are defined by bedrock and do not represent a data gap requiring further investigation. Vertical extent data gaps at PA-20 and PA-21 may be filled during remediation if implemented in this area.

The lateral and vertical extents of the TEQ mammal exceedances have not been defined by samples with results below ISLs or not detected above reporting limits. These exceedances of the ISLs do not represent a data gap requiring further investigation because the TEQ mammal ISL (5.58 ng/kg) is the most conservative and lowest screening level for dioxin TEQ. Further investigation to assess the vertical extent of TEQ mammal is not warranted.

Sediment and Porewater Results

A total of 35 sediment samples and 16 pore water samples were collected from the vicinity of the mouth of East Ravine. Sediment samples collected from depths between 0 and 2 feet below sediment surface (bss) were analyzed for Title 22 metals, CrVI, PAHs, VOCs, SVOCs, dioxins and furans, and PCBs. Sediment samples collected from depths between 5.5 and 6 feet bss were analyzed for total chromium, CrVI, molybdenum, PAHs, VOCs, SVOCs, and PCBs. Sediment results are presented in Table 3-6k through 3-6o. Pore water samples were collected from 1 foot and 6 feet bss and analyzed for Title 22 metals, CrVI, CLP inorganics, and general chemistry parameters, and field parameters. Porewater results are presented in Table 3-6p through 3-6r

Metals in Sediment: The ISLs were exceeded at one or more locations for the following analytes: arsenic (consensus-based threshold effect concentration [TEC]), barium (BK), copper (TEC), lead (TEC), molybdenum (BK), selenium (BK), and zinc (TEC) as presented in Table 3-6k and Figures 3-6t and 3-6u. The majority of the exceedances were less than 2 times the ISLs and/or were not detected in the deepest sediment samples; therefore, these exceedances do not represent a data gap requiring further investigation. Zinc was detected slightly above twice the ISL at ERPW-6 between 1 and 2 feet bss, but is bound by nearby sediment samples, and therefore does not represent a data gap requiring further investigation.

Dioxins and Furans in Sediment: Dioxins and furans were analyzed at three sample locations at depths ranging from 0 to 2 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. Detected results for TEQ avian, human, and mammal were not above their respective ISLs or background values, as shown in Table 3-6o.

Other Analytes in Sediment: In addition, PCBs (Table 3-6n), PAHs (Table 3-6l), VOCs, and SVOCs were not detected above laboratory reporting limits in sediment samples.

Metals in Porewater: Antimony, arsenic, barium, total chromium, cobalt, copper, lead, molybdenum, nickel, and vanadium were detected at one or more of the porewater sample locations (Table 3-6p). These detected were well below the surface water screening levels.

No data gaps were identified for the sediment and porewater samples.

4.1.4.4 AOC 10 Conceptual Site Model

A graphical CSM and cross section have been developed for AOC 10 based on the above site history and background and are shown in Figures 4-4a through 4-4c. The primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for

AOC 10 are presented in Exhibit 4-8. Yellow arrows shown in Figure 4-4a represent flow within the East Ravine, and blue arrows represent surface water flow into the East Ravine. A detailed discussion of the migration pathways, exposure media, exposure routes, and human and ecological receptors is included in *Data Quality Objectives Technical Memorandum – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Soil Part A DQOs TM) (CH2M, 2010), and is summarized in the following paragraphs, with updated information..

For AOC 10, the primary potential sources of contamination are (1) runoff from the compressor station, the access road to the compressor station, and AOC 9; (2) discharge from stormwater drain pipes; (3) surface debris disposed of on the slopes of the ravine; and (4) incidental overflows of chromium-containing hot well (AOC 19) cooling water via the former trench drain at the top of the station access road. Potential releases would primarily have been in liquid form and would have affected surface soil. Releases from debris, whether consisting of solid particles or dissolved constituents, would also have affected surface soil. The highest concentrations of contaminants generally occur along on the slope near the compressor station fence line and along the ravine flow path.

The presence of CrVI, total chromium, and molybdenum as AOC 10 is likely related to the release of cooling water via the former trench drain. The presence of wear metals (copper, nickel, zinc, and lead), PAHs, and PCBs is likely related to runoff from the compressor station and access road, stormwater discharge, and to the disposal of debris (e.g., pieces of metal, cans, tires, concrete rubble, tiles, and bricks) on the ravine slopes. Mercury contamination at AOC 9 may have migrated to AOC 10 via runoff. The primary source of dioxins/furans at the site are residuals from apparent historical burning of compressor station waste.

The soil samples collected in the areas of white powder along the northern slope of the ravine (AOC10-13, -14, and -17) did not show elevated concentrations of metals consistent with the metals detected in the white powder samples collected between Subareas 10c and 10d. This indicates the white powder along the northern slope of the ravine did not contribute to surface soil contamination in this area.

Surface soil is the primary source medium. From surface soil, contaminants could have migrated to shallow and deeper soils; shallow soils may act as a secondary source medium to subsurface soil and subsurface soil may act as a secondary source medium to groundwater. Periodic rainfall events and runoffs to the East Ravine would have pooled in the drainage depressions identified as Subareas 10b, 10c, and 10d. In these subareas, contaminants could potentially be driven deeper and could potentially reach groundwater. The analytical results for AOC 10 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time

A secondary source may also include contaminated windblown dust. For AOC 10, windblown dust contamination, either from AOC 9 or other areas of the East Ravine, could have been deposited in the ravine or on shallow portions of the banks of the ravine. Windblown contamination, if any, is expected to be limited to surface soils.

Because of the berms within East Ravine, surface flow to the Colorado River is not considered a significant potential migration pathway. One berm, the lower dirt road berm associated with old Route 66, was constructed prior to the development of the station. The berm associated with the Southern California Gas Pipeline road was constructed around the time the station was built. Although a culvert exists in the lower dirt road berm, COPCs concentrations east of this road are low, and there are no reports of flow through the culvert. Hexavalent chromium was not detected, and total chromium was below background in the soil sample immediately east of the lower dirt road berm.

Exhibit 4-8. Conceptual Site Model – AOC 10 – East Ravine
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Runoff from compressor station, compressor station access road, and AOC 9 **COCs Include:** • Metals • PCBs • PAHs	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation • Potential discharge of groundwater to surface water [a]	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals
Incidental overflows of chromium-containing cooling water via the former trench drain **COCs Include:** • Metals	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation • Potential discharge of groundwater to surface water [a]	
Discharge from compressor station via stormwater drains **COCs Include:** • Metals • PCBs • PAHs	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation • Potential discharge of groundwater to surface water [a]	
Disposal of Debris **COCs Include:** • Metals • PCBs • PAHs	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation • Potential discharge of groundwater to surface water [a]	

Note:

[a] Discharge to surface water is an insignificant transport pathway as evaluated in the groundwater risk assessment (Arcadis, 2009c).

4.1.4.5 Evaluation of Data Against Data Quality Objectives for AOC 10

Decision 1 (Nature and Extent Determination): Nature and extent has not been sufficiently defined vertically for the following compounds and associated areas:

- Vertical extent of copper has not been defined within Subarea AOC 10c and downgradient of the Southern California Gas Pipeline road berm
- Vertical extent of mercury has not been defined for Subarea AOC 10a
- Vertical extent of molybdenum has not been defined at the Southern California Gas Pipeline road berm and upgradient of Subarea AOC 10a on the access road that runs south of AOC 10
- Vertical extent of dioxins/furans has not been defined on slope just below the compressor station fence line and the visitor parking lot

Analytical results are presented in Tables 3-6a through 3-6r and on Figures 3-6a through 3-6u. A summary of the frequency of detection, maximum detected value, and number of exceedances in soil samples against each screening value is presented in Table 3-6j.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 242 soil samples were collected from 78 locations ranging from 0 to 60 feet bgs for AOC 10. The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, TPH, general chemistry, pesticides, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. No data gaps were identified in the Soil RFI/RI Work Plan (CH2M, 2013a).

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are insufficient to support CMS/FS and/or IMs. The following data gap was identified in the Soil RFI/RI Work Plan: Soil physical parameters to support the CMS/FS.

No samples from AOC 10 were analyzed for soil characteristics during implementation of the RFI/RI Work Plan. This data gap will be addressed during remedial design if necessary at AOC 10.

Additional Considerations: Recommend removal and disposal of surficial debris material be carried forward to CSM/FS.

4.1.5 AOC 11 – Topographic Low Areas

4.1.5.1 Setting

AOC 11 consists of seven topographic low areas (AOCs 11a through 11g) on the northeast side of the TCS as shown in Figure 2-1. AOC 11 is located on PG&E, HNWR, and San Bernardino County property. AOC 11 is an internally draining basin where stormwater runoff from the TCS, north of the TCS, I-40, from the TCS access road, and from the Transwestern Bench collects and infiltrates or evaporates.

4.1.5.2 Unit History

Multiple storm drains discharge to this area, and several former storm drains are believed to have discharged to this area in the past. In addition, portions of AOC 11 also receive discharge from the station

access road. A historical engineering drawing shows that some cooling water blowdown may initially have been discharged to AOC11 via the storm drain system (PG&E, 1957a) and a former employee reported that he observed a release from Cooling Tower B that entered the ravine containing AOC 11 (CH2M, 2012).

The original plant access road ran through the area now identified as AOC 11a. A stormwater pipe that captures runoff from I-40 and National Trails Highway discharges into AOC 11 north of AOC 11a immediately south of the I-40 overcrossing. Stormwater runoff from I-40 could have resulted in the release of TPH, PAHs, lead, and wear metals (including barium, chromium, copper, nickel, and zinc) into AOC 11, and specifically AOC 11a, that are not a result of PG&E's operations at the Topock Compressor Station. Substantial flow from the I-40 stormwater pipe has been observed. After storm events, water pools in area AOC11a and does not readily percolate.

AOCs 11c and 11e are associated with the remnants of two small former check berms. These check berms may have been constructed to prevent stormwater damage to a gas pipeline and a former access road to the compressor station. A new area of white powder was observed upslope of AOC 11e following a January 2010 rain event. This area is located on the steep slope below the northeastern portion of the compressor station and may represent native materials. This area is not accessible by equipment. The white powder is no longer present and is likely a result of an evaporite deposit following the rain event. A similar white powder area was also observed above AOC 1, at a similar elevation following the same rain event.

AOC 11f captures a portion of runoff originating from the compressor station that flows down the station access road. AOC 11f also contains an area where fire training operations were reported to occur. According to former employee interviews, fire training exercises were conducted near the location of the current decontamination pad and Transwestern Meter Station. Materials that were burned during fire training exercises consisted primarily of scrap wood. Fire drills were reportedly later expanded to include extinguishing diesel fires in a 55-gallon drum. Miscellaneous debris (concrete and other material) are located in the drainage north of 11f.

AOC 11g is located between the station access road and the Colorado River, north of the Route 66 sign. AOC 11g may have received runoff from the station access road.

4.1.5.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 11 are presented in Tables 3-7a through 3-7j and sampling locations are shown on Figures 3-7a through 3-7o. Screening level exceedances are summarized in the following paragraphs. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section.

Metals: Samples were collected from 56 locations at depths ranging from 0 to 70 feet bgs. The ISLs were exceeded for one or more of the flowing metals at locations across AOC 11: arsenic (background [BK]), barium (BK), cadmium (BK), CrVI (BK), total chromium (BK), copper (BK), lead (BK), mercury (ECV), molybdenum (BK), selenium (BK), vanadium (BK), and zinc (BK). The metals most frequently detected above the ISL were CrVI, total chromium, copper, lead, molybdenum, and zinc, as shown in Table 3-7a and Figures 3-7a through 3-7g. The highest concentrations were generally found along the slope below the compressor station eastern fence line and within AOCs 11c and 11e.

- Hexavalent chromium was detected above its ISL (0.83 mg/kg) in 29 samples taken from depths between 0 and 10 feet bgs (Table 3-7a). The highest CrVI concentration of 16 mg/kg was detected at sample location AOC11e-6 at 0 to 1 foot bgs. Sample location AOC11e-6 was collected on the slope below AOC 6 (Figure 3-7b).
- Total chromium was detected above its ISL (39.8 mg/kg) in 22 samples taken from depths between 0 and 20 feet bgs (Table 3-7a). The highest total chromium concentration of 320 mg/kg was detected at

sample location AOC11e-6 at 0 to 1 foot bgs. Sample location AOC11e-6 was collected on the slope below AOC 6 (Figure 3-7c).

- Copper was detected above its ISL (16.8 mg/kg) in 28 samples taken from depths between 0 and 15 feet bgs (Table 3-7a). The highest copper concentration of 44 mg/kg was detected at sample location SD-11A at 2 to 3 feet bgs. Sample location SD-11A was collected near the outfall of an inactive storm drain line (Figure 3-7d).
- Lead was detected above its ISL (8.39 mg/kg) in 58 samples taken from depths between 0 and 10 feet bgs (Table 3-7a). The highest lead concentration of 220 mg/kg was detected at sample location AOC11-7 at 0 to 1 foot bgs. Sample location AOC11-7 was collected in a topographic low point to the east of the TCS access road in an area the receives runoff from the access road and the former railroad route (Figure 3-7e).
- Molybdenum was detected above its ISL (1.37 mg/kg) in 17 samples taken from depths between 0 and 20 feet bgs (Table 3-7a). The highest molybdenum concentration of 7.1 mg/kg was detected at sample location AOC11g-OS1 at 8.5 to 9 feet bgs. Sample location AOC11g-OS1 was collected along the TCS access road (Figure 3-7f).
- Zinc was detected above its ISL (58 mg/kg) in 58 samples taken from depths between 0 and 10 feet bgs (Table 3-7a). The highest zinc concentration of 1,100 mg/kg was detected at sample location SD-11 at 0 to 0.5 foot bgs. Sample location SD-11 was collected near the outfall of inactive Storm Drain Line 8 (Figure 3-7g).

The lateral extents of the exceedances have been defined by samples with results below ISLs and topographical features, except at AOC11-6 through AOC11-9 where lead and zinc exceeded their respective background values/ISLs. The exceedances for zinc were less than 2 times the ISL and do not represent a data gap requiring further investigation. The exceedances for lead ranged from 2.5 to 26 times the ISL and therefore, the lateral extent of zinc contamination is not defined in the vicinity of AOC 11g.

The vertical extents of metal exceedances have been defined for most areas by samples with results below ISLs. Although there are locations where the deepest samples exceeded ISLs, the factors of exceedance are low, and are not contributing to unacceptable risk and do not represent a data gap that requires filling. Many of the exceedances only slightly exceed (by 2 times or less) their respective ISLs or nearby samples define vertical extent.

The following compounds exceed their ISL by more than 2 times in the deepest sample collected:

- Barium in the vicinity of AOC 11a (factor of exceedance [FOE] 1.2 to 2.4)
- Hexavalent chromium at SD-08 (2 to 3 feet bgs) (FOE 3.3) and AOC11a-1 (9 to 10 feet bgs) (FOE 3.6)
- Copper at SD-08 (2 to 3 feet bgs) (FOE 2.1)
- Lead at AOC11-8 (2 to 3 feet bgs) (FOE 3.3)
- Molybdenum at AOC11g-OS1 (8.5 to 9 feet bgs) (FOE 5.2)
- Zinc at SD-10 (2 to 3 feet bgs) (FOE 3.1)

These vertical data gaps may be filled during remediation if implemented in this area.

CLP Inorganics: Samples were collected from 16 locations at depths ranging from 0 to 3 feet bgs. The ISLs were exceeded for one or more compounds in locations across AOC 11: aluminum (BK), manganese (BK), potassium (BK), and sodium (BK). The analytes detected above their respective ISLs in more than one sample were aluminum, potassium, and sodium, as shown in Table 3-7b.

- Aluminum was detected above its ISL (16,400 mg/kg) in two samples taken from depths between 0 and 0.5 foot bgs (Table 3-7b). The highest aluminum concentration of 20,000 mg/kg was detected at

sample location AOC11a-2 at 0 to 0.5 foot bgs. Sample location AOC11a-2 was collected in a topographic low point that received runoff from I-40.

- Potassium was detected above its ISL (4,400 mg/kg) in two samples taken from depths between 0 and 0.5 foot bgs (Table 3-7b). The highest potassium concentration of 5,300 mg/kg was detected at sample location AOC11d-1 at 0 to 0.5 foot bgs. Sample location AOC11d-1 was collected in a topographic low point near the Transwestern Meter Station and received runoff from the compressor station.
- Sodium was detected above its ISL (2,070 mg/kg) in two samples taken from depths between 0 and 3 feet bgs (Table 3-7b). The highest sodium concentration of 4,300 mg/kg was detected at sample location AOC11e-6 at 0 to 1 foot bgs. Sample location AOC11e-6 was collected on the slope below AOC-6.

The lateral extents of the exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or topographical features . The vertical extent of the exceedances has not been defined; however, the detected CLP inorganics results are only slightly above (2.1 times or less) their respective ISLs. These minor exceedances of the ISLs are not considered a data gap that requires further investigation.

PAHs: Samples were collected from 56 locations at depths ranging from 0 to 70 feet bgs. PAHs were evaluated by calculating B(a)P equivalents for human health and low molecular weight and HMW PAH values for ecological receptors. The ISLs for B(a)P equivalents (RRSL) and HMW PAHs (ECV) were exceeded at one or more locations, as shown in Table 3-7c and Figures 3-7h and 3-7i. The highest concentrations of PAHs were mostly found below the compressor station fence line and in AOCs 11e, 11c, and 11b.

- B(a)P equivalent was detected above its ISL (110 µg/kg) in 16 samples taken from depths between 0 and 6 feet bgs (Table 3-7c). The highest B(a)P equivalent concentration of 2,300 µg/kg was detected at sample location PA-10 at 0 to 1 foot bgs. Sample location PA-10 was a perimeter sample collected near eastern the compressor station fence line (Figure 3-7h).
- HMW PAH was detected above its ISL (1,160 µg/kg) in 10 samples taken from depths between 0 and 6 feet bgs (Table 3-7c). The highest HMW PAH concentration of 18,180 µg/kg was detected at sample location PA-10 at 0 to 1 foot bgs. Sample location PA-10 was a perimeter sample collected near the eastern compressor station fence line (Figure 3-7i).

The lateral and vertical extents of the exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or topographical features.

VOCs and SVOCs: Samples were collected from nine locations at depths ranging from 2 to 3 feet bgs. Methyl acetate was the only organic detected above laboratory reporting limits. No samples had detected results that exceeded their respective ISLs (Table 3-7d).

TPH: Samples were collected from 45 locations at depths ranging from 0 to 10 feet bgs (Table 3-7e and Figure 3-7j). The ISL for TPH as diesel (environmental screening level [ESL]) was exceeded at two locations: SD-11 and SD-11A. Samples SD-11 and SD-11A were collected on the slope below the eastern compressor fence line.

The lateral extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits. The vertical extent of exceedances has been defined at all locations except SD-11A, where the deepest sample slightly exceeded the ISL. This minor exceedance is not considered a data gap requiring further investigation because the exceedance was only 1.1 times greater than the ISL.

General Chemistry: Samples were collected from 28 locations at depths ranging from 0 to 10 feet bgs. No samples had detected results that exceeded their respective ISLs .

Pesticides: Samples were collected from 14 locations at depths ranging from 0 to 70 feet bgs (Table 3-7g). The ISLs for 4,4-DDE (ECV) and dieldrin (ECV) were exceeded in one sample, AOC11d-1, from 0 to 0.5 foot bgs. Sample location AOC11d-1 was collected in a topographic low point near the Transwestern Meter Station.

The lateral and vertical extents of the exceedances have been defined by samples with results below ISLs or not detected above reporting limits.

PCBs: Samples were collected from 35 locations at depths ranging from 0 to 70 feet bgs. PCBs were evaluated as individual Aroclors and as total PCBs. The ISLs for Aroclor 1254 (RRSL), Aroclor 1260 (RRSL), and total PCBs (ECV) were exceeded at one or more locations as shown in Table 3-7h and Figure 3-7k and 3-7l. The highest concentrations of PCBs were found below the compressor station fence line.

- Aroclor 1254 was detected above the ISL (240 µg/kg) in eight samples taken from depths between 0 and 6 feet bgs (Table 3-7h). The highest concentration of 1,600 µg/kg was detected at sample location SD-OS37 at 0 to 0.5 foot bgs. Sample location SD-OS37 was collected along the eastern compressor station fence line (Figure 3-7k).
- Aroclor 1260 was detected above the ISL (240 µg/kg) in four samples taken from depths between 0 and 6 feet bgs (Table 3-7h). The highest concentration of 1,000 µg/kg was detected at sample location SD-11A at 0 to 1 foot bgs. Sample location SD-11A was collected near the outfall of Storm Drain Line 8.
- Total PCBs were detected above the ISL (204 µg/kg) in 10 samples taken from depths between 0 and 6 feet bgs (Table 3-7h). The highest concentration of 1,927 µg/kg was detected at sample location SD-OS37 at 0 to 0.5 foot bgs. Sample location SD-OS37 was collected along the compressor station fence line (Figure 3-7l).

The lateral extents of the exceedances have been defined by samples with results below ISLs or not detected above reporting limits. The vertical extents of the exceedances have been defined by samples with results below ISLs, except at SD-11A where total PCBs exceeded its ISL in the deepest sample. PCBs and total PCBs concentrations are decreasing with depth at SD-11A and the exceedance in the deepest sample (5 to 6 feet bgs) at this location exceeds the ISL only by a factor of 1.2; therefore, this data gap does not warrant further investigation.

Dioxins and Furans: Samples were collected from 33 locations at depths ranging from 0 to 10 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. The ISLs for TEQ avian (ECV), TEQ human (RRSL), and TEQ mammals (ECV) were exceeded at one or more locations, as shown in Table 3-7i and Figures 3-7m through 3-7o. The highest concentrations of dioxins and furans were detected below the compressor station fence line and at AOC 11e.

- TEQ avian exceeded the ISL (16 ng/kg) in 20 samples taken from depths between 0 and 10 feet bgs (Table 3-7i). The highest TEQ avian concentration of 2,200 ng/kg was detected at sample location AOC11e-1 at 2.5 to 3 feet bgs. Sample location AOC11e-1 was collected on the slope below AOC-6 (Figure 3-7m).
- TEQ human exceeded the ISL (50 ng/kg) in 18 samples taken from depths between 0 and 10 feet bgs (Table 3-7i). The highest TEQ human concentration of 3,200 ng/kg was detected at sample location AOC11e-1 at 2.5 to 3 feet bgs. Sample location AOC11e-1 was collected on the slope below AOC-6 (Figure 3-7n).
- TEQ mammal exceeded the ISL (34 ng/kg) in 34 samples taken from depths between 0 and 10 feet bgs (Table 3-7i). The highest TEQ mammal concentration of 3,200 ng/kg was detected at sample location AOC11e-1 at 2.5 to 3 feet bgs. Sample location AOC11e-1 was collected on the slope below AOC-6 (Figure 3-7o).

The lateral extent of TEQ avian and human exceedances have been defined by samples with results below the RRSL, not detected above reporting limits, or topographical features.

The vertical extent of TEQ avian and human exceedances has been defined by samples with results below ISLs or not detected above reporting limits except for the samples collected in or near AOC11e and at PA-11 and SD-11A, these data gaps may be filled during remediation if implemented in this area.

The lateral and vertical extents of the TEQ mammal exceedances have not been defined by samples with results below ISLs or not detected above reporting limits. These exceedances of the ISLs do not represent a data gap requiring further investigation because the TEQ mammal ISL (5.58 ng/kg) is the most conservative screening level for dioxin TEQ. Further investigation to assess the vertical extent of TEQ mammal is not warranted.

4.1.5.4 AOC 11 Conceptual Site Model

A graphical CSM has been developed for AOC 11 based on the site history, background, and newly identified areas, as shown on Figure 4-5. The primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 11 are presented in Exhibit 4-9. A detailed discussion of the migration pathways, exposure media, exposure routes, and human and ecological receptors is included in *Data Quality Objectives Technical Memorandum – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Soil Part A DQOs TM) (CH2M, 2010), and is summarized in the following paragraphs, with updated information..

The primary source of contamination to AOC 11 is runoff from the compressor station, the access road to the compressor station, the Transwestern Meter Station area, and I-40. Multiple storm drains discharge to this area, and several former storm drains are believed to have discharged to this area in the past. Cooling water may have initially been released to AOC 11 through the storm drain system. Sheet flow surface runoff from the station could also have entered this unit from areas where the edge of the compressor station lacked curbs. Potential releases from railroad debris below the station access road (asphalt, a metal sign, ceramic plates, glass resistors, and concrete were observed during 2008 field activities) may also contribute to contamination at AOC 11.

The presence of wear metals (copper, zinc, and lead), PAHs, and PCBs may be related to runoff from the compressor station and access road and stormwater discharge. The presence of CrVI, total chromium, and molybdenum may be related to the potential release of cooling water via the storm drain system. The distribution of contamination at the site is consistent with drainage and stormwater flows from the compressor station.

The primary source of dioxins and furans at the site are residuals from apparent historical burning of compressor station waste; however, the potential burn area within AOC 11f does not show elevated concentration of PAHs or dioxins/furans. Dioxins and furans display a similar concentration distribution as other compounds, with the highest concentrations below the compressor station fence line and at the nearest topographic low point, AOC 11e.

Stormwater runoff from I-40 could have also resulted in the release of PAHs, lead, and wear metals and galvanized coatings (including barium, chromium, copper, nickel, and zinc) into AOC 11, especially AOC Subarea 11a, that are not a result of compressor station activities.

Runoff from the various potential source areas would have discharged to surface soil and collected in low areas within the AOC. The primary source medium is therefore surface soil. From surface soil, contaminants could have migrated to shallow and deeper soils. Shallow soils may act as a secondary source medium to subsurface soil, and subsurface soil may act as a secondary source medium to groundwater. After storm events, water pools in AOC 11a (the largest topographic low area) and does not readily infiltrate. Historically, water may have also pooled behind the two check berms in AOCs 11c and 11e. Although these structures have been breached and no longer retain water, accumulated fine-grained soils are present behind the berm at AOC 11c. Laterally, COPCs or COPECs in soil would generally be expected to be limited to the area along the topographic drainages. With the exception of Subarea 11g,

Exhibit 4-9. Conceptual Site Model – AOC 11
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PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Medium	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Runoff from compressor station, compressor station access road, Transwestern Meter Station area, and I-40 **COCs Include:** • Metals • PCBs • PAHs	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/ • Potential discharge of groundwater to surface water [a]	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals
Discharge from compressor station via stormwater drains **COCs Include:** • Metals • Hexavalent Chromium • Total Chromium	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion • Potential discharge of groundwater to surface water [a]	
Disposal of Debris **COCs Include:** • Metals • PCBs • PAHs	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil • Potential Groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion • Potential discharge of groundwater to surface water [a]	
Burnt Material **COCs Include:** • Dioxins and Furans	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Surface Soil • Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil	

Notes:

[a] Discharge to surface water is an insignificant transport pathway as evaluated in the groundwater risk assessment (Arcadis, 2009c).

all of the low points within this unit are terminal low points, and flow cannot exit the AOC 11 area. At these low points, contaminants could potentially be driven deeper and could potentially reach groundwater; however, migration to groundwater has been ruled out by vadose zone modeling. The analytical results for AOC 11 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time. Runoff down the station access road periodically reaches Subarea 11g. A significant volume of flow may result in runoff over the Subarea 11g bank and down the slope toward the Colorado River.

Another potential source of contamination to AOC 11 may also include contaminated windblown dust. Contaminated surface soil (either within AOC 11 or from the adjacent compressor station) may have been eroded by wind and deposited at the ground surface within AOC 11.

4.1.5.5 Evaluation of Data Against Data Quality Objectives for AOC 11

Decision 1 (Nature and Extent Determination): Nature and extent has not been sufficiently defined laterally and/or vertically for the following compounds and associated areas:

- Vertical extent of barium and CrVI in the vicinity of AOC 11a
- Vertical extent of CrVI, copper, and zinc on the slope below the eastern compressor fence line
- Vertical extent of lead downgradient of AOC 11g
- Vertical extent of molybdenum along the TCS access road upgradient of AOC 11g
- Lateral extent of zinc in the vicinity of AOC 11g

Analytical results are presented in Tables 3-7a through 3-7i and on Figures 3-7a through 3-7o. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-7j.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 195 samples were collected from 55 locations ranging from 0 to 70 feet bgs for AOC 11. The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, general chemistry, pesticides, PCBs and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. No data gaps were identified in the Soil RFI/RI Work Plan (CH2M, 2013a).

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and/or IMs. The following data gap was identified in the Soil RFI/RI Work Plan:

- Soil physical parameters to support the CMS/FS
- Volume and extent of debris in new Subareas 11f and 11g, including the potential burn area within Subarea 11f, and volume and extent of white powder material on the upper slope of AOC 11e, if applicable

During implementation of the RFI/RI Work Plan, soil characteristics samples were collected at the following locations in AOC 11: AOC11c and AOC11e. Results are presented in Table 3-36. At the time of sampling the following debris was noted in AOC 11f and 11g:

- Subarea 11f: minor trash, cans, metal, and cement
- Subarea 11g: trash from roadway and cement

No white powder was present in AOC 11e at the time of sampling. These data and observations address the data gap identified in the Soil RFI/RI Work Plan and, along with the nature and extent data collected, are sufficient to support CMS/FS and/or IMs.

4.1.6 AOC 12 – Fill Areas

4.1.6.1 Setting

AOC 12 consists of three subareas located near the Transwestern gas pipeline meter station (Transwestern Meter Station) east of the compressor station, as shown in Figure 2-1. These three subareas (identified as AOC 12a, AOC 12b, and AOC 12c) were identified through employee interviews as locations that may contain buried debris. AOC 12a is located on property owned by HNWR, AOC 12c is location on PG&E property, and AOC 12c is located on both HNWR and PG&E property.

4.1.6.2 Unit History

AOC 12a was initially the only disposal area identified in AOC 12. AOC 12a was reportedly a disposal area for construction-related debris; a few small pieces of concrete are visible at the surface in this area. The exact nature of the materials placed into this area and the date(s) of placement are unknown.

Two potential disposal locations were subsequently identified from interviews with former employees, as described in the Soil Part A Phase 1 Work Plan (CH2M, 2006). There is no visible debris at these two sites. These two locations are adjacent to the northwestern corner (AOC 12b) and southwestern corner (AOC 12c) of the Transwestern Meter Station. Location 12b reportedly was used to bury asbestos-containing material and two drums of unused unknown chemicals. Location 12c was apparently a small ravine (about 6 feet deep) that was reportedly used to bury asbestos-containing material and possibly other debris.

Because debris reportedly was buried at AOCs 12a, 12b, and 12c, a geophysical survey was conducted over those areas. Part A Phase 1 trenches were excavated, and soil samples were collected in the areas that former PG&E employees indicated debris had been buried.

4.1.6.3 Geophysical Survey Results and Field Observations

Prior to the 2008 trenching activities, a geophysical survey was performed at each AOC 12 subarea to attempt to locate buried debris. The results of the survey found two linear features crossing AOC 12a, a natural gas pipeline approximately 3 to 4 feet in diameter, and an anode flux wire associated with the pipeline, buried between the upper 1 foot below ground surface (bgs) and 3 to 4 feet bgs. In AOC 12a and AOC 12b, results indicated two undifferentiated utilities extending east from aboveground storage tank (AST) bunker pipe stub-outs.

During the trenching activities, debris was observed in only one trench, AOC12c-T1. Debris consisted of a large piece of concrete (at approximately 1.5 feet bgs), a small piece of wire (at approximately 5 feet bgs), an 18-inch wooden slat, plastic debris, and a bung cover from a polyethylene drum (CH2M, 2012).

4.1.6.4 Analytical Results

Metals: Samples were collected from 11 locations at depths ranging from 0 to 11 feet bgs. The ISLs were exceeded for one or more of the following metals at locations across AOC 12: cobalt (background [BK]), copper (BK), selenium (BK), and zinc (BK) as shown in Table 3-8a and Figures 3-7a to 3-7g.

- Cobalt was detected slightly above its ISL (12.7 mg/kg) in one sample with a concentration of 14 mg/kg at sample location AOC12b-T1a at 2 to 3 feet bgs (Table 3-8a). Sample location AOC12b-T1a was collected in the southern portion of the trench in area AOC12b.
- Cooper was detected slightly above its ISL (16.8 mg/kg) in one sample with a concentration of 18 mg/kg at sample location AOC12b-T1a at 2 to 3 feet bgs (Table 3-8a). Sample location AOC12b-T1a was collected in the southern portion of the trench in area AOC12b (Figure 3-7d).
- Selenium was detected slightly above its ISL (1.47 mg/kg) in one sample with a concentration of 2.5 mg/kg at sample location AOC12b-T1b at 2 to 3 feet bgs (Table 3-8a). Sample locati3on AOC12b-T1b was collected in the northern portion of the trench in area AOC12b.
- Zinc was detected slightly above its ISL (58 mg/kg) in one sample with a concentration of 77 mg/kg at sample location AOC12c-T1a at 0 to 0.5 foot bgs (Table 3-8a). Sample location AOC12c-T1a was collected in the southern portion of the trench in area AOC12c (Figure 3-7g).

The lateral extent of the exceedances has been defined by samples with results below ISLs. The vertical extents of the exceedances have been defined for most metals and locations by samples with results below ISLs. Cobalt, copper and selenium slightly exceeded their respective ISLs in the deepest samples at AOC12b-T1a and AOC12b-T1b, these minor exceedances of the ISLs (less than 2 times the ISLs) are not considered a data gap requiring further investigation.

CLP Inorganics: Samples were collected from two locations at depths ranging from 0 to 0.5 foot bgs. No samples had detected results that exceeded their ISLs (Table 3-8b).

PAHs: Samples were collected from 11 locations at depths ranging from 0 to 11 feet bgs. No samples had detected results that exceeded their ISLs (Table 3-8c).

TPH: Samples were collected from 11 locations at depths ranging from 0 to 11 feet bgs. No samples had detected results that exceeded their ISLs (Table 3-8e).

VOCs and SVOCs: Samples were collected from 11 locations at depths ranging from 0 to 11 feet bgs (Table 3-8d). The ISL for di-n-butyl phthalate (ECV, 46.9 µg/kg) was exceeded in one sample collected at AOC12c-T1c from 10 to 11 feet bgs (1,100 µg/kg). This is well below the RSSL, 6,300,000 µg/kg. Sample location AOC12c-T1c was collected in the western portion of the trench in AOC 12c.

The lateral extents of the exceedances have been defined by samples with results below ISLs. The vertical extents of the di-n-butyl phthalate exceedance has not been defined. This does not represent a data gap requiring further investigation because the detected results exceeded the ECV, but the sample was collected from 10-11 feet bgs which is well below the ecological receptor range of 0-6 feet bgs. In addition, the detected result is well below the human RSSL.

General Chemistry: Samples were collected from 11 locations at depths ranging from 0 to 11 feet bgs. No samples had detected results that exceeded their ISLs (Table 3-8f).

Pesticides: Samples were collected from two locations at depths ranging from 0 to 0.5 foot bgs. No samples had detected results that exceeded their ISLs (Table 3-8g).

PCBs: Samples were collected from two locations at depths ranging from 0 to 3 feet bgs. No samples had detected results that exceeded their ISLs (Table 3-8h).

Asbestos: Samples were collected from 11 locations at depths ranging from 0 to 11 feet bgs. Bulk samples analyzed by polarized light microscopy indicated that asbestos fibers were not present or not detected in the AOC12 samples (Table 3-8i).

4.1.6.5 AOC 12 Conceptual Site Model

Minimal buried materials were encountered in the AOC 12 subareas. The buried debris reported by former employees including drums and asbestos-containing materials were not encountered during geophysical surveys, trenching, and soil samples. PAHs, TPH, PCBs, and pesticides were infrequently detected in AOC 12 soils samples, and all detections were below the application ISLs. Similarly, metals were either not detected or detected below background levels except for one exceedance each for cobalt, copper, selenium, and zinc (exceedances were less than 2 times the ISLs/background levels).

COPCs or COPECs, if present in fill material and buried waste that were not encountered during investigative activities, may have affected subsurface soil underneath the debris and laterally in the immediate vicinity of the debris. Subsurface soil would therefore be the primary source medium. Potential migration from subsurface soil to groundwater was identified as a potential secondary pathway, as shown in Exhibit 4-10, but is not expected.

4.1.6.6 Evaluation of Data Against Data Quality Objectives for AOC 12

Decision 1 (Nature and Extent Determination): Nature and extent has been sufficiently defined laterally and vertically given laboratory results and current data density. The factors of exceedance for cobalt, copper and selenium, and the factor and depth of exceedance of di-n-butyl phthalate do not represent data gaps that require further investigation. Analytical results are presented in Tables 3-8a through 3-8i and sample locations are presented on Figure 3-1. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-8j.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 18 samples were collected from 11 locations ranging from 0 to 11 feet bgs for AOC 12.

Decision 2 (Data Sufficiency for EPC Calculation): No data gaps were identified in the Soil RFI/RI Work Plan (CH2M, 2013a).

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are insufficient to support CMS/FS and/or IMs. Nature and extent was determined to be fully defined at the time of the Soil RFI/RI Work Plan, but additional data regarding site-specific soil properties (soil physical parameters) may be required to support the CMS/FS (CH2M, 2013a). No additional sampling was recommended in AOC 12 to satisfy requirements for soil physical parameters. The remaining data required to address Decision 4 data gaps for soil physical parameters will be collected during remedial design if necessary in AOC 12.

Exhibit 4-10.Conceptual Site Model – AOC 12
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

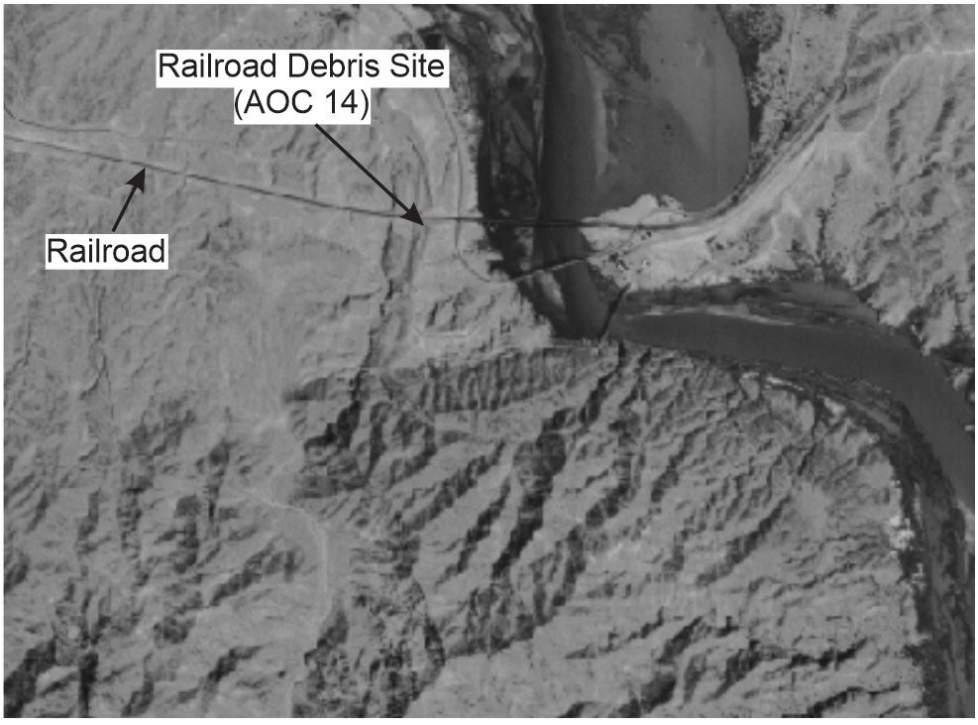
Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Disposal of Buried Debris **COCs Include:** • Metals	• Subsurface Soil	• Percolation and/or infiltration	• Subsurface Soil	• Potential volatilization and atmospheric dispersion	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals

4.1.7 AOC 14 – Railroad Debris Site

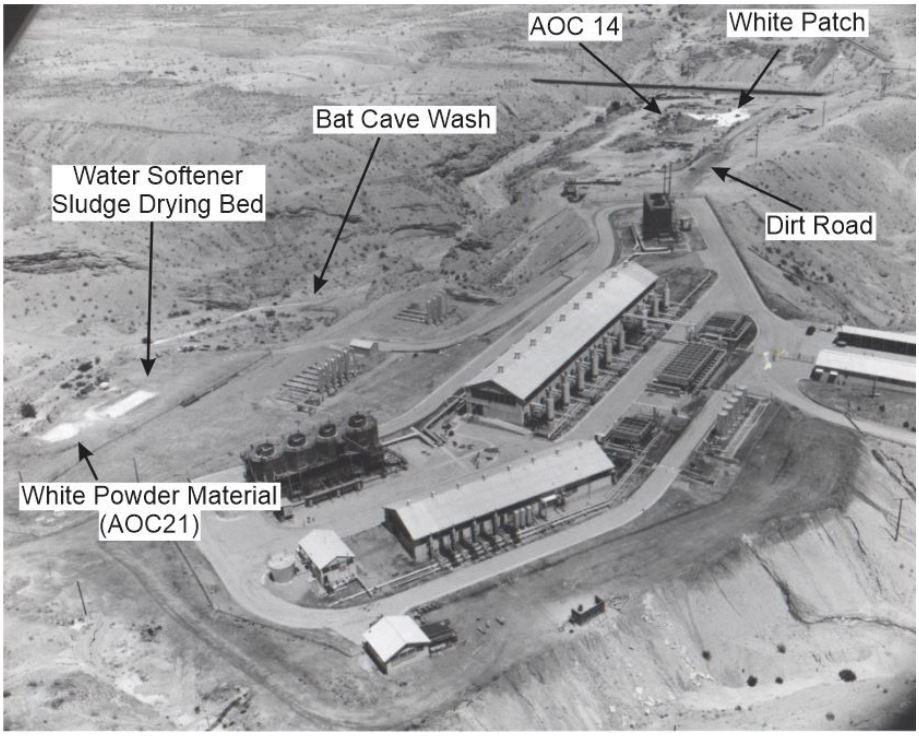
4.1.7.1 Setting

AOC 14, the Railroad Debris Site, is located approximately 1,000 feet north of the compressor station (Figure 2-1) and is currently bounded by the BNSF Railway tracks to the north, I-40 to the south, Bat Cave Wash to the west, and a former access road to the east. AOC 14 is approximately 100 feet above the bottom of Bat Cave Wash.

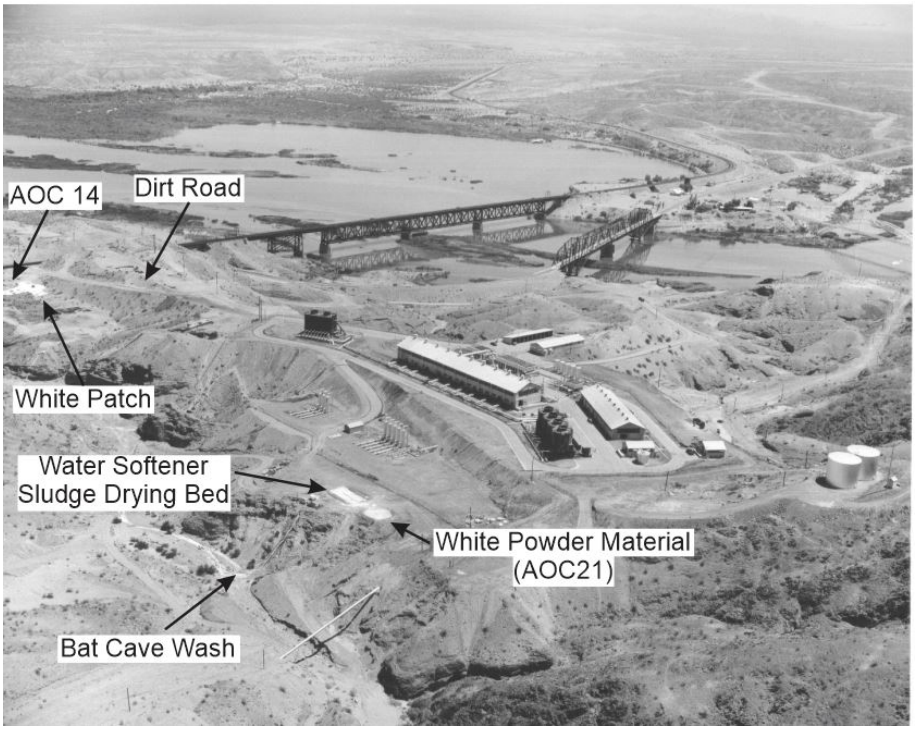
The Railroad Debris Site is approximately 1.5 acres in area and first appears in an aerial photograph dated 1947 (Photograph 4-9), prior to the establishment of the compressor station. In that photograph, a mound of soil presumed related to construction of the rail line is present on the site. In subsequent aerial photographs dated 1955 (Photographs 4-9 and 4-10), a white patch and other materials are present on this site. A dirt road that runs from the north end of the compressor station to this area is also visible on the 1955 aerial photographs. In the same photographs, a white patch can be seen on the ground adjacent to the sludge-drying beds (SWMU 5). The white material is likely dehydrated lime (water softening) sludge from the Permutit water-conditioning system (referred to below as white powder). Former employees report that the water softening sludge was trucked to the Railroad Debris Site and discharged on the ground (CH2M, 2006). Former employees also report AOC 14 was used for dumping and garbage burning until Highway 40 was built in the 1960s. AOC 14 contains miscellaneous construction debris including chunks of asphalt, concrete, railroad ties, piping, burnt material. Asbestos-containing material has also been identified at this site.



Photograph 4-9: September 30, 1947, Aerial Photograph from the United States Geological Survey. First appearance of AOC 14 Railroad Debris Site.



Photograph 4-10: May 19, 1955, Aerial Photograph 2. Facing northwest. A white patch is visible in AOC 14. An apparent round impoundment area with white powder material is located in the lower yard of the compressor station, south of the water-softener sludge-drying bed.



Photograph 4-11: May 19, 1955. Aerial Photograph 1. Facing northeast. A white patch is visible in AOC 14. A dirt access road is visible running from the north end of the compressor station along the east side of AOC 14.

4.1.7.2 Unit History

Employee reports indicate that a removal action for debris and white powder material was conducted in the mid-1990s; however, no documentation regarding the removal has been found (CH2M, 2006). Contours and grading marks on the surface of the site (Figure 3-8a) suggest that excavation occurred across the southern two-thirds of the site. The southern two-thirds of the site are somewhat lower in elevation than the surrounding areas, and a long, low soil mound/berm is present immediately north of this area. Some white powder material remains in the embankment adjacent to I-40, and it appears that a thin lens of additional material has been uncovered by erosion on the southern side of the soil mound. In addition, a 1998 investigation of the area indicated that a layer of white powder material is present below the current soil surface to approximately 5 feet bgs (Wong, personal communication, 1999a). This layer has variable thickness and, in some areas, is underlain and overlain by a mix of the white powder material and gravel.

An asbestos-containing material removal action was completed at this location in 1999 (Wong, personal communication, 1999b). In November 1998, during soil sampling at AOC 14, a small amount of friable construction debris and transite were found. The friable material contained over 1 percent asbestos. The transite was non-friable and, after sampling, the transite was left in the trench and was covered with clean fill material. PG&E removed the friable asbestos-containing material on April 14, 1999, and disposed of the material at an appropriate landfill. Two shallow confirmation samples of the underlying soils were collected and asbestos was detected at one sample location. Additional sampling was implemented to characterize the extent of the asbestos in the soil underlying the loose construction material near this sample. On June 1, 1999, 14 additional samples were taken, and no asbestos was detected in any of the sample locations.

4.1.7.3 Field Observations

Field observations made by DTSC in 2009 identified potential burn material along the I-40 road cut near the southwest corner of AOC 14. During additional employee interviews conducted by PG&E in late 2009 and early 2010, a former PG&E Topock Compressor Station employee reported periodic burning of primarily office garbage on the western edge of the AOC 14 bench area. The employee reported that AOC 14 was used for dumping and garbage burning until the freeway was built in the 1960s (PG&E, 2010). Several soil borings were installed and soil samples were collected during the Phase 1 investigation in 2008 from the general areas identified as the area used for burning; however, burnt material was not delineated or sampled

In 2016 and 2017, trenching was conducted in AOC 14 in a series of six trenches to identify the extent of debris and burnt material. Layers containing various types of debris (metallic material, charcoal, glass, wire, hose, tile, etc.) were observed in the trenches. Trench locations were recorded using GPS and are shown on Figure B1 in Appendix B. Analytical results for trench samples are presented in Tables 3-9a through 3-9k and are discussed below. Detailed descriptions of the trenches and observed debris can be found in Appendix B.

4.1.7.4 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 14 are presented in Tables 3-9a through 3-9k and sampling locations and results are shown on Figures 3-8a through 3-8k. Screening level exceedances are summarized in the following paragraphs. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section.

Metals: Samples were collected from 47 locations at depths ranging from 0 to 15 feet bgs. The ISLs for antimony (ECV), arsenic (BK), cadmium (BK), CrVI (BK), total chromium (BK), cobalt (BK), copper (BK), lead (BK), mercury (ECV), molybdenum (BK), nickel (BK), selenium (BK), thallium (RRSL), vanadium (BK), and zinc (BK) were exceeded at one or more of the following locations: AOC14-1 through AOC14-8, AOC14-10, AOC14-12, AOC14-13, AOC14-14E, AOC14-14W, AOC14-15, AOC14-16E, AOC14-16W,

AOC14-17W, AOC14-18, AOC14-19, AOC14-21, AOC14-SS-1, AOC14-SS-4, S2-6, S2-62, S4-4, SB-23, RR-4 through RR-6, RR-9, and RR-11, as shown in Table 3-9a and Figures 3-8a through 3-8k. Hexavalent chromium and lead were most frequently detected over the ISLs.

- Hexavalent chromium was detected above its ISL (0.83 mg/kg) in 13 samples taken from depths between 0 and 8 feet bgs (Table 3-9a). The highest CrVI concentration of 20 mg/kg was detected at sample location AOC14-16W at 2 to 3 feet bgs. Sample location AOC14-16W was collected from trench AOC14-16, advanced along the western edge AOC 14 above AOC 1 – Bat Cave Wash (Figure 3-8b).
- Lead was detected above its ISL (8.39 mg/kg) at 21 locations from depths between 2 and 3 feet bgs (Table 3-9a). The highest lead concentration of 1,600 mg/kg was detected at sample location AOC14-19 at 2 to 3 feet bgs. Sample location AOC14-19 was collected in the I-40 road cut where burnt material was observed (Figure 3-8e).

The lateral extent of the exceedances has been defined by samples with results below ISLs, not detected above reporting limits, or by topographical features, shown in Figures 3-8a through 3-8k. Most exceedances of metals were in samples collected from trenches AOC14-14 and AOC14-16 and appear to be associated with debris. Copper, mercury, and molybdenum were detected at elevated concentrations in these trenches. The vertical extent of exceedances has been defined by samples with results below ISLs or not detected above reporting limits. The deepest samples at the following locations had detected metal results slightly above their respective ISLs with a factor of exceedance less than 3 times the ISL: AOC14-7, S2-6, AOC14-18, and AOC14-15. These minor exceedances of the ISLs are not considered a data gap. The deepest sample at AOC14-14E (between 9 and 10 feet bgs) exceeded the ISL for thallium by a factor of exceedance of 3.3 times the ISL. No other metals were detected above their respective ISLs in any sample collected from AOC14-14E. This low level exceedance is not considered a data gap based on absence of other contamination at this location and depth.

CLP Inorganics: Samples were collected from 10 locations at depths ranging from 0 to 4 feet bgs (Table 3-9b). No soil samples had detected results that exceeded their respective ISLs.

- The ISLs for calcium (BK), magnesium (BK), and sodium (BK) were exceeded in white powder sample at S4-4 at 4 feet bgs (Table 3-9b). The highest concentration of calcium was 48,000 mg/kg, magnesium was 8,500 mg/kg, and sodium was 850 mg/kg.

The lateral and vertical extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits.

PAHs: Samples were collected from 26 locations at depths ranging from 0 to 15 feet bgs (Table 3-9c). PAHs were evaluated by calculating benzo(a)pyrene equivalents for human health and low molecular weight and HMW PAH values for ecological receptors. The ISLs for B(a)P equivalents (RRSL) and HMW PAHs (ECV) were exceeded at one or more of the following locations: AOC14-12 and AOC14-14w.

- B(a)P equivalents were detected above the ISL (110 µg/kg) in two samples taken from depths between 0 and 6 feet bgs (Table 3-9c). The highest B(a)P equivalent concentration of 740 µg/kg was detected at trench sample location AOC14-14W at 0 to 1 foot bgs. Sample location AOC14-14W was collected from a trench that was advanced along the southwestern edge of AOC 14 near observed burnt material.
- HMW PAH was detected above its ISL (1,160 µg/kg) in two samples taken from depths between 0 and 6 feet bgs (Table 3-9c). The highest HMW PAH concentration of 8,068 µg/kg was detected at trench sample location AOC14-14W at 0 to 1 foot bgs. Sample location AOC14-14W was collected from a trench that was advanced along the southwestern edge of AOC 14 near observed burnt material.

The lateral and vertical extents of the exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or topographical features.

VOCs and SVOCs: Samples were collected from 26 locations at depths ranging from 0 to 15 feet bgs (Table 3-9d). No samples had detected results that exceeded their respective ISLs. The analytical results for AOC 14 do not support evidence of a release of VOCs.

TPH: Samples were collected from 25 locations at depths ranging from 0 to 15 feet bgs (Table 3-9e). The ISLs for TPH as diesel (CHHSL) and TPH as motor oil (CHHSL) were exceeded at the following locations: AOC14-16W and S8-23, as shown in Table 3-9e and Figures 3-8a through 3-8k.

- TPH as diesel was detected above the ISL (230 mg/kg) at one soil location: AOC14-16W from a depth between 2 and 3 feet bgs at a concentration of 630 mg/kg.

The lateral extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits except at S8-23, where TPH as diesel and motor oil exceeded their respective ISLs at 3 feet bgs. This does not represent a data gap requiring further investigation because it appears to be associated with a lens of black sandy material encountered in this boring. These heavy-end TPH compounds are not readily mobile and are not expected to migrate laterally or vertically.

General Chemistry: Samples were collected from 35 locations at depths ranging from 0 to 10 feet bgs (Table 3-9f). No samples had detected results that exceeded their respective ISLs.

Pesticides: Samples were collected from 17 locations at depths ranging from 0 to 10 feet bgs. The ISLs for 4,4-DDE (ECV) were exceeded at AOC14-19, as shown in Table 3-9g. The maximum detected concentration was measured at 4.4 µg/kg at a depth of 2 to 3 feet bgs. Sample location AOC14-19 was collected in the road cut where burnt material was observed.

The lateral and vertical extents of the exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or topographical features.

PCBs: Samples were collected from 16 locations at depths ranging from 0 to 10 feet bgs (Table 3-9h). No samples had detected results that exceeded their respective ISLs.

Dioxins and Furans: Samples were collected from 10 locations at depths ranging from 0 to 10 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. The ISLs for TEQ human (RRSL), TEQ avian (ECV), and TEQ mammal (ECV) were exceeded at AOC14-14E, AOC14-14W, AOC14-15, AOC14-16E, AOC14-16W, and AOC14-19, as shown in Table 3-9i and Figures 3-8j and 3-8k.

- TEQ avian samples were detected above its ISL (16 ng/kg) in four samples taken from depths between 0 and 7 feet bgs (Table 3-9i). The highest TEQ avian concentration of 780 ng/kg was detected at sample location AOC14-14W at 5 to 5.5 feet bgs. Sample location AOC14-14W was collected from a trench that was advanced along the southwestern edge AOC 14 near the area where burnt material was observed (Figure 3-8j).
- TEQ human samples were detected above its ISL (50 ng/kg) in two samples taken from depths between 2 and 5.5 feet bgs (Table 3-9i). The highest TEQ human concentration of 480 ng/kg was detected at sample location AOC14-14W at 5 to 5.5 feet bgs. Sample location AOC14-14W was collected from a trench that was advanced along the southwestern edge AOC 14 near the area where burnt material was observed.
- TEQ mammal samples were detected above its ISL (5.58 ng/kg) in 10 samples taken from depths between 0 and 10 feet bgs (Table 3-9i). The highest TEQ mammal concentration of 480 ng/kg was detected at sample location AOC14-14W at 5 to 5.5 feet bgs. Sample location AOC14-14W was collected from a trench that was advanced along the southwestern edge AOC 14 the area where burnt material was observed (Figure 3-8k).

The lateral and vertical extents of TEQ avian and TEQ human exceedances have been defined by samples with results below ISLs or not detected above reporting limits, as shown in Figures 3-8a through 3-8k.

The lateral and vertical extents of the TEQ mammal exceedances have not been defined by samples with results below ISLs or not detected above reporting limits, as shown in Figures 3-8a through 3-8k. These exceedances of the ISLs do not represent a data gap requiring further investigation because the TEQ mammal ISL (5.58 ng/kg) is the most conservative and lowest screening level for dioxin TEQ. Further investigation to assess the vertical extent of TEQ mammal is not warranted.

Asbestos: Bulk samples of the white powder analyzed by polarized light microscopy indicated that asbestos fibers were present in AOC14-1 through 5, 9, 12, 13, and AOC14-SS1 and 4 (Table 3-9j). To confirm the presence of asbestos fibers, the white powder sample was also analyzed by California Air Resource Board Method 435 and transmission electron microscopy. California Air Resource Board Method 435 did indicate that very low levels of asbestos were present in AOC14-2 and AOC14-SS1 (detected concentration of less than 0.1 percent, where the detection limit was less than 0.1 percent). Based on these results, a very small percentage of asbestos fibers (less than 0.1 percent) are present in the white powder and soil samples. This does not meet the criteria for asbestos-containing material, which is defined in 40 CFR 763.83 as any material or product that contains more than 1% asbestos.

The lateral and vertical extent of exceedances have been defined by the white powder only being located at select locations.

4.1.7.5 AOC 14 Conceptual Site Model

A graphical CSM and cross sections have been developed for AOC 14 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown in Figures 4-6a through 4-6e. Exhibit 4-11 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 14. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential human and ecological receptors is included in the Soil Part A DQOs TM (CH2M, 2013a), and is summarized in the following paragraphs, with updated information.

The primary sources of contamination at AOC 14 are disposal of debris including some asbestos-containing material, water softening sludge, and potentially residuals from burning of office garbage. Metals contamination is likely associated with debris disposed of at AOC 14. CLP Inorganics and metals contamination is likely associated with white powder material (water softening sludge) that was transported to the Railroad Debris Site from AOC 21 (PG&E 2006a). PAH and dioxin/furans detections are likely associated with burnt debris observed at AOC 14. The highest contaminant concentrations are generally located in the west and southwest portions of AOC 14 in the area where disposal and burning of trash occurred.

The primary release mechanisms are direct releases of contaminated particulates or leaching of contaminants from the debris, water softening sludge, and/or burnt material. Contaminants present in these materials could have been deposited on surface soil as particulates or entered surface soil as dissolved constituents through infiltration of rainfall. In addition, the water softening sludge was reportedly sprayed on the ground, and while the majority of the water in the sludge would have evaporated, some of the liquid in the sludge could have infiltrated into underlying soils. Because some material is buried, constituents could also have affected shallow and subsurface soils in the immediate vicinity of the debris, water softening sludge, and/or residual burnt material. Contaminants released from debris located in the higher (eastern) portion of AOC 14 could also have been transported to the lower portions of the unit through surface runoff. Primary source media therefore consist of surface, shallow, and subsurface soils.

Exhibit 4-11. Conceptual Site Model, AOC 14 – Railroad Debris Site
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Disposal of Debris **COCs Include:** • Metals	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals
Burning of trash/burnt Material **COCs Include:** • PAHs • Dioxins and Furans	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil	

Contaminants could have leached from surface soils and shallow soil into underlying deeper soils. Potential migration from subsurface soil to groundwater was identified as a potential secondary pathway.

Windblown dust contamination from small particles of debris or contaminated surface soil within AOC 14 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils. Surface runoff from AOC 14 could also have transported COPCs or COPECs in surface soil or small pieces of debris to Bat Cave Wash.

4.1.7.6 Evaluation of Data Against Data Quality Objectives for AOC 14

Decision 1 (Nature and Extent Determination): Nature and extent has been sufficiently defined laterally and vertically given laboratory results and current data density, with the exception of a minor exceedance of thallium in the deepest AOC14-14 trench sample (AOC14-14E at 9 to 10 feet bgs), which is not considered a data gap. Analytical results are presented in Tables 3-9a through 3-9j and on Figures 3-8a through 3-8k. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-9k.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 152 samples were collected from 47 locations ranging from 0 to 15 feet bgs for AOC 14. The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, TPH, general chemistry, pesticides, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. No data gaps were identified in the Soil RFI/RI Work Plan (CH2M, 2013a).

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and/or IMs.

During implementation of the RFI/RI Work Plan, soil characteristics samples were collected at the following location in AOC 14: AOC14-15. Results are presented in Table 3-36. These data along with the nature and extent data collected are sufficient to support CMS/FS and/or IMs.

Additional Considerations: Recommend removal and disposal of surficial debris material be carried forward to CSM/FS.

4.1.8 AOC 27 – MW-24 Bench

4.1.8.1 Setting

AOC 27, the MW-24 Bench (named because monitoring well MW-24 is located in this area), is located north of the lower yard of the compressor station, as shown on Figure 2-1. AOC 27 is currently bounded by I-40 to the north, Bat Cave Wash (AOC 1) to the west, and steep topography to the south and east. AOC 27 is approximately 40 feet above the bottom of Bat Cave Wash. An unpaved access road runs from the MW-24 Bench into Bat Cave Wash. Prior to the construction of I-40 in the 1960s, AOC 27 was contiguous with AOC 14, the Railroad Debris Site. Miscellaneous construction debris is present in AOC 27. AOC 27 is located on property owned by PG&E and HNWR.

4.1.8.2 Unit History

During employee interviews conducted by PG&E in late 2009 and early 2010, a former PG&E Topock Compressor Station employee indicated AOC 27 was also used as a waste disposal area. In January 2008, during trenching activities in AOC 27 associated with installation of a control panel for the upland in situ pilot test, debris consisting mostly of treated wood, concrete, and scrap steel/tin (including a possible fragment of a storage tank) were encountered at a depth of approximately 3 feet bgs. DTSC and DOI were notified of this discovery in an email dated January 12, 2008. Three samples of the debris and two soil samples were subsequently collected.

During a 2011 site walk with DTSC and DOI, discolored soil and potential burn waste was noted in the embankment of the unpaved access road leading from AOC 27 to Bat Cave Wash. DTSC directed PG&E to collect samples of the waste material in a March 24, 2011 email. The email also directed PG&E to define the lateral and vertical extents of waste and any associated contamination observed in the in situ pilot study trench.

4.1.8.3 Field Observations

An asbestos survey, geophysical survey, and trenching were conducted at AOC 27. During the asbestos survey, debris samples were collected from 11 locations and submitted for laboratory analysis of asbestos. Types of debris sampled included the following: roofing debris, suspected asbestos tile, black felt debris, cement tile, black mastic covered yellow vinyl, gray felt roofing debris, silver mastic at large round metal gasket, curved cement tiles, fire hose debris, black hot tar debris, and an electrical box. One sample was collected from each debris type that was suspected to contain asbestos. Asbestos reports are presented in Appendix B, Attachment B9 and results were as follows:

- Asbestos was present in 7 of the 11 debris types. Results indicated varying concentrations of chrysotile were present in the samples (2 to 40 percent).
- None of the asbestos-containing samples were friable; therefore, the material did not present a hazard to staff performing nonintrusive surveys (utility/geophysical and XRF).

Following the asbestos survey, a geophysical survey was conducted in December 2015 to identify buried debris using terrain conductivity, total field magnetics, metal detection, and ground-penetrating radar. Results of the geophysical survey, and descriptions of the key findings, are presented in Appendix B, Attachment B6.

After completion of the geophysical survey, trenching was conducted in AOC 27 at a series of 10 trenches to confirm the subsurface anomalies identified during the geophysical survey. Trench locations were recorded and are shown on Figures 3-9a through 3-9m and Figure B1 in Appendix B. Layers containing various types of debris (metallic material, wood fragments, piping, concrete, etc.) were observed in most trenches. Analytical results for trench samples are presented in Tables 3-10a through 3-10j and are discussed below. Detailed descriptions of the trenches and observed debris and photographs can be found in Appendix B.

4.1.8.4 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 27 are presented in Tables 3-10a through 3-10j and sampling locations and results are shown on Figures 3-9a through 3-9m. Screening level exceedances are summarized further in the following paragraphs. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section.

Metals: Samples were collected from 20 locations at depths ranging from 0 to 10 feet bgs. The ISLs for antimony (ECV), arsenic (BK), cadmium (BK), CrVI (BK), total chromium (BK), cobalt (ECV), copper (BK),

lead (BK), mercury (ECV), molybdenum (ECV), nickel (BK), selenium (BK), vanadium (BK), and zinc (BK) were exceeded at one or more of the following locations: 24soil-01, 24soil-2, AOC27-1, AOC27-5 through AOC27-8, AOC27-18, AOC27-20, AOC27-27, AOC27-36, AOC27-50, AOC27-51, and PA-13, as shown in Table 3-10a and Figures 3-9a through 3-9h. The analytes most frequently detected over the ISLs were copper, lead, mercury, and zinc.

- Copper was detected above its ISL (16.8 mg/kg) in 10 samples taken from depths between 5 and 6 feet bgs (Table 3-10a). The highest copper concentration of 1,000 mg/kg was detected at sample location AOC27-7 at 2 to 3 feet bgs. Sample location AOC27-7 was collected from trench AOC27-7, advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9d).
- Lead was detected above its ISL (8.39 mg/kg) in 16 samples taken from depths between 0 and 6 feet bgs (Table 3-10a). The highest lead concentration of 630 mg/kg was detected at sample location AOC27-6 at 0 to 1 foot bgs. Sample location AOC27-6 was collected from trench AOC27-6, advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9e).
- Mercury was detected above its ISL (0.0125 mg/kg) in 13 samples taken from depths between 0 and 10 feet bgs (Table 3-10a). The highest mercury concentration of 0.95 mg/kg was detected at sample location AOC27-7 at 2 to 3 feet bgs. Sample location AOC27-7 was collected from trench AOC27-7, advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9f).
- Zinc was detected above its ISL (58 mg/kg) in 13 samples taken from depths between 0 and 6 feet bgs (Table 3-10a). The highest zinc concentration of (1,300 mg/kg) was detected at sample location AOC27-7 at 2 to 3 feet bgs. Sample location AOC27-7 was collected from trench AOC27-7, advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9h).

The lateral extent of the exceedances has been defined by samples with results below ISLs, not detected above reporting limits or topographical features. The vertical extent of the exceedances has been defined by samples with results not detected above reporting limits, or bedrock refusal. The deepest samples at the following locations had detected metals results slightly above their respective ISLs with a factor of exceedance less than 2 times the ISL: AOC27-6, AOC27-18, AOC27-18E, AOC27-51, and 24soil-02. These minor exceedances of the ISLs are not considered a data gap. The deepest samples at AOC27-6, AOC27-27, and AOC27-50 exceeded the ISL for mercury by a factor of exceedance of up to 11 times the ISL. These exceedances are not considered a data gap at this time; a background value has not been established for mercury, the ISL concentration is very low (0.0125 mg/kg), and the maximum mercury concentration detected at these locations is relatively low (0.14 mg/kg). The deepest sample at AOC27-76 exceeds the ISL (BK) for lead. This may be considered a data gap; however, collecting additional deeper samples at this location would require significant disturbance and vertical extent is defined for lead at nearby sample locations.

CLP Inorganics: A single sample was analyzed for CLP inorganics, AOC27-51, and did not exceed any of the ISLs (Table 3-10b).

PAHs: Samples were collected from 20 locations at depths ranging from 0 to 10 feet bgs. PAHs were evaluated by calculating B(a)P equivalents for human health and low molecular weight and HMW PAH values for ecological receptors. The ISLs for HMW PAHs (ECV) and B(a)P equivalent (RRSL) were exceeded at one or more of the following locations: 24soil-01, 24soil-02, AOC27-50, AOC27-51, AOC27-6, AOC27-7, and 24debris-03.

- B(a)P equivalents were detected above the ISL (110 µg/kg) in eight samples taken from depths between 0 and 3 feet bgs (Table 3-10c). The highest B(a)P equivalent concentration of 3,300 µg/kg was detected at sample location AOC27-6 at 0 to 1 foot bgs. Sample location AOC27-6 was collected from trench AOC27-6, advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9i).
- HMW PAH was detected above its ISL (1,160 µg/kg) in six samples taken from depths between 0 and 3 feet bgs (Table 3-10c). The highest HMW PAH concentration of 31,530 µg/kg was detected at

sample location AOC27-6 at 0 to 1 foot bgs. Sample location AOC27-6 was collected from trench AOC27-6, advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9j).

The lateral extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits, except in the area of sample locations AOC27-6, AOC27-7, AOC27-50, and AOC27-51. This data gap may be filled during remediation if implemented in the area of these samples. The vertical extent of the exceedances has been defined by samples with results not detected above reporting limits or by bedrock refusal.

VOCs and SVOCs: Samples were collected from 17 locations at depths ranging from 0 to 10 feet bgs. Only bromomethane and chloromethane were detected above laboratory reporting limits and no samples had detected results that exceeded their respective ISLs (Table 3-10d). The analytical results for AOC 27 do not support evidence of a release of VOCs.

TPH: Samples were collected from 20 locations and no samples had detected results that exceeded their respective ISLs (Table 3-10e).

General Chemistry: Samples were collected from 21 locations and no samples had detected results that exceeded their respective ISLs (3-10f).

Pesticides: Samples were collected from 17 locations and no samples had detected results that exceeded their respective ISLs (3-10g).

PCBs: Samples were collected from 18 locations and no samples had detected results that exceeded their respective ISLs (3-10h).

Dioxins and Furans: Dioxins and furans are evaluated by calculating TEQ values for avian, human, and mammal receptors. The ISLs for TEQ human (RRSL), TEQ avian (ECV), and TEQ mammal (ECV) were exceeded at one or more of the following locations: AOC27-18, 18E, 20, 4, 5, 50, 51, 6, 7, and 8.

- TEQ avian samples were detected above its ISL (16 ng/kg) in six samples taken from depths between 0 and 6 feet bgs (Table 3-10i). The highest TEQ avian concentration of 260 ng/kg was detected at sample location AOC27-7 at 2 to 3 feet bgs. Sample location AOC27-7 was collected from a trench that was advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9k).
- TEQ human samples were detected above its ISL (50 ng/kg) in four samples taken from depths between 0 and 6 feet bgs (Table 3-10i). The highest TEQ human concentration of 230 ng/kg was detected at sample location AOC27-7 at 2 to 3 feet bgs. Sample location AOC27-7 was collected from a trench that was advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9l).
- TEQ mammal samples were detected above its ISL (5.58 ng/kg) in 18 samples taken from depths between 0 and 6 feet bgs (Table 3-10i). The highest TEQ mammal concentration of 230 ng/kg) was detected at sample location AOC27-7 at 2 to 3 feet bgs. Sample location AOC27-7 was collected from a trench that was advanced along the access road to Bat Cave Wash near observed burnt material (Figure 3-9m).

The lateral extents of the TEQ avian exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or by topographical features, except in the area of sample locations AOC27-6, AOC27-7, AOC27-50, and AOC27-51. This data gap may be filled during remediation if implemented in the area of these samples. The vertical extent of the TEQ avian exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or bedrock refusal.

The lateral and vertical extents of the TEQ human exceedances have been defined by samples with results below ISLs or not detected above reporting limits, as shown on Figure 3-9l.

The lateral and vertical extents of the TEQ mammal exceedances have not been defined by samples with results below ISLs or not detected above reporting limits, as shown on Figure 3-9m. These exceedances of the ISLs do not represent a data gap requiring further investigation because the TEQ mammal ISL (5.58 ng/kg) is the most conservative and lowest screening level for dioxin TEQ. Further investigation to assess the vertical extent of TEQ mammal is not warranted.

4.1.8.5 AOC 27 Conceptual Site Model

A graphical CSM was developed for AOC 27 based on the site background, as shown on Figure 4-7. Exhibit 4-12 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 27.

The primary source of contamination at AOC 27 is the disposal of debris (including asbestos-containing material) and apparent historical burning of waste and debris. Most exceedances of metals were in samples collected from trenches AOC27-6, AOC27-7, AOC27-8, AOC27-20, and AOC27-50, and appear to be associated with debris. Copper, lead, mercury, and molybdenum were detected at elevated concentrations in these trenches. PAH and dioxin/furans detections are likely associated with burnt debris observed at AOC 27. The highest concentrations for all contaminants were found along the access road leading from AOC 27 to Bat Cave Wash in trenches AOC27-6, AOC27-7, AOC27-8, AOC27-20, and AOC27-50 in the area where trashed was disposed and burned.

The primary release mechanisms are direct releases of contaminated particulates or leaching of contaminants from the debris and/or burnt material. Contaminants present in these materials could have been deposited on surface soil as particulates or could have entered surface soil as dissolved constituents through infiltration of rainfall. Because some material is buried, constituents could also have affected shallow and subsurface soils in the immediate vicinity of the debris. Contaminants released from debris and burn material located in AOC 27 could also have been transported to the lower portions of the unit and potentially to AOC 1 through surface runoff. Primary source media therefore consist of surface, shallow, and subsurface soils. Contaminants could have leached from surface soils and shallow soil into underlying deeper soils. Potential migration from subsurface soil to groundwater was identified as a potential secondary pathway, but has been ruled out by vadose zone modeling.

Windblown dust contamination from small particles of debris or contaminated surface soil within AOC 27 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils. There is a potential for windblown transportation of contaminants to nearby areas.

4.1.8.6 Evaluation of Data Against Data Quality Objectives for AOC 27

Decision 1 (Nature and Extent Determination): Nature and extent has been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-10a through 3-10i and on Figures 3-9a through 3-9m. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-10j. Field observations during trenching encountered buried debris across much of AOC-27; however, analytical data indicates the buries debris done not contribute to excessive contamination.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data, 62 samples were collected from 19 locations ranging from 0 to 10 feet bgs for AOC 27. The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, general chemistry parameters, pesticides, PCBs, and dioxins/furans.

Exhibit 4-12. Conceptual Site Model, AOC 27 – MW-24 Bench
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Disposal of Debris **COCs Include:** • Metals	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals
Burning of trash/burnt Material **COCs Include:** • PAHs • Dioxins and Furans	• Surface Soil	• Percolation and/or infiltration • Potential entrainment in stormwater/surface water runoff	• Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil	

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the Soil RFI/RI Work Plan, data were insufficient to complete the Decision 2 evaluation. Samples collected during implementation of the Soil RFI/RI Work Plan fill this data gap.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are insufficient to support CMS/FS and/or IMs. The following data gap was identified in the Soil RFI/RI Work Plan: Soil physical parameters to support the CMS/FS.

No samples from AOC 27 were analyzed for soil characteristics during implementation of the RFI/RI Work Plan. This data gap will be addressed during remedial design if necessary in AOC 27.

Debris samples were collected at 11 locations within AOC 27 and analyzed for asbestos. Asbestos was present in seven of the samples. None of the asbestos-containing samples were friable. In addition, a geophysical survey was conducted using the following tools: terrain conductivity, total field magnetic, metal detection, and ground-penetrating radar. Extensive underground utilities were identified along with several groupings of subsurface anomalies. Trenching and debris identification was also performed. All survey and trenching results are presented in Appendix B. The debris characterization data is sufficient to support the CMS/FS.

Additional Considerations: Recommend removal and disposal of surficial debris material be carried forward to CSM/FS.

4.1.9 AOC 28 – Pipeline Drip Legs

4.1.9.1 Setting

AOC 28 consists of four drip legs associated with the 300A and 300B main gas pipelines (two on each of the pipelines), as shown on Figure 2-1. The drip legs have been added as a new AOC (AOC 28a through AOC 28d) at the request of the DTSC during comment resolution on the Soil RCRA Facility Investigation/Remedial Investigation Work Plan (CH2M, 2013a). AOCs 28a, 28b, and 28c drip legs are on the 300A and 300B pipelines located east of the compressor station. AOC 28d is a drip leg for the 300B pipeline where it crosses Bat Cave Wash. AOC 28 drip legs are located on PG&E and HNWR property.

A drip leg is typically a separate section of pipe connected to and located below the main gas pipeline. The drip leg is designed to collect pipeline liquids by gravity. Each drip leg is connected to a valve used to drain the pipeline liquids to a fixed or portable tank. The drip legs on the east side of the compressor station consist of a dog-leg drip on the 300B pipeline, an offset drip on the 300A pipeline, and a bottom drip associated with a raised section of pipe on the 300A pipeline. The 300B dog-leg drip was formerly connected to the 300B Pipeline Liquids Tank, which was investigated separately as Undesignated Area 2. The drip leg on the 300B pipeline in Bat Cave Wash is also a bottom tap. Drip legs are also referred to by their location on the pipeline, as measured in miles from the start of the PG&E-owned pipeline, which is at the state line. AOC 28a is therefore MP 0.13A, AOC 28b is MP 0.21B, AOC 28c is MP 0.64A, and AOC 28d is MP 0.55B.

4.1.9.2 Unit History

Since the early 1980s, PG&E has been conducting annual PCBs testing on the collected pipeline liquids from the incoming 300A and 300B transmission pipelines. No PCBs have been detected coming into the compressor station through those pipelines. As defined in Volume 1 Topock RFI/RI (CH2M, 2007a), a portion of the Transwestern Gas Pipeline that lies offsite to the east of the facility was contaminated with

PCBs in the 1990s. After PG&E discovered the presence of PCBs in some pipeline liquids from Transwestern at Topock in the late 1990s, PG&E installed protective equipment and cleaned portions of the pipeline system to remove PCB contamination. Subsequently, PG&E implemented a monthly PCB monitoring program along the entire downstream Line 300 gas pipeline system. Since the initiation of this testing protocol, only low levels of PCBs have been detected in the downstream pipelines.

All drip legs are currently drained to portable tanks on a monthly basis. A historical procedure for draining pipeline drips confirms this frequency (PG&E, 1989a). It is possible that some spillage could occur or may have historically occurred during the transfer process (for example, if the hose from the valve is not connected properly to the portable tank). All potential releases at the drip legs would be surface releases, and the releases would be confined to a very small area in the immediate vicinity of the drip legs.

In 2011, in order to assess possible contamination near the drip legs, opportunistic soil samples were collected at two locations (AOC28-OS1 and AOC28-OS2) in the vicinity of AOC 28a and AOC 28c. The Soil RFI/RI Work Plan (CH2M, 2013a) proposed four additional soil sampling locations to assess the nature and extent of possible contamination and satisfy the DQOs. These locations (AOC28a-01, AOC28b-01, AOC28c-01, and AOC28d-01) were sampled in 2015. All sample locations are shown on Figure 3-1.

4.1.9.3 Analytical Results

Analytical results for AOC 28a through AOC 28d are presented in Tables 3-11a through 3-11f and sampling locations are shown on Figure 3-1. Figures showing results were not developed for AOC 28 because there were only three minor exceedances of ISLs. Screening level exceedances are summarized in the following paragraphs. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section.

Metals: The ISL for molybdenum (ECV) was exceeded at AOC28-OS1, and the ISLs for molybdenum (ECV) and zinc (BK) were exceeded at AOC28-OS2.

- Molybdenum was detected above its ISL (2.25 mg/kg) from 9 to 9.5 feet bgs at AOC28-OS1 and from 8.5 to 9 feet bgs at AOC28-OS2 (Table 3-11a). The highest molybdenum concentration of 5 mg/kg was detected at sample location AOC28-OS2. Sample location AOC28-OS2 was collected near drip leg AOC28c, located near the access road and Route 66 sign (Figure 3-1).
- Zinc was detected slightly above its ISL (58 mg/kg) at a concentration of 70 mg/kg at sample location AOC28-OS2 at 8.5 to 9 feet bgs (Table 3-11a). Sample location AOC28-OS2 was collected near drip leg AOC28c (Figure 3-1).

The lateral and vertical extent of the exceedances has been defined. The detected metals results are only slightly above their respective ISLs in the deepest samples collected at these locations, with factors of exceedances ranging from 1.2 to 3.6 times the background values for metals and are therefore not considered a data gap.

CLP Inorganics: CLP inorganics were not a COPC for this unit; therefore, samples were not analyzed for CLP inorganics.

PAHs: PAHs were evaluated by calculating benzo(a)pyrene equivalents for human health and low molecular weight and HMW PAH values for ecological receptors. Samples were collected from six locations. No samples had detected results that exceeded their respective ISLs (Table 3-11b).

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

TPH: Samples were collected from six locations. TPHs were detected at all sample locations, but no samples had detected results that exceeded their respective ISLs (Table 3-11c).

General Chemistry: The only general chemistry parameter evaluated was pH, which does not have an ISL (Table 3-11d).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected from six locations no samples had detected results that exceeded their respective ISLs (Table 3-11e).

Dioxins and Furans: Dioxins and furans were not a COPC for this unit; therefore, samples were not analyzed for dioxins and furans.

4.1.9.4 AOC 28 Conceptual Site Model

A graphical CSM has been developed for AOC 28 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-8. Exhibit 4-13 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 28.

The primary source of TPH contamination in AOC 28 is potential historical or current spills while transferring the contents of the drip legs to the portable tanks. Although TPHs and PAHs were detected in soil, no results exceeded their respective ISLs. PAHs are ubiquitous in the environment and have been detected at low concentrations in most RFI/RI soil investigation units.

Any constituents released would have been released in liquid form to surface soil. Surface soil is therefore the primary source medium; however, some contaminants could have infiltrated from surface soil into underlying shallow soil, as supported by higher TPH concentrations at depth. Potential migration from subsurface soil to groundwater was identified as a potential secondary pathway, but was ruled out during vadose zone modeling, presented in Appendix C. During extreme wet-weather events, it is possible that some constituents may have been transported from the unit to the adjacent pipeline road via surface runoff.

Windblown dust contamination from small particles of contaminated surface soil within AOC 28 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils. There is a potential for windblown transportation of contaminants from AOC 28 to nearby areas.

4.1.9.5 Evaluation of Data Against Data Quality Objectives for AOC 28

Decision 1 (Nature and Extent Determination): Nature and extent has been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-11a through 3-11e. No sample locations exceeded the ISLs more than 4 times; therefore, no results figures are presented. Sample locations can be seen on Figure 3-1 for reference. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-11f.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 17 samples were collected from six locations ranging from 0 to 9.5 feet bgs for AOC 28. The samples were analyzed for one or more of the following analyte categories: metals, PAHs, TPH, general chemistry parameters, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the Soil RFI/RI Work Plan, data were insufficient to complete the Decision 2 evaluation. Samples collected during implementation of the Soil RFI/RI Work Plan fill this data gap.

Exhibit 4-13. Conceptual Site Model – AOC 28
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Incidental leaks during transfer process **COCs Include:** • TPH • PAHs	• Surface Soil	• Percolation and/or infiltration	• Surface Soil • Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and/or IMs.

During implementation of the RFI/RI Work Plan, a soil characteristics sample was collected in AOC 28 at AOC28b-01. Results are presented in Table 3-36. These data along with the nature and extent data collected are sufficient to support CMS/FS and/or IMs.

4.1.10 AOC 29 – Interim Measure No. 3 Treatment Plant

4.1.10.1 Setting

AOC 29, Interim Measure No. 3 (IM-3) Treatment Plant, is located north of I-40 (as shown on Figure 2-1). IM-3 provides hydraulic control of the plume boundaries near the Colorado River to maintain a landward gradient. AOC 29 consists of the entire IM-3 groundwater treatment plant, including equipment, pipelines, valves, instrumentation, utilities, all infrastructure, sunshade, mobile warehouse units, trailer, treatment plant foundation and secondary containment areas, underground pipelines and utilities within the footprint of the treatment plant fence line, and the security fence and gate (Figure 4-9).

This facility was established and is operated under modern waste management laws, and will be closed pursuant to a decommissioning plan. Investigation of this unit is scheduled to be conducted as part of the decommissioning and removal activities as proposed in the *Interim Measure No. 3 Decommissioning, Removal, and Restoration Work Plan* (CH2M, 2014b), so therefore this AOC will not be fully investigated until groundwater remedy decommissioning sampling is conducted. AOC 29 is located on property owned by the Fort Mojave Indian Tribe.

4.1.10.2 Unit History

PG&E began implementing an interim measure to hydraulically control groundwater contamination in March 2004. The interim measure is intended to function until the final Topock groundwater remedy is put into operation. The initial stage of the interim measure involved pumping, transporting, and disposing of groundwater from the MW-20 Bench (AOC 30, IM-2). Batch treatment of groundwater was added to the MW-20 Bench in July 2004. The IM-3 treatment plant was constructed to replace IM-2 because space and treatment capacity limitations precluded management of higher groundwater flows at the MW-20 Bench.

The IM-3 treatment plant began treating groundwater in July 2005, and has been in continuous operation since that time. In early September 2005, IM-2 was turned off, and in 2009, it was decommissioned and the MW-20 Bench site was reconfigured to support continued operation of the IM-3 treatment system. Detailed information regarding the MW-20 Bench (AOC 30) is provided in Section 4.1.12.

DOI and DTSC have selected the final groundwater remedy (DOI, 2010a; DTSC, 2011f), and AOC 29 will not be a part of the selected final remedy; therefore, the IM-3 treatment plant and other parts of IM-3 will be decommissioned and removed after DOI and DTSC determine that the final remedy is operating properly and successfully. Because AOC 29 is an operating facility, it will be investigated and closed following decommissioning of IM-3.

4.1.10.3 Analytical Results

Because of active use of the IM-3 treatment plant, characterization sampling has not occurred at AOC 29. Soil data will be collected as part of decommissioning and removal of IM-3.

4.1.10.4 AOC 29 Conceptual Site Model

The primary sources of contamination at AOC 29 are likely to have been incidental spills; all spills within IM-3 were appropriately addressed at the time they occurred. The primary source medium at AOC 29 is soil. Based on unit description, history, previous soil characterization, and discussions with DTSC and DOI, the COPCs for soil within AOC 29 are Title 22 metals, CrVI, VOCs, SVOCs, PAHs, TPH, pH, and ferrous iron.

4.1.10.5 Evaluation of Data Against Data Quality Objectives for AOC 29

Decision 1 (Natural and Extent Determination): Deferred.

Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed.

Decision 2 (Data Sufficiency for EPC Calculation): Deferred.

Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed.

Decision 3 (Threat to Groundwater Determination): Deferred.

Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed.

Decision 4 (Data Sufficiency to Support CMS/FS): Deferred.

Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed.

4.1.11 AOC 30 – MW-20 Bench

4.1.11.1 Setting

AOC 30, the MW-20 Bench, is located between the National Trails Highway and the Colorado River (as shown on Figure 2-1). This area was part of the floodplain reductive zone in-situ pilot test. A portion of the MW-20 Bench is currently being used by PG&E for brine storage and loading facilities to support the IM-3 Treatment Plant. Portions of the MW-20 Bench are also periodically used by San Bernardino County, Southern California Gas Company, and BNSF Railway as a staging area for storing maintenance materials and equipment.

This facility was established and is operated under modern waste management laws and will be closed in accordance with agency requirements. In addition, a portion of this area will be used to support the final groundwater remedy. This AOC will not be fully investigated until groundwater remedy decommissioning sampling is conducted. AOC 30 is located on BOR property.

4.1.11.2 Unit History

PG&E operations on the MW-20 Bench began in 1998 and continue to the present time. Initial PG&E activities at the MW-20 Bench consisted of groundwater monitoring well installation and groundwater monitoring. Starting in 2004, the MW-20 wells were used as extraction wells to support the IM-2 Batch Treatment Facility. This operation was eventually replaced by the IM-3 extraction well system (extraction wells TW-2D, TW-2S, and TW-3D at MW-20 Bench and PE-1 within the floodplain) constructed between April 2004 and March 2006.

IM-2 operations began in March 2004 and continued through August 2005. During initial IM-2 operations, groundwater was extracted and stored in tanks on the MW-20 Bench. Extracted groundwater contained CrVI concentrations exceeding toxicity characteristic leaching procedure concentrations for hazardous waste, requiring the waste be transported offsite for treatment and/or disposal at a licensed hazardous waste treatment facility.

Beginning in July 2004 and continuing until the current groundwater treatment and extraction systems (IM-3) operations began in July 2005, a batch treatment plant operated on the MW-20 Bench. The batch treatment consisted of adding small quantities of sulfuric acid and ferrous chloride to the groundwater to convert CrVI to CrIII, and subsequent addition of small amounts of sodium hydroxide to raise the pH to a target range of 7.5 to 8.2 to precipitate the iron and chromium as hydrous iron oxide and chromium hydroxide, respectively.

PG&E stopped treating groundwater at the IM-2 Batch Treatment Facility in August 2005, as required by BLM (PG&E, 2005a), and has fully closed the unit (CH2M, 2009e). During closure of the IM-2 Batch Treatment Facility, some of the features were reconfigured to support the IM-3 treatment system, which is still in operation. To support IM-3, MW-20 was reconfigured to have two areas with separate containment systems: a brine storage and loading area, and a waste management area.

MW-20 Bench current features are shown on Figure 4-10 and include:

- Three brine storage tanks and secondary containment that store reverse osmosis concentrate (i.e., brine or high-salinity treated water for offsite disposal)
- Small pump station connected to the tanks to allow transferring of the brine to trucks (labeled as Brine Loading Pump, Off-Spec Transfer Pump, and Drainage Pump)
- A polyvinyl chloride (PVC)-lined, gravel truck lane
- Valve Vault No. 1, a partially buried building where extraction well pipelines pass through (the building also contains electrical equipment and instrumentation)
- Parking area
- Security fence, gate, and lighting
- Other ancillary equipment
- Extraction wells TW-2D, TW-2S, and TW-3D
- Monitoring wells MW-20-070, MW-20-100, MW-20-135, MW-31-060, and MW31-135

Spills at AOC 30

Two spills associated with PG&E's operations are known to have occurred at the MW-20 Bench. The first spill occurred on April 10, 2005, during operation of the IM-2 Batch Treatment Facility system and resulted in the release of clarifier (treatment) sludge consisting of precipitated solids and treated water. The second spill occurred on September 6, 2006, after cessation of the IM-2 system but during operation of the IM-3 brine management facility, and consisted of brine from the reverse osmosis system used to reduce the naturally high levels of total dissolved solids in the extracted groundwater.

The clarifier sludge spill on April 10, 2005 involved the release of an estimated 1,700 to 1,800 gallons, with 1,400 to 1,500 gallons retained on the drip pad and recovered. An estimated 300 gallons of liquid drained onto the ground. Soil excavation and confirmation sampling were conducted during several events in April, May, June, and July 2005. Excavation continued until confirmation sample concentrations were below the cleanup threshold of 31 mg/kg total chromium. Excavation and confirmation sampling were completed on July 13, 2005. An estimated total of 130 cubic yards of affected soil were excavated and transported to a permitted offsite disposal facility. The excavation area was backfilled on July 18, 2005 (PG&E, 2005b).

The reverse osmosis brine concentrate spill on September 6, 2006 occurred when a transfer hose ruptured during transfer of brine from one of the brine tanks to one of the storage tanks on the MW-20 Bench. The tanks' secondary containment flooded, and a portion of the brine flowed over the top of the containment berm onto the ground. An estimated volume of 400 gallons of brine overflowed the containment area. The "wetted soil" was excavated and approximately 22 cubic yards of soil were transported and disposed of at an offsite facility as nonhazardous waste. After the "wetted soil" was excavated, PG&E collected one soil sample and analyzed it for total chromium and sodium. The concentrations of total chromium and sodium in the confirmation soil samples were 21.5 mg/kg and 848 mg/kg, respectively, which were below the Topock background balues (39 mg/kg and 2,070 mg/kg, respectively).

4.1.11.3 Analytical Results

Because of active use of the MW-20 Bench as part of IM-3, characterization sampling has not occurred at AOC 30. Soil data will be collected as part of decommissioning and removal of IM-3.

Soil samples were collected at AOC 30 as part of background sampling, confirmation sampling following the 2005 spill, the 2006 spill, and post-IM-2 closure confirmation sampling. Soil samples at AOC 30 were analyzed for metals only.

4.1.11.4 AOC 30 Conceptual Site Model

The primary sources of contamination at AOC 30 are likely to have been incidental spills and potential leaks along piping (aboveground and underground) associated with the groundwater interim measures, and storage and construction activities not associated with PG&E. The primary source medium at AOC 30 is soil; constituents released to surface soil could also be released to subsurface soil through infiltration. Based on the unit description, history, and previous soil characterization, the COPCs for soil within AOC 30 are Title 22 metals, CrVI, and sodium.

4.1.11.5 Evaluation of Data Against Data Quality Objectives for AOC 30

Decision 1 (Natural and Extent Determination): Deferred.

Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed.

Decision 2 (Data Sufficiency for EPC Calculation): Deferred.

Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed.

Decision 3 (Threat to Groundwater Determination): Deferred.

Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed.

Decision 4 (Data Sufficiency to Support CMS/FS): Deferred.

Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed.

4.1.12 AOC 31 – Former Teapot Dome Oil Pit

4.1.12.1 Setting

AOC 31, also known as the Teapot Dome Oil Pit, is located on the northeast side of the facility, just outside the compressor station fence line (as shown on Figure 2-1). It is located within and overlaps with the Perimeter Area Investigation. AOC 31 is located on property owned by PG&E.

4.1.12.2 Unit History

A former employee indicated that he had been told that the Teapot Dome restaurant provided oil changes, and that oil from vehicles was dumped into a pit. Potential wastes in this area pre-date the construction of the compressor station.

A circular area of dark soil approximately 3 to 4 feet in diameter, was determined to be the most likely potential location of the former oil pit. A surface sample was collected from this area in 2015, and a boring to 10 feet bgs was installed in 2016. An opportunistic sample PA-OS-1 was collected at 9 to 9.5 feet bgs from a pipeline excavation near AOC 31 in 2011. Soil sampling results are presented in the following sections

4.1.12.3 Analytical Results

Metals: Samples were collected from two locations at depths ranging from 0 to 10 feet bgs. The ISLs for copper (background [BK]), lead (BK), and zinc (BK) were exceeded at in surface samples in PA-08, as shown in Table 3-12a.

- Copper was detected above its ISL (16.8 mg/kg) in one sample with a concentration of 62 mg/kg at sample location PA-08 (Table 3-12a). Sample location PA-08 was collected in the former Tea Pot Dome oil pit area (Figure 2-1).
- Lead was detected above its ISL (8.39 mg/kg) in two samples taken from depths between 0 and 3 feet bgs (Table 3-12a). The highest lead concentration of 19 mg/kg was detected at sample location PA-08 at 0 to 1 foot bgs. Sample location PA-08 was collected in the former Tea Pot Dome oil pit area.
- Zinc was detected above its ISL (58 mg/kg) in one sample with a concentration of 94 mg/kg at sample location PA-08 at 0 to 1 foot bgs (Table 3-12a). Sample location PA-08 was collected in the former Tea Pot Dome oil pit area.

The vertical extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits. Only one surface sample, PA-08, was collected from the oil pit area, limiting the definition of lateral extent. Minimal exceedances collected from the stained soil area indicate impacts laterally are likely limited.

CLP Inorganics: A single sample was submitted for CLP inorganics, PA-08, and sample results did not exceed any of the respective ISLs (Table 3-12b).

PAHs: Samples were collected from two locations at depths ranging from 0 to 10 feet bgs (Table 3-12c). PAHs were evaluated by calculating B(a)P equivalents for human health and low molecular weight and HMW PAH values for ecological receptors.

- B(a)P equivalent was detected above its ISL (RRSL) (110 µg/kg) in one sample with a concentration of 150 µg/kg at sample location PA-08 at 0 to 1 foot bgs. Sample location was collected in the former Tea Pot Dome oil pit area (Figure 2-1).

The lateral and vertical extent of the exceedances has been defined by samples with results below ISLs or not detected above reporting limits.

VOCs and SVOCs: Samples were collected from two locations at depths ranging from 0 to 10 feet bgs. Only chloroform was detected and no sample had detected results that exceeded their respective ISLs (Table 3-12d).

TPH: Samples were collected from two locations and no sample results exceeded their respective ISLs (Table 3-12e).

General Chemistry: Samples were collected from a single location and no sample results exceeded their respective ISLs (Table 3-12f).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected from two locations and no sample results exceeded their respective ISLs (Table 3-12g).

Dioxins and Furans: Dioxins and furans were not a COPC for this unit; therefore, samples were not analyzed for dioxins and furans.

4.1.12.4 AOC 31 Conceptual Site Model

Exhibit 4-14 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 31. The primary sources of contamination at AOC 31 are likely to have been discharge of used automobile engine oil into the pit, and incidental spills of new and used oil. The potential type and quantity of any materials released at this unit are unknown. Any constituents released would have been released in liquid form. The presence of PAHs, metals, and low level TPH detections is consistent with motor oil being released in this area.

The primary source media are shallow soils. From surface soil, contaminants could have migrated to shallow and deeper soils. The presence of PAHs and TPH and metals above background concentrations are confined to the top 3 feet of soil in AOC 31. Concentrations in deeper soils do not indicate contamination migrated beyond shallow soil.

Exhibit 4-14. Conceptual Site Model – AOC 31
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Discharge of used automobile engine oil into the pit, and incidental spills of new and used oil **COCs Include:** • Metals • PAHs • TPH	• Shallow Soil	• Percolation and/or infiltration	• Surface Soil • Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals

4.1.12.5 Evaluation of Data Against Data Quality Objectives for AOC 31

Decision 1 (Nature and Extent Determination): Nature and extent has been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-12a through 3-12g and the sample locations are shown on Figure 3-1. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-12h.

Only Category 1 and Category 2 data were used to delineate the nature and extent of contamination. Considering these data only, samples were collected from two locations (PA-08 and PA-OS1) ranging from 0 to 10 feet bgs for AOC 31. There are no AOC 31 specific samples.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the Soil RFI/RI Work Plan, data were insufficient to complete the Decision 2 evaluation. Samples collected during implementation of the Soil RFI/RI Work Plan filled this data gap. A total of six samples were collected

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): No samples from AOC 31 were analyzed for soil characteristics during implementation of the RFI/RI Work Plan. This data gap will be addressed during remedial design if necessary in AOC 31.

4.1.13 UA-1 – Potential Pipe Disposal Area

4.1.13.1 Setting

Unidentified Area 1 (UA-1), also known as Potential Pipe Disposal Area, is located west of the station, and north of the gas pipeline road near the former evaporation ponds (Figure 2-1). During site historical data gathering, a former employee identified an area just north of the gas pipeline road near the former evaporation ponds where potential asbestos-wrapped pipes were buried and disposed. The area was immediately north of the pipeline road, across from the northern boundary of the former pounds. UA-1 is located on HNWR property within a culturally sensitive area.

4.1.13.2 Unit History

During the site historical data gathering, a former employee described 20-foot lengths of asbestos-covered metal pipes as having been buried in a trench, shown on Figure 2-1 as UA-1.

The Tribes have expressed their desire to avoid or greatly limit activity in this area. At DOI's direction, no intrusive sampling was performed at UA-1 in fulfillment of the RFI/RI Work Plan. To date, investigation activities at UA-1 have been limited to surface observations, geophysical surveys, and a review of historical aerial photographs to identify potential buried pipe in the area.

4.1.13.3 Geophysical Surveys and Visual Inspections

Initial Survey at UA-1

During the 2008 field investigation, a geophysical survey was performed in UA-1 to evaluate the potential presence of buried asbestos-wrapped metal pipes in this area and to identify the location of underground

utility infrastructure. Results of the geophysical survey did not suggest the presence of buried pipes in this area; however, several small metallic anomalies and two undifferentiated utilities (UUs) were observed sporadically across the UA-1 area. One UU was truncated in the north and extended out of the survey area in the south, and the other UU was located in the southern portion of the survey area trending east west within the alignment of the access road adjacent to UA-1. The UU within the access road was identified as the former wastewater transference pipeline that transferred non-hazardous wastewater from the compressor station to the evaporation ponds. This pipeline was abandoned in place in 2007 when it was replaced with a new transfer pipeline. The complete geophysical survey results are presented in Appendix C of the Soil RCRA Facility Investigation/Remedial Investigation Work Plan (CH2M, 2013aA).

Following the geophysical survey, further visual assessment of the area in the vicinity of UA-1 identified miscellaneous pipe clamps and small quantities of insulation on the ground surface at a second location approximately 200 to 250 feet to the east of UA-1. A pronounced soil mound approximately 100 feet long by 25 feet wide was also observed in this area and is shown on Figure 2-1 as UA-1A.

During a follow-up interview with the same former employee in early 2011, the employee indicated that he did not remember the burial location with precision. He indicated that the original location (UA-1), the second location described in the preceding paragraph (UA-1A), and a third location (UA-1B) to the west of the originally identified location are all potential locations for the burial. The employee indicated that the burial occurred in the 1970s or 1980s and his memory did not allow him to precisely determine which of the three locations are the most likely burial site.

Follow-up Surveys at UA-1A and UA-1B

In 2015, an asbestos survey and a geophysical survey were conducted at UA-1A and UA-1B. During the asbestos survey, debris samples were collected from two locations and submitted for laboratory analysis of asbestos. Results indicated the following:

- Asbestos was present in both debris types (a pipe gasket and hose clamps with fibrous material attached to residual paint). Results indicated chrysotile was present in the gasket and hose clamp samples at 20 and 15 percent, respectively.
- None of the asbestos-containing samples were friable; therefore, the material did not present a hazard to staff performing nonintrusive geophysical survey.

Following the asbestos survey, a geophysical survey was conducted using the following tools: terrain conductivity, total field magnetics, metal detection, and (for UA-1A only) ground-penetrating radar. Results of the geophysical survey are presented in Appendix B, Attachment B6. Key findings include:

- UA-1A:
  - Two subsurface anomalies were detected with the total field magnetics survey. These anomalies could be associated with buried pipes or metallic debris.
  - A follow-on survey with metal detection and ground-penetrating radar did not detect anomalies that correlated with the total field magnetics survey, but did identify a linear anomaly between the two areas (with metal detection).
- UA-1B West – No subsurface anomalies were detected.
- UA-1B East – One subsurface anomaly was detected with the terrain conductivity, which suggests the presence of nonconductive buried debris (for example, wood or brick). Alternatively, this could be associated with a change in soil type or moisture content. The metal detection survey was negative.

Trenching was not conducted to evaluate subsurface anomalies because of the cultural significance of the area and the inert nature of the suspected buried pipes.

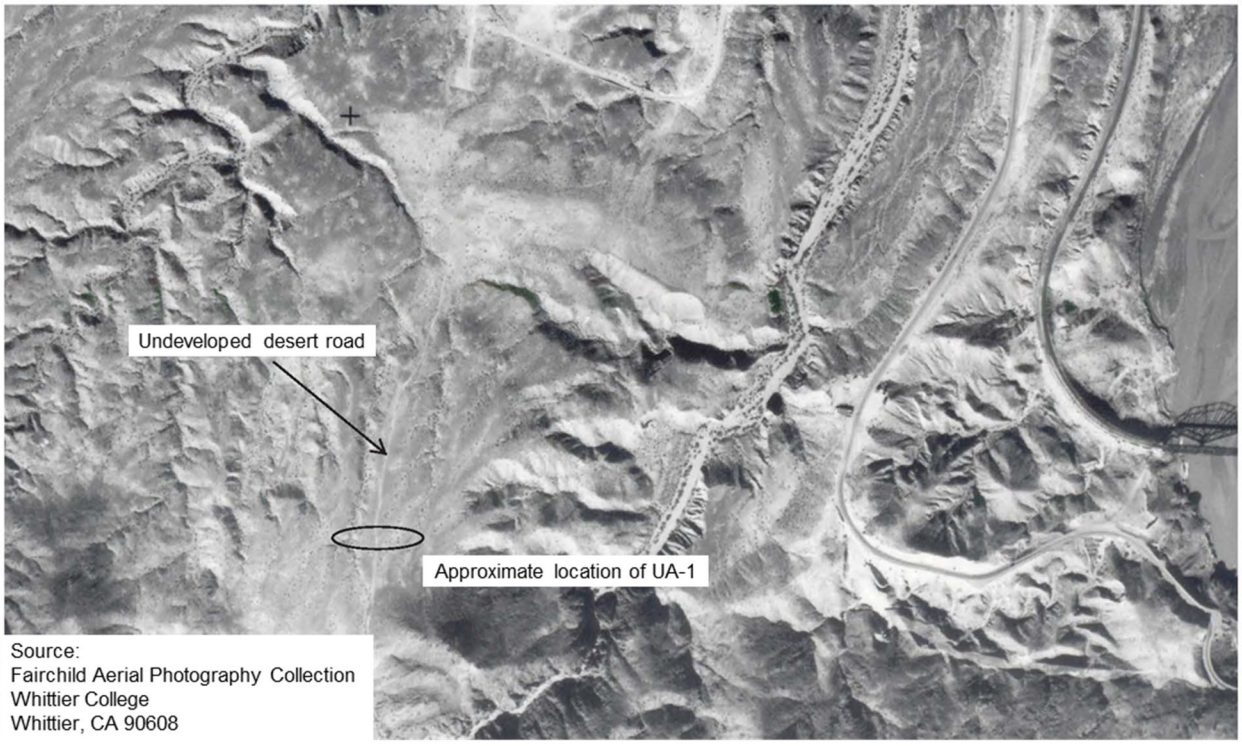
4.1.13.4 Review of Historical Aerial Photographs

As requested by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in a December 13, 2010 e-mail, PG&E performed a detailed historical aerial photograph analysis near UA-1 and the immediate surrounding area to determine/identify evidence of soil disturbances, including potential pipe disposal. All available and applicable historical aerial photographs which span from 1936 to 2004 were reviewed in detail. The date for one of the aerial photographs reviewed is not known with certainty, although it was taken after 1973 and before 1989. Additionally, aerial photographs from the late 1940s, 1947, 1951, 1957, 1960, 1966, 1970, 1973, 1976, 1981, 1983, 1995, 2001, 2005, and 2006 were also viewed but did not show UA-1 or the immediate vicinity; therefore, these aerial photographs are not discussed further in this document.

Exhibit 4-15 presents a summary of the information observed in each of the applicable aerial photographs reviewed. The aerial photographs are presented in Photographs 4-12 through 4-28. The approximate location of UA-1 is shown in these figures.

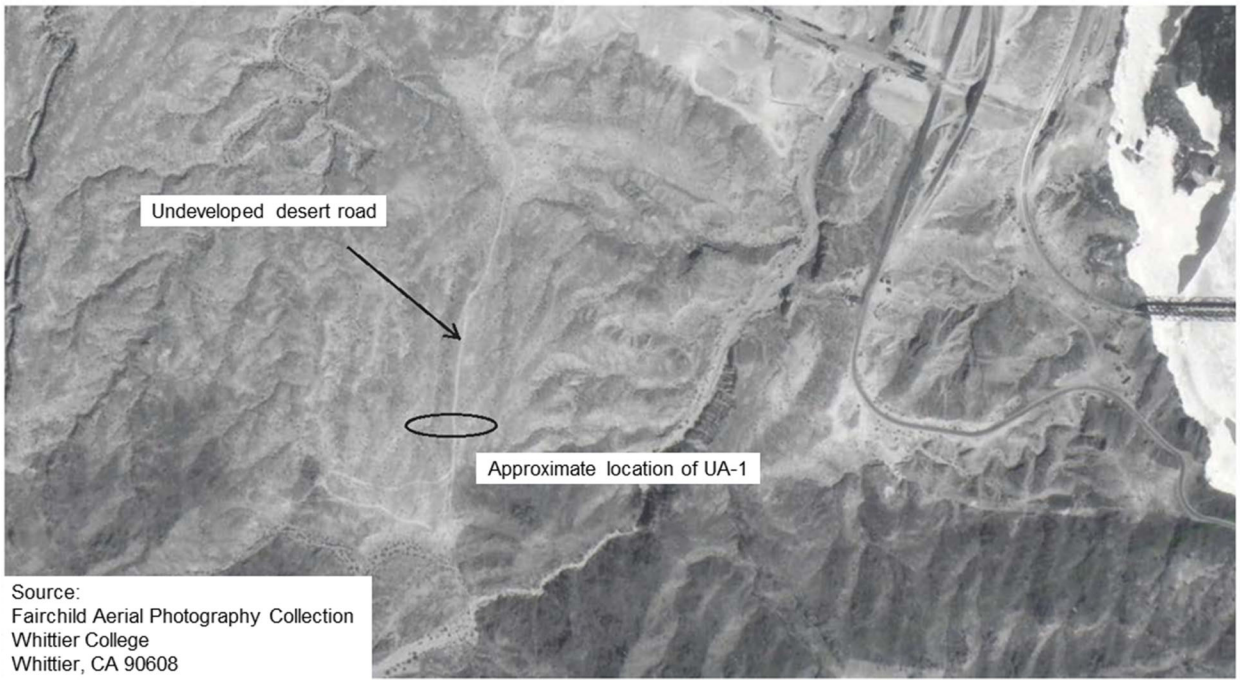
Exhibit 4-15. Summary of Aerial Photographs for UA-1, 1936 to 2004
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Year	Description
1936, 1942, and 1944 (Photographs 4-12 through 4-14)	UA-1 and the surrounding area are undeveloped. An undeveloped desert road with a north-south orientation is located in the general area of UA-1 (see arrows in photographs). No evidence of other constructed features or other soil disturbance is visible in UA-1 or surrounding area.
1953 (Photograph 4-15)	The compressor station (built in 1951) is present in this aerial photograph (see arrow #1). The pipeline right-of-way (ROW) and road south of UA-1 is now visible (see arrow #2). There are several smaller roads/paths/turnaround loops stemming off the pipeline ROW (see arrow #3). What appears to be a small constructed structure is present north of the pipeline ROW (see arrow #4). Soil disturbance appears to be limited to ROW clearing and road construction.
1955 and 1956 (Photographs 4-16 and 4-17)	The small constructed structure north of the pipeline ROW is no longer visible (see arrow in photographs). No significant changes in manmade features or soil disturbance in UA-1 and the surrounding area can be seen between the 1953, 1955, and 1956 aerial photographs.
1961 and 1962 (Photographs 4-18 and 4-19)	A new pipeline ROW and/or pipeline road is visible to the north and parallel to the existing pipeline ROW (see arrow #1). Several access roads connecting the new pipeline ROW and the existing pipeline ROW are visible (see arrow #2). No evidence of other constructed features or other soil disturbance is visible in UA-1 or the surrounding area.
1964 (Photograph 4-20)	Several white areas near the pipeline ROWs are visible in this photograph (see arrow #1). These white areas were not identified in the previous aerial photos, perhaps because those photos were overexposed. A black feature is visible to the south of the pipeline road (see arrow #2). No other changes can be seen between the 1961 and 1962 photographs and the 1964 photograph.
1967 (Photograph 4-21)	No significant changes in manmade features or soil disturbance in UA-1 and the surrounding area can be seen between 1964 and 1967 photographs.
1969 (Photograph 4-22)	The white areas near the pipeline ROWs are no longer visible in this photograph. No significant changes in constructed features or soil disturbance in UA-1 and the surrounding area can be seen between 1967 and 1969 photographs.
1975 (Photograph 4-23)	The old evaporation ponds are visible south of the pipeline ROW (see arrow #1). No other changes in constructed features or soil disturbance in UA-1 and the surrounding area can be seen between 1969 and 1975 photographs.
Undated Photograph, Between 1973 and 1989 (Photograph 4-24)	What appears to be a constructed structure is visible south of the UA-1 area along the pipeline ROW (see arrow #1). The old evaporation ponds are visible south of the pipeline road (see arrow #2). Dark marks or shadows appear on a portion of the pipeline road to the east of the UA-1 area (see arrow #3).
1992, 1994, 1997, 2004 (Photographs 4-25 through 4-28)	The northern-most pipeline ROW was widened significantly (see arrow #1) for the installation of the new Mojave Gas Pipeline in 1992. The old and new evaporation ponds are visible south of the pipeline road (see arrows #2 and #3).

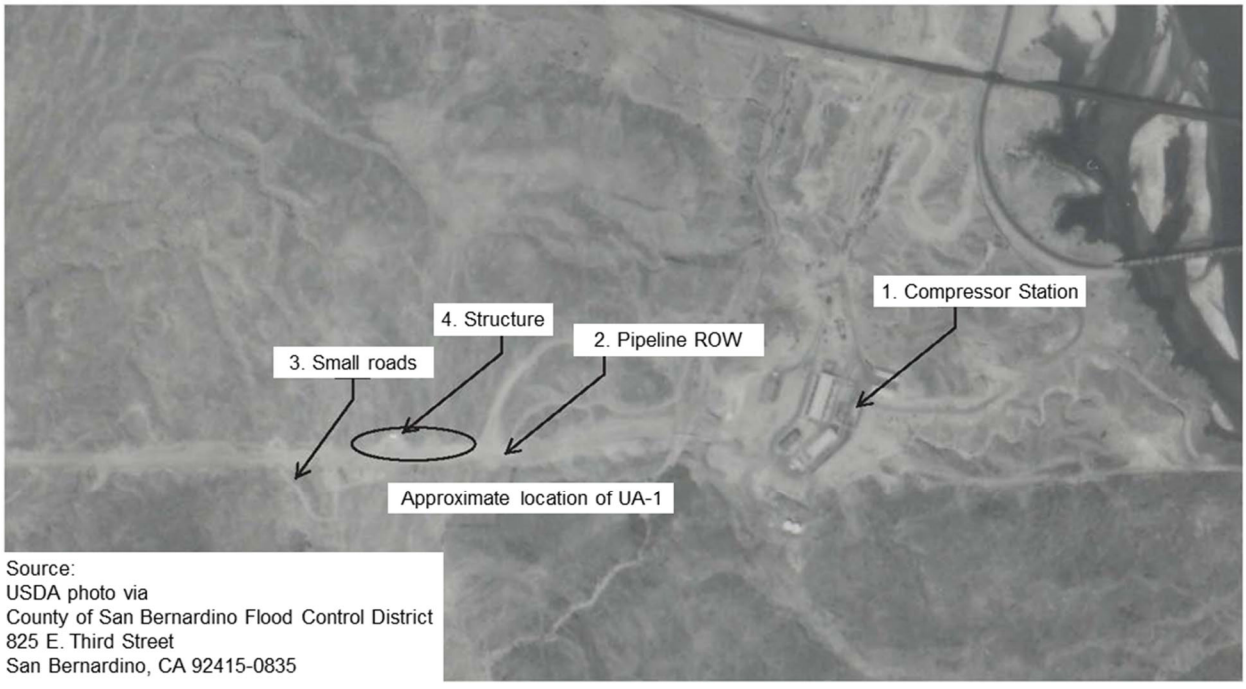


Photograph 4-12: 1936 Aerial photograph of compressor station area prior to construction.

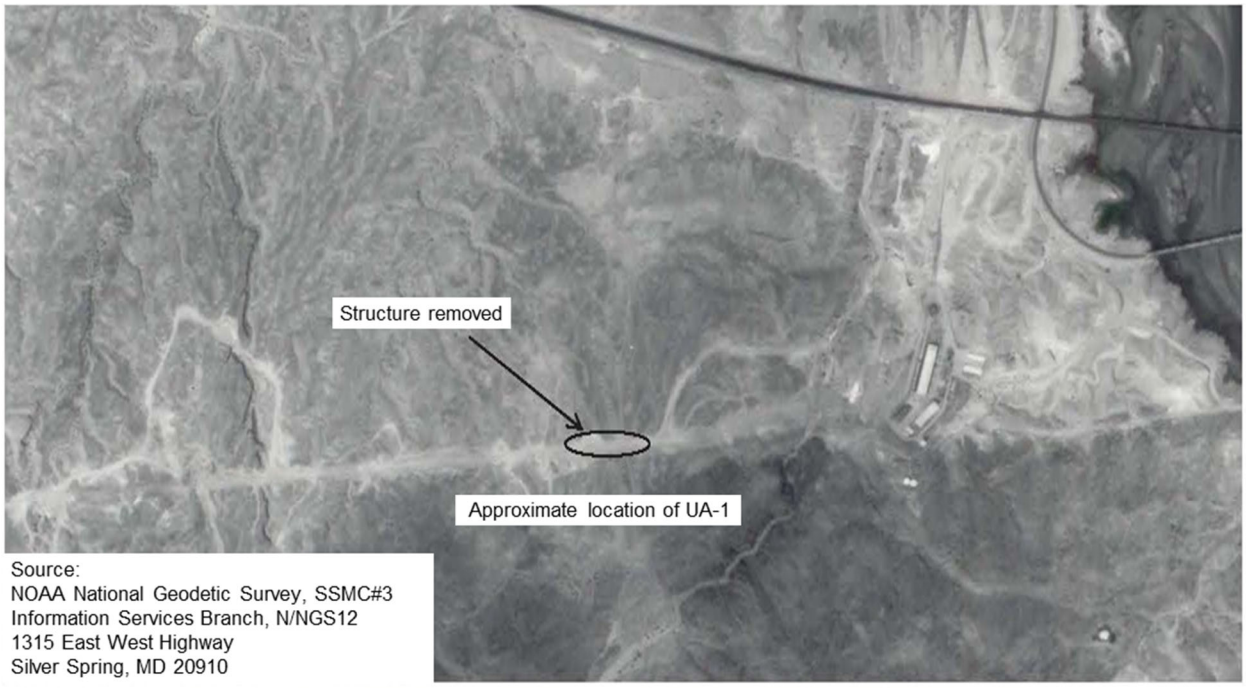
Photograph 4-13: 1942 Aerial photograph of compressor station area prior to construction.



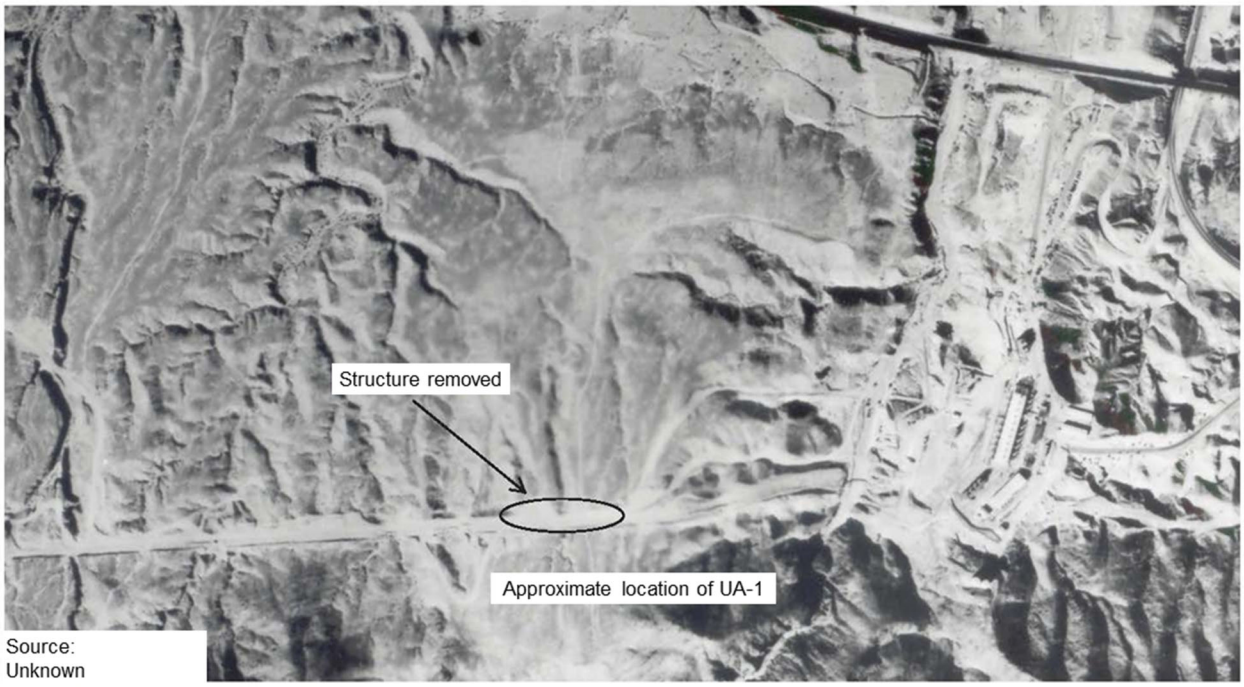
Photograph 4-14: 1944 Aerial photograph of compressor station area prior to construction.



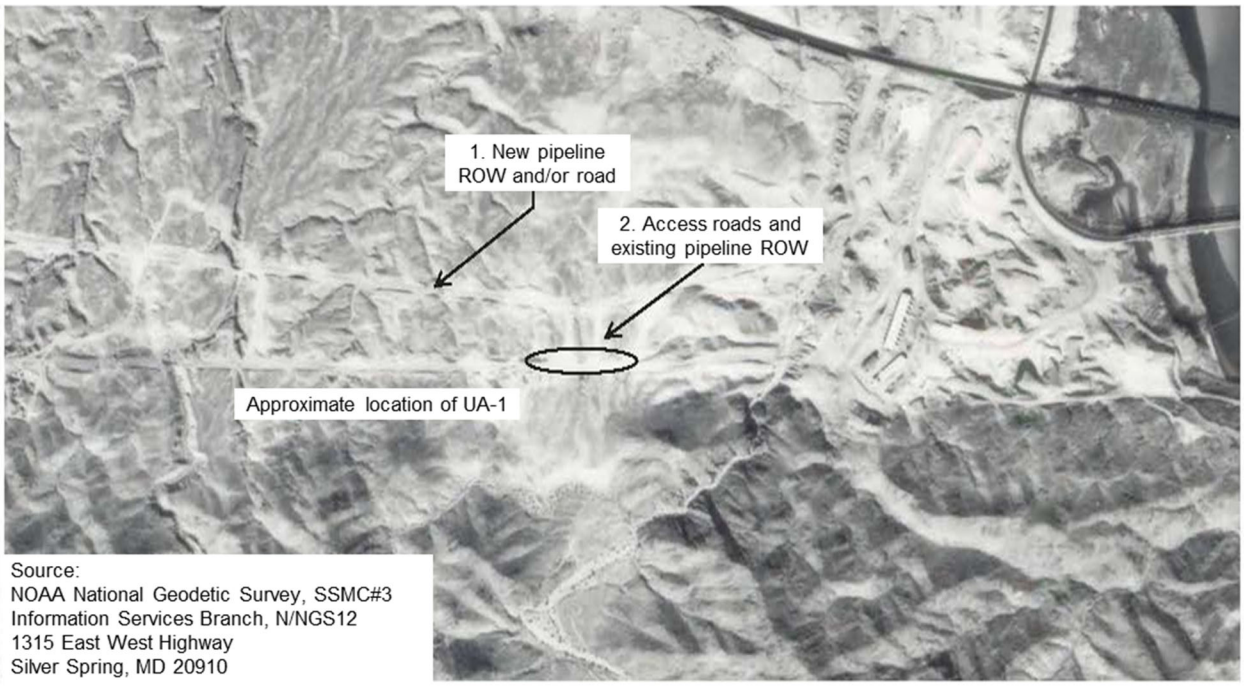
Photograph 4-15: 1953 Aerial photograph of compressor station area.



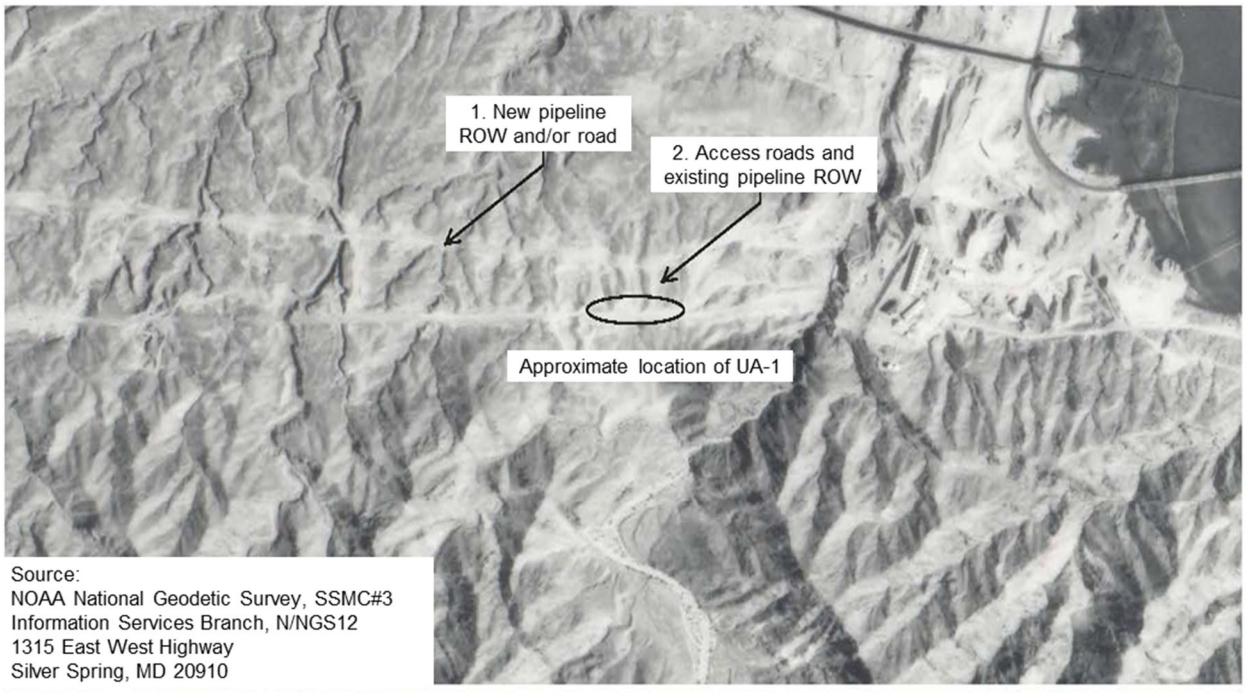
Photograph 4-16: 1955 Aerial photograph of compressor station area.



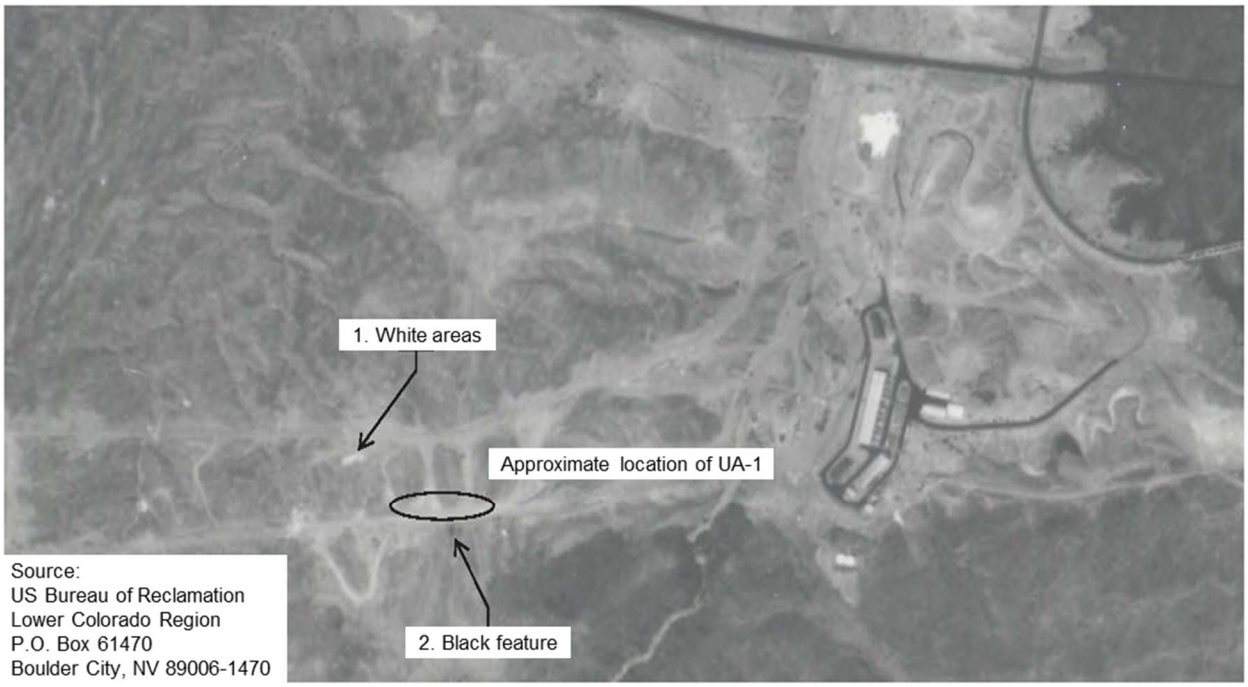
Photograph 4-17: 1956 Aerial photograph of compressor station area.



Photograph 4-18: 1961 Aerial photograph of compressor station area.

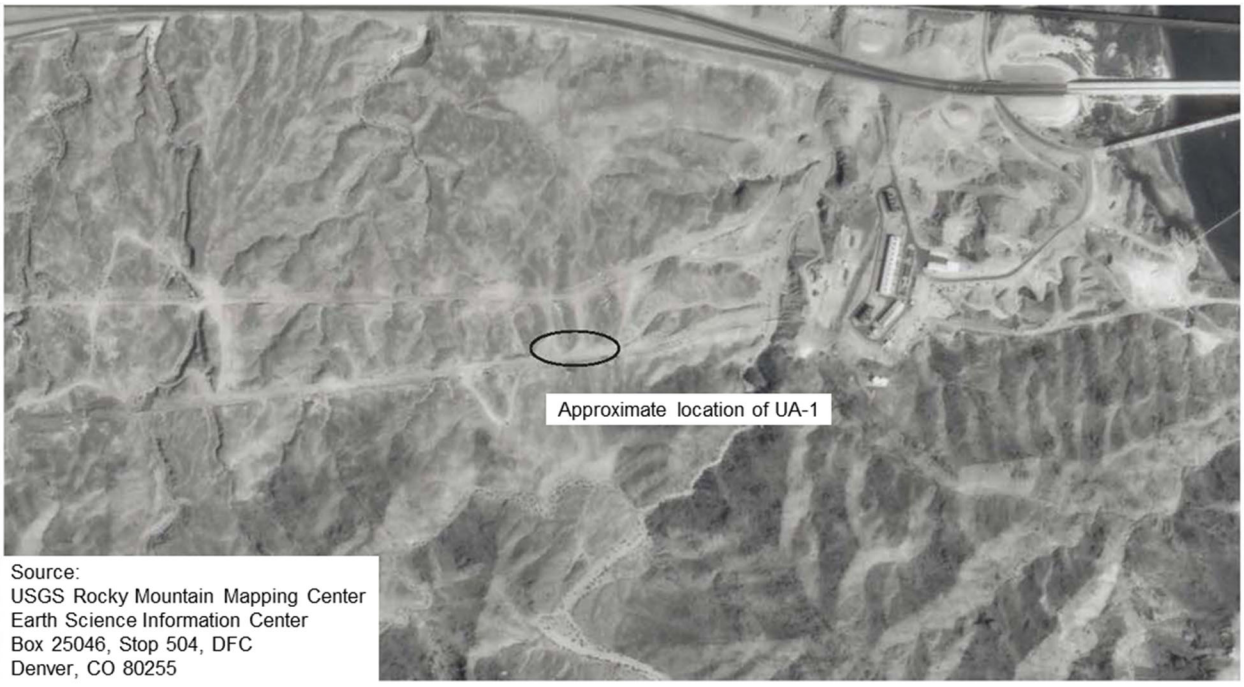


Photograph 4-19: 1962 Aerial photograph of compressor station area.

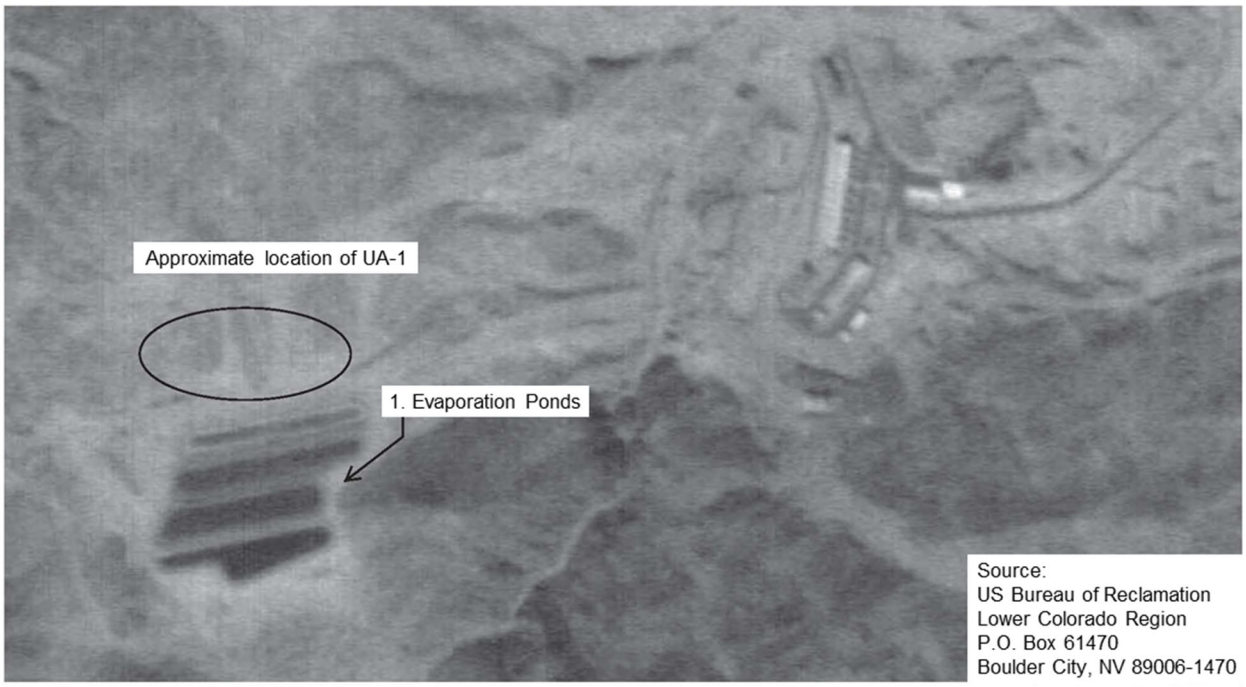


Photograph 4-20: 1964 Aerial photograph of compressor station area.

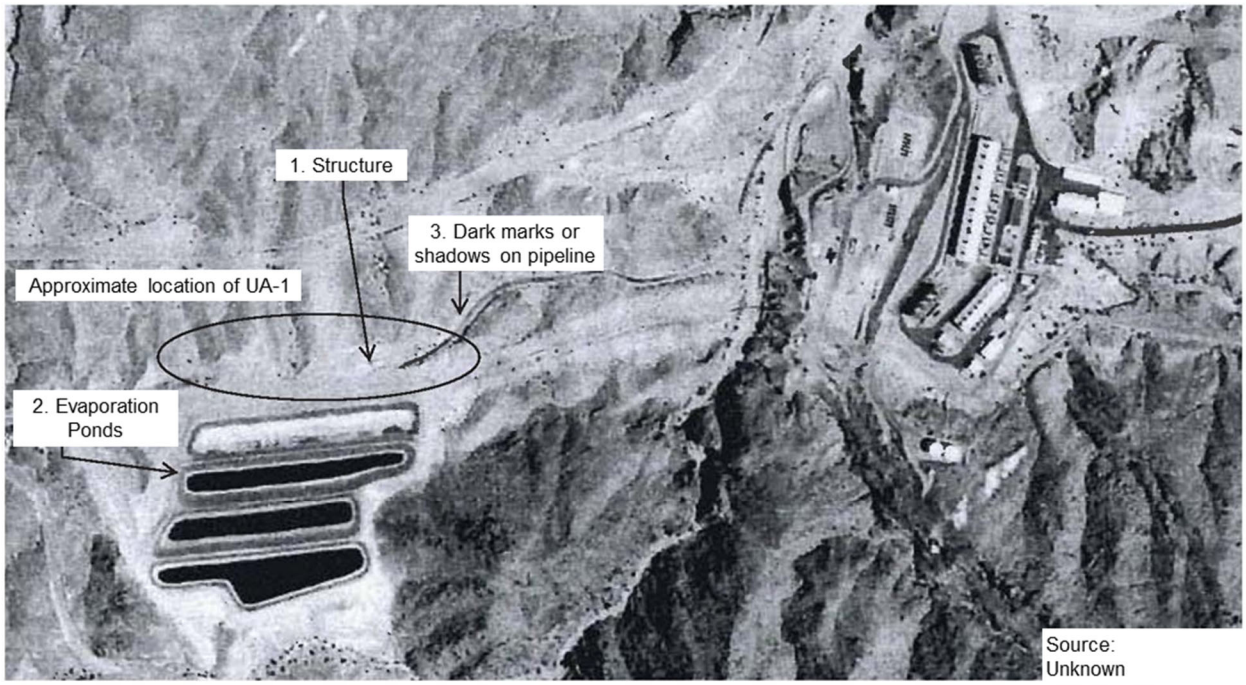
Photograph 4-21: 1967 Aerial photograph of compressor station area.



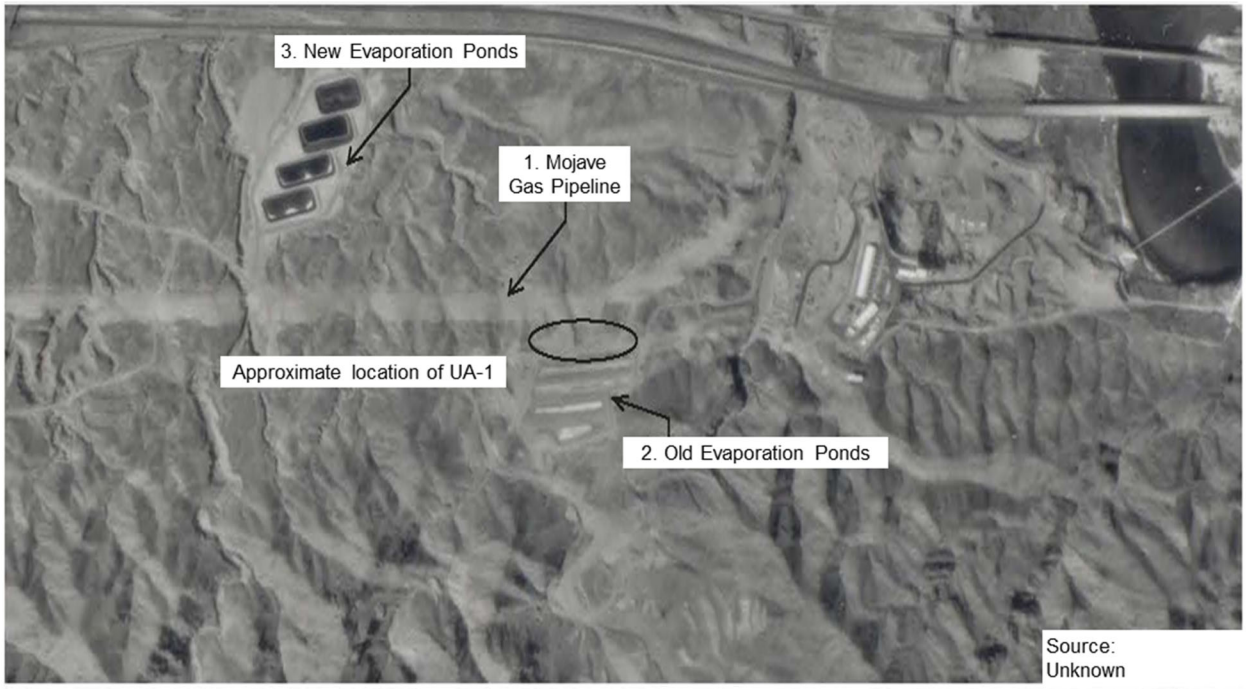
Photograph 4-22: 1969 Aerial photograph of compressor station area.



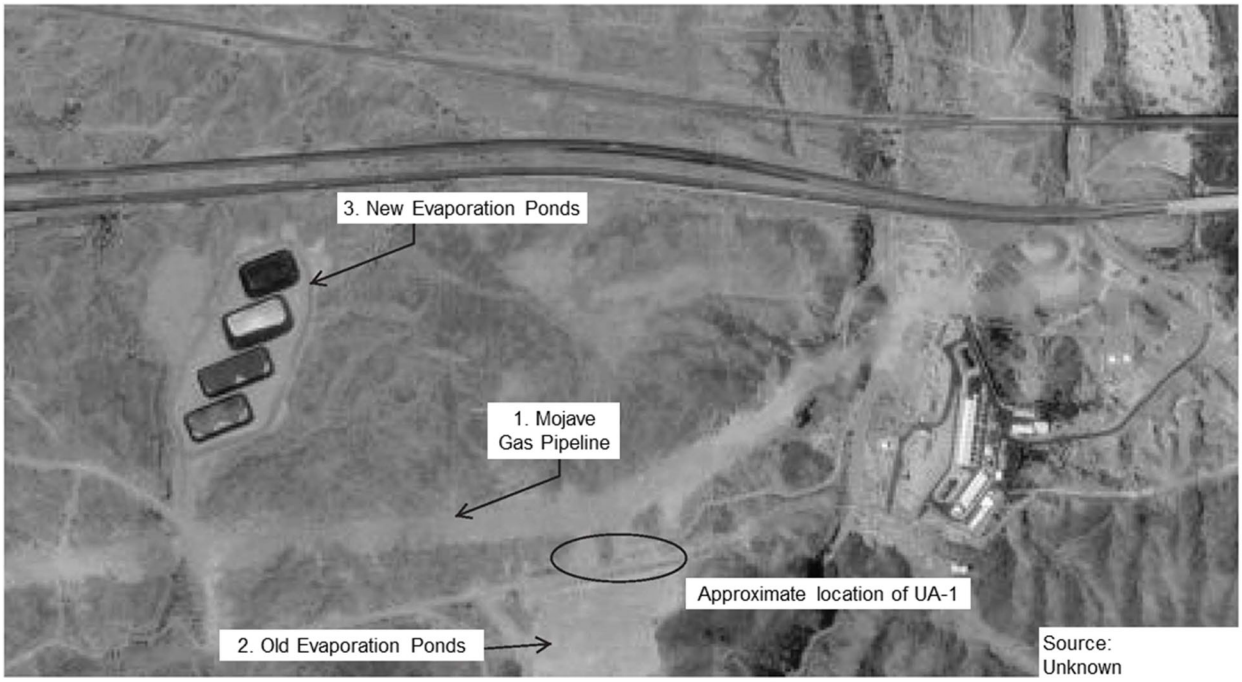
Photograph 4-23: 1975 Aerial photograph of compressor station area.



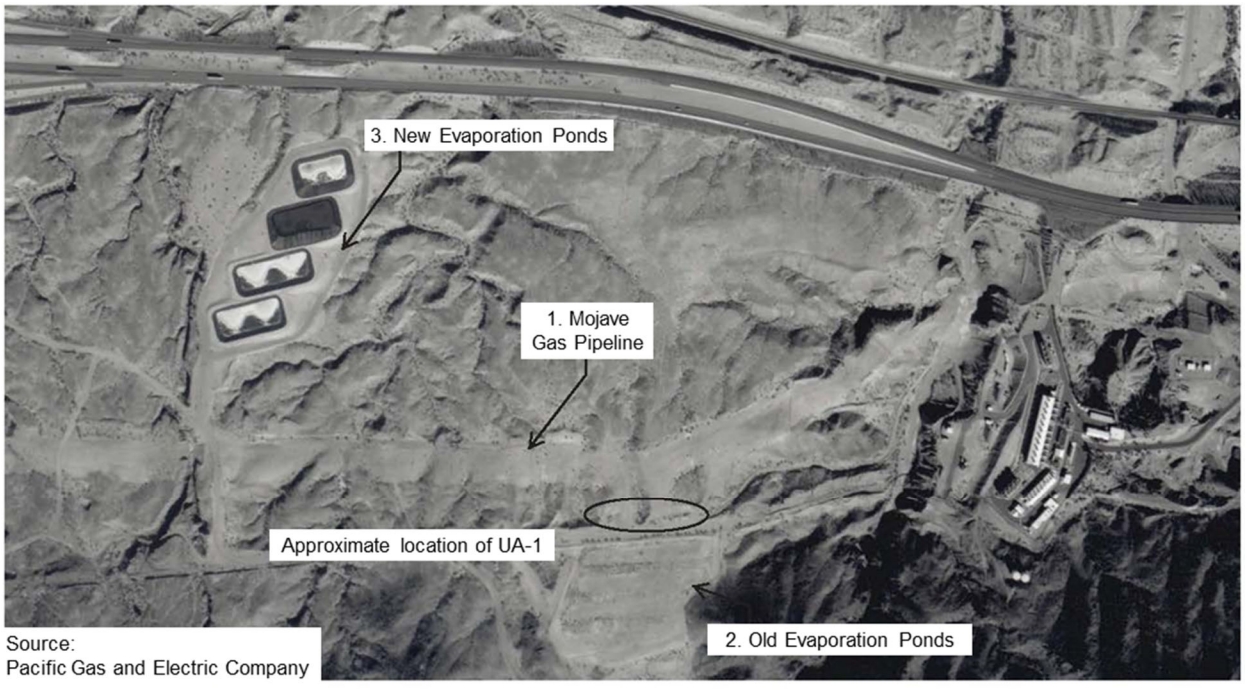
Photograph 4-24: Undated photograph, between 1973 and 1989, of compressor station area.



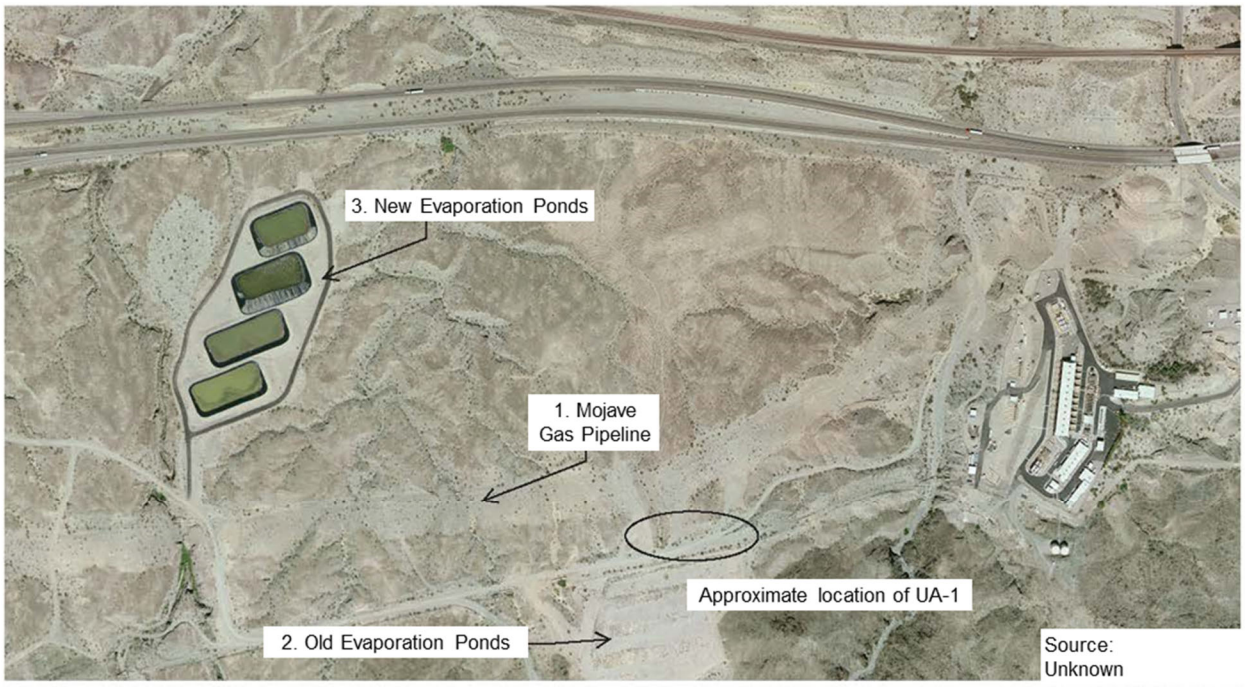
Photograph 4-25: 1992 Aerial photograph of compressor station area.



Photograph 4-26: 1994 Aerial photograph of compressor station area.



Photograph 4-27: 1997 Aerial photograph of compressor station area.



Photograph 4-28: 2004 Aerial photograph of compressor station area.

4.1.13.5 Analytical Results

Not applicable. No intrusive sampling was performed at UA-1 in fulfillment of the RFI/RI Work Plan.

4.1.13.6 UA-1 Conceptual Site Model

No conceptual site model has been developed for UA-1.

4.1.13.7 Evaluation of Data Against Data Quality Objectives for UA-1

Not applicable. No intrusive sampling was performed at UA-1 in fulfillment of the RFI/RI Work Plan.

4.1.14 UA-2 – Former 300B Pipeline Liquids Tank Area

4.1.14.1 Setting

Unidentified Area 2 (UA-2), also known as the Former 300B Pipeline Liquids Tank Area, is located southeast of the compressor station, as shown on Figure 2-1. PG&E's 300B pipeline was formerly equipped with a 900-gallon-capacity aboveground drip tank. The 300B Pipeline Liquids Tank was formerly used to collect pipeline liquids from the 300B natural gas pipeline. The drip tank was located on a shelf in the hill next to a section of old Route 66. The tank was 2 feet 10 inches in diameter and 20 feet long, located on two concrete saddle supports. The tank pad was unpaved (CH2M, 2006).

4.1.14.2 Unit History

In 1994, oil-stained soil was observed underneath and immediately adjacent to a portion of the tank, and an initial site investigation was performed on December 2, 1994. Samples were analyzed for total petroleum hydrocarbons in the motor oil range (TPH-motor oil). Low levels of TPH-motor oil were detected at 1.2 and 2 feet below ground surface (bgs) (CH2M, 2006). The tank was removed in 1995.

One surface soil sample was collected on April 16, 1996 to characterize the stained soil for future disposal. The soil sample was analyzed for total recoverable petroleum hydrocarbons (TRPH), VOCs, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and California Assessment Method 17 metals. TRPH was detected at an elevated concentration. Metals, VOCs, SVOCs, and PCBs were sampled at a location coincident with the highest level of TRPH, and analytical results indicated no elevated concentrations of these constituents; therefore, TRPH was considered the only COC.

A closure plan was submitted in May 1996 to remove the TRPH-impacted soil (Trident, 1996a). The cleanup was implemented and soil excavation was conducted between July 18 and September 26, 1996. Four rounds of excavation were performed, with a total excavation depth of 5.5 feet bgs. Confirmation samples were collected after each round of excavation. The cleanup target was 1,000 mg/kg TRPH. Samples collected during the last two sampling events indicated that the soil remaining in place below and adjacent to the excavation contained TRPH at concentrations ranging from less than analytical detection limits to 150 mg/kg. The soil excavation and sampling results are documented in the Closure Certification Report (Trident, 1996b).

The County of San Bernardino, County Fire Department, Hazardous Materials Management Division issued a closure letter on June 9, 1997, confirming the completion of the site investigation and remedial action for the contaminated soil at this site.

In 2006, the California Environmental Protection Agency, DTSC requested additional sampling at this site. The area of potential contamination is small (20 feet by 40 feet). Based on DTSC's request, the Soil Part A Work Plan recommended further characterization at UA-2 (CH2M, 2006).

Part A Phase 1 and historical soil samples were collected in the area in and around where the former AST had been located.

4.1.14.3 Analytical Results

Metals: Samples were collected from six locations at depths ranging from 0 to 6 feet bgs. The ISLs for arsenic (BK), barium (BK), lead (BK), and zinc (BK) were exceeded at one or more of the following locations: UA2-300B-1, 2, 3, 4, and 5. The analytes most frequently detected over the ISLs were arsenic and zinc, as shown in Table 3-13a and Figures 3-6a through 3-6l.

- Arsenic was detected above its ISL (11 mg/kg) at seven locations from depths between 0 to 6 feet bgs (Table 3-13a). The highest arsenic concentration of 24 mg/kg was detected at sample location UA2-300B-1 at 0.5 to 1 foot bgs (Figure 3-6a).
- Zinc was detected above its ISL (58 mg/kg) in 10 samples taken from depths between 0 and 6 feet bgs (Table 3-13a). The highest zinc concentration of 65 mg/kg was detected at sample locations UA2-300B-3 at 2 to 3 feet bgs and UA2-300B-5 at 0.5 to 1 foot bgs (Figure 3-6l).

The lateral and vertical extents of the exceedances have been defined by samples with results below ISLs, not detected above reporting limits, or geographical features. There are several locations that have detected metal results slightly above (2 times or less) their respective ISLs (typically, background values), these minor exceedances of the ISLs are not considered a data gap requiring further investigation. Additionally, these exceedances are defined by the natural boundaries of UA-2 (i.e., dirt road to the north, bedrock at 5.5 feet bgs, bedrock outcropping to the east and south, and steep slope to the west).

CLP Inorganics: Samples were collected in two samples at depths from 0 to 0.5 foot bgs (Table 3-13b). The ISL for manganese (BK) was exceeded at UA2-300B-1 and 5, at a depth of 0 to 0.5 foot bgs. The highest manganese concentration of 840 mg/kg was detected above the ISL of 402 mg/kg.

Because only two surface samples were collected for CLP inorganics, and manganese was exceeded in both, lateral and vertical extent of the exceedances of manganese has not been defined. Manganese is

not considered a COPC/COPEC for this area. These minor exceedances of the manganese ISL are not considered a data gap.

PAHs: Samples were collected at six locations at depths from 0 to 6 feet bgs. No samples had detected results that exceeded their respective ISLs (Table 3-13c).

VOCs and SVOCs: Samples were collected at six locations and no samples had detected results that exceeded their respective ISLs (Table 3-13d).

TPH: Samples were collected at up to six locations and no samples had detected results that exceeded their respective ISLs (Table 3-13e).

General Chemistry: General chemistry parameters were not a COPC for this unit; therefore, samples were not analyzed for general chemistry parameters.

Pesticides: Samples were collected from three locations and no samples had detected results that exceeded their respective ISLs (Table 3-13f).

PCBs: Samples were collected from six locations and no samples had detected results that exceeded their respective ISLs (Table 3-13g).

Dioxins and Furans: Dioxins and furans were not a COPC for this unit; therefore, samples were not analyzed for dioxins and furans.

4.1.14.4 UA-2 Conceptual Site Model

A graphical CSM has been developed for UA-2 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013aa) and is shown on Figure 4-11. The primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for UA-2 are presented in Exhibit 4-16. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential human and ecological receptors is included in *Data Quality Objectives Technical Memorandum – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Soil Part A DQOs TM) (CH2M, 2010), and is summarized in the following paragraphs, with updated information.

The primary potential sources of contamination in UA-2 are historical spills while filling or emptying the tank and historical leaks from the tank. Any constituents released would have been released in liquid form and released to surface soil.

Low level detections of TPH and in some cases, PAHs, are consistent with releases from 300B Pipeline Liquids Tank; however, these compounds did not exceed ISLs. The minor exceedances of arsenic, zinc, and manganese are likely representative of slightly elevated background concentrations possibly due to the presence of bedrock in the UA-2 area.

Surface soil is the primary source medium at UA-2. The majority of the affected soil has been removed, as documented by post-remediation confirmation sampling. Potential migration from subsurface soil to groundwater was identified as a potential secondary pathway, however the threat to groundwater was ruled out for this unit. During extreme wet-weather events, it is possible that some constituents may have been transported from the unit to the adjacent pipeline road in surface runoff. The analytical results for UA-2 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time.

Exhibit 4-16. Conceptual Site Model – UA 2
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human and Ecological Receptors
Incidental leaks or spills from former aboveground storage tank **COCs Include:** • TPH • PAHs	• Surface Soil	• Percolation and/or infiltration	• Surface Soil • Subsurface Soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion/enclosed space accumulation	**Human:** • Recreational User • Tribal User • Maintenance Worker • Commercial Worker **Ecological:** • Plants • Invertebrates • Birds • Mammals

4.1.14.5 Evaluation of Data Against Data Quality Objectives for UA-2

Decision 1 (Nature and Extent Determination): Nature and extent has been sufficiently defined laterally and vertically given laboratory results and current data density, with the exception of manganese, which is not considered a COPC/COPEC. Analytical results are presented in Tables 3-13a through 3-13g and on Figures 3-6a through 3-6p. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-13h.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 18 samples were collected from five locations ranging from 0 to 6 feet bgs for UA2-300B. The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, pesticides, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. No data gaps were identified in the Soil RFI/RI Work Plan (CH2M, 2013aa).

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Data Sufficiency to Support CMS/FS): No samples from UA-2 were analyzed for soil characteristics during implementation of the RFI/RI Work Plan. This data gap will be addressed during remedial design if necessary at UA-2.

4.2 Part B Investigation

4.2.1 SWMU 5 – Sludge Drying Beds

4.2.1.1 Setting

SWMU 5 is located in the southern portion of the lower yard near the western fence line. It comprises two former sludge-drying beds that were adjacent to one another, as shown on Figure 2-2. Both of these beds were approximately 20 feet wide by 50 feet long. Both beds sloped longitudinally, with the upper end at grade level and the lower end about 2 feet below grade. The walls and floors of both beds were constructed of 8-inch-thick concrete. A drain line ran from the beds to the Transfer Sump (SWMU 9) to facilitate the removal of liquids (Mittelhauser, 1990a).

4.2.1.2 Unit History

Sludge-Drying Bed 1, constructed in the early 1950s, was used to dehydrate lime sludge generated by the water softening process (PG&E, 1962, 1968b). In historical aerial photographs from the mid-1950s (Photographs 4-1 and 4-2 in Section 4.1.1), the drying bed contains white material. A circular white area is also present just south of the sludge drying beds (AOC 21). In addition, a similar white-colored area is present in those photographs at AOC 14 – the Railroad Debris site. Former employees reported that dehydrated lime sludge was trucked to AOC 14 and sprayed there (Russell, 2006b). A light area is also present in AOC 4 – Debris Ravine; however, the coloration in the Debris Ravine is much darker than that at the sludge drying beds or Railroad Debris Site.

From 1964 through 1969, Bed 1 was used to treat chromium-bearing wastewater in the single-step chromate reduction process. Wastewater was allowed to flow through the bed and was injected with sulfur dioxide to reduce CrVI to CrIII prior to discharge. A second bed was constructed in the late 1960s, and from 1969 through 1985, the two drying beds were used to dehydrate chromic hydroxide sludge generated by the two-step wastewater treatment system (SWMUs 6 through 9) prior to disposal.

A 1970 letter (PG&E, 1970d) indicates that PG&E was planning on burying the initial batch of sludge on or near the compressor station; however, there is no information to suggest that this occurred (Russell, 2006c). It appears that the chromium hydroxide sludge was disposed of at Needles Landfill from 1970 until 1983. Shipping documentation compiled by PG&E indicated that the amount of sludge disposed of each year was highly variable, and it appears that the sludge drying beds had some storage capacity.

Disposal of the chromium sludge at Needles Landfill was discontinued by 1984. From January 1984 to May 1985, the dried sludge was transported offsite to an approved Class I hazardous waste facility (PG&E, 1984b). Use of the sludge drying beds ceased in 1985. Closure of the drying beds was accomplished during Phase I of the Hazardous Waste Treatment System Closure, between 1988 and 1989 (Mittelhauser, 1990a).

4.2.1.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for SWMU 5 are presented in Tables 3-14a through 3-14i, and sampling locations and results are shown on Figures 3-10a through 3-10h. Screening level exceedances are summarized in this section.

Metals: Soil samples were collected from six locations at depths from 0 to 6 feet bgs. No samples exceeded the CSLs at SWMU 5. The CSL for arsenic is less than background; therefore, arsenic results are only screened against the background value. The background concentrations for total chromium, lead, and zinc were exceeded at one or more of the following locations: EDB-4, EDB-5, WDB-4, and WDB-5. The most frequently detected analyte exceeding the background value was lead.

- Lead was detected exceeding its background value (8.39 mg/kg) in two samples between depths 0 to 3 feet bgs (Table 3-14a). The highest lead concentration of 17 mg/kg was detected at sample location EDB-4 at 2.5 to 3 feet bgs. This sample was southeast of the former drying beds (Figure 3-10e).

The lateral extent of the exceedances has been defined by samples with results less than background levels or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results not detected above reporting limits. Samples EDB-5 and WDB-4 had results for total chromium and zinc, respectively, that were slightly above their background values. These minor exceedances, with a factor of exceedance of 1.2 times the background value for total chromium and 1.7 times the background value for zinc, are not considered a data gap.

CLP Inorganics: Samples were collected from two locations, and no samples had detected results that exceeded their respective background levels (Table 3-14e).

PAHs: Samples were collected from two locations at depths from 0 to 10 feet bgs (Table 3-14c). PAHs were evaluated by calculating benzo(a)pyrene (B(a)P) equivalents for human health. The CSL (2,100 µg/kg) for B(a)P equivalent was exceeded at SWMU5-2 from 2 to 3 feet bgs with a concentration of 5,800 µg/kg, as shown in Table 3-14c. A sample from location SWMU5-2 was collected in the northern end of the western drying bed. There were no detections of carcinogenic PAHs (cPAHs); the 5,800-µg/kg result is because of elevated detection limits for the cPAHs and the calculated B(a)P equivalent.

The lateral extent of the exceedance has not been defined within the unit boundaries; however, the lateral extent is defined within the compressor station by samples below CSLs or not detected above reporting limits. This does not represent a data gap requiring further investigation. The vertical extent of the exceedances for all analytes has been defined by samples with results not detected above background levels.

TPH: Samples were collected from two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-14d).

General Chemistry: Samples were collected from four locations, and no samples had detected results that exceeded their respective CSLs (Table 3-14e).

Pesticides: A single sample was collected and had no detected results that exceeded the respective CSLs (Table 3-14f).

PCBs: A single sample was collected and had no detected results that exceeded the respective CSLs (Table 3-14g).

Dioxins and Furans: Samples were collected from one location from 0 to 3 feet bgs and had no detected results that exceeded the respective CSLs (Table 3-14h).

4.2.1.4 SWMU 5 Conceptual Site Model

Due to their proximity to each other, a combined CSM has been developed for SWMU 5, SWMU 6, SWMU 9, and Units 4.3, 4.4, and 4.5 based on the site history and background reported for these units in the RFI/RI Work Plan (CH2M, 2013aa). Exhibit 4-17 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for these units.

The primary sources of contamination in the region of SWMU 5, SWMU 6, SWMU 9, and Units 4.3-4.5 are likely incidental releases of chromium-bearing cooling water from the sludge drying beds or chromate reduction tank, incidental spills of water-softener sludge during transfer of material to or from the sludge drying beds, and/or incidental releases of oily water from the oily water treatment system at Units 4.3-4.5. The potential quantity of sludge, wastewater, and/or oily water released in the vicinity of these units is unknown but expected to be relatively small. The highest chromium and zinc concentrations were detected at SWMU 6. The highest lead concentrations were detected at SWMU 5. No detected metals had concentrations that exceeded their respective CSL. TPHs were detected at low levels at SWMU 5, SWMU 6, and Unit 4.3.

Exhibit 4-17. Conceptual Site Model – SWMU 5, SWMU 6, SWMU 9, and Units 4.3, 4.4, and 4.5
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills or releases of water-softener sludge, wastewater, or oily water **COCs Include:** • TPH	• Surface soil • Shallow soil	• Percolation • Infiltration	• Subsurface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential entrainment in surface water runoff	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals

The primary source media in the region of SWMU 5, SWMU 6, SWMU 9, and Units 4.3-4.5 are surface and shallow soil. Because the area around these units was unpaved, spilled liquid or sludge would have been released directly to surface soil, and any associated liquids could have infiltrated to shallow soil. Liquids released to shallow soils could have infiltrated to deeper soils. Runoff of contaminated surface soil in rainwater is a potential migration pathway for soils located outside the structure. Surface runoff may have transported contaminants to Bat Cave Wash. Windblown dust contamination from small particles of contaminated surface soil is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils.

4.2.1.5 Evaluation of Data Against Data Quality Objectives for SWMU 5

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-14a through 3-14h and on Figures 3-10a through 3-10h. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-14i.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 17 samples were collected from 8 locations ranging from 0 to 10 feet bgs for SWMU 5. The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, TPH, general chemistry parameters, pesticides, dioxins and furans, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in SWMU 5 may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Surface soils samples were collected in unpaved areas associated with SWMU 5 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, PCBs, and dioxins and furans. The full analytical results are presented in Tables 3-38a through 38j.

Results of shallow soil samples were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the following equivalency factors:

- B(a)P equivalent exceeded the ISL (RRSL) of 110 µg/kg at one of two locations, with a maximum concentration of 500 µg/kg at SWMU5-2.
- TEQ avian exceeded the ISL (BK) of 16 ng/kg at one of one location (SWMU5-2) at a concentration of 25 ng/kg.
- TEQ mammals exceeded the ISL (BK) of 5.58 ng/kg at one of one location (SWMU5-2) at a concentration of 42 ng/kg.

Table 3-38j summarizes the highest exceedances and presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms, including surface water

flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion, constituents exceeding ISLs within SWMU 5 have the potential to migrate outside the fence line. Sufficient data have been collected outside the compressor station fence line to assess potential offsite migration, and the nature and extent of these analytes have been evaluated as part of the applicable Part B units in Table 3-37 and in the risk assessment. The need for controls or removal of contaminated soil will be evaluated in the CMS/FS.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from SWMU 5 were collected at SWMU5-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.2 SWMU 6 – Chromate Reduction Tank

4.2.2.1 Setting

SWMU 6, the Chromate Reduction Tank, was located in the southern end of the lower yard, as shown on Figure 2-2. The tank was constructed of steel, had an open top, was approximately 10 feet high and 5 feet in diameter, and had a capacity of 1,500 gallons. The tank was partially set below grade within a pit that measured 10 feet wide by 10 feet long by 6 feet deep. The pit was supported on all four sides with wooden retaining walls; however, the bottom of the pit was not lined or paved (Kearny, 1987).

4.2.2.2 Unit History

The Chromate Reduction Tank was part of the two-step wastewater treatment system installed in 1969. Cooling water blowdown containing chromium flowed by gravity from the cooling towers to the Chromate Reduction Tank via a 3-inch-diameter steel pipe. In the tank, wastewater was injected with sulfur dioxide, and CrVI was reduced to CrIII. Treated wastewater was then discharged by gravity flow through a 3-inch-diameter steel pipe into the Transfer Sump (SWMU 9).

The Chromate Reduction Tank was removed from service as part of the chromium treatment system in October 1985. However, starting in November 1985, the tank was reportedly used as a holding tank for an unspecified period of time (Kearny, 1987). As a holding tank, it received treated effluent from the OWS (Unit 4.4) prior to discharge of the treated effluent to the Evaporation Ponds.

Closure of the chromium treatment system was completed during Phase I of the Hazardous Waste Treatment System Closure between 1988 and 1990. Physical removal of the Chromate Reduction Tank occurred during Phase 2 of the Hazardous Waste Management Facilities Closure process between November 1989 and March 1990 (Mittelhauser, 1990a).

4.2.2.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for SWMU 6 are presented in Tables 3-15a through 3-15i, and sampling locations and results are shown on Figures 3-10a through 3-10h. Screening level exceedances are summarized in this section.

Metals: Soil samples were collected from two locations at depths from 0 to 12.5 feet bgs. No samples exceeded the CSLs at SWMU 6. The CSL for arsenic is less than background; therefore, arsenic results are only screened against the background value. Background concentrations for hexavalent chromium and total chromium were exceeded at one or more of the following locations: SWMU6-1 and CRT-4. The analytes most frequently detected over the background concentration are hexavalent chromium, total chromium, and zinc.

- Hexavalent chromium was detected above its background value (0.83 mg/kg) in two samples between depths 5 to 7.5 feet bgs (Table 3-15a). The highest hexavalent chromium concentration of

1 mg/kg was detected at sample location CRT-4 at 7.5 feet bgs. A sample from location CRT-4 was collected east of the former Chromate Reduction Tank (Figure 3-10c).

- Total chromium was detected above its background value (39.8 mg/kg) in four samples between depths 5 to 12.5 feet bgs (Table 3-15a). The highest total chromium concentration of 120 mg/kg was detected at sample location CRT-4 at 7.5 feet bgs. A sample from location CRT-4 was collected east of the former Chromate Reduction Tank (Figure 3-10d).
- Zinc was detected above its background value (58 mg/kg) in two samples between depths 7.5 to 12.5 feet bgs (Table 3-15a). The highest zinc concentration of 96 mg/kg was detected at sample location CRT-4 at 7.5 feet bgs. A sample from location CRT-4 was collected east of the former Chromate Reduction Tank (Figure 3-10f).

The lateral extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results not detected above reporting limits. At SWMU6-1 and CRT-4, the deepest samples had results exceeding background values for total chromium and hexavalent chromium. Vertical extent was defined by bedrock refusal encountered at these locations, which prevented the collection of deeper samples.

CLP Inorganics: Samples were collected from one location, and no samples had detected results that exceeded their respective background levels (Table 3-15b).

PAHs: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-15c).

TPH: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-15d).

General Chemistry: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-15e).

Pesticides: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-15f).

PCBs: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-15g).

Dioxins and Furans: One sample was collected at SWMU6-1 at a depth of 9 to 10 feet bgs (Table 3-15h). Dioxins and furans are evaluated by calculating TEQ values for human receptors. The CSLs for TEQ human (220 ng/kg) was exceeded with a concentration of 300 ng/kg, as shown in Table 3-15h. A sample from location SWMU6-1 was collected in the footprint of the former Chromate Reduction Tank (Figure 3-10h).

The lateral extent of the exceedance has not been defined within the unit boundaries; however, the lateral extent is defined within the compressor station by samples below CSLs or not detected above reporting limits. This does not represent a data gap requiring further investigation. The vertical extent of exceedances has not been defined by samples with results below CSLs or not detected above reporting limits. Additional samples may be collected during the CMS/FS if remediation is necessary in this area.

4.2.2.4 SWMU 6 Conceptual Site Model

Due to their proximity to each other, a combined CSM has been developed for SWMU 5, SWMU 6, SWMU 9, and Units 4.3, 4.4, and 4.5 based on the site history and background reported for these units in the RFI/RI Work Plan (CH2M, 2013aa). The written tabular CSM for these units can be found in Section 4.2.1 (SWMU 5).

4.2.2.5 Evaluation of Data Against Data Quality Objectives for SWMU 6

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density, with the exception of dioxins and furans at SWMU6-1. This vertical extent data gap may be addressed during remedial design as needed. Analytical results are presented in Tables 3-15a through 3-15h and on Figures 3-10a through 3-10h. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-15i.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, eight samples were collected from two locations ranging from 0 to 12.5 feet bgs for SWMU 6. The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, TPH, general chemistry parameters, pesticides, dioxins and furans, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in SWMU 6 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. One surface soil sample was collected in unpaved areas associated with SWMU 6 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, PAHs, VOCs, SVOCs, and TPH. The full analytical results are presented in Tables 3-38a through 3-38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). No ISLs were exceeded.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IMs. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples collected at SWMU 5 (a nearby unit) will be used to support characterization of SWMU 6. Samples from SWMU 5 were collected at SWMU5-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.3 SWMU 8 – Process Pump Tank

4.2.3.1 Setting

SWMU 8 (Process Pump Tank) was located in the southern end of the lower yard in an area that is now covered by concrete and partially by the new Fire Pump Building. SWMU 8 was the Process Pump Tank that was part of the two-step wastewater treatment system. The Process Pump Tank consisted of a 1,500-gallon capacity steel holding tank about 8 feet high and 5.5 feet in diameter (PG&E, 1982a; Kearny, 1987). The tank had an open top and was situated on a concrete pad. The pump tank was used as a temporary holding tank for treated wastewater discharged from the Precipitation Tank (SWMU 7; Unit 4.9) before it was pumped to the former Percolation Bed (SWMU 1) or the former Evaporation Ponds (SWMU 10, closed). In 1985, this unit was removed from service; and closure was accomplished during Phase I of the Hazardous Waste Treatment System Closure, between 1988 and 1989.

4.2.3.2 Unit History

From May 1970 to December 1973, effluent from SWMU 8 was discharged primarily to injection well PGE-08 (SWMU 2); however, after Pond 1 (SWMU 10; Unit 4.11) was constructed in late 1971, it also received some of the discharged wastewater from SWMU 8. From December 1973 to October 1987, SWMU 8 effluent was discharged to the old Evaporation Ponds (SWMU 10; Unit 4.11).

Chemical analysis data for wastewater held within the Process Pump Tank are not available. No indication of a release was observed during a facility inspection performed as part of the RFI (Kearny, 1987).

The Process Pump Tank was removed from service along with the rest of the treatment system in October 1985. Closure of the treatment system was completed between December 1988 and March 1990. Physical removal of the Process Pump Tank occurred during Phase 1 of the closure process between December 1988 and February 1989 (Mittelhauser, 1990a). Steps taken in the closure process were:

- Hydroblasting of the steel tank; the hydroblast water was containerized and disposed of as hazardous waste.
- Removal of sludge from the tank and disposal of the sludge as hazardous waste.
- Removal of the tank from its foundation; the tank was cut up and recycled.
- Removal of the concrete foundation; this concrete was combined with the concrete from the Precipitation Tank (for a total of about 30 cubic yards [yd^3]), and it was disposed of as Class III waste.
- Collection of an initial round of confirmation samples.
- Soil removal after the initial confirmation samples indicated residual contamination (the volume of soil removed is estimated to be about 0.25 yd^3).
- Collection of final confirmation samples.
- Backfilling of the area with local material and final grading

The results of the final confirmation samples indicated that the COPCs were at levels below cleanup objectives (i.e., established background concentrations). In 1995, DTSC issued a closure certification acceptance letter for this unit (DTSC, 1995).

4.2.3.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for SWMU 8 are presented in Tables 3-16a through 3-16g, and sampling locations and results are shown on Figures 3-11a through 3-11b. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.3.4.

Metals: Soil samples were collected from two locations at depths from 0 to 3 feet bgs. No samples exceeded the CSLs at SWMU 8. Background concentrations for total chromium, cobalt, copper, nickel, and vanadium were exceeded at one or two of the sampling locations. The analytes most frequently detected above the background levels were copper and nickel.

- Copper was detected above its background value (16.8 mg/kg) in three samples between depths 0 to 3 feet bgs (Table 3-16a). The highest copper concentration of 21 mg/kg was detected at sample location SWMU8-1 at 0 to 1 foot bgs. A sample from location SWMU8-1 was collected in the footprint of the former Process Pump Tank (Figure 3-11b).
- Nickel was detected exceeding its background value (27.3 mg/kg) in three samples between depths 0 to 3 feet bgs (Table 3-16a). The highest nickel concentration of 40 mg/kg was detected at sample

location SWMU8-1 at 2 to 3 feet bgs. A sample from location SWMU8-1 was collected in the footprint of the former Process Pump Tank.

The lateral and vertical extents of the exceedances have been defined by samples with results below background values or not detected above reporting limits. Although several metals at both locations had detected results slightly above (less than 2 times) their respective background values at several locations, these minor exceedances of the background values for the other metals are not considered a data gap requiring further investigation.

CLP Inorganics: Samples were collected from one location at depths from 0 to 3 feet bgs. The background values for aluminum and magnesium were exceeded at SWMU8-1.

- Aluminum and magnesium were detected just above their respective background values (16,400 mg/kg and 12,100 mg/kg, respectively) at SWMU8-1 from depths 0 to 3 feet bgs (Table 3-16b). The highest aluminum concentration was 18,000 mg/kg, and magnesium was 15,000 mg/kg; both were detected at sample location SWMU8-1 at 2 to 3 feet bgs. A sample from location SWMU8-1 was collected in the footprint of the former Process Pump Tank.

The lateral extent of the exceedances are minor exceedances of the background values and are not considered a data gap requiring further investigation.

PAHs: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-16c).

TPH: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-16d).

General Chemistry: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-16e).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: PCBs were not a COPC for this unit; therefore, samples were not analyzed for PCBs.

Dioxins and Furans: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-16f).

4.2.3.4 SWMU 8 Conceptual Site Model

A CSM has not been developed for SWMU 8. SWMU 8 was removed and issued a closure certification by DTSC in 1995. Confirmation samples and RFI/RI soil samples confirmed detected metals are at concentrations just above background. Further, the footprint of the former unit is covered by concrete and a building.

4.2.3.5 Evaluation of Data Against Data Quality Objectives for SWMU 8

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-16a through 3-16f and on Figures 3-11a through 3-11b. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-16g.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, four samples were collected from two locations ranging from 0 to 3 feet bgs for SWMU 8.

The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, TPH, general chemistry parameters, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in SWMU 8 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway, as the former unit is covered with concrete and a building, preventing surface soil migration. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IMs. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples were collected at AOC 23 (a nearby unit) in part to support characterization of SWMU 8. One sample from AOC 23 was collected at AOC23-2, but the volume of the sample was insufficient to run the ordered analyses. Results from other samples collected at nearby units will be used to support characterization of SWMU 8. These samples were collected at AOC5-2, AOC7-1, and AOC8-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.4 SWMU 9 – Transfer Sump

4.2.4.1 Setting

SWMU 9 was the Transfer Sump that was part of a two-step wastewater treatment system located in the southwestern portion of the lower yard, adjacent to SWMU 5 and SWMU 6, as shown on Figure 2-2. The Transfer Sump was a prefabricated concrete septic tank that was 3 feet in diameter, 20 feet deep, and had a capacity of 1,500 gallons. The sump was also fitted with a concrete cover.

4.2.4.2 Unit History

From 1969 through 1985, effluent from the Chromate Reduction Tank was routed through SWMU 9 to the Precipitation Tank (SWMU 7). Sometime around 1974, the Transfer Sump also started to receive treated effluent water from the OWS (either directly or through the Chromate Reduction Tank) (Kearny, 1987).

From 1985 to 1989, the Transfer Sump received nonhazardous (that is, phosphate-based) cooling water blowdown, and the effluent from the Transfer Sump was discharged directly to the old Evaporation Ponds (SWMU 10). Oily sludges and solids that accumulated in the Transfer Sump were periodically removed and transported to an offsite disposal facility (Kearny, 1987).

The Transfer Sump was removed from service in October 1989. Physical removal of the Transfer Sump occurred during Phase 2 of the Hazardous Waste Management Facilities Closure process between November 1989 and March 1990 (Mittelhauser, 1990a). A closure certification acceptance letter was issued by DTSC on June 26, 1995 (DTSC,1995). The steps taken during closure of the Transfer Sump included:

- Removal of the surface soil around the manhole of the sump that was visibly stained with oil; approximately 2 cubic feet of stained soil was removed and disposed of as hazardous waste.

- Removal of sludge and water in the sump, followed by hydroblasting of the concrete sump; the sludge and hydroblast water were containerized and disposed of as a hazardous waste.
- Demolition of the sump in place; the concrete rubble was found to be nonhazardous and was used as fill onsite.
- Collection of confirmation samples.
- Backfilling of the pit with local material and final grading.

4.2.4.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for SWMU 9 are presented in Tables 3-17a through 3-17c. Figures were not developed for SWMU 9, as there were no exceedances. Screening level exceedances are summarized in this section.

Metals: One sample was collected from underneath the former sump location at 19 feet bgs, and no detected results exceeded their respective CSLs or background levels (Table 3-17a).

CLP Inorganics: CLP inorganics were not a COPC for this unit; therefore, samples were not analyzed for CLP inorganics.

PAHs: PAHs were not a COPC for this unit; therefore, samples were not analyzed for PAHs.

TPH: TPH was not a COPC for this unit; therefore, samples were not analyzed for TPH.

General Chemistry: One sample was collected from underneath the former sump location at 19 feet bgs, as shown in Table 3-17b. No CSLs were exceeded (background values are not established) (Table 3-17b).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: PCBs were not a COPC for this unit; therefore, samples were not analyzed for PCBs.

Dioxins and Furans: Dioxins and furans were not a COPC for this unit; therefore, samples were not analyzed for dioxins and furans.

4.2.4.4 SWMU 9 Conceptual Site Model

Due to their proximity to each other, a combined CSM has been developed for SWMU 5, SWMU 6, SWMU 9, and Units 4.3, 4.4, and 4.5 based on the site history and background reported for these units in the RFI/RI Work Plan (CH2M, 2013aa). The written tabular CSM for these units can be found in Section 4.2.1 (SWMU 5).

4.2.4.5 Evaluation of Data Against Data Quality Objectives for SWMU 9

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results. Analytical results are presented in Tables 3-17a and 3-17b. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-17c.

Only Category 2 data were used to delineate the nature and extent of contamination. One sample was collected from one location at 19 feet bgs for SWMU 9. The sample was analyzed for metals.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. The entire area within the compressor station is one exposure unit for the risk assessment;

therefore the combined data set for all units within the fence line will be used to support EPC development.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Not applicable. Surface soil samples (0 to 1 foot bgs) were not collected at SWMU 9 because this was an underground tank. Therefore, offsite migration within SWMU 9 is not evaluated.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples collected at SWMU 5 (a nearby unit) will be used to support characterization of SWMU 9. Samples from SWMU 5 were collected at SWMU5-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.5 SWMU 11 – Former Sulfuric Acid Tanks

4.2.5.1 Setting

SWMU 11 consists of the former locations of two 2,600-gallon sulfuric acid tanks located at Cooling Towers A (AOC 5) and B (AOC 6), referred to as SWMU 11S and SWMU 11N, respectively. SWMU 11S and SWMU 11N are each divided into two subunits, as shown on Figure 2-2: the former location of the tanks (the northern polygons at SWMU 11S and SWMU 11N) and the current tank locations (the southern polygons).

4.2.5.2 Unit History

Sulfuric acid is and was used at the Compressor Station to control pH and minimize scaling in the cooling towers. The composition of the cooling water must be carefully maintained at optimal conditions to minimize potential for scale, corrosion, and biological growth. As needed, an automatic controller adds sulfuric acid and other chemicals to maintain the proper conditions of the cooling water.

Prior to 1958, sulfuric acid was delivered to the facility in drums and pumped directly into the cooling tower basins. The active sulfuric acid feed drums were located in the acid houses (also known as chemical storage sheds) located at Cooling Towers A and B. The original tanks were unlined steel ASTs with a capacity of 2,600 gallons each and were installed in 1958 as part of an overall effort to improve the chemical addition process for the cooling towers. Because the tanks were unlined, sulfuric acid sludge was generated and required periodic removal (PG&E, 1972, 1982a).

The steel tanks were replaced with new epoxy-lined tanks between 1982 and 1984 (PG&E, 1982b, 1984). Secondary containment was provided for the sulfuric acid tanks in 1988 (PG&E, 1988). The steel tanks were replaced with polyethylene (PE)-lined 400-gallon tanks in 2006. Until early 2012, these tanks were located within the original epoxy-coated concrete containment structures. In 2012, the chemical feed facilities were relocated again (CH2M, 2014a).

4.2.5.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for SWMU 11 are presented in Tables 3-18a through 3-18h, and sampling locations and results are shown on Figures 3-12a through 3-12i (SWMU 11S) and Figures 3-13a through 3-13j (SWMU 11N). Screening level exceedances are summarized in this section. A discussion of the nature and extent of

contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.5.4.

Metals: Soil samples were collected from five locations at depths from 0 to 10 feet bgs. No samples exceeded the CSLs at SWMU 11. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. Background concentrations for hexavalent chromium, total chromium, copper, lead, molybdenum, and zinc were exceeded at one or more of the following locations: SWMU11-1 through 5, as shown in Table 3-18a. The analytes that most frequently exceeded the background levels were hexavalent chromium, total chromium, copper, lead, molybdenum, and zinc.

- Hexavalent chromium was detected above its background value (0.83 mg/kg) in nine samples between depths 0 to 6 feet bgs (Table 3-18a). The highest hexavalent chromium concentration of 5.4 mg/kg was detected at sample location SWMU11-3 at 2 to 3 feet bgs. A sample from location SWM11-3 was collected within AOC 5, south of the former sulfuric acid tank at SWMU 11S (Figure 3-12b).
- Total chromium was detected above its background value (39.8 mg/kg) in six samples between depths 0 to 3 feet bgs (Table 3-18a). The highest total chromium concentration of 87 mg/kg was detected at sample location SWMU11-3 at 2 to 3 feet bgs. A sample from location SWM11-3 was collected within AOC 5, south of the former sulfuric acid tank at SWMU 11S (Figure 3-12c).
- Copper was detected above its background value (16.8 mg/kg) in five samples between depths 0 to 3 feet bgs (Table 3-18a). The highest copper concentration of 58 mg/kg was detected at sample location SWMU11-1 at 0 to 0.5 foot bgs. A sample from location SWM11-1 was collected within AOC 5, south of the former sulfuric acid tank at SWMU 11S (Figure 3-12d).
- Lead was detected above its background value (8.39 mg/kg) in seven samples between depths 0 to 3 feet bgs (Table 3-18a). The highest lead concentration of 59 mg/kg was detected at sample location SWMU11-3 at 0 to 0.5 foot bgs. A sample from location SWM11-3 was collected within AOC 5, south of the former sulfuric acid tank at SWMU 11S (Figure 3-12e).
- Molybdenum was detected above its background value (1.37 mg/kg) in five samples between depths 0 to 3 feet bgs (Table 3-18a). The highest molybdenum concentration of 4.8 mg/kg was detected at sample location SWMU11-5 at 2 to 3 feet bgs. A sample from location SWM11-5 was collected within the footprint of the southern former sulfuric acid tank at SWMU 11N (Figure 3-13f).
- Zinc was detected exceeding its background value (58 mg/kg) in five samples between depths 0 to 3 feet bgs (Table 3-18a). The highest zinc concentration of 170 mg/kg was detected at sample location SWMU11-1 at 0 to 0.5 foot bgs. A sample from location SWM11-1 was collected within AOC 5, south of the former sulfuric acid tank at SWMU 11S (Figure 3-12g).

The lateral extent of the exceedances has been defined by samples with results less than background values or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results not detected above reporting limits or detected results below CSLs and/or background values. The deepest sample at SWMU11-2 had results that slightly exceed the background values for hexavalent chromium and total chromium, with a maximum factor of exceedance of 2 times the background value. The deepest sample at SWMU11-5 had results that slightly exceeded background values for hexavalent chromium, total chromium, copper, lead, molybdenum, and zinc, with a maximum factor of exceedance of 3.5 times the background value. These minor exceedances of background values are not considered a data gap.

CLP Inorganics: Samples were collected from two locations, and no samples had detected results that exceeded their respective background levels (Table 3-18b).

PAHs: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-18c).

TPH: TPH was not a COPC for this unit; therefore, samples were not analyzed for TPH.

General Chemistry: Samples were collected from five locations and were only analyzed for pH, which has no CSL or background concentration (Table 3-18d).

Pesticides: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-18e).

PCBs: Samples were collected from two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-18f).

Dioxins and Furans: Samples were collected from two locations at depths from 0 to 10 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. The CSL for TEQ human (220 ng/kg) was exceeded at SWMU11-1 and SWMU11-3, as shown in Table 3-18g.

- TEQ human was detected above its CSL in two samples between depths 0 and 3 feet bgs (Table 3-18g). The highest TEQ human concentration of 830 ng/kg was detected at sample location SWMU11-3 at 2 to 3 feet bgs. A sample from location SWM11-3 was collected within AOC 5, south of the former sulfuric acid tank (Figure 3-12i).

The lateral extent of the exceedance has not been defined within the unit boundaries; however, the lateral extent is defined within the compressor station by samples below CSLs or not detected above reporting limits. This does not represent a data gap requiring further investigation. The vertical extent of exceedances has been defined by samples with results below CSLs at all locations.

4.2.5.4 SWMU 11 Conceptual Site Model

A graphical CSM has been developed for SMWU 11 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013aa), as shown on Figure 4-12. Exhibit 4-18 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for SMWU 11. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the *Final Data Quality Objectives Steps 1 through 5 Part B Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Soil Part B DQOs TM) (CH2M, 2011b), and discussed in this section, with updated information.

The primary sources of contamination at SWMU 11N and SWMU 11S are likely to be historical incidental spills of chromium and molybdenum bearing cooling water. The quantity of any liquid released in the area is unknown. If a large spill occurred, it could have resulted in cooling water reaching the storm drain system. The highest contaminant concentrations are found at SWMU11-3, located south of the former sulfuric acid tank at SWMU 11S.

It is possible that historical incidental spills of sulfuric acid occurred during transfer; however, pH measurements in soil samples do not reflect presence of acidic conditions. The quantity of acid released, if any, is unknown but is expected to be relatively small, as any spills or incidental leaks would have quickly been addressed due to the inherent hazards of the acid. Early chemical handling procedures at Topock indicated that baking soda was maintained at the station to neutralize sulfuric acid spills (PG&E, 1953). If a large release from the tank occurred, it could have resulted in acid reaching the storm drain system.

The primary source medium at SMWU 11 is surface soil. Because most of the area around the former tank locations is covered with gravel, liquids released in SMWU 11 would have been released to surface soil and would have infiltrated to shallow soil. Acid released to soils could have solubilized metals in the soil matrix. Liquids released to shallow soils and metals solubilized from surface and shallow soils could also have infiltrated to deeper soils. Because the entire SWMU is covered with gravel or pavement, runoff of contaminated surface soil in rainwater is not considered a potential migration pathway. Windblown dust contamination from small particles of contaminated surface soil around SWMU 11N and SWMU 11S is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils.

Exhibit 4-18. Conceptual Site Model – SWMU 11
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PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Potential incidental spills and releases from sulfuric acid tanks **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration	• Surface soil • Shallow soil	• Wind erosion and atmospheric dispersion of surface soil Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker

4.2.5.5 Evaluation of Data Against Data Quality Objectives for SWMU 11

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-18a through 3-1g. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-18h.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, up to 12 samples were collected from 5 locations ranging from 0 to 10 feet bgs for SWMU 11. The samples were analyzed for one or more of the following analyte categories: metals, CLP inorganics, PAHs, pesticides, dioxins and furans, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in SWMU 11 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway; as areas within this unit are covered with gravel, paved, or otherwise covered with an impermeable surface, preventing surface soil migration. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from SWMU 11 were collected at SWMU 11-4. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.6 AOC 5 – Cooling Tower A

4.2.6.1 Setting

AOC 5 includes the area below and surrounding the original southern Cooling Tower A, as shown on Figure 2-2. The new Cooling Tower A is in the same location as the original Cooling Tower A. AOC 5 encompasses the cooling tower, the site of the former chemical shed, the site of the sulfuric acid tank (SWMU 11S), and the site of the current cooling water treatment product tanks. Most of the area surrounding the cooling tower is unpaved but covered with gravel. The AOC 5 boundary is bounded on all sides by pavement.

4.2.6.2 Unit History

Operations at AOC 5 consist of the storage, handling, and use of cooling water additives. From 1951 to 1985, chromium-based corrosion inhibitors were used to treat the cooling water. From 1985 to the present time, nonhazardous, phosphate-based inhibitors, scale control agents, and biocides have been used. Sulfuric acid has been used from 1951 to the present time to control the pH of the cooling water (CH2M, 2007a). The major features located in AOC 5 are discussed in this section.

Original Cooling Tower A: The original Cooling Tower A was a coil shed tower constructed along with the rest of the compressor station in 1951. The original tower was replaced with a new tower in 2001. The

cooling tower is used to cool compressed natural gas and lubricating oil cooling water. The original tower was located within a concrete water basin that held heated cooling water (the hot water basin). The basin is no longer used for collecting cooling water. Limited soil sampling conducted in 1999 in the unpaved areas in the vicinity of the cooling tower indicated that total chromium, hexavalent chromium, zinc, and copper were present at concentrations exceeding background.

Former Chemical Shed (Acid House): The former chemical shed was located about 15 feet east of Cooling Tower A. The shed was used to store chromium-based cooling water additives used in the cooling tower from 1951 to 1985, as well as sulfuric acid prior to the installation of the sulfuric acid tanks (SWMU 11). The shed was demolished in the summer of 2000 as part of the replacement of Cooling Tower A. Stained soils beneath the former chemical storage shed were observed after its demolition (PG&E, 2000b). The stained soils were reportedly limited to a small area of about 4 feet by 4 feet. Stained soil was excavated and disposed of offsite. Confirmation soil samples were not collected. After removal, the area was backfilled with clean fill. As part of the new cooling tower construction, a reinforced concrete pad was built adjacent to the removal area, and a small portion of the area is covered with this pad.

Sulfuric Acid Tank (SWMU 11s): Sulfuric acid is used at this site to control the pH of the cooling water in Cooling Tower A. The original tank was an unlined steel AST with a capacity of 2,600 gallons. The tank was located within a concrete secondary containment area. In 1984, the original tank was replaced with a new epoxy-lined AST of the same size and capacity (PG&E, 1984a). The sulfuric acid tank is discussed in Section 4.2.5.

Chemical Storage Tanks: There are currently three ASTs at AOC 5 that are used for the storage of phosphate-based cooling water treatment products. These tanks were located at the southern end of the cooling tower until 2012 and are now located in newly constructed secondary containment on the eastern side of AOC 5. The tanks are constructed of polyethylene and have secondary containment. Currently, there are six additives, including sulfuric acid, that are used to manage corrosion and microbiological activity in the cooling towers.

4.2.6.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 5 are presented in Tables 3-19a through 3-19i, and sampling locations and results are shown on Figures 3-12a through 3-12i. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.6.4.

Metals: Soil samples were collected from 13 locations within AOC 5, from 0 to 10 feet bgs. The CSLs were exceeded for hexavalent chromium at the following locations: AOC5-2, -4, -5, AOC5-OS2 and -4, and PS-13 and -15. Background values were also exceeded for cadmium, hexavalent chromium, total chromium, copper, lead, molybdenum, nickel, and zinc at one or more of the following locations: AOC5-1 through -6, AOC5-OS2 through -4, and PS-13 through -16, as shown in Table 3-19a. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. The most frequently detected analytes over background levels were hexavalent chromium, total chromium, copper, lead, molybdenum, and zinc.

- Hexavalent chromium was detected above its background value (0.83 mg/kg) in 25 samples and was detected above the CSL (6.3 mg/kg) in 8 samples between depths 0 to 10 feet bgs (Table 3-19a). The highest hexavalent chromium concentration of 24 mg/kg was detected at sample location AOC5-OS4 at 0 to 0.5 foot bgs. A sample from location AOC5-OS4 was collected on the western side of the cooling tower (Figure 3-12b).
- Total chromium was detected above its background value (39.8 mg/kg) in 18 samples between depths 0 to 10 feet bgs (Table 3-19a). The highest total chromium concentration of 730 mg/kg was detected at sample location AOC5-4 at 0 to 0.5 foot bgs. A sample from location AOC5-4 was collected on the western side of the cooling tower (Figure 3-12c).

- Copper was detected above its background value (16.8 mg/kg) in 15 samples between depths 0 to 5 feet bgs (Table 3-19a). The highest copper concentration of 530 mg/kg was detected at sample location AOC5-4 at 0 to 0.5 foot bgs. A sample from location AOC5-4 was collected on the western side of the cooling tower (Figure 3-12d).
- Lead was detected above its background value (8.39 mg/kg) in 16 samples between depths 0 to 5 feet bgs (Table 3-19a). The highest lead concentration of 220 mg/kg was detected at sample location AOC5-OS4 at 0 to 0.5 foot bgs. A sample from location AOC5-OS4 was collected on the western side of the cooling tower (Figure 3-12e).
- Molybdenum was detected above its background value (1.37 mg/kg) in 15 samples between depths 0 to 5 feet bgs (Table 3-19a). The highest molybdenum concentration of 23 mg/kg was detected at sample location AOC5-5 at 0 to 0.5 foot bgs. A sample from location AOC5-5 was collected northwest of the cooling tower (Figure 3-12f).
- Zinc was detected above its background value (58 mg/kg) in 21 samples between depths 0 to 5 feet bgs. The highest zinc concentration of 1,900 mg/kg was detected at sample location AOC5-4 at 0 to 0.5 foot bgs (Table 3-19a). A sample from location AOC5-4 was collected on the western side of the cooling tower (Figure 3-12g).

The lateral extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results not detected above reporting limits or detected results below CSLs and/or background values, or by collocated samples.

Sample locations AOC5-2, AOC5-4, and AOC5-6 had hexavalent chromium results that exceeded the background value in the deepest sample. These exceedances were minor, with factors of exceedances ranging from 1.93 to 2.29 times background values, and show decreasing concentrations with depth. Therefore, these minor exceedances are not considered a data gap. In addition, metals results for the deepest samples at PS-13 (zinc), AOC5-1 (molybdenum), and AOC5-2 (lead) slightly exceeded background values (with factors of exceedances ranging from 1.2 to 2.7 times background values). These minor exceedances are not considered a data gap.

CLP Inorganics: Samples were collected from three locations from 0 to 5.5 feet bgs (Table 3-19b). No samples had detected results that exceeded their respective CSLs or background values.

PAHs: Samples were collected from two locations from 0 to 6 feet bgs. PAHs were evaluated by calculating B(a)P equivalents for human health. The background value for B(a)P equivalent was exceeded at locations AOC5-4 and AOC5-5. The CSL for B(a)P equivalent was exceeded at location AOC5-4.

- B(a)P equivalent was detected above its CSL (2,100 µg/kg) at AOC5-4 between depths 0 to 0.5 foot bgs (Table 3-19c). The highest B(a)P equivalent concentration of 2,900 µg/kg was detected at sample location AOC5-4 at 0 to 0.5 foot bgs. A sample from location AOC5-4 was collected on the western side of the cooling tower (Figure 3-12h).

The lateral and vertical extents of the exceedances for all analytes have been defined by samples with results not detected above reporting limits.

TPH: TPH was not a COPC for this unit; therefore, samples were not analyzed for TPH.

VOCs and SVOCs: A single sample was collected for VOCs and SVOCs at AOC5-4 at 5 to 5.5 feet bgs, and no results exceeded their respective CSLs (Table 3-19d).

Pesticides: A single sample was collected for pesticides at AOC5-4 at 5 to 5.5 feet bgs, and no results exceed their respective CSLs (Table 3-19f).

PCBs: Samples were collected at five locations for PCBs at depths ranging from 0 to 10 feet bgs (Table 3-19g). The CSLs (970 µg/kg) for Aroclor 1254 were exceeded at AOC5-5 and AOC5-6, as shown in Table 3-19g. The highest Aroclor 1254 concentration of 1,700 µg/kg was detected at sample location AOC5-5 at 0 to 0.5 foot bgs. A sample from location AOC5-5 was collected northwest of the cooling tower.

The lateral extent of exceedances has been defined by samples less than CSLs or not detected above reporting limits. The vertical extent of exceedances has been defined by samples with results not detected above reporting limits except AOC5-6, where Aroclor 1254 exceeded the CSL at the deepest sample depth of 2 to 3 feet bgs. Deeper samples could not be collected at AOC5-6. Additional samples may be collected during remedial design if necessary in this area; however, due to the limited vertical migration potential for PCBs in soil, this is not considered a data gap.

Dioxins and Furans: Samples were collected at five locations from 0 to 10 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. The CSLs for TEQ human (220 ng/kg) were exceeded at locations AOC5-2, AOC5-4, and AOC5-5, as shown in Table 3-19h.

- TEQ human was detected above the CSL at four samples between depths 0 to 2 feet bgs (Table 3-19h). The highest TEQ human concentration of 2,000 ng/kg was detected at sample location AOC5-4 at 0 to 0.5 foot bgs. A sample from location AOC5-4 was collected adjacent to the western side of the cooling tower (Figure 3-12i).

The lateral extent of the exceedance has not been defined within the unit boundaries; however, the lateral extent is defined within the compressor station by samples below CSLs or not detected above reporting limits. This does not represent a data gap requiring further investigation. The vertical extent of exceedances has been defined by samples with results not detected above reporting limits.

4.2.6.4 AOC 5 Conceptual Site Model

A graphical CSM was developed for AOC 5 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013aa), as shown on Figure 4-13. Exhibit 4-19 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 5. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential human and ecological receptors is included in the Soil Part B DQOs TM (CH2M, 2011b), and is summarized in this section with updated information.

The primary sources of contamination at AOC 5 are potential historical liquid discharges (spills) from the cooling tower hot-water basin (while the old cooling tower was in operation), the lubricating-oil cooling system hot-water basin, potentially incidental spills of cooling system additives during storage and/or transfer of the additive chemicals, and potential releases of PCBs (Aroclor 1254) from electrical transformers. Dioxin and furan and PAH contamination at AOC 5 may be related to industrial activities, such as fire suppression or vehicle exhaust. The quantity of liquid released from the hot-water basin is unknown; however, periodic overflows are known to have occurred. The quantity of chemicals released in the vicinity of the storage shed is also unknown but is expected to be relatively small because any spills or incidental leaks would have been small. If a large release from the hot-water basin occurred, it could have resulted in cooling water reaching the storm drain system and being discharged outside the fence line. Potential releases via the storm drain system are addressed by the storm drain investigation program described in Section 4.3.

The presence of chromium at AOC 5 is likely related to the release of cooling water. Until approximately 1964, cooling water blowdown containing hexavalent chromium was discharged to Bat Cave Wash via historical discharge piping. From approximately 1964 to 1985, cooling water blowdown containing hexavalent chromium was discharged to the cooling water treatment system as part of routine operations. Potential leaks from the cooling water treatment transference piping are addressed by the AOC 18 investigation program (Section 4.2.14), and effects outside the fence line due to routine cooling water blowdown discharge are evaluated in AOC 1 and SWMU 1 (Section 4.1.1).

Exhibit 4-19. Conceptual Site Model – AOC 5
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Potential historical liquids discharges (spills) and leaks (possible discharge to storm drain system and discharge offsite) **COCs Include:** • PCBs • PAHs	• Surface soil	• Percolation • Infiltration	• Surface soil • Shallow soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker

Finally, while there is no information indicating that the concrete hot-water basins have lacked integrity in the past, some concerns have been expressed that it is possible that small quantities of cooling water may have been released to shallow soil directly beneath the basins. Available information indicates that the hot-water basins maintained their integrity.

As part of the cooling tower replacement project, the hot-water basins were cleaned, de-scaled, and inspected. According to the monthly status report provided by ICF Kaiser, the vendor managing the cooling tower replacement project, the basin floor did not exhibit "…any structural cracks or other injurious flaws that would have allowed basin water to leak out through the containment of the floor" (ICF Kaiser, 2000). The report also indicated that while some minor repairs to the basin walls were required and there were many visible cracks or fissures in the concrete side walls, they appeared to be only hairline at and below the water mark of the walls. Once the walls were repaired, an epoxy coating was applied to the basins.

The primary source medium at AOC 5 is surface soil. Because most of the area around the cooling tower and former chemical shed is covered with gravel, liquids released in AOC 5 would have been released to surface soil and infiltrated to shallow soil. Liquids released to shallow soils could have infiltrated to deeper soils. Because the entire AOC is covered with gravel or pavement, runoff of contaminated surface soil in rainwater is not considered a potential migration pathway. Stained concrete has not been identified at this unit.

The normal operation of the cooling towers also included some loss of cooling water through evaporation or mist from the top of the tower; this phenomenon is known as drift. As discussed in the Revised *Final RCRA Investigation/Remedial Investigation Report, Volume 1 Site Background and History, PG&E Topock Compressor Station, Needles, California (*CH2M, 2007a), drift accounts for an estimated 1 percent of total cooling water losses from a cooling tower. Chemicals released in drift could have affected concrete surfaces and surface soils in unpaved areas. In paved areas, any chemicals deposited from drift would ultimately have been discharged to storm drains via surface water runoff.

4.2.6.5 Evaluation of Data Against Data Quality Objectives for AOC 5

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-19a through 3-19h and Figures 3-12a through 3-12i. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-19i.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 33 samples were collected from 13 locations at depths ranging from 0 to 10 feet bgs for AOC 5. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, VOCs, SVOCs, pesticides, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 5 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration

pathway; as areas within this unit are covered with gravel, paved, or otherwise covered with an impermeable surface preventing surface soil migration. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS and IMs): During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 5 were collected at AOC5-2 and AOC5-5. Results are presented in Table 3-37. These data along with the nature and extent data collected are sufficient to support CMS/FS and IM decisions.

4.2.7 AOC 6 – Cooling Tower B

4.2.7.1 Setting

AOC 6 includes the area below and surrounding Cooling Tower B, as shown in Figure 2-2. The new Cooling Tower B is in the same location as the original northern Cooling Tower B. AOC 6 encompasses the cooling tower, the site of the former chemical shed, the site of the current cooling water treatment product tanks, and the sulfuric acid tank (SWMU 11N). The area around the cooling tower is largely unpaved but covered with gravel, with pavement surrounding the AOC 5 boundary.

4.2.7.2 Unit History

Operations at AOC 6 consist of the storage, handling, and use of cooling water additives. Operations began in 1954 with the construction of a two-cell cooling tower. From 1954 to 1985, chromium-based corrosion inhibitors were used to treat the cooling water. From 1985 to the present time, non-hazardous, phosphate-based inhibitors, scale control agents, and biocides have been used. Sulfuric acid has been used from 1954 to the present time to control the pH of the cooling water. The major features located in AOC 6 are discussed below.

Cooling Tower B. The original Cooling Tower B was a coil shed tower constructed as a two-cell unit in 1954 to support the expansion of the compressor station. Cooling Tower B was subsequently expanded to a four-cell tower in 1958. The original tower was replaced with a new tower in 2002. The cooling tower is used to cool compressed natural gas and lubricating oil cooling water. The original tower was located within a concrete water basin that held heated cooling water (hot water basin). The original hot-water basin is no longer used for collecting cooling water. A former Compressor Station employee stated that he had observed cooling water from Cooling Tower B overflowing and discharging into the Northeast Ravine (Russell 2006b).

Former Chemical Shed. The former chemical shed was located approximately 15 feet east of Cooling Tower B. The shed was used to store the chromium-based cooling water additives used in the cooling tower from 1954 to 1985, as well as sulfuric acid prior to the installation of the sulfuric acid tanks. The shed was demolished in the winter of 2001 in conjunction with the installation of the new cooling tower. Stained soil was observed beneath the shed following its removal. The stained soil was removed, generating five drums of material that were shipped offsite for disposal. The excavation was backfilled with clean soil. No confirmation samples were collected. As part of the new cooling tower construction, a reinforced concrete pad was built adjacent to the removal area, and a small portion of the area is covered with this pad.

Sulfuric Acid Tank (SWMU 11N). Sulfuric acid has been used at this site to control the pH of the cooling water in Cooling Tower B. The original tank was an unlined steel AST with a capacity of 2,600 gallons. The tank was located within a concrete secondary containment area. In 1984, the original tank was replaced with a new epoxy-lined AST of the same size and capacity (PG&E 1984a). The sulfuric acid tank is discussed in Section 4.2.5.

Chemical Storage Tanks. There are currently three ASTs at AOC 6 located just east of the Cooling Tower B that are used for the storage of phosphate-based cooling water treatment products. The tanks are constructed of polyethylene and have secondary containment. Currently, there are six additives,

including sulfuric acid, that are used to manage corrosion and microbiological activity in the cooling towers. The tanks are replaced by the vendor as needed.

4.2.7.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 6 are presented in Tables 3-20a through 3-20i and sampling locations and results are shown on Figures 3-13a through 3-13j. Screening level exceedances are summarized below. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in the CSM section below.

Metals: Soil samples were collected at up to 19 locations from 0 to 10 feet bgs. The CSL was exceeded for hexavalent chromium at one location, PS-6. Background values were also exceeded for total chromium, copper, lead, molybdenum, and zinc at one or more of the following locations: 2B-Tower, 3B-Tower, AOC6-1 through AOC6-8, AOC6-OS1, B Tower SE Standpipe, and PS-1 through PS-7, as shown in Table 3-20a. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. The most frequently detected over the background levels were hexavalent chromium, total chromium, copper, lead, molybdenum and zinc.

- Hexavalent chromium was detected above its background value (0.83 mg/kg) in 16 samples between depths 0 to 6 feet bgs (Table 3-20a). The highest hexavalent chromium concentration of 15.3 mg/kg was detected at sample location PS-6 at 0 feet bgs (Figure 3-13b).
- Total chromium was detected above its background value (39.8 mg/kg) in 15 samples between depths 0 to 6 feet bgs (Table 3-20a). The highest total chromium concentration of 459 mg/kg was detected at sample location PS-6 at 0 feet bgs. A sample from location PS-6 was collected on the southeastern side of the cooling tower (Figure 3-13c).
- Copper was detected above its background value (16.8 mg/kg) in 19 samples between depths 0 to 10 feet bgs (Table 3-20a). The highest copper concentration of 250 mg/kg was detected at sample location AOC6-4 at 0 to 0.5 foot bgs. A sample from location AOC6-4 was collected southwest of the cooling tower along aboveground pipelines (Figure 3-13d).
- Lead was detected above its background value (8.39 mg/kg) in 12 samples between depths 0 to 6 feet bgs (Table 3-20a). The highest lead concentration of 73 mg/kg was detected at sample location AOC6-7 at 5 to 6 feet bgs. A sample from location AOC6-7 was collected on the western side of the cooling tower along aboveground pipelines (Figure 3-13e).
- Molybdenum was detected above its background value (1.37 mg/kg) in 11 samples between depths 0 to 6 feet bgs (Table 3-20a). The highest molybdenum concentration of 15 mg/kg was detected at sample location AOC6-1 at 0 to 0.5 foot bgs. A sample from location AOC6-1 was collected in the northeastern corner of the unit (Figure 3-13f).
- Zinc was detected above its background value (58 mg/kg) in 20 samples between depths 0 to 6 feet bgs (Table 3-20a). The highest zinc concentration of 1,130 mg/kg was detected at sample location PS-6 at 0 feet bgs. A sample from location PS-6 was collected on the southeastern side of the cooling tower (Figure 3-13g).

The lateral extent of the exceedances has been defined by samples with results below CSLs and background values or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results not detected above reporting limits except at locations with only shallow soil samples (0 and/or 3 feet bgs) (Table 3-20a). These shallow exceedances do not represent data gaps requiring further investigation because nearby deeper samples have defined the vertical extent. Further, these background exceedances are below the CSL; therefore, they do not present a threat to workers.

CLP Inorganics: Samples were collected at three locations from 0 to 6 feet bgs. No samples had detected results that exceeded their respective background levels or CSLs (Table 3-20b).

PAHs: Samples were collected at six locations from 0 to 6 feet bgs. No samples had detected results that exceeded their respective CSLs (Table 3-20c).

TPH: Samples were collected at one location from 0 to 0.5 foot bgs. No samples had detected results that exceeded their respective CSLs (Table 3-20d).

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected at nine locations from 0 to 9 feet bgs. No samples had detected results that exceeded their respective CSLs (Table 3-20e).

Pesticides: Samples were collected at two locations from 0 to 0.5 and 5 to 6 feet bgs. No samples had detected results that exceeded their respective CSLs (Table 3-20f).

PCBs: Samples were collected at eight locations from 0 to 9 feet bgs. The CSLs for Aroclor 1254 and Aroclor 1260 were exceeded at one or more of the following locations: AOC6-4, AOC6-7, and AOC20-OS09, as shown in Table 3-20h.

- Aroclor 1254 was detected above the CSL value (970 µg/kg) at 4 locations between depths 0 to 6 feet bgs (Table 3-20g). The highest Aroclor 1254 concentration of 2,800 µg/kg was detected at sample location AOC6-7 at 0 to 0.5 foot bgs. A sample from location AOC6-7 was collected on the western side of the cooling tower along aboveground pipelines (Figure 3-13i).
- Aroclor 1260 was detected above the CSL value (990 µg/kg) at 2 locations between depths 0 to 6 feet bgs (Table 3-20g). The highest Aroclor 1260 concentration of 1,200 µg/kg was detected at sample location AOC6-7 at 5 to 6 feet bgs. A sample from location AOC6-7 was collected on the western side of the cooling tower along aboveground pipelines.

The lateral and vertical extents of exceedances have been defined by samples below CSLs or not detected above reporting limits.

Dioxins and Furans: Samples were collected at six locations from 0 to 3 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. The CSL (220 ng/kg) was exceeded at locations AOC6-1 and AOC6-7, as shown in Table 13-20h.

- TEQ human was detected above the CSL at three samples between depths 0 to 3 feet bgs (Table 3-20h). The highest TEQ human concentration of 730 ng/kg was detected at sample location AOC6-7 at 2 to 3 feet bgs and exceeded the CSL of 220 ng/kg. A sample from location AOC6-7 was collected on the western side of the cooling tower along aboveground pipelines (Figure 3-13j).

The lateral extent of exceedances has not been defined within the unit boundaries; however, the lateral extent is defined within the compressor station by samples below CSLs or not detected above reporting limits. This does not represent a data gap requiring further investigation. The vertical extent of exceedances has not been defined. Deeper samples could not be collected at AOC6. Additional samples may be collected during remedial design if necessary in this area, however, due to the limited vertical migration potential for dioxin and furans in soil, this is not considered a data gap.

4.2.7.4 AOC 6 Conceptual Site Model

A graphical CSM has been developed for AOC 6 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013aa), as shown in Figure 4-14. Exhibit 4-20 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 6. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential human and ecological receptors is included in the Soil Part B DQOs TM (CH2M, 2011b), and is summarized below, with updated information.

Exhibit 4-20. Conceptual Site Model – AOC 6
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Potential historical liquids discharges (spills) and leaks (possible discharge to storm drain system and discharge offsite) **COCs Include:** • PCBs • Metals	• Surface soil	• Percolation • Infiltration	• Surface soil • Shallow soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion •	**Human:** • Maintenance Worker • Commercial Worker

The primary sources of contamination at AOC 6 are potential historical liquid discharges (spills) from the cooling tower hot-water basin (while the old cooling tower was in operation), potential incidental spills of cooling system additives during storage or transfer of the additive chemicals, and potential releases of PCBs (Aroclors 1254 and 1260) from electrical transformers. The quantity of liquid released from the hot-water basin is unknown; however, periodic overflows are known to have occurred. The quantity of chemicals released in the vicinity of the storage shed is also unknown but is expected to be relatively small because any spills or incidental leaks would have been small.

If a large release from the hot-water basin occurred, it could have resulted in cooling water reaching the storm drain system and being discharged outside the fence line, most likely to AOC 11. In addition, if large quantities of cooling water overflowed, they also could have migrated to the west to the station road and potentially down the station road to the lower yard. Potential releases via the storm drain system are addressed by the storm drain investigation program described in Section 4.3. Downslope impacts to the east are addressed by the investigation being conducted for AOC 11 (Section 4.1.5), and potential impacts to the lower yard are being addressed in AOC 13 (Section 4.2.10).

The presence of chromium at AOC 6 is likely related to the release of cooling water. Until approximately 1964, cooling-water blowdown containing hexavalent chromium was directly discharged to Bat Cave Wash. Engineering drawings also indicate that some of the blowdown from AOC 6 may initially have been discharged to Bat Cave Wash and the eastern edge of the station (AOC 11) via the storm drain system (PG&E, 1957a). From approximately 1964 to 1985, cooling-water blowdown containing hexavalent chromium was processed by the cooling-water treatment system as part of routine operations and then discharged. Potential leaks from the cooling-water treatment transference piping are addressed by the AOC 18 investigation program (Section 4.2.14), and effects outside the fence line due to routine cooling-water blowdown discharge are evaluated in AOC 1 and SWMU 1 (Section 4.1.1).

Finally, while there is no information indicating that the concrete hot-water basin of the cooling tower lacked integrity in the past, some concerns have been expressed that it is possible that small quantities of cooling water may have been released to shallow soil directly beneath the hot-water basin. Available information indicates that the hot-water basins maintained their integrity.

As part of the cooling tower replacement project, the hot-water basins were cleaned and inspected. According to one of the monthly status reports provided by ICF Kaiser (the vendor managing the cooling tower replacement project), the basin floor did not exhibit "…any structural cracks or other injurious flaws that would have allowed basin water to leak out through the containment of the floor" (ICF Kaiser, 2000). The report also indicated that while some minor repairs to the basin walls were required and there were many visible cracks or fissures in the concrete side walls, these cracks appeared to be only hairline at and below the water mark of the walls. Once the walls were repaired, an epoxy coating was applied to the basins (ICF Kaiser, 2000).

The primary source medium at AOC 6 is surface soil. Because the majority of the area around the cooling tower and former chemical shed is covered with gravel, liquids released in AOC 6 would have been released to surface soil and would have infiltrated to shallow soil. Liquids released to shallow soils could have infiltrated to deeper soils. If present, organic constituents in surface soils could have been degraded by heat and light. Because the entire AOC 6 is covered with gravel or pavement, runoff of contaminated surface soil in rainwater is not considered a potential migration pathway. Stained concrete has not been identified at this unit.

The normal operation of the cooling towers also included some loss of cooling water through evaporation and/or mist from the top of the tower; this phenomenon is known as drift. As discussed in the Revised *Final RCRA Investigation/Remedial Investigation Report, Volume 1 - Site Background and History, PG&E Topock Compressor Station, Needles, California* (CH2M, 2007a), drift accounts for an estimated 1 percent of total cooling-water losses from a cooling tower. Chemicals released in drift could have affected

concrete surfaces and surface soils in unpaved areas. In paved areas, any chemicals deposited from drift would ultimately have been discharged to storm drains via surface water runoff.

4.2.7.5 Evaluation of Data Against Data Quality Objectives for AOC 6

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-20a through 3-20h and on Figures 3-13a through 3-13j. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-20i.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 40 samples were collected from 19 locations at depths ranging from 0 to 10 feet bgs for AOC 6. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, general chemistry parameters, pesticides, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan and subsequent data gap investigations. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 6 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway; as areas within this unit are covered with gravel, paved, or otherwise covered with an impermeable surface preventing surface soil migration. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS and IMs): During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 6 were collected at AOC6-2 and AOC6-5. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.8 AOC 7 – Hazardous Materials Storage Area

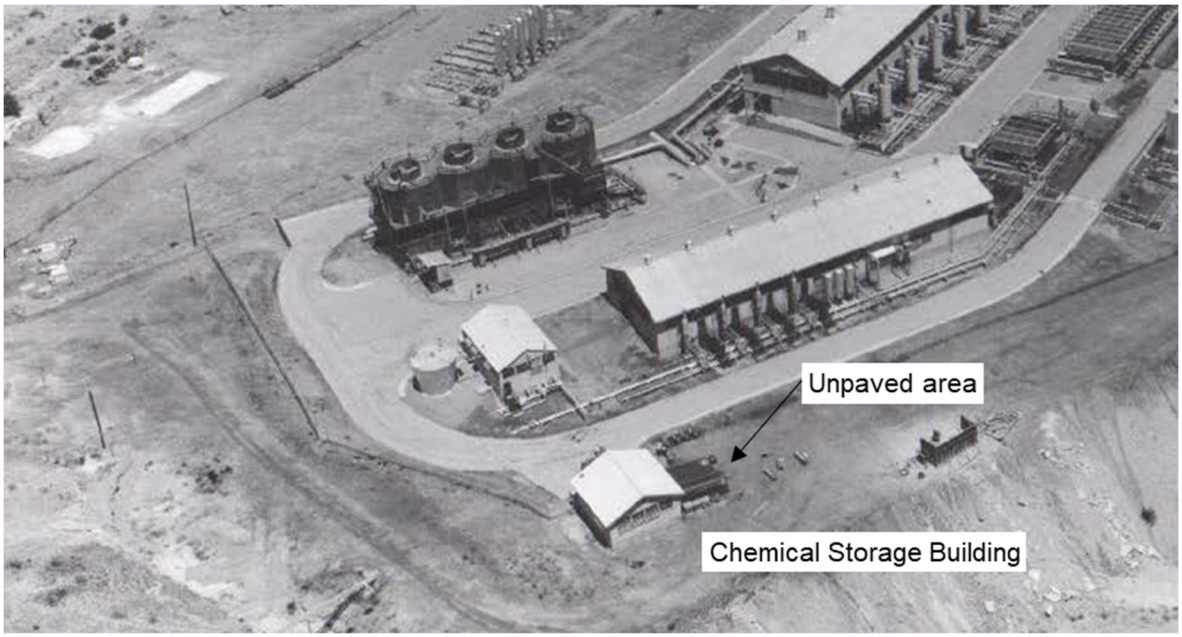
4.2.8.1 Setting

AOC 7 consists of the hazardous materials storage area and loading dock, and the adjacent Carpenter Shop (former Chemical Storage Building). The current hazardous material storage area has been used since at least the mid-1980s to store chemical products used at the station (CH2M, 2007a). The former Chemical Storage Building was constructed in 1951 as part of the original station configuration. This facility is concrete-lined and is equipped with secondary containment walls.

4.2.8.2 Unit History

The area currently serves as the storage area for hazardous wastes generated at the facility (e.g., oily rags, used oil filters, etc.). This area has been used for the collection and storage of hazardous materials since at least the early to mid-1980s. The area is also used to store chemical products used at the compressor station (e.g., lubricants, parts cleaning compounds, and small quantities of solvents). This area has apparently always been used for chemical storage (Riddle, 2004), though the types of chemicals

stored is unknown. A roof was installed over the storage area during the 1960s (Russell, 2006b). Review of aerial photographs suggests that this area was unpaved until at least the mid-1950s (Photograph 4-29).



Photograph 4-29: May 19, 1955 Aerial Photograph 2 (cropped). Facing northwest. The Chemical Storage Shed (now the Carpenter Shop) and the adjacent unpaved area.

4.2.8.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 7 are presented in Tables 3-21a through 3-21h, and sampling locations and results are shown on Figures 3-11a and 3-11b. Figures 3-14a through 3-14o show sampling locations and results for AOC 13. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.8.4.

Metals: Soil samples were collected from five locations at depths from 0 to 3 feet bgs. No CSLs were exceeded in AOC 7. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. Background concentrations were exceeded for hexavalent chromium, total chromium, cobalt, copper, lead, molybdenum, and nickel at one or more locations across AOC 7, as shown in Table 3-21a. The analytes most frequently detected over the background concentration were hexavalent chromium and lead.

- Hexavalent chromium was detected above the background value (0.83 mg/kg) in three samples between depths 0 to 3 feet bgs (Table 3-21a). The highest hexavalent chromium concentration of 1.8 J mg/kg was detected at sample location AOC7-2 at 0 to 0.5 foot bgs. A sample from location AOC7-2 was collected near the southeastern corner of the building (Figure 3-14d).
- Lead was detected above the background value (8.39 mg/kg) in three samples between depths 0 to 3 feet bgs (Table 3-21a). The highest lead concentration of 32 J mg/kg was detected at sample location AOC7-2 at 0 to 0.5 foot bgs. A sample from location AOC7-2 was collected near the southeastern corner of the building (Figure 3-14h).

The lateral extent of the exceedances has been defined by samples with results below the background level or not detected above reporting limits. The vertical extent of the exceedances has been defined by

samples with results below background levels or not detected above reporting limits, except at AOC7-1 and 5, where analytes exceeded their respective background concentrations, as shown in Table 3-21a. At these locations the detected metal results are slightly above (less than 2 times) their respective background values; these minor exceedances of the background values are not considered a data gap requiring further investigation.

CLP Inorganics: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs or background levels (Table 3-21b).

PAHs: Samples were collected from five locations, and no samples had detected results that exceeded their respective CSLs (Table 3-21c).

TPH: Samples were collected from five locations, and no samples had detected results that exceeded their respective CSLs (Table 3-21d).

VOCs and SVOCs: Samples were collected from five locations, and no samples had detected results of VOCs or SVOCs.

General Chemistry: Samples were collected from five locations and were only analyzed for pH, which has no CSL or background level (Table 3-21e).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected from five locations, and no samples had detected results that exceeded their respective CSLs (Table 3-21f).

Dioxins and Furans: One sample was collected; no detected results exceeded their respective CSLs (Table 3-21g).

4.2.8.4 AOC 7 Conceptual Site Model

A graphical CSM has been developed for AOC 7 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-15. Exhibit 4-21 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 7. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in Soil Part B DQOs TM (CH2M, 2011b), and is summarized in this section with updated information.

The primary sources of contamination at AOC 7 are likely to be incidental spills of hazardous materials and/or waste during storage or transfer of the materials. The specific compounds released, if any, are unknown. The potential quantities of chemicals released in AOC 7 are also unknown; however, quantities are expected to be relatively small because the containers stored in this area have capacities of 55 gallons or less.

The presence of low-level detections of PAHs, TPH, and PCBs are consistent with this site being used for chemical and hazardous material storage (e.g., oily rags, used oil filters, lubricants). No VOCs or SVOCs were detected in AOC 7, indicating potential leaks or spills of chemical products, like parts cleaning compounds or solvents, did not affect soil at the site.

Because of the small quantity of materials that would have been released at any one time, it is not expected that the material would have migrated to nearby storm drains; however, this potential migration pathway is included for completeness. Releases via the storm drain system are addressed by the storm drain investigation program described Section 4.3.

Exhibit 4-21. Conceptual Site Model – AOC 7
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills from Hazardous Material Storage Building **COCs Include:** • Metals	• Surface soil • Pavement	• Percolation • Infiltration • Potential entrainment in stormwater or surface water runoff	• Subsurface soil • Potential groundwater	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals

The original drawings for the Chemical Storage Building also show a sink in the southwestern corner of the building. The piping diagram for the sink shows a line (presumably the water line) entering the building from the southwest and a drain line exiting to the east. The drawing indicates that the location of the drain line was to be determined during construction (PG&E, 1953). A pipe is visible in the floor at the approximate location of the sink; however, it is unknown where the drain line led or whether it may have been connected to the septic system.

The primary source media at AOC 7 are pavement and surface soil. Most of the area around AOC 7 is asphalt-paved or covered by concrete foundations; however, unpaved soils are present immediately to the east of this unit. Liquids released in AOC 7 would either have been released to pavement or to surface soil. From surface soils, materials could have infiltrated to shallow soil and subsurface soil. Some materials could potentially also have penetrated the asphalt paving. The concrete foundations in this area are quite thick, and it is unlikely that any materials migrated through the concrete. If any materials did penetrate either asphalt or concrete and reach surface soil, they could also have migrated into shallow soil. Discharges from potential leaks from the sink drain line could also have reached shallow soil.

In the paved area, movement of contaminants with rainwater (that is, infiltration) is not considered an existing pathway, and any liquids released are unlikely to have migrated to subsurface soils. The analytical results for AOC 7 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time. Runoff of contaminated surface soil in rainwater is a potential migration pathway from the eastern side of this AOC.

4.2.8.5 Evaluation of Data Against Data Quality Objectives for AOC 7

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-21a through 3-21g and on Figures 3-13a and 3-13b, and 3-14a through 3-14o. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-21h.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 11 samples were collected from 5 locations at depths ranging from 0 to 3 feet bgs. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, TPHs, general chemistry, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 7 may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Surface soils samples were collected in unpaved areas associated with AOC 7 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, PAHs, VOCs, SVOCs, TPH, PCBs, and dioxins and furans. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations

outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the following analytes: hexavalent chromium, copper, lead, and molybdenum were detected at concentrations exceeding ISLs at one of three locations. The highest factor of exceedance was for lead, which was detected at a concentration exceeding the ISL (BK) of 8.39 mg/kg in one sample collected at AOC7-2 at a maximum concentration of 32 J mg/kg.

A summary of the highest exceedances is provided in Table 3-38j and presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms, including surface water flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion (for unpaved areas only), constituents exceeding ISLs within AOC 7 have the potential to migrate outside the fence line. Sufficient data have been collected outside the compressor station fence line to assess any potential offsite migration, and nature and extent of these analytes have been evaluated as part of the applicable Part B units in Table 3-37 and in the risk assessment. The need for controls or removal of contaminated soil will be evaluated in the CMS/FS.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 7 were collected at AOC7-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.9 AOC 8 – Paint Shed

4.2.9.1 Setting

AOC 8 consists of a small storage locker used for paint storage, as shown on Figure 2-2. The locker is 5 feet wide by 5 feet long and is set back into the southern retaining wall at the Compressor Station. The paint locker is constructed of steel with tight-fitting doors and is located on pavement. It was designed for the fire-safe storage of flammable materials.

4.2.9.2 Unit History

Large-scale painting activities at the compressor station are handled by outside crews (Riddle, 2004). Therefore, only small quantities of paint and thinners used for minor touch-up work are stored in this shed. Paint is stored in both spray cans and in 1- to 5-gallon cans. Non-chlorinated paint thinners are also stored in 1-gallon cans. About 100 gallons of paint and thinners are routinely stored in this shed. No evidence of releases is present in or around the shed.

It is likely that paints contained within the locker have consisted of both oil- and water-based paints. Thinners are believed to have consisted of non-chlorinated thinners. During the use of these products, it is possible that small quantities of paint and/or thinners may have spilled in the vicinity of the paint locker.

4.2.9.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 8 are presented in Tables 3-22a through 3-22e, and sampling locations and results are shown on Figures 3-14a through 3-14o. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.9.4.

Metals: Soil samples were collected from two locations at depths from 0 to 3 feet bgs. No CSLs were exceeded in AOC 8. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. Background concentrations were exceeded for total chromium, copper, molybdenum, and nickel, as shown in Table 3-22a. The analytes most frequently detected at concentrations exceeding background concentrations were copper and molybdenum.

- Copper was detected above the background value (16.8 mg/kg) in two samples between depths 0 to 3 feet bgs (Table 3-22a). The highest copper concentration of 18 mg/kg was detected at sample location AOC8-1 at 0 to 0.5 foot bgs. A sample from location AOC8-1 was collected on the southern side of the paint locker (Figure 3-14c). The concentrations detected (18 and 17 mg/kg) are within the range of background.
- Molybdenum was detected above the background value (1.37 mg/kg) in two samples between depths 0 to 3 feet bgs (Table 3-22a). The highest molybdenum concentration of 5.1 mg/kg was detected at sample location AOC8-2 at 2 to 3 feet bgs. A sample from location AOC8-2 was collected on the northern side of the paint locker beneath pavement (Figure 3-14i).

The lateral extent of the exceedances has been defined by samples with results below the background levels or not detected above reporting limits. The vertical extent of the exceedance of molybdenum has not been defined, as it exceeds the background concentration in the deepest sample (2 to 3 feet bgs). This minor exceedance of the background values is not considered a data gap requiring further investigation.

CLP Inorganics: Samples were collected at one location, and no samples had detected results that exceeded their respective background levels (Table 3-22b).

PAHs: Samples were collected at two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-22c).

TPH: Samples were collected at two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-22d).

VOCs: Samples were collected at two locations and analyzed for VOCs. No samples had detected results of VOCs.

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: PCBs were not a COPC for this unit; therefore, samples were not analyzed for PCBs.

Dioxins and Furans: Dioxins and furans were not a COPC for this unit; therefore, samples were not analyzed for dioxins and furans.

4.2.9.4 AOC 8 Conceptual Site Model

A graphical CSM has been developed for AOC 8 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-15. Exhibit 4-22 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 8. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included the Soil Part B DQOs TM (CH2M, 2011b), and is summarized in this section with updated information.

If contamination is found at AOC 8, the likely source would be incidental spills of paints and paint thinners (solvents) to pavement. However, there is no information indicating that any spills have occurred, and the maximum quantity likely to be released at any one time would be small (that is, 5 gallons or less of paint; 1 gallon or less of thinners). Additionally, no VOCs were detected in soil at AOC 8.

Exhibit 4-22. Conceptual Site Model – AOC 8
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills from Paint Locker **COCs Include:** • Metals	• Pavement	• Percolation • Infiltration • Potential entrainment in stormwater and surface water runoff	• Surface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals

Because of small quantity of materials that would have been released at any one time, it is highly unlikely that material would have migrated to nearby storm drains; however, this potential migration pathway is included for completeness. Releases via the storm drain system are addressed by the storm drain investigation program described in Section 4.3.

The primary source medium at AOC 8 is pavement. Because most of the area around the paint locker is asphalt-paved, liquids released in AOC 8 would have been released to pavement and potentially infiltrated to surface soil. If any materials did penetrate the pavement and reach surface soil, they could also have migrated into shallow soil. Because the area is paved, movement of contaminants with rainwater (that is, infiltration) is not considered an existing pathway, and any liquids released are unlikely to have migrated to deeper soils. The analytical results for AOC 8 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time Runoff of contaminated surface soil in rainwater is a potential migration pathway from the southern side of this AOC.

4.2.9.5 Evaluation of Data Against Data Quality Objectives for AOC 8

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-22a through 3-22d and on Figures 3-14a through 3-14o. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-22e.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, four samples were collected from two locations at depths ranging from 0 to 3 feet bgs for AOC 8. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, and PAHs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled by sampling that occurred at AOC 7, which is immediately adjacent. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 8 may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. One surface soil sample was collected from an unpaved areas (AOC8-1) between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, VOCs, SVOCs, and TPH. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISLs for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the following analytes:

- Mercury was detected at a concentration exceeding the ISL (ECV) of 0.0125 mg/kg in the one sample (AOC8-1) at a concentration of 0.31 mg/kg.

A summary of the highest exceedances is provided in Table 3-38j and presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms, including surface water flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion (for

unpaved areas only), mercury near AOC 8 may have the potential to migrate outside the fence line. Sufficient data have been collected outside the compressor station fence line to assess potential offsite migration, and nature and extent of these analytes have been evaluated as part of the applicable Part B units in Table 3-37 and in the risk assessment. The need for controls or removal of contaminated soil will be evaluated in the CMS/FS.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 8 were collected at AOC8-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.10 AOC 13 – Unpaved Areas within the Compressor Station

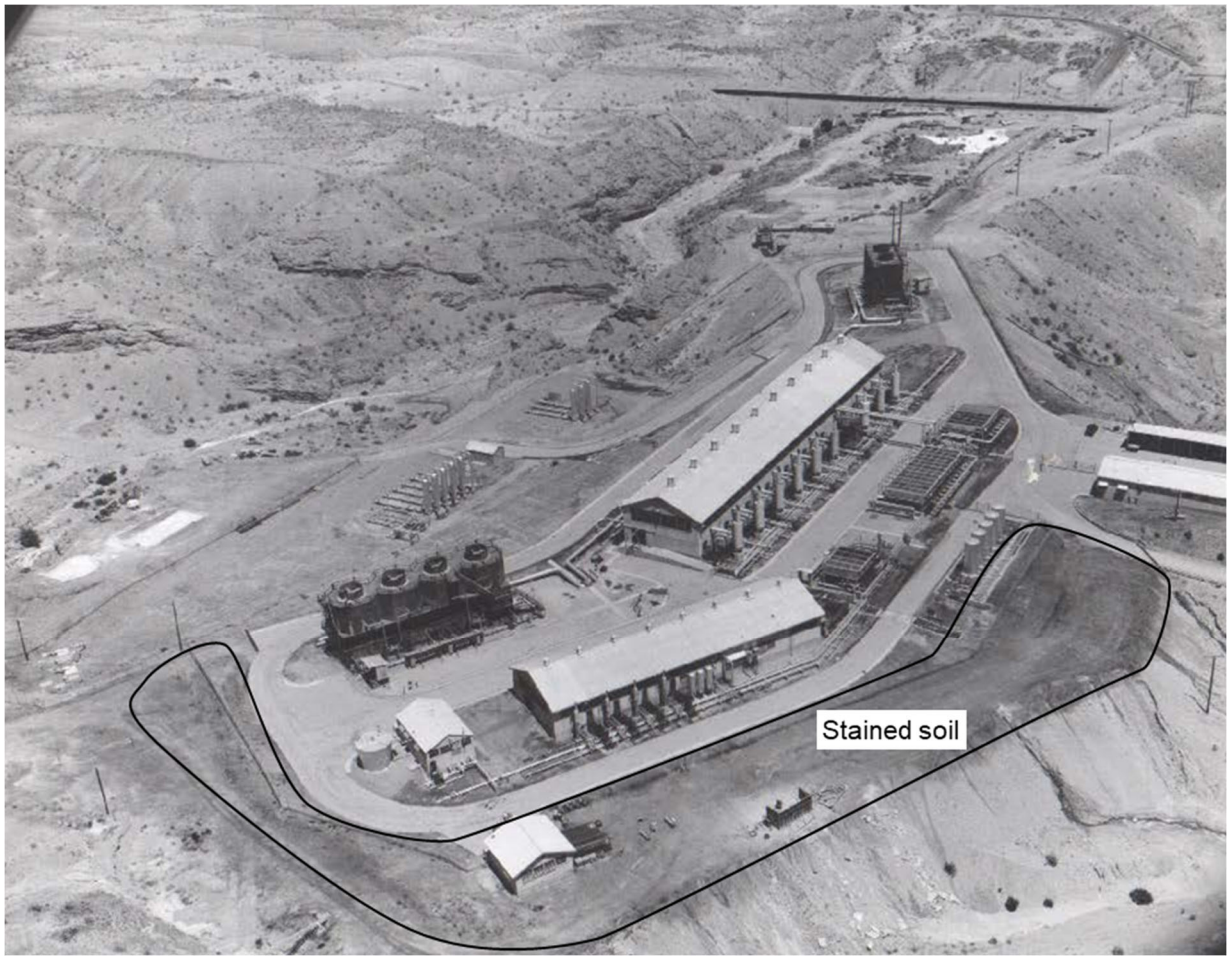
4.2.10.1 Setting

AOC 13 consists of current and formerly unpaved areas within the fence line of the compressor station. These areas may have been impacted incidentally as a result of facility activities. In addition, former employees have reported, and existing documentation suggests, that pipeline liquids and/or waste oil were sprayed on station roads for dust control (PG&E, 1980; Russell, 2006c). Some dark staining on the eastern side of the compressor station is visible in the May 1955 aerial photographs, likely as a result of applying oil for dust suppression (Photograph 4-30). In addition, incidental staining is visible in the lower yard in construction photographs taken in the early 1950s.

Currently, the unpaved areas in the upper yard are located in various strips and patches among buildings and structures on this active facility. Most of the unpaved areas within the fence line lie within the lower yard on the western side of the facility. Formerly unpaved areas that are now paved or covered by buildings include much of the upper yard, including most of the area east of the main station buildings (that is, east of the compressor and auxiliary buildings). Given that stormwater runoff is likely to have traversed various areas, pipeline liquids could have been sprayed in various areas, and potential spills of cooling water could have occurred in various areas, AOC 13 will be addressed as one unit across the entire station.

4.2.10.2 Unit History

Several spills historical spills occurred at the Topock facility associated with AOC 13. Details of historical spills on the station are provided in Section 1.3.1. Confirmation sample results from these spills are included in Tables 3-23a through 3-23j, as applicable. All spill sample results contain the word ‘spill’ and the date of the spill in the Location column of the associated tables. Detailed information regarding each of these spills is presented in the *Revised Final RCRA Investigation/Remedial Investigation Report, Volume 1 - Site Background and History, PG&E Topock Compressor Station, Needles, California* (CH2M, 2007a). None of the spill samples were analyzed for pesticides or dioxins and furans (the available data for these constituents are presented in Tables B11-8 and B11-9). Spill samples are included in the samples counts and comparisons to screening values presented in Table 3-23j.



Photograph 4-30: May 19, 1955 Aerial Photograph 2. Facing northwest. Dark staining visible on eastern side of compressor station.

4.2.10.3 Analytical Results

Soil Investigation

Analytical results for AOC 13 are presented in Tables 3-23a through 3-23k, and sampling locations and results are shown on Figures 3-14a through 3-14o. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented Section 4.2.10.4.

Metals: Soil samples were collected from 125 locations within AOC 13, at depths ranging from 0 to 160 feet bgs. The CSLs were exceeded for cadmium, hexavalent chromium, lead, and mercury at locations across AOC 13. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. Background concentrations were exceeded for barium, cadmium, hexavalent chromium, total chromium, cobalt, copper, lead, molybdenum, nickel, selenium, vanadium, and zinc at locations across AOC 13, as shown in Table 3-23a. The analytes that were detected more than once at concentrations exceeding CSLs are cadmium, hexavalent chromium, and lead. The analytes that were more frequently detected at concentrations above background levels are cadmium, hexavalent chromium, total chromium, cobalt, copper, lead, molybdenum, nickel, and zinc. The concentrations of metals at AOC 13 tend to be highest near or between AOC 19 and AOC 15, from debris

samples collected from storm drain line SDL-3 south of AOC 15, and on the northwestern slope of the compressor station in the vicinity of storm drain line SD-31. The specific compounds and concentration ranges vary within these areas. Storm drain samples SD-OS34 and SD-OS42 reflect material that was removed during repairs made to SDL-3 during the storm drain investigation program described in Section 4.3.

- Cadmium was detected above its CSL (7.3 mg/kg) in two samples collected at location SD-OS34 between 0.5 and 4 feet bgs and its background value (1.1 mg/kg) in 11 samples between depths 0 to 5.5 feet bgs (Table 3-23a). The highest cadmium concentration of 26 mg/kg was detected at sample location SD-OS42 at 3 to 4 feet bgs. A sample from location SD-OS42 was collected during the storm drain investigation in a gravel area north of AOC 5 – Cooling Tower A and represents material removed during repair of the storm drain (Figure 3-14c).
- Hexavalent chromium was detected above its CSL (6.3 mg/kg) in five samples between depths 0 to 1 foot bgs (Table 3-23a) and its background value (0.83 mg/kg) in 29 samples between depths 0 to 150 feet bgs. The highest total chromium concentration of 12.2 mg/kg was detected at sample location PS-8 at 0 feet bgs. A sample from location PS-8 was collected in a gravel area, south of AOC 19 – Former Cooling Liquid Mixing and Hotwell Area and south of a stained concrete pad (Figure 3-14d).
- Total chromium was detected above its background value (39.8 mg/kg) in 34 samples between depths 0 to 150 feet bgs (Table 3-23a). There were no exceedances of the total chromium CSL. The highest total chromium concentration of 780 mg/kg was detected at sample location SD-OS42 at 3 to 4 feet bgs. A sample from location SD-OS42 was collected during the storm drain investigation from in a gravel area north of AOC 5 – Cooling Tower A and represents material removed during repair of the storm drain (Figure 3-13e).
- Cobalt was detected above its background value (12.7 mg/kg) in 10 samples collected between depths 0 to 120 feet bgs (Table 3-23a). There were no exceedances of the cobalt CSL. The highest cobalt concentration of 27 mg/kg was detected at sample location AOC13-7 at 0 to 0.5 foot bgs. A sample from location AOC13-7 was collected in a gravel area, east of AOC 25 – Compressor and Generator Engine Basements (Figure 3-14f).
- Copper was detected above its background value (16.8 mg/kg) in 73 samples between depths 0 to 150 feet bgs (Table 3-23a). There were no exceedances of the copper CSL. The highest copper concentration of 830 mg/kg was detected at sample location SD-OS34 at 0.5 to 1 foot bgs. A sample from location SD-OS34 was collected along a storm drain line south of AOC 15 and represents material removed during repair of the storm drain (Figure 3-14g).
- Lead was detected above its CSL (320 mg/kg) in 7 samples collected between 0 and 4 feet bgs (Table 3-23a) and its background value (8.39 mg/kg) in 81 samples between depths 0 to 10 feet bgs. The highest lead concentration of 1,100 mg/kg was detected at sample location SD-OS34 at 0.5 to 1 foot bgs and SD-OS42 at 3 to 4 feet bgs. A sample from location SD-OS34 was collected along a storm drain line south of AOC 15. A sample from location SD-OS42 was collected during repair of storm drain lines in a gravel area north of AOC 5 – Cooling Tower A and represents material removed during repair of the storm drain (Figure 3-14h).
- Molybdenum was detected above its background value (1.37 mg/kg) in 41 samples between depths 0 to 160 feet bgs (Table 3-23a). There were no exceedances of the molybdenum CSL. The highest molybdenum concentration of 120 mg/kg was detected at sample location AOC13-7 at 0 to 0.5 foot bgs. A sample from location AOC13-7 was collected in a gravel area, east of AOC 25 – Compressor and Generator Engine Basements (Figure 3-14i).
- Nickel was detected above its background value (23.7 mg/k) in 20 samples collected between depths 0 to 150 feet bgs (Table 3-23a). There were no exceedances of the nickel CSL. The highest cobalt concentration of 210 mg/kg was detected at sample location SD-OS34 at 0.5 to 1 foot bgs. A sample from location SD-OS34 was collected along a storm drain line south of AOC 15 (Figure 3-14j).
- Zinc was detected exceeding its background value (58 mg/kg) in 49 samples between depths 0 to 30 feet bgs (Table 3-23a). There were no exceedances of the zinc CSL. The highest zinc concentration

of 2,200 mg/kg was detected at sample location SD-OS42 at 3 to 4 feet bgs. A sample from location SD-OS42 was collected from a gravel area north of AOC 5 – Cooling Tower A and represents material removed during repair of the storm drain.

The lateral extent of the exceedances has not been defined by samples with results below background levels or not detected above reporting limits.

- For multiple metals (hexavalent chromium, total chromium, copper, lead, and zinc) along the slope in the northwestern corner of the station between AOC 6 and the lower yard (i.e., sample locations AOC13-33, SD-31, and PA-02).

The vertical extent of exceedances has not been defined.

- For multiple metals in the vicinity of storm drain line SDL-3 at sample locations SD-OS35A (hexavalent chromium, total chromium, copper, lead, and zinc), SD-OS35 (lead), and SD-OS34 (copper and lead). These were opportunistic samples collected during the storm drain survey investigation and repair activities, and represent material removed during repair of the storm drain. Deeper samples were not collected.
- For hexavalent chromium and lead at sample location AOC13-33.
- Sample locations SD-OS38 and SD-OS41 for molybdenum. These were opportunistic samples collected during storm drain investigation and repair activities, and represent material removed during repair of the storm drain. Deeper samples were not collected.
- For copper at the southwestern corner of the station at sample locations PGE-LT-OS9 and AOC13-OS2.
- For molybdenum at sample location BH-67.

Although some locations have detected metal results slightly above (2 times or less) their respective background values in the deepest sample, these minor exceedances of the background values are not considered a data gap requiring further investigation.

CLP Inorganics: Samples were collected from up to 22 locations, and no samples had detected results that exceeded their respective background levels (Table 3-23b).

PAHs: Samples were collected from 92 locations at depths ranging from 0 to 160 feet bgs. PAHs were evaluated by calculating B(a)P equivalents for human health. B(a)P equivalents exceeded the CSL at one location, as shown in Table 3-22c.

- B(a)P equivalents were detected above the CSL (2,100 µg/kg) in one sample between depths 0 to 0.5 foot bgs at location at SD-31 at a concentration of 2,300 µg/kg (Table 3-23c). A sample from location SD-31 was collected on the slope to the west of AOC 6 along a former drain line (Figure 3-14n).

The lateral and vertical extents of exceedances have been defined by samples with results not detected above reporting limits or the CSL

TPH: Samples were collected from 114 locations at depths ranging from 0 to 160 feet bgs. The CSL for TPH-d and TPH-mo were exceeded at one or more locations across AOC 13, as shown in Table 3-23e.

- TPH-mo was detected above its CSL (140,000 mg/kg) at one location, Spill4232006_Sam at 0 feet bgs, with a concentration of 240,000 mg/kg (Table 3-23e). A sample from location Spill4234006_Sam was collected in a gravel area, east of AOC 25 – Compressor and Generator Engine Basement.
- TPH-d was detected above its CSL (1,100 mg/kg) at four locations between depths 0 to 4.5 feet bgs (Table 3-23e). The highest TPH-d concentration of 8,500 mg/kg was detected at sample location SD-OS42 at 3 to 4 feet bgs from debris within a storm drain line and represents material removed during

repair of the storm drain. A sample from location SD-OS42 was collected in a gravel area north of AOC 5 – Cooling Tower A.

The lateral and vertical extents of the exceedances for all analytes have been defined by samples with results not detected above reporting limits or below the CSLs.

VOCs and SVOCs: Samples were collected at 74 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-23d).

General Chemistry: The only general chemistry parameter with a CSL is fluoride, and no samples had detected results that exceeded their respective CSLs (Table 3-23f).

Pesticides: Samples were collected from 17 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-23g).

PCBs: Samples were collected from 86 locations at depths ranging from 0 to 160 feet bgs. The CSLs for Aroclor 1254 and total PCBs were exceeded at multiple locations across AOC 13, as shown in Table 3-23h.

- Aroclor 1254 was detected above its CSL (970 µg/kg) at five locations between depths 0 to 4 feet bgs (Table 3-23h). The highest Aroclor 1254 concentration of 2,600 J µg/kg was detected at sample location AOC13-33 at 0 to 0.5 foot bgs. A sample from location AOC13-33 was collected on the slope to the west of AOC 6.
- Total PCBs were detected above the CSL (940 µg/kg) at six locations between 0 and 4 feet bgs (Table 3-23h). The highest Total PCB concentration of 3,537 µg/kg was detected at sample location AOC 13-33. A sample from location AOC13-33 was collected on the slope to the west of AOC 6.

The lateral extent of the exceedances has not been defined for PCBs by samples with results below background levels, or not detected above reporting limits along the slope in the northwestern corner of the station between AOC 6 and the lower yard (i.e., sample locations AOC13-33 and SD-31). The vertical extent of exceedances has been defined by samples below CSLs or not detected above reporting limits.

Dioxins and Furans: Samples were collected from 29 locations at depths ranging from 0 to 4.5 feet bgs (Table 3-23i). Dioxins and furans are evaluated by calculating TEQ values for human receptors. The CSL for TEQ human was exceeded at multiple locations across AOC 13, as shown in Table 3-23i.

- TEQ human was detected above its CSL (220 ng/kg) at four locations between 0 and 3 feet bgs (Table 3-23i). The highest TEQ human concentration of 2,200 ng/kg was detected at sample location AOC13-33 at 0 to 0.5 foot bgs. A sample from location AOC13-33 was collected on the slope to the west of AOC 6 (Figure 3-14o).

The lateral extent of exceedances has been defined by samples with results not detected above reporting limits or the CSL, except at sample locations AOC13-30 and AOC13-33. This data gap may be filled during remedial design if remediation is necessary in this area.

The vertical extent of exceedances has been defined by samples with results not detected above reporting limits or the CSL, except at sample location AOC13-33. This data gap may be filled during the CMS/FS if remediation is necessary in this area.

Debris and Waste Samples

Debris and waste samples were collected at AOC 13 and analyzed for metals, PAHs, VOCs and SVOCs, general chemistry, PCBs, and dioxins and furans. The results of these samples are presented in Tables 3-23a through 3-23j. Samples were collected on the slope between AOC 6 and the lower yard.

Metals: Three debris samples were analyzed for metals: AOC13-33, AOC13-Debris, and AOC13-Wood, as shown in Table 3-23a. Metals concentrations in these samples exceeded background in all three samples for total chromium (39.8 mg/kg), copper (16.8 mg/kg), lead (8.39 mg/kg), and zinc (58 mg/kg). AOC13-Debris and AOC13-Wood detected total chromium exceeding total threshold limit concentration (TTLC) hazardous waste limits. Background was exceeded in two of the samples for arsenic (11 mg/kg), hexavalent chromium (0.83 mg/kg), and molybdenum (1.37 mg/kg). The CSL was exceeded for hexavalent chromium (6.3 mg/kg) in one sample (AOC13-Debris).

PAHs: Six debris samples were analyzed for PAHs, as shown in Table 3-23c. B(a)P equivalents exceeded background (55 µg/kg) in four of the five samples, and the B(a)P equivalent CSL (2,100 µg/kg) was exceeded at one location. The highest PAH concentration was measured at AOC13-Debris (2,600 µg/kg).

VOCs and SVOCs: Four debris samples were analyzed for VOCs and SVOCs. All results were nondetect, as shown in Table 3-23d.

PCBs: Six debris samples were analyzed for PCBs, as shown in Table 3-23h. Results were nondetect or did not exceed the CSLs for five of the six samples. The CSL was exceeded for Aroclor 1254 (970 µg/kg), Aroclor 1260 (990 µg/kg), and total PCBs (940 µg/kg) at AOC13-Debris. The factors of exceedance ranged from 1.2 to 4, depending on the chemical.

Dioxins and Furans: Five debris samples were analyzed for dioxins and furans, as shown in Table 3-23i. Results were nondetect or did not exceed CSLs for three samples. The TEQ human CSL (220 ng/kg) was exceeded by two samples: AOC13-Asphalt2 and AOC13-Debris, with AOC13-Debris having a much higher concentration (56,000 ng/kg) than AOC13-Asphalt2 (460 ng/kg).

A summary of debris and waste samples is as follows:

- Concentrations in debris samples were less than or comparable to some of the highest concentrations in soil samples, except for total chromium, copper, and TEQ human, which had measurably higher concentrations in a debris sample than in the soil samples from AOC 13.
- The concentration of TEQ human in AOC13-Debris was 56,000 ng/kg, and the highest concentration in soil was 2,200 ng/kg.
- The concentration of total chromium in AOC13-Debris was 3,800 mg/kg, and the highest concentration in soil was 780 mg/kg.
- The concentration of copper in AOC13-Wood was 2,400 mg/kg, and the highest concentration in soil was 830 mg/kg.
- Soil samples collected near debris samples (AOC13-33 and SD-31, PA-02) were generally high in total chromium, copper, and dioxins and furans.

Impacted debris material on slopes within and around the TCS should be removed. Debris removal is recommended to be carried forward into the CMS/FS.

Soil Gas Investigation

In addition to the soil and debris samples discussed above, soil gas vapor probes were installed at locations AOC13-5, AOC13-6, and AOC13-11 to assess AOC 25 (Compressor and Generator Engine Basements), and at location AOC13-16 to assess AOC 32 (Oil Storage Tanks and Waste Oil Sump), where soil sampling was not feasible. Installation and sampling details are described in Appendix B, Attachment B7. Soil gas samples were collected from 2 to 3 feet bgs. Soil gas samples were collected from each of these locations in January 2016 and February 2017. Results are presented in Table 3-23k.

- Results from the January 2106 sampling event: Three analytes (acetone, methyl ethyl ketone [MEK], and toluene) were detected at low concentrations. Acetone and MEK are frequently detected lab

contaminants. The highest detected toluene concentration was 16 micrograms per cubic meter ($\mu g/m^3$).

- Results from the February 2017 sampling event: Acetone, carbon disulfide, chloroform, MEK, and methylene chloride were detected at low concentrations. Acetone, MEK, and methylene chloride are frequently detected lab contaminants. Toluene was not detected above laboratory reporting limits.

No data gaps were identified for soil gas.

4.2.10.4 AOC 13 Conceptual Site Model

Exhibit 4-23 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 13. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b), and is summarized in this section with updated information.

The primary sources of contamination at AOC 13 are likely to be historical incidental spills and/or spraying of lubricants and pipeline liquids, cooling water, and wastewater. The presence of hexavalent chromium, total chromium, and molybdenum is likely related to releases of cooling water. The presence of wear metals (zinc, copper, nickel, and lead), PAHs, TPH, and PCBs is likely related to historical and/or incidental spills. The spraying of lubricants may also have contributed to PAH and TPH contamination. The quantity of liquid released to unpaved areas of the compressor station is unknown; however, overflows from some of the equipment on the station are known to have occurred in the past. While spills that occurred in recent years have been cleaned up, no information is available regarding the cleanups of any historical spills.

The highest concentrations of hexavalent chromium and total chromium are in the vicinity of AOC 19 (former cooling liquids mixing and jacket cooling water [JCW] hot well) and AOC 15 (auxiliary jacket cooling water [AJCW] pumps). Elevated hexavalent chromium and total chromium concentrations in soil are also found along the slope between AOC 6 (cooling tower) and the lower yard, and along storm drain line SDL-3. The presence of chromium at these locations is consistent with known or potential releases of cooling water.

Runoff containing wear metals may contribute to the elevated concentrations of these metals detected along storm drain lines (e.g., SDL-6, SDL-5, and SDL-3) and on the slope between AOC 6 and the lower yard. The highest concentrations of PAHs, PCBs, and dioxins and furans were also detected on the slope between AOC 6 and the lower yard.

The primary source medium at AOC 13 is surface soil. Because areas comprising AOC 13 either are or historically were unpaved, liquids released in AOC 13 would have been released to surface soil and would have infiltrated to shallow soil. Liquids released to shallow soils could have infiltrated to deeper soils. The analytical results for AOC 13 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time. During high rainfall events, chemicals contained in currently unpaved portions of AOC 13 could also reach the storm drain system or run off in sheet flow. Releases to areas outside the fence line are addressed by the Perimeter Area investigation (Section 4.4); constituents that may have been released to the storm drain system are addressed by the storm drain investigation program described in Section 4.3.

Exhibit 4-23. Conceptual Site Model – AOC 13
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills of lubricants and pipeline liquids, and cooling and wastewater **COCs Include:** • Metals • PCBs • PAHs • TPH	• Surface soil	• Percolation • Infiltration • Potential entrainment in stormwater and surface water runoff	• Subsurface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals
Disposal of Debris **COCs Include:** • Metals • PAHs • PCBs • Dioxins and furans	• Surface soil	• Percolation • Infiltration • Potential entrainment in stormwater and surface water runoff	• Surface soil • Subsurface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion and enclosed space accumulation	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals

4.2.10.5 Evaluation of Data Against Data Quality Objectives for AOC 13

Decision 1 (Nature and Extent Determination): Nature and extent have not been sufficiently defined laterally or vertically for the following compounds and associated areas:

- Lateral extent of dioxins/furans, PCBs, and multiple metals (hexavalent chromium, total chromium, copper, lead, and zinc) along the slope between AOC 6 and the lower yard.
- Vertical extent of dioxins/furans, hexavalent chromium, and lead along the slope between AOC 6 and the lower yard (AOC13-33).
- Lateral extent of hexavalent chromium, total chromium, copper, lead, and zinc in the vicinity of storm drain line SDL-3. Opportunistic samples were collected in this area during maintenance and construction activities; therefore, deeper samples could not be collected.
- Vertical extent of molybdenum at sample locations SD-OS38 and SD-OS41. These opportunistic samples were collected during maintenance and construction activities; therefore, deeper samples could not be collected.
- Vertical extent of molybdenum at sample location BH-67.
- Vertical extent of copper at the southwestern corner of the station at sample locations PGE-LT-OS9 and AOC13-OS2.

Analytical results are presented in Tables 3-23a through 3-23i and on Figures 3-14a through 3-14o. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-23j.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 403 samples were collected from 147 locations at depths ranging from 0 to 160 feet bgs for AOC 13. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, TPH, general chemistry parameters, pesticides, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 13 may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Surface soils samples were collected in unpaved areas associated with AOC 13 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, general chemistry parameters, pesticides, PCBs, and dioxins and furans. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the analytes and equivalency factors described in this subsection.

Several metals were detected at concentrations exceeding ISLs (antimony, cadmium, hexavalent chromium, total chromium, copper, lead, mercury, molybdenum, and zinc). The highest factor of

exceedance was for zinc, which was detected at a concentration exceeding the ISL (BK) of 58 mg/kg at 7 of 27 locations with a maximum concentration of 1,000 mg/kg at SD-24.

- Cyanide was detected at a concentration exceeding the ISL (ECV) of 0.9 mg/kg at one of three locations (AOC13-PITOS9) at a concentration of 1 mg/kg.
- B(a)P equivalent exceeded the ISL (RRSL) of 110 µg/kg at 4 of 27 locations with a maximum concentration of 2,300 µg/kg at SD-31. HMW PAH also exceeded the ISL (ECV) of 1,160 µg/kg at 3 of 27 locations with a maximum concentration of 18,670 µg/kg at SD-31.
- Total PCBs exceeded the ISL (ECV) of 204 µg/kg at 6 of 25 locations with a maximum concentration of 3,537 µg/kg at AOC 13-33. Aroclor 1254 and Aroclor 1260 also exceeded their respective ISLs (RRSL) at 5 of 25 and 2 of 25 locations, respectively.
- TEQ avian exceeded the ISL (ECV) of 16 ng/kg at 5 of 11 locations with a maximum concentration of 1,500 ng/kg at AOC 13-33.
- TEQ human exceeded the ISL (DTSC-SL) of 50 ng/kg at 5 of 11 locations with a maximum concentration of 2,200 ng/kg at AOC 13-33.
- TEQ mammals exceeded the ISL (BK) of 5.58 ng/kg at 9 of 11 locations with a maximum concentration of 2,200 ng/kg at AOC 13-33.

A summary of the highest exceedances is shown on Table 3-38j, which presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms, including surface water flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion, constituents exceeding ISLs within AOC 13 have the potential to migrate outside the fence line. Sufficient data have been collected outside the compressor station fence line to assess potential offsite migration, and nature and extent of these analytes have been evaluated as part of the applicable Part B units in Table 3-37 and in the risk assessment. The need for controls or removal of contaminated soil will be evaluated in the CMS/FS.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 13 were collected at AOC13-30. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

Additional Considerations: Recommend that removal and disposal of surficial debris material on slope between lower and upper yard be carried forward to the CMS/FS.

4.2.11 AOC 15 – Auxiliary Jacket Cooling Water Pumps

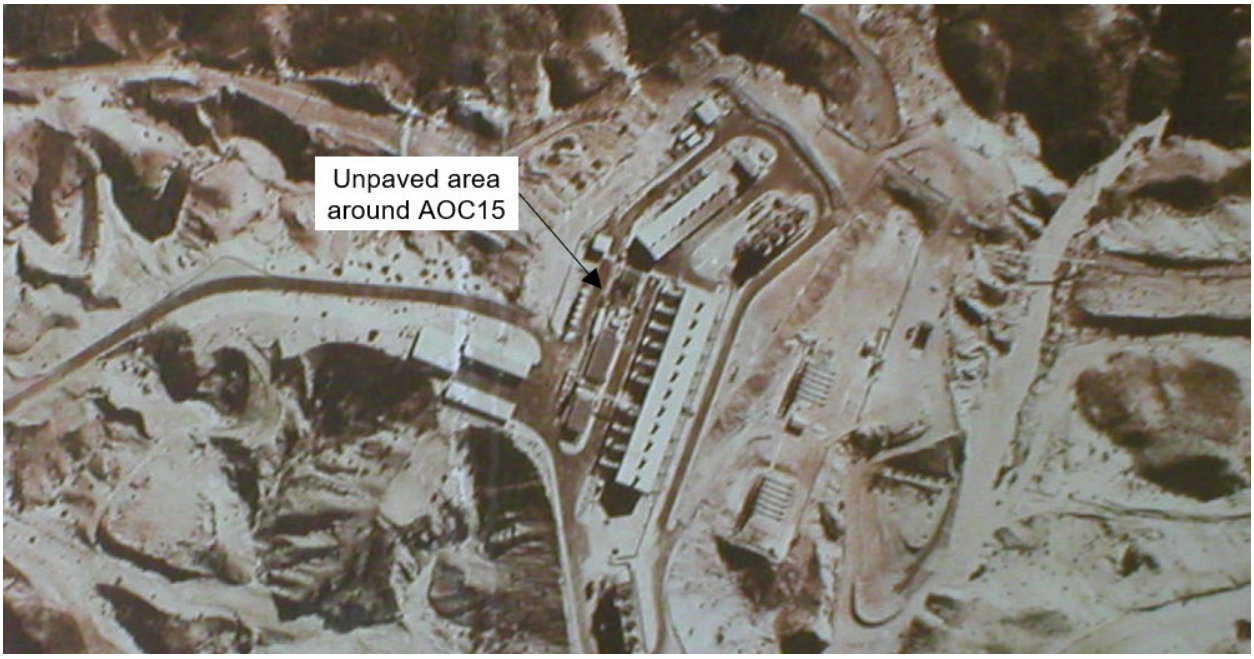
4.2.11.1 Setting

AOC 15 consists of the AJCW pumps located north of the Auxiliary Building, as shown on Figure 2-2. AOC 15 is part of the closed-loop cooling system for the generator engines. The pumps are used to circulate the cooling water through the system. Incidental leaks and spills from valve seals and pumps have occurred and resulted in impacts to the soil beneath the pumps.

4.2.11.2 Unit History

The AJCW system was subject to occasional leaks because of failure of pump and valve seals. Two employees indicated that in the past, leaks from the AJCW entered a pipe trench in the road near the AJCW system (Russell, 2006c). The trench led to a storm drain that discharged in the area of AOC 9. The ground surface in the immediate vicinity of the pumps was unpaved but covered with gravel; the area outside the containment berm is paved. There is currently no exposed soil in this area; however, the area immediately adjacent to the AJCW system was historically unpaved. Aerial photos from 1967 and earlier

indicate that the area was unpaved (Photograph 4-31). Intervening aerial photographs do not provide sufficient resolution to determine when the area was first paved.



Photograph 4-31: 1967 Aerial Photograph 1, compressor station area. Stereoscopic review of photograph shows unpaved area around AOC 15.

Chromium-based cooling water additives were used in this system from 1951 through 1985. In 1985, this system was converted to using nonhazardous, molybdate-based cooling water additives. Incidental leaks and spills have occurred and may have resulted in impacts to the soil beneath the pumps. Historical information indicates that concentrations of molybdenum as molybdate (MoO_4) typically ranged from 300 to 800 parts per million (ppm) (Betz 1987, 1989, 1990, 1991).

In August 2020, as part of a Compressor Station upgrade project, the entire AOC 15 area was excavated. The purpose of the project was to replace the AJCW cooler and appurtenances. Approximately 280 tons of excavated soil and concrete was removed and disposed of. Ten confirmation samples were collected from the bottom of the excavations, as shown on Photographs 4-32 and 4-33. Excavation activities resulted in the removal of soil represented by many of the RFI/RI soil samples: the surface interval (0 and 0 to 0.5 foot bgs) in all samples except AOC15-7, and the entirety of sample locations JP-8-3, AOC15-OS2, AOC15-2, JP-2-3, AOC15-6, and AOC15-3. The samples that represent soil that is no longer present are identified in the table as “Sample removed during excavation” in Tables 3-24a through 3-24f. The excavated area was backfilled with clean backfill and covered in concrete (Photograph 4-34).

Photograph 4-32: August 2020 photograph, excavation in progress at AOC 15. Looking north.

Photograph 4-33: August 2020 photograph, completed excavation area at AOC 15. Looking north.

Photograph 4-34: May 2021 photograph, paved area at AOC 15 after 2020 excavation. Looking east.

4.2.11.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 15 are presented in Tables 3-24a through 3-24g, and sampling locations and results are shown on Figures 3-15a through 3-15g. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.11.4. Only samples that remained in place after the 2020 excavation are included in the analytical results discussion.

Metals: Soil samples were collected from 16 locations at depths from 0.5 to 15 feet bgs. The CSLs were exceeded for hexavalent chromium and lead at one or more locations across AOC15, as shown in Table 3-24a. Background concentrations were exceeded for hexavalent chromium , total chromium, copper, lead, molybdenum, and zinc, as shown in Table 3-24a.

- Hexavalent chromium was detected above its CSL (6.3 mg/kg) in five samples between depths 0.5 to 3 feet bgs (Table 3-24a) and its background value (0.83 mg/kg) at 21 samples between depths 0.5 to 15 feet bgs. The highest hexavalent chromium concentration of 65 mg/kg was detected at sample location AOC15-OS8 at 0.5 to 1 foot bgs. A sample from location AOC15-OS8 was collected at the bottom of the 2020 excavated area within the footprint of the former jacket coolers (Figure 3-15b).
- Total chromium was detected above its background value (39.8 mg/kg) in nine samples between depths 0.5 to 3 feet bgs (Table 3-24a). The highest total chromium concentration of 480 mg/kg was detected at sample location AOC15-OS1 at 2 to 3 feet bgs. A sample from location AOC15-OS1 was collected in a gravel area, near the northern boundary of the unit (Figure 3-15c).
- Copper was detected above its background value (16.8 mg/kg) in five samples between depths 0.5 to 3 feet bgs (Table 3-24a). The highest copper concentration of 110 mg/kg was detected at sample location AOC15-OS8 at 0.5 to 1 foot bgs. A sample from location AOC15-OS8 was collected at the bottom of the 2020 excavated area within the footprint of the former jacket coolers (Figure 3-15d).

- Lead was detected above its background value (8.39 mg/kg) in 11 samples between depths 0 to 5 feet bgs and above its CSL (320 mg/kg) in 1 sample collected at 0.5 to 1 foot bgs (Table 3-24a). The highest lead concentration of 580 mg/kg was detected at sample location AOC15-OS8 at 0.5 to 1 foot bgs. A sample from location AOC15-OS8 was collected at the bottom of the 2020 excavated area within the footprint of the former jacket coolers (Figure 3-15e).
- Molybdenum was detected above its background value (1.37 mg/kg) in 20 samples between depths 0 to 15 feet bgs (Table 3-24a). The highest molybdenum concentration of 450 mg/kg was detected at sample location AOC15-OS1 at 2 to 3 feet bgs. A sample from location AOC15-OS1 was collected in a gravel area, near the northern boundary of the unit (Figure 3-15f).
- Zinc was detected above its background value (58 mg/kg) in one sample at 0.5 to 1 foot bgs (Table 3-24a). The highest zinc concentration of 160 mg/kg was detected at sample location AOC15-OS8 at 0.5 to 1 foot bgs. A sample from location AOC15-OS8 was collected at the bottom of the 2020 excavated area within the footprint of the former jacket coolers (Figure 3-15g).

The lateral extent of the exceedances has not been defined by samples with results below the background levels or not detected above reporting limits for hexavalent chromium, total chromium, lead, or molybdenum. The area around AOC 15 is bounded by buildings to the north and east, concrete and the Auxiliary Building to the south, and pavement to the west. Therefore, assessing the lateral extent is not considered a data gap requiring further investigation at this time.

The vertical extent of the exceedances has generally not been defined by samples with results below the background levels or not detected above reporting limits. However, for most locations and metals, the concentrations decrease with depth and do not represent a data gap requiring further investigation.

Digging or drilling deeper samples in these areas is not feasible because of underground utilities. Additionally, the area was recently excavated, backfilled, and covered in concrete. As such, no additional sampling is planned at AOC 15 to address the data gaps discussed in this section. Additionally, locations where the deepest samples exceeded background by 2 times or less were not considered a data gap requiring further investigation.

CLP Inorganics: Samples were collected at two locations, and no samples had detected results that exceeded their respective background levels (Table 3-24b).

PAHs: Samples were collected at two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-24c).

TPH: TPH was not a COPC for this unit; therefore, samples were not analyzed for TPH.

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected at 11 locations, and there are no applicable screening levels for the reported parameters (Table 3-24d).

Pesticides: Samples were collected at one location, and there were no detections of pesticides (Table 3-24e).

PCBs: Samples were collected at two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-24f).

Dioxins and Furans: Dioxins and furans were not a COPC for this unit; therefore, samples were not analyzed for dioxins and furans.

4.2.11.4 AOC 15 Conceptual Site Model

A graphical CSM has been developed for AOC 15 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-16. Exhibit 4-24 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 15. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is summarized in this section with updated information.

The primary sources of contamination at AOC 15 are likely to be historical liquid discharges (leaks) from the AJCW pumps and valves. The quantity of liquid released from the pumps and associated valves is unknown; however, periodic leaks are known to have occurred. If a large release from the pumps or valves occurred, it could have resulted in AJCW reaching the storm drain system. Releases via the storm drain system are addressed by the storm drain investigation program described in Section 4.3. In addition, any liquids released to surface soil immediately adjacent to the unit could have affected surface soil and migrated to shallow soil.

The presence of hexavalent chromium, total chromium, and molybdenum at AOC 15 is likely related to releases of cooling water. The presence of wear metals (copper, lead, and zinc) is likely related to runoff from the surrounding compressor station roads and facilities.

The primary source medium at AOC 15 is surface soil. Because the entire AOC is covered with concrete, there is no direct contact or surface migration pathway for this AOC.

4.2.11.5 Evaluation of Data Against Data Quality Objectives for AOC 15

Decision 1 (Nature and Extent Determination): Nature and extent have not been sufficiently defined laterally for hexavalent chromium, total chromium, copper, lead, molybdenum, or zinc. Nature and extent have been sufficiently defined vertically for molybdenum (AOC15-1).

Analytical results are presented in Tables 3-24a through 3-24f and on Figures 3-15a through 3-15g. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-24g.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 44 samples were collected from 20 locations at depths ranging from 0 to 15 feet bgs for AOC 15. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, general chemistry parameters, pesticides, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Exhibit 4-24. Conceptual Site Model – AOC 15
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills and releases around AJCW pumps **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration • Potential entrainment in historical stormwater and surface water runoff (Area now completely covered in concrete)	• Subsurface soil	• Wind erosion and atmospheric dispersion of historical surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker
Runoff from the surrounding compressor station roads and facilities **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration • Potential entrainment in historical stormwater and surface water runoff (Area now completely covered in concrete)	• Subsurface soil	• Wind erosion and atmospheric dispersion of historical surface soil • Potential volatilization and atmospheric dispersion	

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 15 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway, as areas within this unit are paved. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 15 were collected at AOC15-3. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.12 AOC 16 – Former Sandblast Shelter

4.2.12.1 Setting

AOC 16, the Former Sandblast Shelter, is located in the lower yard west of the TCS, as shown on Figure 2-2. 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.

4.2.12.2 Unit History

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. At that time, regulatory requirements for sandblasting changed. PG&E ceased using the sandblast shelter for sandblasting and hired contractors to do sandblasting of smaller items. Sandblasting work is now primarily conducted offsite. For any work done onsite, contractors are required to implement best management practices to contain sandblast material. No changes to plant operations are required to minimize future risks associated with current sandblasting activities at AOC 16.

4.2.12.3 Field Observations

During site walks with DTSC, two different colors of apparent abrasive material were noted on the ground in the immediate vicinity of the sandblast shelter. Sandblasting operators bring abrasive materials onsite and are specified to meet standards associated with the air permit for sandblasting activities. Two types of sandblast material typically have been used at AOC 16 in the past several years: KleenBlast and Monterey 30 Mesh sand. KleenBlast comprises mostly iron oxide, silicon dioxide, silica, alumina, calcium, and 5.9 percent of other trace metals and oxides. Monterey sand is primarily (99 percent) silica sand. Historically, lead-based paint or paint containing higher levels of other heavy metals may have been used at the facility and may be present in sandblast residue. Dark material mixed with sand, which was identified on the western side of the sandblast shelter as possible abrasive material (sandblast grit), may also be coke breeze (granular carbon material used to fill the cathodic protection anodes at the station).

4.2.12.4 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 16 are presented in Tables 3-25a through 3-25f, and sampling locations and results are shown on Figures 3-10a through 3-10h. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.12.5.

Metals: Soil samples were collected from up to seven locations between 0 and 3 feet bgs. No samples exceeded the CSLs within AOC 16. The background concentrations were exceeded for arsenic, cadmium, cobalt, copper, lead, molybdenum, and zinc at AOC16-2, -3, -5, AOC16-grit, and AOC2A, as shown in Table 3-25a. The CSL for arsenic is below background; therefore, arsenic results are only

screened against the background value. The analytes most frequently detected over the background levels were copper, molybdenum, and zinc.

- Copper was detected above its background value (16.8 mg/kg) in five samples between depths 0 to 3 feet bgs (Table 3-25a). The highest copper concentration of 1,500 mg/kg was detected at sample location AOC16-grit at 0 to 0.5 foot bgs. A sample from location AOC16-grit was collected from sandblast grit material to the west of the sandblast shelter.
- Molybdenum was detected above its background value (1.37 mg/kg) in three samples between depths 0 to 0.5 foot bgs (Table 3-25a). The highest molybdenum concentration of 79 mg/kg was detected at sample location AOC16-grit at 0 to 0.5 foot bgs. A sample from location AOC16-grit was collected from sandblast grit material to the west of the sandblast shelter.
- Zinc was detected above its background value (58 mg/kg) in three samples between depths 0 to 0.5 foot bgs (Table 3-25a). The highest zinc concentration of 377 mg/kg was detected at sample location AOC 2A at 0.4 foot bgs. A sample from location AOC 2A was collected southwest of the sandblast shelter (Figure 3-10f).

The lateral and vertical extents of the exceedances have been defined by samples with results not detected above reporting limits or less than respective CSL and background values. The deepest samples at AOC16-1 and AOC16-2 had results that slightly exceeded the background value for copper, with a factor of exceedance of 1.25 times the background value for both samples. These minor exceedances are not considered a data gap requiring further investigation.

CLP Inorganics: Samples were collected from one location, and no samples had detected results that exceeded their respective background levels (Table 3-25b).

PAHs: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-25c).

TPH: TPH was not a COPC for this unit; therefore, samples were not analyzed for TPH.

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected from two locations and only sampled for pH, which has no background levels or CSLs (Table 3-25d).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-25e).

Dioxins and Furans: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-25f).

4.2.12.5 AOC 16 Conceptual Site Model

AOC 16 is included on the graphical CSM for AOC 1 and SWMU 1 (Figures 4-1b and 4-1c). Exhibit 4-25 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 16. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is discussed in this section with updated information.

Exhibit 4-25. Conceptual Site Model – AOC 16
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental releases from Sand Blasting Area **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration • Potential entrainment in stormwater and surface water runoff	• Subsurface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals

The primary sources of metals contamination at AOC 16 are likely to be used sandblast grit and incidental spills of sandblasting materials. A potential secondary source of contamination is lead-based paint used at the shelter or on sandblasted materials. However, lead was only detected above background values in one sample (AOC16-grit). The quantity of used sandblast grit released in the area is unknown; however, as noted above, sandblast grit was observed on the ground in the vicinity of the structure.

The primary source medium at AOC 16 is surface soil. The area around the structure is unpaved; therefore, contaminated sandblast grit spilled from the shelter would have been released to surface soil. Contaminants could have leached from surface soils into underlying soils. Contaminated sandblast grit could also have been carried off the station in sheet flow during high rainfall events. Surface runoff may have transported contaminants from AOC 16 to Bat Cave Wash. Windblown dust contamination from small particles of sandblast grit or contaminated surface soil around AOC 16 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils.

4.2.12.6 Evaluation of Data Against Data Quality Objectives for AOC 16

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-25a through 3-25g. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-25h.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 10 samples were collected from 7 locations at depths ranging from 0 to 3 feet bgs for AOC 16. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, general chemistry parameters, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan and subsequent data gap investigations. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 16 may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Surface soils samples were collected in unpaved areas associated with AOC 16 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, PAHs, VOCs, SVOCs, general chemistry parameters, PCBs, and dioxins and furans. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the following analytes and equivalency factors:

- Several metals were detected at concentrations exceeding ISLs (arsenic, cadmium, cobalt, copper, lead, mercury, molybdenum, and zinc). The highest factor of exceedance was for copper, which was detected at a concentration exceeding the ISL (BK) of 16.8 mg/kg at three of seven locations with a maximum concentration of 1,500 mg/kg at AOC16-grit.

A summary of the highest exceedances is provided in Table 3-38j, which presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms,

including surface water flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion, constituents exceeding ISLs within AOC 16 have the potential to migrate outside the fence line. Sufficient data have been collected outside the compressor station fence line to assess potential offsite migration, and nature and extent of these analytes have been evaluated as part of the applicable Part B units in Table 3-37 and in the risk assessment. The need for controls or removal of contaminated soil will be evaluated in the CMS/FS.

Decision 5 (Data Sufficiency to Support CMS/FS): During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 16 were collected at AOC16-3. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.13 AOC 17 – Onsite Septic System

4.2.13.1 Setting

AOC 17 is the former onsite septic system that was connected to the Auxiliary Building and served the Auxiliary Building, Technical Maintenance Building, Weld Shop, Garage, and Maintenance Shop. The septic system consisted of a septic tank and associated leachfield. The leachfield consisted of four leach lines, spaced 6 feet apart, and 100 feet long.

The compressor station laboratory located in the Auxiliary Building also discharged into the septic system until 2008. The Auxiliary Building includes the electric generators (P-Units), air compressors, electric switchgear, battery room, laboratory, mechanics' office, machine shop, locker room, and crew lunchroom. Incidental releases of maintenance-type chemicals could therefore also have entered the septic system.

In August 2018, the septic system was replaced. The existing septic tank was decommissioned in place by filling the tank with grout after being pumped dry. The former leach lines remain in place. A new septic tank and seepage pit was installed to the west of the existing leach field. The former Air Dryer Building was demolished, and a new Air Compressor Building was built partially on top of the former septic tank. Drawings of the former and current systems are shown on Figures 4-17b and 4-17c, respectively.

AOC 33, the potential former burn area, is located mostly within the boundaries of AOC 17. AOC 33 is discussed in detail in Section 4.2.24 but is included in the CSM discussion with AOC 17 in Section 4.2.13.5.

4.2.13.2 Unit History

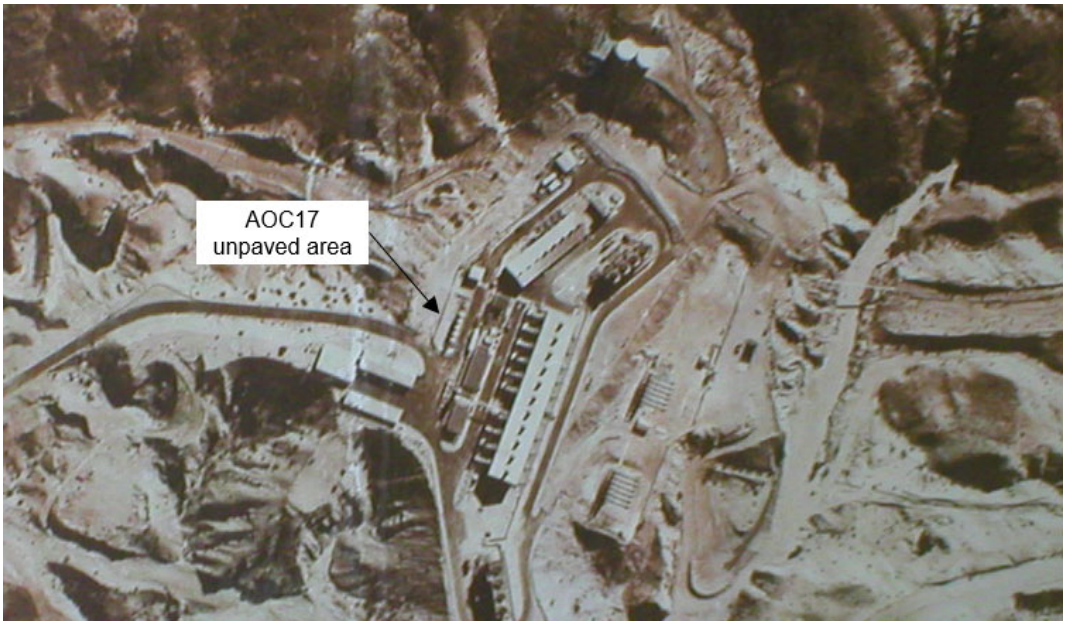
The septic system is believed to have been installed when the facility was first constructed, at the same time as the Auxiliary Building, because locker room facilities were part of the original design for the Auxiliary Building. Other nearby buildings were installed later; the Weld Shop and Garage in 1973 and the Technical Maintenance Building in the early 1990s.

One of the sources of wastewater received by this septic system is the facility laboratory located in the Auxiliary Building. The plant cooling water was routinely sampled to monitor its chemical content and pH. Test chemicals consisted of indicator reagents, which were supplied by the cooling water treatment chemical company. Once the cooling water was tested, the laboratory waste (testing solutions and small amounts of cooling water) was discharged into the septic system. Approximately 1 pint per day of testing solutions and cooling water was disposed of into the septic system connected to the facility laboratory. This practice ended in 2008.

A plaque mounted on the wall of the Air Dryer Building indicates that the southwestern corner of the septic tank is located 4 feet northeast of the Air Dryer Building and is buried 4 feet deep (Russell, 2006c). Drawing 481785 (Revision 22), located during a review of engineering drawings, shows the approximate location of the septic system (PG&E, 1967). The previous locations of the septic tank and leach lines were based on a hand-sketched drawing and were slightly east of the position shown on the engineering

drawing. The location of the leach lines and the boundary of AOC 17 have been adjusted to reflect the engineering drawing information.

Aerial photos from 1967 and earlier indicate that the area around the septic tank and leachfield was unpaved (Photograph 4-35). A review of an aerial photograph from 1983 indicates a portion of the AOC 17 area may have been paved at that time (Photograph 4-36). A 1994 aerial photograph shows AOC 17 as paved (Photograph 4-37).



Photograph 4-35: 1967 Aerial Photograph 1. View of the compressor station showing AOC 17 as unpaved.

Photograph 4-36 (left): 1983 Aerial photograph of compressor station showing potentially paved areas in the vicinity of AOC 17.

Photograph 4-37 (right): 1994 Aerial photograph of compressor station showing paved area in the vicinity of AOC 17.

4.2.13.3 Geophysical Survey and Field Notes

A geophysical survey was conducted at AOC 17 to confirm the location of a septic tank and associated leach lines. The survey was conducted using ground-penetrating radar and metal detection. The proximity of metal structures precluded the use of total field magnetics analysis and terrain conductivity during this survey. Results are presented on Figure 4-17d and in Attachment B6. The septic tank and leach field location was identified during the geophysical survey. During sample collection near the leach line using vacuum excavation, the location of the leach line was visually confirmed at a depth of about 4 feet (Photograph 4-38). Soil boring logs for AOC 17 did not indicate the presence of any burn material (Attachment B1).

Photograph 4-38: December 2015 photograph, leach lines located approximately 4 feet bgs.

4.2.13.4 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 17are presented in Tables 3-26a through 3-26h, and sampling locations and results are shown on Figures 3-14a through 3-14o. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.13.4.

Metals: Soil samples were collected from five locations at depths from 0 to 10 feet bgs. No samples exceeded the CSLs within AOC 17. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. The background concentrations were exceeded for cadmium, lead, and zinc, as shown in Table 3-26a.

- Cadmium was detected above its background value (1.1 mg/kg) in two samples between 5 to 6 feet bgs (Table 3-26a). The highest concentration of 2.3 mg/kg was detected at sample location AOC17-4 at 5 to 6 feet bgs. A sample from location AOC17-4 was collected in the northern portion of the septic leach field (Figure 3-14c).
- Lead was detected above its background value (8.39 mg/kg) in three samples between depths 0 to 1 foot bgs (Table 3-26a). The highest lead concentration of 24 mg/kg was detected at sample location

AOC17-5 at 0 to 1 foot bgs. A sample from location AOC17-5 was collected near the northern portion of the septic tank (Figure 3-14h).

- Zinc was detected above its background value (58 mg/kg) at one location (AOC17-3) between depths 5 to 6 feet bgs (Table 3-26a) at a concentrations of 71 mg/kg. A sample from location AOC17-3 was collected in the central portion of the septic leach field (3-14m).

The lateral and vertical extents of the exceedances have been defined by samples with results below background concentrations or not detected above reporting limits.

CLP Inorganics: Samples were collected from one location, and no samples had detected results that exceeded their respective background levels (Table 3-26b).

PAHs: Samples were collected from five locations at depths ranging from 0 to 10 feet bgs. PAHs were evaluated by calculating B(a)P equivalents for human health. No samples exceeded the B(a)P equivalents CSL, as shown in Table 3-26c.

TPH: Samples were collected from five locations, and no samples had detected results that exceeded their respective CSLs (Table 3-26e).

VOCs and SVOCs: Samples were collected from five locations, and no samples had detected results that exceeded their respective CSLs (Table 3-26d).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected from five locations, and no samples had detected results that exceeded their respective CSLs (Table 3-26f).

Dioxins and Furans: Samples were collected from two locations at depths ranging from 0 to 3 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. No samples had detected results that exceeded the CSL (Table 3-26g).

4.2.13.5 AOC 17 Conceptual Site Model

A graphical CSM has been developed for AOC 17 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-17a. Exhibit 4-26 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 17. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is summarized in this section with updated information.

The primary sources of contamination at AOC 17 are likely to be historical liquid discharges from the laboratory. The quantity of liquid released to the septic system is unknown. Weekly testing of plant cooling water would have resulted in the disposal of approximately 6.5 gallons of liquid per year, whereas daily testing would have resulted in the disposal of approximately 45.5 gallons of liquid per year (assuming approximately 1 pint of liquid waste per test event). In addition to the laboratory waste, the septic system received sanitary waste from the Auxiliary Building as well as the other buildings listed above.

The primary source of contamination at AOC 33 is likely to have been diesel fuel that may have spilled from a modified drum that was used in potential fire training exercises and potential release of burn material.

Exhibit 4-26. Conceptual Site Model – AOC 17
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental releases from septic system **COCs Include:** • Metals	• Subsurface soil	• Percolation • Infiltration	• Subsurface soil	• None	**Human:** • Maintenance Worker • Commercial Worker
Potential burning during fire training activities **COCs Include:** • TPH	• Surface soil	• Percolation • Infiltration • Surface water runoff	• Subsurface soil	• Wind erosion and atmospheric dispersion	

The presence of lead above the background concentration in shallow (0- to 1-foot-bgs) samples may be from runoff from nearby roads and buildings. The presence of cadmium and zinc above background concentrations in 5 to 6 feet bgs may indicate these compounds were released through the septic system, which likely discharged below 4 feet bgs.

The presence of TPH-d and TPH-mo may be from potential fire training exercises at AOC 33 or runoff from the surrounding roads and buildings. Dioxins and furans, as TEQ human, were not detected above the background concentration, indicating burned materials did not contribute to contamination in this area.

The primary source medium at AOC 17 is subsurface soil. The depth of the leach lines is approximately 4 feet bgs. The continuous release of liquids in AOC 17 would have possibly caused wastes to infiltrate to deeper soils. Because the liquids were discharged below the ground surface and the entire area is currently paved, there are no surface migration pathways for this AOC.

The primary source medium at AOC 33 is surface soil and may also have included pavement if fire-training activities occurred after the area was paved. The primary release mechanisms are direct releases of contaminated particulates or leaching of contaminants from potential fire-training exercises in this area. Contaminants present in burned materials could have been deposited on surface soil as particulates or entered surface soil as dissolved constituents through infiltration of rainfall. However, analytical results (i.e., dioxins and furans) and soil boring logs for AOC 17 (Attachment B1) do not support the presence of burned materials in this area.

Contaminants could have leached from surface soils and shallow soil into underlying deeper soils. Potential migration from subsurface soil to groundwater was identified as a potential secondary pathway. Windblown dust contamination from contaminated surface soil within AOC 33 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils. Surface runoff from AOC 33 to the East Ravine could also have transported COPCs and COPECs in surface soil.

4.2.13.6 Evaluation of Data Against Data Quality Objectives for AOC 17

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-26a through 3-26g. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-26h.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 19 samples were collected from 5 locations at depths ranging from 0 to 10 feet bgs for AOC 17. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 17 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway, as areas within this unit are paved or otherwise covered with an impermeable surface. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS and IMs): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 17 were collected at AOC17-3. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.14 AOC 18 – Combined Wastewater Transference Pipelines

4.2.14.1 Setting

AOC 18 consists of the hazardous waste transference pipelines associated with the former hazardous waste treatment system, including the pipelines conveying the cooling tower blowdown to the lower yard, as shown on Figure 2-2. These pipelines were used only to convey wastewater. Pipelines for stormwater and septic waste are separate systems. There is limited information regarding these pipelines, and no as-built drawings have been located.

4.2.14.2 Unit History

AOC 18 includes pipelines that were used to connect the cooling towers to the wastewater system: SWMUs 1 (Former Percolation Bed), 2 (Inactive Injection Well PGE-08), 5 (Sludge Drying Beds), 6 (Chromate Reduction Tank), 7 (Precipitation Tank), 8 (Process Pump Tank), 9 (Transfer Sump), and 10 (Old Evaporation Ponds); and Units 4.3 (Oil/Water Holding Tank), 4.4 (Oil/Water Separator), and 4.5 (Portable Waste Oil Storage Tank), as shown on Figure 4-18. Details of the former waster transference pipelines (for example, connection, material, and associated samples) are provided by pipeline segment in Table 4-1.

Wastewater pipelines at the site were made of polyethylene, PVC, aluminum, cast iron, and vitrified clay (Mittelhauser, 1986). The hazardous waste management system and the related piping were closed in the late 1980s. Most of the piping was pressure-tested for leaks as part of the closure process, as described in the Phase 1 and 2 Closure Certification Report Hazardous Waste Management Facilities (Mittelhauser, 1990b). Inaccessible and vitrified clay piping was not tested. All accessible pipes were visually inspected for leaks. Most of the wastewater pipelines passed within the limits of the test. Only one pipeline failed and was removed, along with most of the other inactive pipelines.

During removal of some pipes, there was visible staining below some sections of pipe. The interior of most of the pipelines had a visible green sludge, and they were disposed of as hazardous waste. Several sections of pipeline were not removed because they were inaccessible, sufficiently decontaminated, still active, or were long and difficult to remove.

Visually contaminated soil was removed, confirmation sampling was conducted, and supplemental soil excavation was conducted where needed. The pipes that were removed as part of the closure operations are not part of the RFI process.

The original OWS (Unit 4.4), which was connected to the AOC 18 piping, was closed around 1990 (Mittelhauser, 1990a). Characterization of leaks near the pipelines associated with Unit 4.4 was conducted. Piping was removed where accessible, but some sections of the pipe were capped and left in place.

4.2.14.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 18 are presented in Tables 3-27a through 3-27h, and sampling locations and results are shown on Figures 3-10a through 3-10h. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.14.4.

Metals: Soil samples were collected from 30 locations at depths ranging from 0 to 6 feet bgs. No samples exceeded the CSLs within AOC 18. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. The background concentrations were exceeded for beryllium, hexavalent and total chromium, lead, molybdenum, nickel, and zinc at locations across AOC 18, as shown in Table 3-27a. The analyte most frequently detected over the background levels was lead.

- Lead was detected above its background value (8.39 mg/kg) in 15 samples between depths 0 to 6 feet bgs (Table 3-27a). The highest lead concentration of 38 mg/kg was detected at sample location PH2. A sample from location PH2 was collected along a former combined wastewater conveyance line south of the SWMU 5 – Former Drying Beds (Figure 3-10e). PH2 was a confirmation sample collected along former wastewater transfer pipeline segment H after the removal of visibility contaminated soil during the closure process in 1988. PH2 was collected below a gate valve at an unknown depth, as described in Table 4-1.
- Zinc was detected above its background value (58 mg/kg) in six samples between depths of 1 and 5 feet bgs. The highest zinc concentration of 210 mg/kg was detected at sample location PH2. A sample from location PH2 was collected along a former combined wastewater conveyance line south of the SWMU 5 – Former Drying Beds (Figure 3-10f). PH2 was a confirmation sample collected along former wastewater transfer pipeline segment H after the removal of visibility contaminated soil during the closure process in 1988. PH2 was collected below a gate valve at an unknown depth, as described in Table 4-1.

The lateral and vertical extents of the exceedances have been defined by samples with results below background levels or not detected above reporting limits.

CLP Inorganics: Samples were collected at two locations, and no samples had detected results that exceeded their respective background levels (Table 3-27b).

PAHs: Samples were collected at 12 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-27c).

TPH: Samples were collected at 12 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-27d).

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected at 30 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-27e).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected at 12 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-27f).

Dioxins and Furans: Samples were collected at five locations at depths ranging from 0 to 0.5 foot bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. No samples had detected results that exceeded their respective CSL (Table 3-27g).

4.2.14.4 AOC 18 Conceptual Site Model

A CSM has been developed for AOC 18 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a). Exhibit 4-27 present primary sources, primary source median, potential release mechanisms, secondary source median, and potential secondary release mechanisms for AOC 18.

The primary source of contamination at AOC 18 is likely to be historical leaks from the wastewater pipelines. The presence of lead and zinc above background may be from lead-based paint and galvanized pipes.

The primary source medium at AOC 18 is subsurface soil, as releases from the pipeline would have occurred below ground surface. The surface above the pipelines is unpaved. Liquids released to surface soil, such as runoff from nearby buildings and roads or historical incidental spills, would have infiltrated to shallow soil. Liquids released to shallow soils could have infiltrated to deeper soils.

4.2.14.5 Evaluation of Data Against Data Quality Objectives for AOC 18

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-27a through 3-27g and on Figures 3-10a through 3-10h. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-27h.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 51 samples were collected from 30 locations at depths ranging from 0 to 6 feet bgs for AOC 18. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, TPH, general chemistry parameters, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 18 may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Surface soils samples were collected in unpaved areas associated with AOC 18 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, PAHs, VOCs, SVOCs, TPH, general chemistry parameters, PCBs, and dioxins and furans. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the following analytes and equivalency factors:

- Two metals (lead and mercury) exceeded ISLs. Lead was detected at a concentration exceeding the ISL (BK) of 8.39 mg/kg at two of eight locations with a maximum concentration of 17 mg/kg at AOC18-11. Mercury was detected at a concentration exceeding the ISL (ECV) of 0.0125 mg/kg at three of eight locations with a maximum concentration of 0.24 mg/kg at AOC 18-9.

Exhibit 4-27. Conceptual Site Model – AOC 18
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental releases from pipeline **COCs Include:** • Metals	• Subsurface soil	• Percolation • Infiltration	• Subsurface soil	• None	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals
Incidental spills of lubricants and pipeline liquids, and cooling and wastewater **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration • Potential entrainment in stormwater and surface water runoff	• Subsurface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	

- B(a)P equivalent exceeded the ISL (RRSL) of 110 µg/kg at four of eight locations with a maximum concentration of 570 µg/kg at AOC18-9.
- TEQ avian exceeded the ISL (ECV) of 16 ng/kg at two of four locations with a maximum concentration of 71 ng/kg at AOC18-1.
- TEQ human exceeded the ISL (DTSC-SL) of 50 ng/kg at one of four locations with a maximum concentration of 160 ng/kg at AOC18-1.
- TEQ mammals exceeded the ISL (BK) of 5.58 ng/kg at four of four locations with a maximum concentration of 160 ng/kg at AOC18-1.

A summary of the highest exceedances is provided in Table 3-38j, which presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms, including surface water flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion, constituents exceeding ISLs within AOC 18 have the potential to migrate outside the fence line. Sufficient data have been collected outside the compressor station fence line to assess potential offsite migration, and nature and extent of these analytes have been evaluated as part of the applicable Part B units in Table 3-37 and in the risk assessment. The need for controls or removal of contaminated soil will be evaluated in the CMS/FS.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples collected at SWMU 5 (a nearby unit) will be used to support characterization of AOC 18. Samples from SWMU 5 were collected at SWMU5-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.15 AOC 19 – Former Cooling Liquid Mixing and Hotwell Area

4.2.15.1 Setting

AOC 19 is the Former Cooling Liquid Mixing and Hotwell Area located directly east of the Compressor Building, as shown on Figure 2-2. AOC 19 was initially defined as the concrete pad area associated with the former cooling additive mixing shed; however, subsequent information regarding potential leaks from the JCW system (Russell, 2006b) led to the inclusion of the adjacent pumps and tank area in AOC 19. The pad from the former shed currently exists and is located adjacent to a smaller concrete pad that presently serves as a base for an exterior employee emergency safety shower. The JCW system cools the internal combustion compressor engines. The JCW system circulates water through the engine blocks and cylinder heads of each compressor unit. The heated water is then run through air-cooled heat exchanger units to dissipate the heat. The JCW system is a closed-loop system (that is, no water is added or lost from the system under normal operating conditions).

The JCW system originally was designed with a hot well (a large, rectangular, concrete structure, partially below grade) that acted as a surge tank for the JCW system. The water was pumped from the hot well into the heat exchangers. There was no overflow control system on the hot well, and employees stated that it periodically overflowed. Occasional leaks also occurred from the hot well, and from pump and valve seal failure. Cooling water would flow onto the graveled area near the pumps. Larger leaks could sometimes result in releases onto the paved area between the JCW system and the visitor parking lot and warehouse, and then potentially down the main entrance road leading to the station (Russell, 2006c).

Circa 1967, the hot well was abandoned in place and replaced with surge tanks (or JCW tanks), which still exist. In the early 1990s, a construction project began to provide secondary containment in the area. During construction, remnants of the old hot well were discovered and removed (CH2M, 2007a).

The hot well was approximately 10 feet deep, with about half that height above ground. The area covered by the hot well was about twice the area covered by the current concrete containment area for the JCW tanks.

The former cooling liquid mixing area consisted of a chemical additive shed, which no longer exists. Powdered coolant chemicals were mixed here, and then reportedly hand-added to the hot well (Russell, 2006c). The former cooling liquid mixing area now consists of a small concrete pad. The area around the concrete pad is unpaved.

4.2.15.2 Unit History

Cooling water additives for this system were chromium-based until October 1985; since 1985, the additive package has been molybdate-based. Historical records (Betz 1987, 1989, 1990, 1991) indicate that concentrations of molybdenum as molybdate typically ranged from 300 to 800 ppm.

A cleanup project was conducted in the 1990s to remove the hot well remnants. The remaining concrete and the soil contained in the hot well were removed, and the concrete debris and soil were sampled. The soil samples contained total chromium at 280 and 220 mg/kg, and hexavalent chromium at 4 and 3.6 mg/kg. The concrete sampled contained total chromium at concentrations ranging from 530 to 2,300 mg/kg, and hexavalent chromium at concentrations ranging from 37 to 330 mg/kg (CH2M, 2007a).

The two soil samples with the highest total chromium concentrations were analyzed for soluble total and hexavalent chromium with the California Waste Extraction Test (WET) and the toxicity characteristic leaching procedure (TCLP). All samples exceed the soluble threshold limit concentration (STLC) and TTLC criteria of 5 milligrams per liter (mg/L). The TCLP indicated soluble total chromium at 40 and 68 mg/L for STLC and TTLC, respectively. The WET indicated soluble total chromium at 78 and 110 mg/L for STLC and TTLC, respectively. The WET also indicated soluble hexavalent chromium concentrations were 64 and 80 mg/kg for STLC and TTLC, respectively. No soil samples were collected under the hot well (CH2M, 2007a).

The chemical mixing additive shed was located between the JCW pumps, and tanks and hot well. The concrete pad from the shed remains; it is adjacent to an eyewash station and emergency shower. Green droplets were noticed on the concrete pad during a routine test of a nearby eyewash fountain and safety shower in 2006. Elevated levels of chromium were found in the green water. The affected area was covered with Visqueen to minimize employee contact, and a wooden pad was installed over the pad to minimize human exposure and allow the safety shower to remain in operation.

4.2.15.3 Analytical Results

Analytical results for AOC 19 are presented in Tables 3-28a through 3-28h, and sampling locations and results are shown on Figures 3-16a through 3-16k. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.15.4. Due to belowground and overhead utilities in the area, sample locations were limited to accessible areas around the footprint of the former hot well.

Metals: Soil samples were collected from up to 25 locations at depths ranging from 0 to 10 feet bgs. The CSLs were exceeded for cadmium, hexavalent chromium, lead, and mercury at one or more locations across AOC 19. The CSL for arsenic is less than background; therefore, arsenic results are only screened against the background value. The background concentrations were also exceeded for cadmium, hexavalent chromium, total chromium, copper, lead, molybdenum, selenium, and zinc, as shown in Table 3-28a.

- Cadmium was detected above its CSL (7.3 mg/kg) in one sample collected at location AOC19-14 between 0 and 0.5 foot bgs (Table 3-28a) and its background value (1.1 mg/kg) in 10 samples

collected between depths 0 to 0.5 foot bgs. The highest cadmium concentration of 14 J mg/kg was detected at sample location AOC19-14 at 0 to 0.5 foot bgs. A sample from location AOC19-14 was collected in a gravel area, northeast of AOC 19 (Figure 3-16b).

- Hexavalent chromium was detected above its CSL (6.3 mg/kg) in 11 samples collected between depths 0 to 3 feet bgs (Table 3-28a) and its background value (0.83 mg/kg) at 26 locations between depths 0 to 10 feet bgs. The highest hexavalent chromium concentration of 31 mg/kg was detected at sample location AOC19-OS7 at 2 to 3 feet bgs. A sample from location AOC19-OS7 was collected within the footprint of the former hot well (Figure 3-16c).
- Total chromium was detected above its background value (39.8 mg/kg) in 17 samples collected between depths 0 to 3 feet bgs (Table 3-28a). The highest total chromium concentration of 4,300 mg/kg was detected at sample location SS#6 at 0 feet bgs. A sample from location SS#6 was collected near a stained concrete pad (Figure 3-16d).
- Copper was detected above its background value (16.8 mg/kg) in 15 samples collected between depths 0 to 3 feet bgs (Table 3-28a). The highest copper concentration of 170 mg/kg was detected at sample location AOC19-10 at 0 to 0.5 foot bgs. A sample from location AOC19-10 was collected in a gravel area south of the former hot well (Figure 3-16e).
- Lead was detected above its CSL (320 mg/kg) in 5 surface soil samples collected at 0 feet bgs and its background value (8.39 mg/kg) in 25 samples between depths 0 to 3 feet bgs (Table 3-28a). The highest lead concentration of 890 mg/kg was detected at sample location SS#3 at 0 feet bgs. A sample from location SS#3 was collected around a stained concrete pad (Figure 3-16f).
- Molybdenum was detected above its background value (1.37 mg/kg) in 33 samples between depths 0 to 10 feet bgs (Table 3-28a). The highest molybdenum concentration of 510 mg/kg was detected at sample location AOC19-11 at 0 to 1 foot bgs. A sample from location AOC19-11 was collected within the footprint of the former hot well (Figure 3-16g).
- Zinc was detected above its background value (58 mg/kg) in 16 samples collected between depths 0 to 3 feet bgs (Table 3-28a). The highest zinc concentration of 480 mg/kg was detected at sample location SS#3 at 0 feet bgs. A sample from location SS#3 was collected around a stained concrete pad (Figure 3-16h).

The lateral extent of the exceedances has not been defined by samples with results below background levels or not detected above reporting limits:

- For hexavalent chromium and total chromium to the south and west of AOC 19
- For lead to the north and west of AOC 19

The vertical extent of the exceedances has generally been defined by samples with results below background levels or not detected above reporting limits. However, there are several locations where the deepest samples exceeded ISLs. For several metals, this does not represent a data gap requiring further investigation because the concentrations in the deepest samples only slightly exceed (by 2 times or less) their respective ISLs, or the concentrations exceeding the ISLs are decreasing with depth.

The vertical extent of exceedances has not been defined at the following locations:

- For hexavalent chromium at AOC19-OS7
- For total chromium at AOC 19-7 and AOC19-OS7
- For lead at AOC19-5 and AOC19-7
- For mercury at AOC19-5
- For molybdenum at AOC19-7, AOC19-10, AOC19-11, AOC19-OS1, and AOC19-OS2

Opportunistic samples (identified with “OS” in the sample name) were collected during maintenance and construction activities, and deeper samples were not collected at the time of construction.

CLP Inorganics: Samples were collected from four locations, and no samples had detected results that exceeded their respective background levels (Table 3-28b).

PAHs: Samples were collected from 14 locations at depths ranging from 0 to 6 feet bgs, and no samples had detected results that exceeded their respective CSLs (Table 3-28c).

TPH: TPH was not a COPC for this unit; therefore, samples were not analyzed for TPH.

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected from 14 locations; there are no applicable CSLs (Table 3-28d).

Pesticides: Samples were collected from two locations, and no pesticides were detected in either sample (Table 3-28e).

PCBs: Samples were collected from 10 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-28f).

Dioxins and Furans: Samples were collected from 10 locations at depths ranging from 0 to 6 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. The CSL for TEQ human was exceeded at one location, as shown in Table 3-28g.

- TEQ human was detected above the CSL (220 ng/kg) in one sample collected at depths 0 to 0.5 foot bgs at a concentration of 630 ng/kg (Table 3-28g). A sample from location AOC19-10 was collected in a gravel area south of the former hot well (Figure 3-16k).

The lateral and vertical extents of exceedances have been defined by samples below CSLs.

4.2.15.4 AOC 19 Conceptual Site Model

A graphical CSM and cross section have been developed for AOC 19 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-19a through 4-19c. Scaled engineering drawings of the hot well system are shown on Figures 4-19d and 4-19e. Exhibit 4-28 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 19. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is summarized in this section with updated information.

The primary sources of contamination at AOC 19 are likely to be historical liquid discharges (spills) from the former JCW hot well and leaks from the JCW pumps. In addition, incidental spills during the mixing of the chemicals, and potentially during the manual addition of the chemicals, could have impacted the soil in this area.

The presence of hexavalent chromium, total chromium, and molybdenum in soil at AOC 19 is consistent with the release of JCW. The presence cadmium, copper, lead, and zinc is likely related to wear metals associated with the compressor engines, as well as galvanized materials.

Exhibit 4-28. Conceptual Site Model – AOC 19
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Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills or /releases from former Cooling Liquid Mixing Area **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration • Potential entrainment in stormwater and surface water runoff	• Subsurface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker

The quantity of liquid released from the hot well and pumps is unknown; however, periodic overflows and leaks are known to have occurred. It is also possible that cooling water could have been released directly to subsurface soil through small cracks in the concrete hot well. The potential quantity of chemicals released in the vicinity of the former cooling additive mixing shed is also unknown; however, releases are expected to be relatively small, as spills would have been small. If a large release from the hot well occurred, it could have resulted in cooling water infiltrating into gravel surfaces around the hot well as well as reaching the storm drain system or station access road and being discharged outside the fence line. Releases via the storm drain system are addressed by the storm drain investigation program described in Section 4.3

The primary source medium at AOC 19 is surface soil. Because most of the area around the former hot well, and former cooling liquid mixing area and chemical additive mixing shed is covered with gravel, liquids released in AOC 19 would have been released to surface soil and would have infiltrated to shallow soil. Liquids released to shallow soils could have infiltrated to deeper soils and possibly to groundwater. If the concrete of the former hot well lacked sufficient integrity, subsurface soil may be a secondary source medium. Because the entire AOC is covered with gravel or pavement, runoff of contaminated surface soil in rainwater is considered to be only a minor migration pathway (where gravel cover is thin); however, soluble constituents located in surface soils may dissolve into rain water and be carried in surface water runoff.

4.2.15.5 Evaluation of Data Against Data Quality Objectives for AOC 19

Decision 1 (Nature and Extent Determination): Nature and extent have not been sufficiently defined laterally or vertically for the following compounds:

- Lateral extent of hexavalent chromium, total chromium, and lead
- Vertical extent of hexavalent chromium (AOC19-OS7), total chromium (AOC 19-7 and AOC19-OS7), lead (AOC19-5 and AOC19-7), mercury (AOC19-5), and molybdenum (AOC19-7, AOC19-10, AOC19-11, AOC19-OS1, and AOC19-OS2)

Analytical results are presented in Tables 3-28a through 3-28g and on Figures 3-16a through 3-16k. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-28h.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 54 samples were collected from 25 locations at depths ranging from 0 to 10 feet bgs for AOC19. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, general chemistry parameters, pesticides, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan and subsequent data gap investigations. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 19 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway; as areas within this unit are covered with gravel, paved, or otherwise covered with an impermeable surface preventing migration of surface soil. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 19 were collected at AOC19-7. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.16 AOC 20 – Industrial Floor Drains

4.2.16.1 Setting

AOC 20 consists of the industrial floor drains within the compressor station buildings and other industrial structures and facilities within the upper yard that are routed to the oily water treatment system (formerly Units 4.3, 4.4, and 4.5). AOC 20 does not include the miscellaneous floor drains in the area, such as lavatories, that drain to one of the three septic systems on the station.

Several of the industrial buildings within the compressor station are equipped with floor drains that capture liquids released to the floor of the building and convey the liquid to the current oily water treatment system; previously, these drains conveyed flow to the former American Petroleum Institute (API) OWS (part of AOC 24, Section 4.2.20) and the old oily water treatment system (Units 4.3, 4.4, and 4.5). In addition, other industrial facilities, such as the steam cleaning area and the main JCW surge tanks, are equipped with drains that capture overflow and spills. A pipe trench that extends from just north of the steam cleaning area to the eastern side of the Compressor Building also drains to the oily water treatment system and has been included in this AOC.

Collectively, these drains are referred to as industrial floor drains to distinguish their use and intent from the storm drains that are also present at the facility. As shown on Figure 3-20, industrial floor drains are found in the following buildings and facilities: Compressor Building, Auxiliary Building, JCW Pumps, Oil Storage Tank Area, Steam Rack (steam cleaning area), and Fire Water Pump Building (Former Water Softener Building).

4.2.16.2 Unit History

Historically, the pipes associate with AOC 20 were made primarily from vitrified clay. Currently, the system contains a variety of pipe materials, including reinforced fiberglass, PVC, cast iron, and acrylonitrile-butadiene-styrene. The aboveground lines are all welded carbon steel pipe (PG&E, 1991).

No sampling of material from within the industrial floor drain pipes has been conducted. Many of the pipes leading from the industrial floor drains to the oily water treatment system are located under building floors and machinery, or are buried below ground and largely inaccessible.

The liquids potentially discharged to the industrial floor drains would consist primarily of liquids present within the industrial buildings and facilities. Liquids used in the operations in the industrial buildings included lubricating oil, oily water from the steam cleaning area and compressor and generator engine steam cleaning, JCW, and lubricating oil cooling water. The other two sources of liquids consist of the rainwater that collected in the steam cleaning area pipe trench and hose-down water used when the pipe trench was cleaned. Drainage from the various cooling water systems would have contained chromium compounds and, later, molybdenum. No records exist of any specific releases to the industrial floor drains; however, the drains are expected to have captured incidental drips and spills during plant operations, as well as occasional washing liquid from floor cleaning within the buildings.

4.2.16.3 Floor Drain Investigation Summary

AOC 20 floor drains, manholes, and cleanouts were investigated as part of this investigation in 2016. The results of the floor drain survey are summarized in Table 3-42. Floor drain lines, manholes, and cleanouts, along with associated soil sample locations, are shown on Figure 3-20. Figure 3-20 also identifies segments of storm drain lines, manholes, and cleanouts that were video surveyed.

Of the approximately 45 floor drains identified onsite, 19 were video surveyed. Three manholes and six cleanouts were also surveyed. A detailed list of size, composition, and observations is provided in Table 3-42. Summaries of potential issues (for example, blockages) and results of soil samples associated with floor drains, manholes, and cleanouts are provided in the following paragraphs.

Floor drains with blockages, standing water, debris, or corrosion (or some combination of these) were encountered in floor drains FD-2, FD-4, FD-5, FD-14, FD-16, FD-17, FD-38, and FD-44. All three manholes that were investigated had liquid, sludge, and/or blockages. Cleanouts with liquid, debris, and/or blockages were CO-1, CO-2, and CO-5.

Soil samples were collected from nine locations along the floor drains, primarily at locations of junctions.

4.2.16.4 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 20 are presented in Tables 3-29a through 3-29g, and sampling locations and results are shown on Figures 3-14a through 3-14o. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.16.5.

Metals: Soil samples were collected from 16 locations at depths ranging from 0 to 10 feet bgs. No CSLs were exceeded in AOC 20. The background concentrations were exceeded for cadmium, hexavalent chromium, total chromium, copper, lead, molybdenum, nickel, and zinc at one or more locations across AOC 20, as shown in Table 3-29a. The analytes most frequently detected exceeding the background levels were hexavalent chromium, total chromium, copper, lead, and zinc.

- Hexavalent chromium was detected above its background value (0.83 mg/kg) in 10 samples between depths 0 to 9.5 feet bgs (Table 3-29a). The highest hexavalent chromium concentration of 5.1 mg/kg was detected at sample location AOC20-OS12 at 0 to 0.5 foot bgs. A sample from location AOC20-OS12 was collected from the western side of AOC 5 (Figure 3-14d).
- Total chromium was detected above its background value (39.8 mg/kg) in 10 samples between depths 0 to 9.5 feet bgs (Table 3-29a). The highest total chromium concentration of 220 mg/kg was detected at sample location AOC20-OS12 at 2 to 3 feet bgs. A sample from location AOC20-OS12 was collected from the western side of AOC 5 (Figure 3-14e).
- Copper was detected above its background value (16.8 mg/kg) in 14 samples between depths 0 to 9.5 feet bgs (Table 3-29a). The highest copper concentration of 140 mg/kg was detected at sample location AOC20-08 at 0 to 0.5 foot bgs. A sample from location AOC20-08 was collected from between AOC 23 and AOC 25 (Figure 3-14g).
- Lead was detected above its background value (8.39 mg/kg) in 16 samples between depths 0 to 9.5 feet bgs (Table 3-29a). The highest lead concentration of 78 mg/kg was detected at sample location AOC20-OS12 at 2 to 3 feet bgs. A sample from location AOC20-OS12 was collected from the western side of AOC 5 (Figure 3-14e).
- Zinc was detected above its background value (58 mg/kg) in 10 samples between depths 0 to 9.5 feet bgs (Table 3-29a). The highest zinc concentration of 280 mg/kg was detected at sample location AOC20-OS12 at 2 to 3 feet bgs. A sample from location AOC20-OS12 was collected from the western side of AOC 5 (Figure 3-14e).

The lateral extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits except for hexavalent chromium, total chromium, copper, lead, and zinc on the western side of AOC 6, as discussed in Section 4.2.16.

The vertical extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits, except at AOC20-OS16 and AOC20-OS21, where molybdenum (AOC20-OS16 and AOC20-OS21) and zinc (AOC20-OS16) exceed their respective background values in the deepest samples, as shown in Table 3-29a. AOC20-OS16 was collected below the junction of FD-17, and the main line AOC20-OS21 was collected at the junction of the main line west of the Compressor Building and the main line from Manhole 2. Although there are other locations where the deepest samples exceeded background, these do not represent data gaps requiring further investigation because the concentrations in the deepest samples only slightly exceed (by 2 times or less) their respective background concentrations.

CLP Inorganics: CLP inorganics were not a COPC for this unit; therefore, samples were not analyzed for CLP inorganics.

PAHs: Samples were collected from 17 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-29b).

TPH: Samples were collected from 17 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-29d).

VOCs and SVOCs: Samples were collected from 17 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-29c).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected at 17 locations at depths ranging from 0 to 10 feet bgs. The CSLs for Aroclor 1254, Aroclor 1260, and total PCBs were exceeded at AOC20-OS09 and -OS12, as shown in Table 3-29e.

- Aroclor 1254 was detected above the CSL (970 µg/kg) in four samples between depths 0 to 3 feet bgs (Table 3-29e). The highest Aroclor 1254 concentration of 2,800 µg/kg was detected at sample location AOC20-OS12 at 2 to 3 feet bgs. A sample from location AOC20-OS12 was collected from the western side of AOC 5.
- Aroclor 1260 was detected above the CSL (990 µg/kg) in three samples between depths 0 to 3 feet bgs (Table 3-29e). The highest Aroclor 1260 concentration of 1,700 µg/kg was detected at sample location AOC20-OS12 at 2 to 3 feet bgs. A sample from location AOC20-OS12 was collected from the western side of AOC 5.
- Total PCBs were detected above the CSL (940 µg/kg) in four samples between depths of 0 to 3 feet bgs (Table 3-29e). The highest total PCB concentration of 4,517 µg/kg was detected at sample location AOC20-OS12 at 2 to 3 feet bgs. A sample from location AOC20-12 was collected from the western side of AOC 5.

The lateral and vertical extents of exceedances have been defined by samples with results not detected above reporting limits or the CSL.

Dioxins and Furans: Samples were collected from one location at depths from 0 to 2 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. No samples had detected results that exceeded their respective CSLs (Table 3-29f).

4.2.16.5 AOC 20 Conceptual Site Model

A graphical CSM has been developed for AOC 20 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-20. Exhibit 4-29 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 20. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is summarized in this section with updated information.

The primary sources of contamination at AOC 20 are likely to be incidental spills and leaks from the industrial drain system of lubricants and cooling water generated during plant operations. The quantity of liquid released from the industrial floor drains and associated piping to the environment is unknown. The presence of hexavalent and total chromium is consistent with leaks or spills of cooling water entering the drains at the JCW pumps and copper, lead, and zinc as wear metals from engine lubricants.

The primary source media at AOC 20 are shallow or subsurface soil, as the system consists primarily of underground piping. Short runs of aboveground piping overlying unpaved (gravel-covered) soil are also part of this unit. In the gravel-covered areas with aboveground piping, liquids released in AOC 20 would have been released to surface soil and could have infiltrated to shallow soil. Liquids released to shallow soils either directly from underground piping or through infiltration from the surface could have infiltrated to deeper soils. The analytical results do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time. Because the entire AOC is covered with gravel or pavement, runoff of contaminated surface soil in rainwater is considered to be only a minor migration pathway (where gravel cover is thin); however, soluble constituents located in surface soils may dissolve into rain water and be carried in surface water runoff.

4.2.16.6 Evaluation of Data Against Data Quality Objectives for AOC 20

Decision 1 (Nature and Extent Determination): Nature and extent have not been sufficiently defined laterally or vertically for the following compounds and associated areas:

- Lateral extent of hexavalent chromium, total chromium, copper, lead, and lead on the western side of AOC 6
- Vertical extent of molybdenum at AOC20-OS16 and AOC20-OS21. These were opportunistic samples collected during maintenance and construction activities; therefore, deeper samples could not be collected.
- Vertical extent of zinc at AOC20-OS16. This was an opportunistic sample collected during maintenance and construction activities; therefore, deeper samples could not be collected.

Analytical results are presented in Tables 3-29a through 3-29f. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-29g.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, up to 45 samples were collected from up to 16 locations at depths ranging from 0 to 10 feet bgs for AOC 20. The samples were analyzed for one or more of the following analytes: metals, VOCs, SVOCs, PAHs, TPHs, PCBs, and dioxins and furans.

Exhibit 4-29. Conceptual Site Model – AOC 20
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills and releases within the Compressor Station and floor drains **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration • Potential entrainment in stormwater and surface water runoff	• Subsurface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 20 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. One surface soil sample was collected from an unpaved area associated with AOC 20 between 0 and 1 foot bgs and submitted for analysis of the following analytical groups: metals, PAHs, VOCs, SVOCs, TPH, and PCBs. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). No ISLs were exceeded.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 20 were collected at AOC20-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.17 AOC 21 – Round Depression Near Sludge Drying Bed

4.2.17.1 Setting

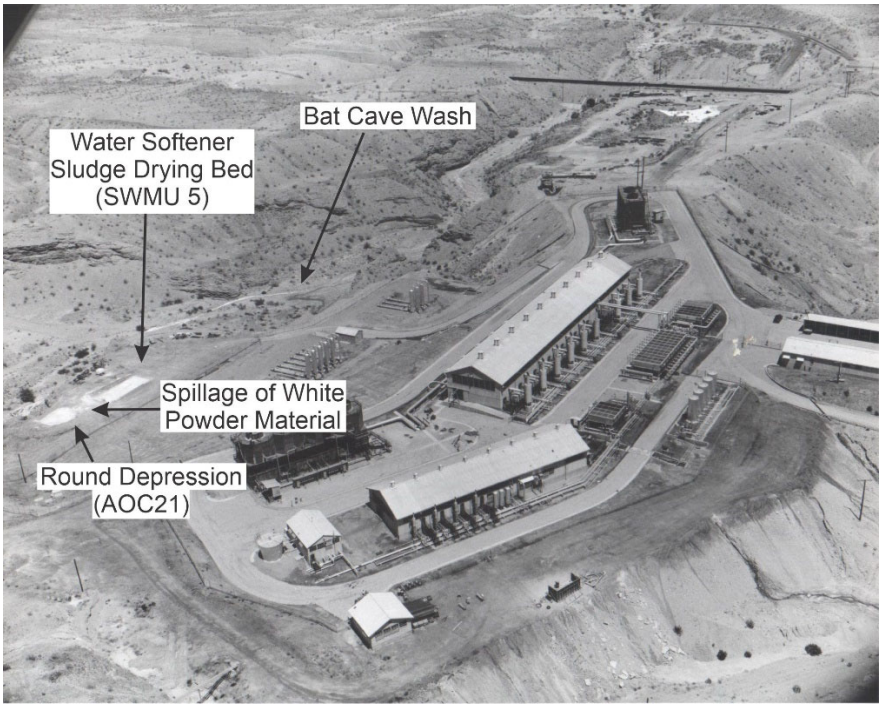
AOC 21 was a former round structure adjacent to Sludge Drying Bed 1 (part of SWMU 5) identified from a 1955 aerial photograph (Photographs 4-1 and 4-2 in Section 4.1.1), as shown on Figure 2-2. This round structure was approximately 20 feet wide, with an uncertain depth. No information is available on the construction of this area, although the structure appears to be constructed with a circular earthen berm. The area around AOC 21 is unpaved.

4.2.17.2 Unit History

AOC 21 was filled with white powder material that was most likely water softener (lime) sludge. The structure appeared to contain material of the same color as the material in SWMU 5 and may have served a similar function as the sludge drying bed. During the 1950s and early 1960s, Sludge Drying Bed 13 (also part of SWMU 5) was used to dry lime treatment sludge from the Permutit water-softening system. The Permutit water-softening system used a combination of lime and soda ash to remove excess minerals from Topock well water. The available information indicates that at least a portion of the dried or partially dried sludge was transported to the Railroad Debris Site (AOC 14, discussed in Section 4.1.7) (Russell, 2006b). Based on data from the white powder material in AOC 14, the material may contain low levels of total and hexavalent chromium.

4.2.17.3 Field Observations

In an ariel photograph from 1955, some apparent spillage of the white material is visible between SWMU 5 and AOC 21 (Photograph 4-39). The water-softener sludge likely contained some liquid, as former employees reported that it was sprayed onto the ground at AOC 14 (CH2M, 2007a).



Photograph 4-39: May 19, 1955 Aerial Photograph 2. Facing northwest. Apparent spillage of white powder material visible between AOC 21 and SWMU 5.

4.2.17.4 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 21 are presented in Tables 3-30a through 3-30h, and sampling locations and results are shown on Figures 3-10a through 3-10h. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.17.5.

Metals: Soil samples were collected from up to 10 locations within AOC 21, at depths ranging from 0 to 9 feet bgs. No CSLs were exceeded in AOC 21. The background concentrations were exceeded for hexavalent chromium, total chromium, copper, lead, molybdenum, and zinc at one or more of the following locations: AOC21-1, and AOC21-OS1 through -OS4, as shown on Table 3-30a. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. The analytes most frequently over the background levels were hexavalent chromium, copper, and lead.

- Hexavalent chromium was detected above the background value (0.83 mg/kg) in five samples between depths 0 to 6 feet bgs (Table 3-30a). The highest hexavalent chromium concentration of 2 mg/kg was detected at sample location AOC21-1 at 5 to 6 feet bgs. A sample from location AOC21-1 was collected within the unit (Figure 3-10c).
- Copper was detected above the background value (16.8 mg/kg) in two samples between depths 0 to 0.5 foot bgs (Table 3-30a). The highest copper concentration of 98 mg/kg was detected at sample location AOC21-OS2 at 0 to 0.5 foot bgs. A sample from location AOC21-OS2 was collected southwest of the unit.
- Lead was detected above the background value (8.39 mg/kg) in three samples between depths 0 to 1.5 feet bgs (Table 3-30a). The highest lead concentration of 41 mg/kg was detected at sample location AOC21-OS2 at 0 to 0.5 foot bgs. A sample from location AOC21-OS2 was collected southwest of the unit (Figure 3-10e).

The lateral extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results below background levels, not detected above reporting limits, or by nearby samples. The results for the deepest sample at AOC21-OS1 exceeded the background value for hexavalent chromium by a factor of exceedance of 2.1 times the background value. This may be considered a data gap; however, collecting additional deeper samples at this location would require a significant disturbance for the relatively low exceedance (1.8 mg/kg).

CLP Inorganics: The background concentrations were exceeded for calcium, magnesium, and sodium at AOC21-1, AOC21-OS1, and AOC21-OS4, as shown in Table 3-30b.

- Calcium was detected above the background value (66,500 mg/kg) in five samples between depths 0 to 6 feet bgs (Table 3-30b). The highest calcium concentration of 310,000 mg/kg was detected at sample location AOC21-OS1 at 2 to 3 feet bgs. A sample from location AOC21-OS1 was collected south of the unit (Figure 3-10g).
- Magnesium was detected above the background value (12,100 mg/kg) in two samples between depths 2 to 6 feet bgs (Table 3-30b). The highest magnesium concentration of 17,000 mg/kg was detected at sample location AOC21-1 at 5 to 6 feet bgs. A sample from location AOC21-1 was collected within the unit.
- Sodium was detected above the background value (2,070 mg/kg) in two samples between depths 0 to 3 feet bgs (Table 3-30b). The highest sodium concentration of 3,400 mg/kg was detected at sample location AOC21-OS4 at 2 to 3 feet bgs. A sample from location AOC21-OS4 was collected within the unit.

The lateral extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results below background levels, not detected above reporting limits, or by nearby samples. The deepest sample at AOC21-OS1 exceeds the background value for calcium by a factor of exceedance of 3.3 times the background value. This small exceedance of calcium is not considered a data gap that requires filling, as it is not a compound driving risk.

PAHs: Samples were collected at up to 10 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-30c).

TPH: Samples were collected at up to 10 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-30d).

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected at up to 10 locations and were only analyzed for pH, which has no CSL or background concentration (Table 3-30e).

Pesticides: Samples were collected at one location, and no samples had detected results that exceeded their respective CSLs (Table 3-30f).

PCBs: Samples were collected at 10 locations, and no samples had detected results that exceeded their respective CSLs (Table 3-30g).

Dioxins and Furans: Dioxin and furans were not a COPC for this unit; therefore, samples were not analyzed for dioxins and furans.

4.2.17.5 AOC 21 Conceptual Site Model

A graphical CSM has been developed for AOC 21 based on site history and background reported in the RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-21. Exhibit 4-30 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 21. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is discussed in this section with updated information.

The primary source of contamination at AOC 21 is likely incidental spills of water-softener sludge during transfer of material from the sludge drying beds to AOC 21 or during loading of material onto trucks to haul it to AOC 14. Copper and lead contamination at AOC 21 is likely associated with wear metals from industrial equipment onsite. The occurrence of incidental spills is supported by Photograph 4-37, which shows that white coloration is visible between AOC 21 and SWMU 5. The potential quantity of solid sludge or associated liquid released in the vicinity AOC 21 is unknown. It is possible that the bottom of the AOC 21 structure consisted solely of soil and that softened water may have been released to shallow soil directly beneath the structure.

The primary source media at AOC 21 are surface and shallow soil. Because the area around AOC 21 was unpaved, spilled sludge would have been released directly to surface soil, and any associated liquids could have infiltrated to shallow soil. Liquids released inside the AOC 21 round structure would have been released directly to shallow soil. Liquids released to shallow soils could have infiltrated to deeper soils. Runoff of contaminated surface soil in rainwater is a potential migration pathway for soils located outside the structure. Surface runoff may have transported contaminants from AOC 21 to Bat Cave Wash. Windblown dust contamination from small particles of contaminated surface soil around AOC 21 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils.

4.2.17.6 Evaluation of Data Against Data Quality Objectives for AOC 21

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-30a through 3-30g and on Figures 3-10a through 3-10h. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-30h.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 18 samples were collected from 10 locations at depths ranging from 0 to 15 feet bgs for AOC 21. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, TPHs, general chemistry parameters, pesticides, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Exhibit 4-30. Conceptual Site Model – AOC 21
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills and releases of material stored in the depression **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration • Potential entrainment in stormwater and surface water runoff	• Subsurface soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 21 may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Surface soils samples were collected in unpaved areas associated with AOC 21 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, general chemistry parameters, and PCBs. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the following analytes:

- Several metals were detected at concentrations exceeding ISLs (hexavalent chromium, copper, lead, mercury, molybdenum, and zinc). The highest factor of exceedance was for mercury, which was detected at a concentration exceeding the ISL (ECV) of 0.0125 mg/kg at one of five locations, with a maximum concentration of 0.14 mg/kg.

A summary of the highest exceedances is provided in Table 3-38j, which presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms, including surface water flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion, constituents exceeding ISLs within AOC 21 have the potential to migrate outside the fence line. Sufficient data have been collected outside the compressor station fence line to assess any potential offsite migration, and nature and extent of these analytes have been evaluated as part of the applicable Part A units in Table 3-37 and in the risk assessment. The need for controls or removal of contaminated soil will be evaluated in the CMS/FS.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 21 were collected at AOC21-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

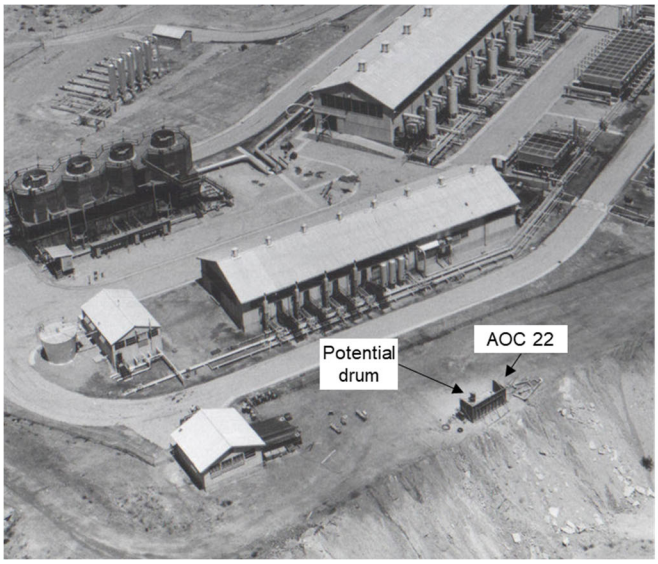
4.2.18 AOC 22 – Unidentified Three-Sided Structure

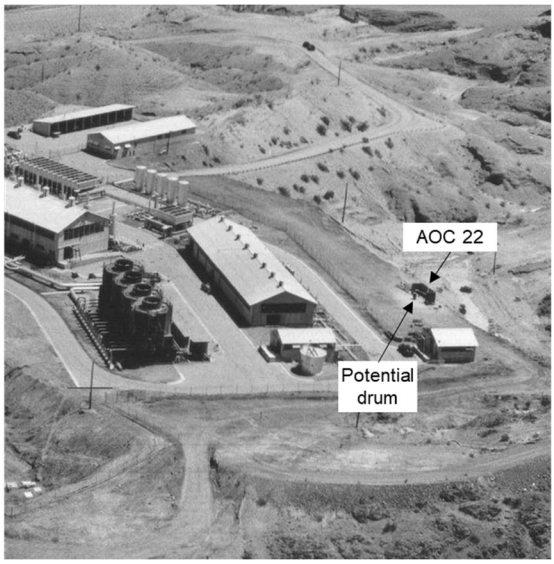
4.2.18.1 Setting

AOC 22 consists of a former three-sided structure located in the upper yard, along the present southeastern compressor station fence line, as shown on Figure 2-2. 1955 aerial photographs depict the structure (Photographs 4-35 and 4-36). The northern end of the structure was slightly north of what is now the Technical Maintenance Shop (the Technical Maintenance Shop did not exist in the aerials that show the three-sided structure).

4.2.18.2 Unit History

Based on the aerial photographs, it appears that the footprint of the structure would have been located within the current unpaved area adjacent to the existing fence. In the aerial photographs, a container that appears to be a drum is located near this structure. There is no available information on the use or purpose of this structure or any materials that may have been stored at this structure or in its vicinity. Soil around this former structure, as observed in the May 19, 1955, aerial photographs (Photographs 4-40 and 4-41) and the 1954 to 1956 oblique aerial photograph (Photograph 4-42), appears lighter in color than surrounding soil.





Photograph 4-40 (left): May 19, 1955 Aerial Photograph 2 (cropped). Facing northwest. Three-sided structure and potential drum identified.
Photograph 4-41 (right): May 19, 1955 Aerial Photograph 1 (cropped). Facing northeast. Three-sided structure and potential drum identified.

Photograph 4-42: Taken between 1954 and 1956 Aerial Photograph 1, as found on an invitation from Needles Chamber of Commerce to a dinner on May 5, 1956 dedicated to PG&E. Oblique view to the east.

4.2.18.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 22 are presented in Tables 3-31a through 3-31i, and sampling locations and results are shown on Figures 3-17a through 3-17c. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.18.4.

Metals: Soil samples were collected from three locations at depths from 0 to 10 feet bgs. The CSL for hexavalent chromium was exceeded at one location. The background concentrations were exceeded for hexavalent chromium, total chromium, copper, lead, and zinc at one or more locations across AOC 22, as shown in Table 3-31a. The analytes most frequently detected over the background concentration were lead and hexavalent chromium.

- Hexavalent chromium was detected above its CSL (6.3 mg/kg) in samples collected from 2 to 3 feet bgs and its background value (0.83 mg/kg) in three samples between depths 0 to 3 feet bgs (Table 3-31a). The highest hexavalent chromium concentration of 10 mg/kg was detected at sample location AOC22-2 at 2 to 3 feet bgs. Hexavalent chromium was not detected in samples collected at 5 to 6 feet bgs and 9 to 10 feet bgs in AOC 22-2. A sample from location AOC22-2 was collected along the western side of the former three-sided structure (Figure 3-5a).
- Lead was detected above its background value (8.39 mg/kg) in four samples between depths 0 to 3 feet bgs (Table 3-31a). The highest lead concentration of 100 mg/kg was detected at sample location AOC22-1 at 2 to 3 feet bgs. No samples were collected below 2 to 3 feet bgs. A sample from location AOC22-1 was collected in the center of the former three-sided structure (Figure 3-17b).

The lateral extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits, as shown on Figures 3-17a through 3-17c. Although a few locations have detected metal results slightly above (up to 2 times) their respective background values, these minor exceedances of the background values are not considered a data gap requiring further investigation.

The vertical extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits, except at AOC22-1 where total chromium and lead exceeded the background concentrations at the deepest sample (2 to 3 feet bgs), as shown in Table 3-31a. These minor exceedances at 2 to 3 feet bgs are not considered data gaps needing filling.

CLP Inorganics: Samples were collected at two locations, and no samples had detected results that exceeded their respective background levels or CSLs (Table 3-31b).

PAHs: Samples were collected at three locations, and no samples had detected results that exceeded their respective CSLs (Table 3-31c).

TPH: Samples were collected at two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-31d).

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected at two locations and were only sampled for pH, which has no CSL or background level (Table 3-31e).

Pesticides: Samples were collected at two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-31f).

PCBs: Samples were collected at three locations, and no samples had detected results that exceeded their respective CSLs (Table 3-31g).

Dioxins and Furans: Samples were collected from two locations at depths from 0 to 10 feet bgs. Dioxins and furans are evaluated by calculating TEQ values for human receptors. No samples had detected results that exceeded its CSLs (Table 3-31h).

4.2.18.4 AOC 22 Conceptual Site Model

A graphical CSM has been developed for AOC 22 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-22. Exhibit 4-31 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 22. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is summarized in this section with updated information.

The primary sources of contamination at AOC 22 are likely to be incidental spills of any materials stored or handled in this area. The presence of metals above background concentrations (hexavalent chromium, total chromium, copper, lead, and zinc) at AOC 22 could be related to incidental spills, although the potential type and quantity of any materials released in the vicinity of this structure are unknown.

The primary source medium at AOC 22 is surface soil. Because the area around AOC 22 is unpaved, liquids released in AOC 22 would have been released to surface soil and could have infiltrated to shallow soil. Liquids released to shallow soils could have infiltrated to deeper soils. The analytical results for AOC 22 do not support evidence of a release of VOCs or that VOCs have been degraded by heat and light over time. In addition, contaminated surface soil runoff would have been a potential migration pathway to the east to the area outside the fence line.

4.2.18.5 Evaluation of Data Against Data Quality Objectives for AOC 22

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally. Nature and extent have not been defined vertically for total chromium or lead at AOC22-1; however, the minor exceedances at 2 to 3 feet bgs are not considered a data gap that requires filling. Analytical results are presented in Tables 3-31a through 3-31h and on Figures 3-17a through 3-17c. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-31i.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 10 samples were collected from 3 locations at depths ranging from 0 to 10 feet bgs for AOC 22. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, TPHs, general chemistry parameters, pesticides, and PCBs.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Exhibit 4-31. Conceptual Site Model – AOC 22
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills and releases from possible hazardous material storage in structure **COCs Include:** • Metals	• Surface soil	• Percolation • Infiltration	• Surface soil • Shallow soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 22 may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Surface soils samples were collected in unpaved areas associated with AOC 22 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, general chemistry parameters, pesticides, PCBs, and dioxins and furans. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the following analytes and equivalency factors:

- Hexavalent chromium, copper, and lead were detected in one or more samples at concentrations exceeding ISLs. The highest factor of exceedance was for hexavalent chromium, which exceeded the ISL (BK) of 0.83 mg/kg at one of three locations with a maximum concentration of 3.3 J mg/kg at AOC22-1.
- TEQ avian exceeded the ISL (ECV) of 16 ng/kg at two of two locations with a maximum concentration of 92 ng/kg at AOC22-3.
- TEQ human exceeded the ISL (DTSC-SL) of 50 ng/kg at one of two locations with a maximum concentration of 200 ng/kg at AOC22-3.
- TEQ mammals exceeded the ISL (BK) of 5.58 ng/kg at two of two locations with a maximum concentration of 200 ng/kg at AOC22-3.

A summary of the highest exceedances is shown in Table 3-38j, which presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms, including surface water flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion, constituents exceeding ISLs within AOC 22 have the potential to migrate outside the fence line. Sufficient data have been collected outside the compressor station fence line to assess potential offsite migration, and nature and extent of these analytes have been evaluated as part of the applicable Part A units in Table 3-37 and in the risk assessment. The need for controls or removal of contaminated soil will be evaluated in the CMS/FS.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 22 were collected at AOC22-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.19 AOC 23 – Former Water Conditioning Building

4.2.19.1 Setting

AOC 23 is the Former Water Conditioning Building, which was previously referred to as the Water Softening Building and is currently identified as the Storage Building, located in the southern part of the upper yard, as shown on Figure 2-2. The building is currently used to store miscellaneous dry materials; no hazardous materials are stored there.

4.2.19.2 Unit History

Available information indicates that the Former Water Conditioning Building may have been used for dry storage of the chemicals (primarily soda ash and lime) used in the Permutit water softening process (CH2M, 2014a). Water softening (mineral removal from raw well water) was conducted at the station to reduce the amount of cooling tower blowdown generated during plant operations and to reduce cooling tower maintenance requirements.

Chemical feed tanks for the water softening process were located inside the Former Water Conditioning Building. The water softening process occurred in the large Permutit precipitator outside the building (Permutit, 1948). Raw (incoming) well water was pumped into the Permutit precipitator and mixed with soda and lime slurry to remove excess minerals and thereby soften the water. The Permutit process was used at the compressor station until approximately 1962 (CH2M, 2007a). The need for water softening was eliminated when the source of plant water was switched to new water supply wells on the Arizona side of the river in the early 1960s.

The primary chemical used was soda ash; plant records from 1958 indicate that soda ash was delivered in bulk shipments of approximately 50,000 pounds every 4 to 6 weeks. Lime was provided in 50-pound bags, and the process apparently consumed several hundred pounds per day (PG&E, 1959). Sodium aluminate was another chemical used in the process. The Former Water Conditioning Building was divided into eastern and western sides. The western side contained the mixing tanks used to dissolve the soda ash and lime, as well as pumps to feed the lime and soda ash slurries to the Precipitation Tank outside the building. The pre-mixed chemicals were pumped to the Precipitation Tank through dedicated lines leading directly from inside the building to the Precipitation Tank. The eastern side of the building contained pumps used to circulate the treated (softened) water and fire water (PG&E, 1960). Treated water was pumped into a holding tank, and water treatment was discontinued when the treated water tank was full. Precipitated water softening sludge was transferred directly to Sludge Drying Bed 1 (part of SWMU 5) via a dedicated pipeline.

In approximately 1957, a bulk chemical storage and feed system was constructed to handle the soda ash (PG&E, 1957b, 1970a). This system consisted of a conveyor trench, an elevator, and storage bins on top of the building. The components of this system may have been removed when the two-step hazardous waste treatment system was constructed. At that time, one of the mixing tanks was reused as the Chromate Reduction Tank (SWMU 6), and the other tank was reused as part of the Precipitation Tank (SWMU 7) (PG&E, 1970a-c).

The foundation of the Former Water Conditioning Building was built up around the mixing tanks (also referred to as “chemical vats”) to provide easy access during operations. Sometime after the tanks were removed, the concrete foundation was brought to a common level, and a small former stairwell was also filled in. The doorway leading to the stairwell was sealed off, thereby dividing the building in half. Floor drains were present on both sides of the building and were initially connected to the industrial drains (AOC 20). The drain in the western half of the building (containing the chemical mixing tanks) was later cut off and rerouted to the sludge drain pipeline (PG&E, 1957a).

From 1969 to 1985, the former Permutit Precipitation Tank (SWMU 7) was used as the precipitation tank for the hazardous waste treatment system (CH2M, 2007a). Therefore, it is also possible that this building may have been used to store chemicals or house incidental equipment associated with the hazardous waste treatment system. The chemicals used in the hazardous waste treatment system at this location consisted of sodium hydroxide, Poly Floc II, and ferric sulfate in the precipitation tank. No chemicals were known to have been added to the Process Pump Tank. No organic compounds were used in the water softening process.

4.2.19.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 23 are presented in Tables 3-32a through 3-32i, and sampling locations and results are shown on Figures 3-11a through 3-11b. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.19.4.

Metals: Soil samples were collected from four locations at depths from 0 to 3 feet bgs. The CSLs for hexavalent chromium and lead were exceeded at AOC23-3. The background concentrations were exceeded for cadmium, hexavalent chromium, total chromium, copper, lead, molybdenum, nickel, and zinc at one or more of the following locations: AOC23-1 through 4, as shown on Table 3-32a. The CSL for

arsenic is below background; therefore, arsenic results are only screened against the background value. The analytes most frequently detected over the background levels were copper and lead.

- Copper was detected above its background value (16.8 mg/kg) in four samples between depths 0 to 3 feet bgs (Table 3-32a). The highest copper concentration of 55 mg/kg was detected at sample location AOC23-3 at 0 to 0.5 foot bgs. A sample from location AOC23-3 was collected on the eastern side of the building (Figure 3-11b).
- Lead was detected above its CSL (320 mg/kg) in one sample at 0 to 0.5 foot bgs and above its background value (8.39 mg/kg) in three samples at 0 to 0.5 foot bgs (Table 3-32a). The highest lead concentration of 330 mg/kg was detected at sample location AOC23-3 at 0 to 0.5 foot bgs. A sample from location AOC23-3 was collected on the eastern side of the building.

The lateral extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits, except at AOC23-3, where hexavalent chromium and lead exceeded their respective CSLs. Cadmium, total chromium, copper, molybdenum, nickel, and zinc exceeded their respective background concentrations, as shown in Table 3-32a. This was a surface sample, and refusal was reached at 1.1 feet bgs. This data gap may be filled during remedial design if remediation is necessary in this area. The deepest sample at AOC23-4 had results that slightly exceed the background value for total chromium, copper, and nickel, with a maximum factor of exceedance of 1.4 times the background value. These minor exceedances are not considered a data gap.

CLP Inorganics: Samples were collected from one location, and no samples had detected results that exceeded their respective background levels (Table 3-32b).

PAHs: Samples were collected from four locations, and no samples had detected results that exceeded their respective CSLs (Table 3-32c).

TPH: Samples were collected from three locations, and no samples had detected results that exceeded their respective CSLs (Table 3-32d).

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected from three locations and were only sampled for pH, which has no CSLs or background levels (Table 3-32e).

Pesticides: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-32f).

PCBs: Samples were collected from four locations, and no samples had detected results that exceeded their respective CSLs (Table 3-32g).

Dioxins and Furans: Samples were collected from three locations at depths from 0 to 3 feet bgs (Table 3-32h). Dioxins and furans are evaluated by calculating TEQ values for human receptors. The CSL for TEQ human (220 ng/kg) was exceeded at AOC23-3, as shown in Table 3-32h. The concentration was 440 ng/kg at a depth of 0 to 0.5 foot bgs. A sample from location AOC23-3 was collected on the eastern side of the building.

The lateral and vertical extents of exceedances have been defined by samples with results below CSLs or not detected above reporting limits at all locations except at AOC23-3, where TEQ human exceeded the CSL. This data gap may be filled during remedial design if remediation is necessary in this area.

4.2.19.4 AOC 23 Conceptual Site Model

A graphical CSM has been developed for AOC 23 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-23. Exhibit 4-32 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 23. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is discussed in this section with updated information.

The primary sources of contamination at AOC 23 are likely to be historical incidental spills of dry soda ash or lime, and water-softening sludge. If sodium hydroxide, Poly Floc II, and ferric sulfate were stored in the building, incidental spills of these chemicals could also have occurred at AOC 23. The quantities of any materials released are unknown; however, the quantities are expected to be relatively small because spills of dry material would most likely have been contained in the building or cleaned up if needed, and spills of water-softening sludge would similarly have been cleaned up.

The presence of chromium at AOC 23 may be associated with water-softener sludge released in the area; based on data from the white powder material in AOC 14 (Section 4.1.7), the water-softening sludge might have contained low levels of total and hexavalent chromium. Other metals contamination may be from wear metals from industrial equipment onsite or associated with the water conditioning products. The highest contaminant concentrations were detected at shallow soil sample location AOC23-3, located east of the Former Water Conditioning Building.

Sodium hydroxide spills would have been cleaned up quickly due to the acute danger posed by the chemical. Any releases of sodium hydroxide to soil would have raised the pH of the soil and thereby reduced the solubility of metals in the soil. If a large release of water-softening sludge occurred, it could have resulted in water potentially containing some sludge reaching the storm drain system and being discharged outside the fence line. Because the area around the AOC was formerly unpaved, dry chemicals deposited on the soil could also have been entrained in stormwater runoff and been discharged outside the fence line. Releases via the storm drain system are addressed by the storm drain investigation program described in Section 4.3. Finally, while there is no information indicating that the concrete floor in the building lacked integrity in the past, it is possible that small cracks are present and that small quantities of dissolved lime or soda ash may have been released to shallow soil directly beneath the building.

The primary source medium at AOC 23 is concrete within the building (the building floor). Secondary source media include surface soil adjacent to the building and shallow soil underneath the building. If any liquids were released in AOC 23, they would have been released to surface soil and could have infiltrated to shallow soil or been released to shallow soil directly. Liquids released to shallow soils could have infiltrated to deeper soils. Due to the high pH of the main chemicals used in the water softening process, release of the chemicals or sludge would have helped to fix any metals contained in the material and prevent migration.

4.2.19.5 Evaluation of Data Against Data Quality Objectives for AOC 23

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density, except at sample location AOC23-3. This vertical extent data gap may be filled during remedial design if remediation is necessary. Analytical results are presented in Tables 3-32a through 3-32h and on Figures 3-11a and 3-11b. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-32i.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, seven samples were collected from four locations at depths ranging from 0 to 3 feet bgs for AOC 23. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, TPHs, PCBs, general chemistry parameters, pesticides, and PCBs.

Exhibit 4-32. Conceptual Site Model – AOC 23
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Potential incidental spills of water conditioning products **COCs Include:** • Metals • Dioxin and Furans	• Surface soil	• Percolation • Infiltration	• Surface soil • Shallow soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 23 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway; as areas within this unit are covered by gravel, paved, or otherwise covered with an impermeable surface preventing migration of surface soil. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. One sample from AOC 23 was collected at AOC23-2, but the volume of sample was insufficient to run the ordered tests. Other samples were collected at nearby units, however, which can be used to support characterization of AOC 23. These samples were collected at AOC5-2 and AOC8-1. Results are presented in Table 3-37. These data along with the nature and extent data collected are sufficient to support CMS/FS and IM decisions.

4.2.20 AOC 24 – Stained Area and Former API Oil/Water Separator

4.2.20.1 Setting

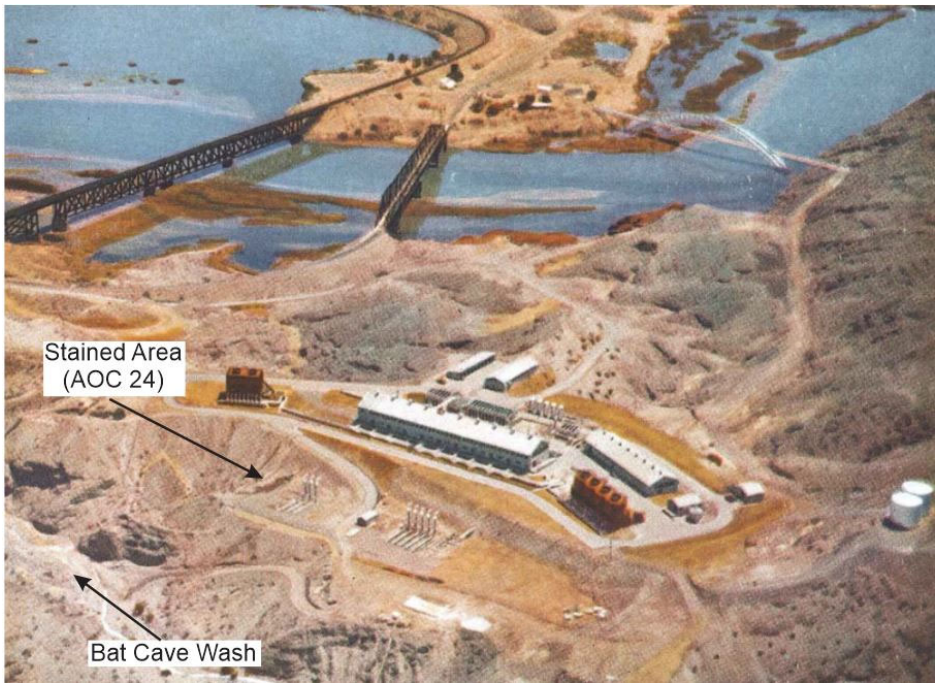
AOC 24 consists of the stained area near the former API OWS, which was located northeast of the former northern scrubbers, as well as the footprint of the OWS, as shown on Figure 2-2.

4.2.20.2 Unit History

The elongated area of staining is visible in a 1955 aerial photograph (Photograph 4-43) and a 1954-1956 plant photograph (Photograph 4-44). It appears that the staining may have potentially come from a discharge emanating from the former OWS. The OWS was 14 feet long by 8 feet wide and had 1-foot-thick walls. It was 4 feet deep and had a 1-foot-thick concrete bottom. The unit was apparently installed during the initial construction of the station. The actual discharge point of the effluent water, and the disposal process for the oil collected in the former OWS and the solid material removed from the bottom of the separator, are not known. In approximately 1967, the OWS was moved to the southern portion of the lower yard and then became Unit 4.4 of the oily water treatment system. Discharges from the original OWS location in AOC 24 would also have ceased in approximately 1967 (CH2M, 2007a).

Subsequent to the 1955 aerial photo, additional grading was performed in the lower yard, and the northern portion of the lower yard was filled in late 1989. Based on the available information, portions of the fill may be as much as 40 to 45 feet deep (PG&E, 1989b-c).

Photograph 4-43: May 19, 1955 Aerial Photograph 2. Facing northwest. Elongated area of staining visible in AOC 24.



Photograph 4-44: Taken between 1954 and 1956 Aerial Photograph 1, as found on an invitation from Needles Chamber of Commerce to a dinner on May 5, 1956 dedicated to PG&E. Oblique view to the east. Elongated area of staining visible in AOC 24.

4.2.20.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 24 are presented in Tables 3-33a through 3-33i. No results figures were developed for AOC 24 because each analyte had fewer than four exceedances. Sample locations are presented on Figure 3-1. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section 4.2.20.4.

Metals: Soil samples were collected from four locations at depths from 0 to 6 feet bgs. No CSLs were exceeded in AOC 24. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. The background values were exceeded only for hexavalent chromium and lead at one or more of the following locations: AOC24-1 and AOC24-OS1 and -OS2, as shown in Table 3-33a.

- Hexavalent chromium was detected above its background value (0.83 mg/kg) in three samples between depths 0 to 3 feet bgs (Table 3-33a). The highest hexavalent chromium concentration of 1.2 mg/kg was detected at sample locations AOC24-1 from 2 to 3 feet bgs and AOC24-OS1 from 0 to 0.5 foot bgs. A sample from location AOC24-OS1 was collected north of the stained area and former API OWS.
- Lead was detected above its background value (8.39 mg/kg) in two samples between depths 0 to 0.5 foot bgs (Table 3-33a). The highest lead concentration 17 mg/kg was detected at sample location AOC24-OS2 at 0 to 0.5 foot bgs. A sample from location AOC24-OS2 was collected in the historical stained soil area.

The lateral extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits, except at AOC24-1, where the hexavalent chromium result in the deepest sample slightly exceeds background concentrations by a factor of exceedance of 1.4 times the background value. This minor exceedance is not considered a data gap.

CLP Inorganics: Samples were collected from one location, and no samples had detected results that exceeded their respective background levels (Table 3-33b).

PAHs: Samples were collected from four locations, and no samples had detected results that exceeded their respective CSLs (Table 3-33c).

TPH: Samples were collected from four locations, and no samples had detected results that exceeded their respective CSLs (Table 3-33d).

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected from two locations and were only analyzed for pH, which has no CSL or background level (Table 3-33e).

Pesticides: Samples were collected from two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-33f).

PCBs: Samples were collected from four locations, and no samples had detected results that exceeded their respective CSLs (Table 3-33g).

Dioxins and Furans: Samples were collected from one location, and no samples had detected results that exceeded their respective CSLs (Table 3-33h).

4.2.20.4 AOC 24 Conceptual Site Model

A graphical CSM has been developed for AOC 24 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-24. Exhibit 4-33 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 24. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is summarized in this section with updated information.

The primary source of metals and low levels of TPH contamination at AOC 24 is likely to be historical water discharge from the former OWS. The quantity of water released from the OWS is unknown. There is potential for the discharge to have been directed into a low area previously located north of the historical northern boundary of the lower yard and then to a low area in Bat Cave Wash. Due to the fill in northernmost portion of the lower yard, the affected area would now be covered by several to 10s of feet of additional soil.

The primary source medium at AOC 24 was surface soil. A potential secondary source medium at AOC 24 is shallow and subsurface soil. Liquids released to shallow soils could have infiltrated to deeper soils. As discussed above, available information indicates that grading occurred around 1955 throughout AOC 24, and subsequently during the fill of the low area previously located north of the northern scrubbers, as well as during construction of the Transwestern Pipeline interconnection facilities. Grading activities may have led to the dispersal of contaminated soil around the area. Liquids would have been released to surface soil and infiltrated to shallow soil. Because the entire AOC is covered with additional soil from the expansion of the lower yard, as shown on Figure 4-24, runoff of contaminated surface soil in rainwater is not considered a potential migration pathway. Windblown dust contamination from small particles of contaminated surface soil around AOC 24 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils.

4.2.20.5 Evaluation of Data Against Data Quality Objectives for AOC 24

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-33a through 3-33i. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-33j.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, nine samples were collected from four locations at depths ranging from 0 to 6 feet bgs for AOC 24. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, TPHs, pesticides, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Exhibit 4-33. Conceptual Site Model – AOC 24
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Potential discharge of water from former separator **COCs Include:** • Metals • TPH	• Surface soil	• Percolation • Infiltration	• Surface soil • Shallow soil	• Surface soil runoff, wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker • Recreational User • Tribal User • Hypothetical Future Groundwater User **Ecological:** • Plants • Invertebrates • Birds • Mammals

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 24 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Surface soil samples were collected in unpaved areas associated with AOC 24 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, general chemistry parameters, pesticides, PCBs, and dioxins and furans. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). One or more samples exceeded the ISLs for the following analytes and equivalency factors:

- Hexavalent chromium and lead were detected at concentrations exceeding ISLs. The highest factor of exceedance was for lead, which exceeded the ISL (BK) of 8.39 at two of four locations with a maximum concentration of 17 mg/kg at AOC 24-OS2.
- TEQ mammals exceeded the ISL (BK) of 5.58 ng/kg at one of one location at a concentration of 6.2 ng/kg at AOC24-2.

A summary of the highest exceedances is shown in Table 3-38j, which presents the highest factors of exceedances for each of the locations. The factors of exceedances of hexavalent chromium, and dioxin and furans are all 2 or less. Constituents exceeding the ISLs by these low factors of exceedance within AOC 24 are not expected to migrate outside the fence line at concentrations that pose a threat to offsite receptors. Sufficient data have been collected outside the compressor station fence line to assess any potential offsite migration, and nature and extent of these analytes have been evaluated as part of the applicable Part B units in Table 3-37 and in the risk assessment.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 24 were collected at AOC 24-2. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.2.21 AOC 25 – Compressor and Generator Engine Basements

4.2.21.1 Setting

AOC 25 consists of the compressor and generator engine basements, as shown on Figure 2-2. There are 10 compressor engines, 9 of which are still active within the Compressor Building, and 4 generator engines within the Auxiliary Generator Building (Figure 4-25).

Each of the compressor engines is mounted on a concrete pedestal on a concrete foundation, as shown on Figure 4-25. The pedestal is surrounded by a concrete trench. The trench around the pedestal is known as the basement. Drips and leaks from the engines would discharge into the drains in the basements and enter AOC 20 (the industrial floor drains). The basements have small openings (open air windows) to allow pipes to enter the basement. The compressor engine basement floors are located approximately 36 inches below the bottom of the windows. Each compressor basement is also equipped with two drains that are connected to the oily water treatment system.

The generators are equipped with basements similar to the compressors; however, the basements are present only on the southern and eastern sides of the generator engines and are shallower than the compressor engine basements (approximately 30 inches deep). The generator engines are also located on pedestals. The pedestals are approximately 42 inches high measured from the bottom of the engine basement. The generator windows are level with the surrounding ground surface. Incidental drips and leaks from the generator engines that collect in the basements would be discharged to drains connected to the oily water treatment system and could also leak out through the basement window. The ground

surface adjacent to the generator engine basement windows was paved in the early 1990s (CH2M, 2014a).

4.2.21.2 Unit History

The two types of liquids present in the compressor and generator engines are lubricating oil and cooling water. When the lubricating oil is drained from the compressor or generator engines during engine maintenance, it is, and historically has been, drained directly to a holding tank via piping specifically installed for that purpose. Cooling water was contained in a closed-loop system. When this system was drained, the water was combined with the oily water and was routed to the oily water treatment system. The oily water treatment system effluent was then combined with the cooling tower blowdown. Currently, the cooling water is still drained to the oily water treatment system through the industrial drains. The engine basements are cleaned periodically to remove surface coatings of oil; the cleaning water is also allowed to drain to the oily water treatment system.

Concrete sampling of select compressor pedestals was conducted in 1990 to evaluate cracks in the concrete pedestals. The sampling indicated that oil saturation was present to depths of 10 to 30 inches into the top of the concrete, with the deeper penetrations occurring at the location of the cracks. The concrete sampling work was performed to assist with the selection of future pedestal replacements. Pedestals have been repaired at Compressor Engines 1, 3, 5, 6, 7, 8, 9, and 10. The pedestals were repaired between the late 1980s and 2004. The original pedestals were removed only to the point required to reach competent concrete; the new concrete was then tied into the existing concrete (CH2M, 2014a).

PG&E has taken various steps to minimize leakage into the compressor engine basements. For example, historical information (PG&E, 1971) indicated that oil leakage from the compressor engines was cleaned up by plant staff daily. In 1971, new mechanical valve seals were installed to minimize the leakage. Similarly, in 1968, PG&E upgraded pipe joints from the cooling-water headers to the compressor engines to minimize the potential for cooling-water leaks prior to increasing the operating pressure of the cooling-water system (PG&E, 1971).

Similar to the compressor engines, the generator engine foundations were also tested (PG&E, 1992). Oil penetration and decomposing concrete were noted at the four generator engines at Topock. The generator engine pedestals were repaired between 2001 and 2007 in the same way as the compressor engine pedestals (CH2M, 2014a).

Surface and shallow subsurface site investigation and soil removal have been conducted in areas immediately adjacent to the Auxiliary and Compressor Buildings (in AOC 13).

4.2.21.3 Analytical Results

Soil Investigation

Due to substantial access constraints, active use of buildings, utilities, and physical dangers, soil samples were not collected from within the Compressor Building or Auxiliary Building. Soil data will be collected when AOC 25 becomes available for sampling. Samples were collected from areas around the buildings and are reported and evaluated as part of AOC 13.

Soil Gas Investigation

Soil gas vapor probes were installed at locations AOC13-5, AOC13-6, and AOC13-11 to assess AOC 25, as soil sampling was not feasible. Installation and sampling details are described in Appendix B, Attachment B7. Soil gas samples were collected from 2 to 3 feet bgs in January 2016 and February 2017. Results are presented in Table 3-23k and discussed with AOC 13 (Section 4.2.10). No data gaps were identified for soil gas.

4.2.21.4 AOC 25 Conceptual Site Model

A graphical CSM has been developed for AOC 25 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-25. Exhibit 4-34 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 25. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is discussed in this section with updated information.

The primary sources of contamination at AOC 25 are likely to be small-scale historical liquid discharges from the compressor and generator engines, including small quantities of lubricating oil, cleaning fluids, and coolant. The estimated annual flow of oily wastewater is 220,000 gallons (CH2M, 2007a); a portion of this total derives from the drains in the Compressor and Auxiliary Buildings. The construction of the compressor basements largely precludes releases of fluids from the basements to the soil adjacent to the buildings. Only if there had been massive failure of an engine or a cooling-water line would large quantities of liquids have been generated and had the potential to overflow out of the compressor basement to areas adjacent to the buildings. There are no records of any such events.

Unlike the compressor basements, the generator engine basements would have been more likely to have leaked oily water and cooling liquid to the area immediately outside the building because the bottoms of the windows were at the same level as the basement floors. Stained soil was removed from this area, and the area was subsequently paved with concrete.

The primary source media at AOC 25 are surface soil, shallow soil, and concrete. Liquids released to the drains could have entered shallow soils at breaks in the oily water system pipelines; from shallow soil, the liquid could have infiltrated to deeper soils. Leaks to surface soil outside the generator engine basements could have infiltrated to shallow soil; from shallow soil, the liquid could have infiltrated to deeper soils. Liquids released to the basements could also have impacted the concrete. Liquids released to the concrete could have penetrated cracks in the foundation and could have entered surface and shallow soil underneath the basements. However, the concrete is between 24 and 81 inches thick and is steam cleaned periodically. Therefore, the concrete is not considered a major source. Because the entire potential surface soil source area is covered by concrete or asphalt, runoff of contaminated surface soil is not considered a potential migration pathway.

4.2.21.5 Evaluation of Data Against Data Quality Objectives for AOC 25

Decision 1 (Nature and Extent Determination): Deferred.

Due to substantial access constraints, active use of buildings, and physical dangers, samples were not collected in AOC 25. Soil data will be collected when areas become available.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. No sampling was conducted at AOC 25 because it is an active unit, and sampling the unit would not be possible without compromising the integrity of the secondary containment. Instead, samples were collected around the Compressor and Auxiliary Buildings in AOC 13. If appropriate, the EPCs can be recalculated in the future when new data become available.

Decision 3 (Threat to Groundwater Determination): Deferred.

Current or potential threat to groundwater was not evaluated because samples were not collected at AOC 25. Threat to groundwater will be evaluated in the future after soil data are collected at AOC 25.

Exhibit 4-34. Conceptual Site Model – AOC 25
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Potential historical liquids discharges (spills) and leaks (possible discharge to storm drain system and discharge offsite) **COCs Include:** • Unknown	• Surface soil	• Percolation • Infiltration	• Surface soil • Shallow soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion and enclosed space accumulation	**Human:** • Maintenance Worker • Commercial Worker

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 25 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway, as areas within this unit are paved or otherwise covered with an impermeable surface. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples collected at AOC 17 and AOC 20 (nearby units) can be used to support characterization of AOC 25. Samples were collected at the following locations: AOC17-5 and AOC20-1. Results are presented in Table 3-37. These data are sufficient to support CMS/FS and IM decisions.

4.2.22 AOC 26 – Former Scrubber Oil Sump

4.2.22.1 Setting

AOC 26 is the location of the former Scrubber Oil Sump located in the lower yard south of the former South Scrubbers, as shown on Figure 2-2. The scrubber sump consisted of an underground concrete structure with three compartments, each measuring 5 feet wide by 5 feet long (including walls) by 4 feet deep.

4.2.22.2 Unit History

The scrubber sump received pipeline liquids removed from two banks of natural gas scrubbers, as well as oil from the oil bath filters (until the filters were taken out of service in the 1960s). When the northern compartment of the scrubber sump filled up, the pipeline liquids were either transferred to one of the other two compartments or were pumped directly to the waste-oil sump (Trident, 1996c). The scrubber sump was removed in 1996 as part of an upgrade to the waste oil system.

Closure of the sump consisted of the following steps:

- Piping was emptied, disconnected, and capped at abandoned ends.
- Residual liquid was removed from the sump by vacuum.
- Oily sludge in the sump was removed, placed into 55-gallon drums, and disposed of at a Class I landfill as non-RCRA hazardous waste.
- The sump was steam-cleaned after removal of the liquids, and sludge and was completely removed from the site.
- Discolored soil was excavated and stockpiled.
- Stockpiled soils were analyzed for California Assessment Manual (CAM) 17 metals; TPH using EPA Method 418.1; and benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 5030/8020.
- The sludge within the sump was also analyzed for PCBs.
- Additional soil excavation was performed, and four initial confirmation samples were collected at 6 feet bgs and were analyzed for TPH using EPA Method 418.1.
- Supplemental excavation was conducted to 10 bgs, and four additional soil samples were collected.

Although TPH was present in the bottom of the excavation, safety considerations precluded further extending or deepening the excavation. High-pressure gas pipelines are present to the south and west of the excavation area, and the scrubber oil pump foundation and enclosed electrical conduits are present to the north. The electrical conduits prevented removal of the pump foundation. Increasing the depth of the excavation beyond 10 feet bgs was not possible due to the proximity of the high-pressure gas lines and

pump foundation. Upon receipt of the closure certification report, the County of San Bernardino requested further delineation of the residual contamination (sidewall samples) and additional data for metals.

To further assess the extent of the remaining contamination, platforms were constructed at the corners of the excavation to allow use of a hand sampling tool without having workers enter the excavation. The success of the hand sampling was limited by the very rocky soil encountered in the bottom of the excavation; soil samples were successfully obtained from four locations ranging from 10.4 to 11 feet bgs; at two locations, two soil samples were collected (Trident, 1996d). Although there was residual contamination, closure of the scrubber sump was proposed based on leaking underground fuel tank manual criteria, including low rainfall and depths to groundwater exceeding 100 feet, which led to the conclusion that the residual petroleum contamination did not pose a threat. The results of the additional sampling were submitted in an addendum to the closure certification report (Trident, 1996d).

The conclusions presented in the closure certification report remained the same (Trident, 1996d). On January 16, 1997, Ecology and Environment, Inc. (E&E), conducted a deeper soil investigation (E&E, 2002); the investigation report indicates that it was completed in accordance with the scope of work reviewed by the County of San Bernardino. Five borings were installed to a maximum depth of 40 feet bgs. Hydrocarbon impacts to soil were present to approximately 35 feet bgs. The results of this investigation indicated there was little lateral spreading of hydrocarbons; rather, they migrated vertically to 35 to 40 feet bgs. Consistent with the Trident Environmental Consultants (Trident) reports, E&E reported that the sump and surrounding impacted soils were removed to 10 feet bgs. E&E also indicated the excavation backfilled with clean material (E&E, 2002).

4.2.22.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for AOC 26 are presented in Tables 3-34a through 3-34i, and sampling locations and results are shown on Figures 3-10a through 3-10h. Screening level exceedances are summarized in this section. A discussion of the nature and extent of contamination, contaminant sources, fate and transport of contamination, and evaluation of results against the data quality objectives is presented in Section4.2.22.4.

Metals: During the RFI/RI, additional soil samples were collected from five locations at depths from 0 to 75 feet bgs. No CSLs were exceeded in AOC 26. The CSL for arsenic is below background; therefore, arsenic results are only screened against the background value. The background concentrations were exceeded for total chromium, cobalt, copper, lead, and molybdenum at one or more of the following locations: AOC26-1 through 4 and SS-NE, as shown in Table 3-34a. The analytes most frequently detected above the background levels were lead and molybdenum.

- Lead was detected above its background value (8.39 mg/kg) in five samples between depths 0 to 10.5 feet bgs (Table 3-34a). The highest lead concentration of 19 mg/kg was detected at sample location AOC26-4 at 0 to 0.5 foot bgs. A sample from location AOC26-4 was collected on the southern side of the former scrubber oil sump (Figure 3-10e).
- Molybdenum was detected above its background value (1.37 mg/kg) in three samples between depths 2 to 10 feet bgs (Table 3-34a). The highest molybdenum concentration of 2.3 mg/kg was detected at sample location AOC26-2 at 5 to 6 feet bgs. A sample from location AOC26-2 was collected on the northern side of the former scrubber oil sump.

The lateral extent of the exceedances has been defined by samples with results below background concentrations or not detected above reporting limits. The vertical extent of the exceedances has been defined by samples with results below background levels or not detected above reporting limits. The deepest sample at AOC26-1 had results for total chromium, cobalt, copper, and nickel that slightly exceeded their respective background values, with a maximum factor of exceedance of 1.3 times the background value. The deepest sample at AOC26-2 had results that slightly exceeded the background value for lead, with a factor of exceedance of 1.1 times the background value. The deepest sample at AOC26-4 had results that slightly exceeded the background value for molybdenum, with a factor of exceedance of 1.2 times the background value. These minor exceedances are not considered a data gap.

CLP Inorganics: CLP inorganics were not a COPC for this unit; therefore, samples were not analyzed for CLP inorganics.

PAHs: Samples were collected at five locations. PAHs were detected at low levels at AOC26-1 through AOC26-4, but no samples had detected results that exceeded their respective CSLs (Table 3-34b).

TPH: Samples were collected at five locations at depths from 0 to 75 feet bgs (Table 3-34d). No background concentrations have been established for TPH. The CSLs for TPH-d were exceeded at AOC26-1 and AOC26-5, as shown in Table 3-34d. The highest TPH-d concentration of 3,100 mg/kg was detected at sample location AOC26-1 at 24 to 25 feet bgs. A sample from location AOC26-1 was collected in the center of the former scrubber oil sump. TPH-d was not detected in soil samples collected from AOC26-1 at 49 to 50 feet bgs and 74 to 75 feet bgs.

The lateral and vertical extents of the exceedances have been defined by samples with results below CSLs or nearby samples.

VOCs and SVOCs: Samples were collected from five locations. VOCs and SVOCs were detected at low levels at AOC26-1 from 24 to 25 feet bgs, but no samples had detected results that exceeded their respective CSLs (Table 3-34c). VOCs were not detected in AOC26-1 in samples collected from 49 to 50 feet bgs and 74 to 75 feet bgs.

General Chemistry: Samples were collected from five locations and were only sampled for pH, which has no CSL or background level (Table 3-34e).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected from five locations. PCBs were detected at all locations, but no samples had detected results that exceeded their respective CSLs (Table 3-34g).

Dioxins and Furans: Samples were collected from two locations. Dioxins and furans were detected at both locations, but no samples had detected results that exceeded their respective CSLs (Table 3-34h).

Additional Investigation: VOCs in Soil Gas: In addition to the soil samples discussed above, soil gas vapor probes were installed and sampled as described in Appendix B and Attachment B7. Soil gas samples were collected from AOC26-1 at 5-6, 24-25, and 49-50 feet bgs for the purposes of assessing nature and extent of VOCs in the subsurface. Soil gas samples were collected from this location in January 2016 and February 2017. Results are presented in Table 3-34f. All soil gas concentrations were below DTSC Commercial/Industrial Screening Levels for the soil gas to indoor air vapor intrusion pathway.

- Results from the January 2016 sampling event: Benzene, carbon tetrachloride, 1,3-dichlorobenzene, acetone, carbon disulfide, chloromethane, MEK, tetrachloroethene, ethylbenzene, and toluene were detected in soil gas samples (Table 3-34f). Acetone and MEK are frequently detected lab contaminants.
- Results from the February 2017 sampling event: benzene, carbon tetrachloride, 1,1-dichloroethene, acetone, carbon disulfide, chloromethane, MEK, tetrachloroethene, ethyl-benzene, toluene, and xylenes were detected in soil gas samples (Table 3-34f). Acetone and MEK are frequently detected lab contaminants.

Due to construction in the area around AOC 26, and the additional of gravel across the AOC 26 area, the existing soil vapor probes we unable to be located in 2020; therefore, additional soil vapor samples cannot be collected. The lateral and vertical extents of the vapor plume for AOC 26 have not been defined.

4.2.22.4 AOC 26 Conceptual Site Model

A graphical CSM and cross sections have been developed for AOC 26 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figures 4-26a through 4-26c. Exhibit 4-35 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 26. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is discussed in this section with updated information.

The primary sources of contamination at AOC 26 are likely to be incidental spills or leakage at fittings during transfer of the accumulated pipeline liquids, as well as potential leaks through the bottom of the sump. The quantity of pipeline liquids released from the scrubber sump is unknown; however, as documented previously (Trident, 1996e and 1996c; E&E 1997), releases from the sump occurred because contamination was present in and below the excavation. The presence of TPH in soil samples and VOCs in soil gas samples in consistent with the release of hydrocarbons from AOC 26.

The primary source medium at AOC 26 is subsurface soil. Residual contamination is present to approximately 35 feet bgs (CH2M, 2013a). Soil samples collected from the core of the release at 50 and 75 feet bgs confirm the vertical extent of TPH is limited to above 50 feet bgs.

4.2.22.5 Evaluation of Data Against Data Quality Objectives for AOC 26

Decision 1 (Nature and Extent Determination): Nature and extent in soil have been sufficiently defined laterally and vertically given laboratory results and current data density. The lateral and vertical extents of the vapor plume for AOC 26 have not been defined. Because VOCs were not collected in samples collected at 50 and 75 feet bgs, the extent of the vapor plume is not considered a data gap. Analytical results are presented in Tables 3-34a through 3-34h and on Figures 3-10a through 3-10h. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-34i.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, 21 samples were collected from 5 locations at depths ranging from 0 to 75 feet bgs for AOC 26. The samples were analyzed for one or more of the following analytes: metals, PAHs, VOCs, SVOCs, TPHs, general chemistry, PCBs, and dioxins and furans.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C. Soil samples collected from the core of the release area confirm impacts to vadose zone are limited to above 50 feet bgs. The depth to groundwater at this location is approximately 140 feet bgs.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 26 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway, as concentrations are close to background and not a threat to offsite receptors.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples from AOC 26 were collected at AOC26-1. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

Exhibit 4-35. Conceptual Site Model – AOC 26
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills and releases from former sump **COCs Include:** • TPH • VOCs	• Surface soil	• Percolation • Infiltration	• Surface soil • Shallow soil • Deep soil	• Wind erosion and atmospheric dispersion of surface soil • Potential volatilization and atmospheric dispersion	**Human:** • Maintenance Worker • Commercial Worker

4.2.23 AOC 32 – Oil Storage Tanks and Waste Oil Sump

4.2.23.1 Setting

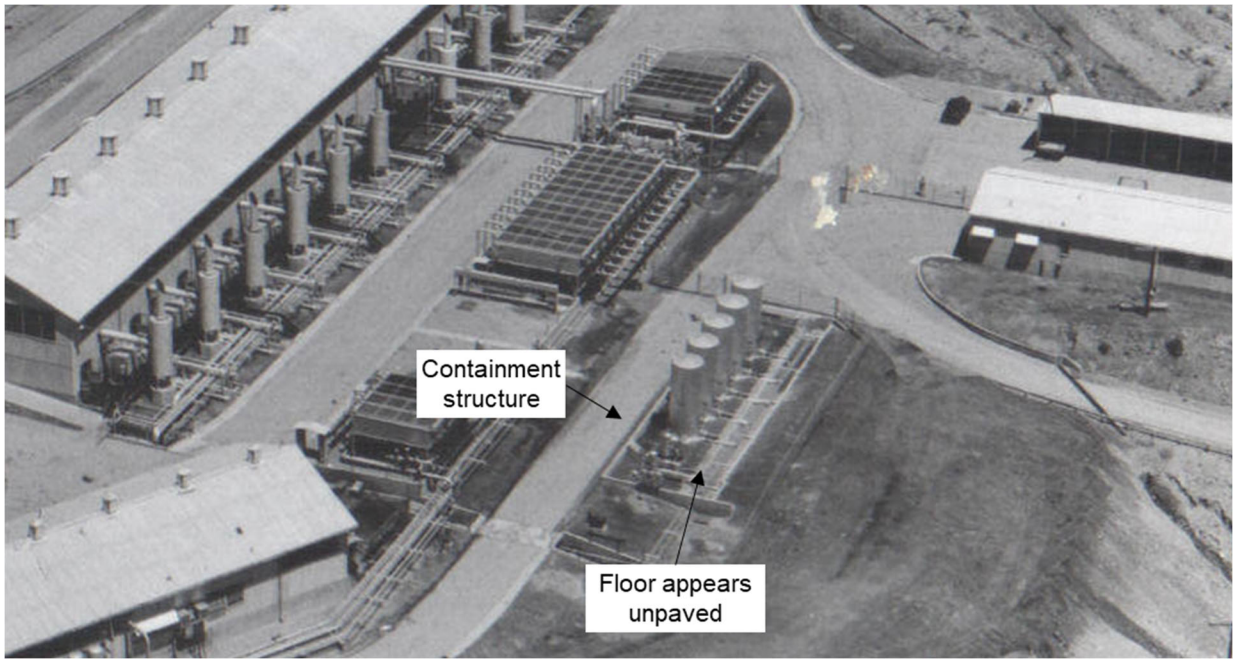
AOC 32 is the oil storage area in the upper yard immediately west of the visitor parking lot, as shown on Figure 2-2. AOC 32 contains five 7,150-gallon capacity oil storage tanks, the steel-lined concrete waste oil sump, and two 150-gallon capacity lubricating oil surge tanks. The oil storage tanks and waste oil sump are part of the original compressor station installation. Four of the five storage tanks contain clean (makeup) oil for the main compressor engines and generator engines. The fifth tank contains waste oil that is removed regularly by a contractor. The waste oil sump receives waste oil from the OWS, pipeline liquids collected from the scrubbers, and formerly received used oil from the scrubber sump. The waste oil sump discharges to the oily water treatment system.

The oil storage tanks and waste oil sump, along with associated piping, are located within a concrete secondary containment structure. The bottom of the containment structure is located approximately 16 inches below the surrounding grade, and the sides of the containment structure are approximately 5 to 8 inches above the surrounding grade. The bottom of the pipe trench located in the containment structure, along the eastern side, is approximately 1 foot below the bottom of the main portion of the containment structure.

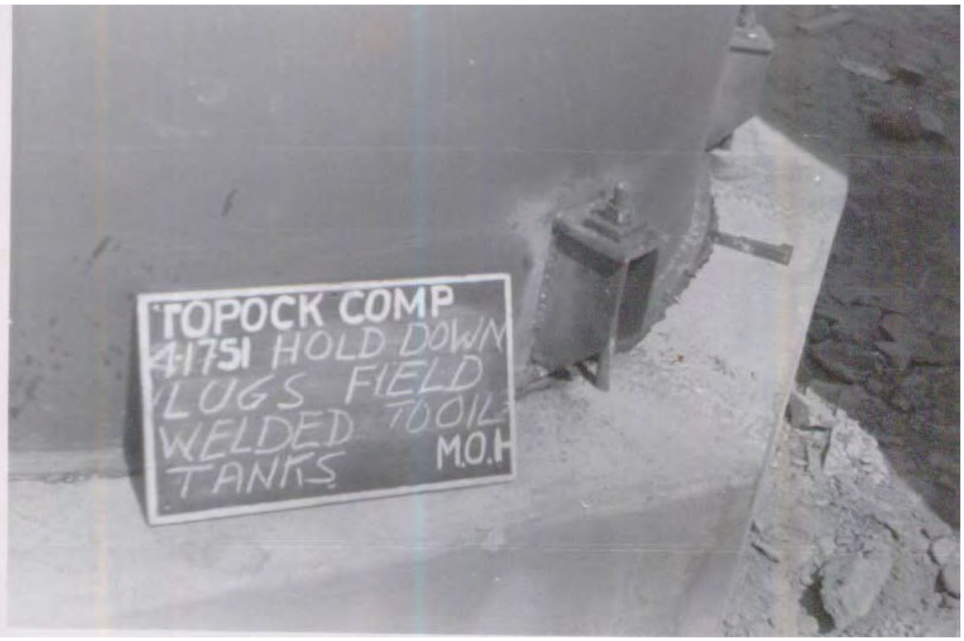
A catch basin is located in the southeastern corner of the secondary containment structure. This catch basin is piped to the waste oil sump in the pipe trench south of the oil storage tank area. In addition, a pipe connection exists from the catch basin to the storm drain line in the area. The valve leading to the storm drain line is closed and locked (chained) shut.

4.2.23.2 Unit History

The sidewalls of the secondary containment structure are apparent in a 1955 aerial photograph (Photograph 4-45). It appears that the floor of the oil storage area may have been unpaved at this time. It appears from the same photo and a 1951 photograph (Photograph 4-46) that the tanks were mounted on foundations.



Photograph 4-45: May 19, 1955 Aerial Photograph 2 (cropped). Facing northwest. Concrete containment structure around AOC 32 visible, floor appears unpaved.



Photograph 4-46: April 17, 1951 photograph, shows the foundation of an oil storage tank at installation.

Currently, the bottoms of the tanks appear to be set level with the floor of the containment structure (Photographs 4-47 and 4-48). The containment structure appears to be in good repair and also appeared to be in good condition during an engineering inspection in 1994. In 1994, a registered civil engineer evaluated the condition of the concrete containment for the oil storage tanks and rated it as being in good to excellent condition, suitable for use as secondary containment. Minor surface cracks were determined to be unlikely to penetrate the concrete. Therefore, the letter concludes that it would be unlikely that an oil spill would penetrate through the containment (Trident, 1996e).

Photograph 4-47: August 21, 2012 photograph. Facing west. Photo shows the oil storage tanks and concrete containment.

Photograph 4-48: August 21, 2012 photograph. Facing south. Photo shows the oil storage tanks and concrete containment, including the pipe trench on the eastern side.

The waste-oil sump consists of a steel tank within a concrete liner; the steel tank was installed into the existing waste-oil sump in 1996 (Trident, 1996e). Prior to the installation of the steel liner in 1996, the waste-oil sump was emptied and cleaned, and the concrete structure was inspected by a registered civil engineer. The concrete was found to be in good condition, with no cracks in the surface of the concrete and no erosion, pitting, or spalling of the concrete; and the condition of the concrete around the pipe penetrations was sound. The concrete tank was determined to be suitable as secondary containment for the new steel tank (Trident, 1996e).

4.2.23.3 Analytical Results

Soil Investigation

Due to substantial access constraints, active use of buildings, and physical dangers, samples were not collected from within AOC 32. Soil data will be collected when areas become available for sampling.

Soil Gas Investigation

Soil gas vapor probes were installed at location AOC13-16 to assess AOC 32, as soil sampling was not feasible. Installation and sampling details are described in Appendix B, Attachment B7. Soil gas samples were collected from AOC 13-11 at 2 to 3 feet bgs in January 2016 and February 2017. Results are presented in Table 3-23k and discussed with AOC 13 (Section 4.2.10). No data gaps were identified for soil gas.

4.2.23.4 AOC 32 Conceptual Site Model

A graphical CSM has been developed for AOC 32 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-27. Exhibit 4-36 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 32. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b).

Exhibit 4-36. Conceptual Site Model – AOC 32
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Primary Source	Primary Source Media	Potential Release Mechanism	Secondary Source Media	Potential Secondary Release Mechanism	Potential Human Receptors
Incidental spills and releases from new or waste oil tanks, or waste oil sump **COCs Include:** • TPH	• Concrete • Surface soil[a]	• Infiltration	• Surface soil • Shallow soil	• Potential release to deeper soil	**Human:** • Maintenance Worker • Commercial Worker

Notes:

[a] Surface soil was the primary source media when the bottom of the oil storage tank farm was unpaved.

The primary sources of contamination at AOC 32 are likely to be incidental releases of new and waste oil stored in this area. The potential type and quantity of any oil released in the vicinity this AOC are unknown. The primary source medium at AOC 32 appears to be concrete or asphalt (if releases occurred to outside the secondary containment). Oil released in AOC 32 would have been released primarily to concrete, and if the concrete lacked integrity, could have been released to surface soils underlying the concrete. If the bottom of the unit was unpaved or if releases occurred outside the secondary containment in earlier times, surface soil could also have been a primary source medium.

Any oil that entered surface soil could have infiltrated to shallow soil. Oils released to shallow soils could have infiltrated to deeper soils. If surface soil was previously exposed within this area, organic constituents in surface soils could have been degraded by heat and light. Because this unit is now entirely covered with concrete and located within secondary containment, surface soil runoff and wind dispersion are not potential migration pathways.

4.2.23.5 Evaluation of Data Against Data Quality Objectives for AOC 32

Decision 1 (Nature and Extent Determination): Deferred

Due to substantial access constraints, active use of buildings, and physical dangers, samples were not collected in AOC 32. Soil data will be collected when areas become available.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. No sampling was conducted at AOC 32 because it is an active unit, and sampling the unit would not be possible without compromising the integrity of the secondary containment. Instead, samples were collected around the Compressor and Auxiliary Buildings in AOC 13. If appropriate, the EPCs can be recalculated in the future when new data become available.

Decision 3 (Threat to Groundwater Determination): Deferred

Current or potential threat to groundwater was not evaluated because samples were not collected at AOC 32. Threat to groundwater will be evaluated in the future after soil data are collected AOC 32.

Decision 4 (Offsite Migration Assessment): Concentrations in AOC 32 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway, as areas within this unit are paved or otherwise covered with an impermeable surface. No surface migration pathway exists.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples collected at AOC 15 (a nearby unit) can be used to support characterization of AOC 32. Samples from AOC 15 were collected at AOC15-3. Results are presented in Table 3-37. These data are sufficient to support CMS/FS and IM decisions.

4.2.24 AOC 33 – Potential Former Burn Area near AOC 17

4.2.24.1 Setting

AOC 33 is the potential former burn area located near AOC 17, the former onsite septic system, as shown on Figure 2-2. This area was identified when PG&E conducted additional interviews with current and former employees to collect new anecdotal information pertaining to historical compressor station practices. Several employees reported that PG&E may have conducted a yearly fire training exercise, during which materials were set on fire, and employees practiced extinguishing the fire.

4.2.24.2 Unit History

Information provided during the interviews indicated yearly fire-training exercises involving burning diesel oil in a modified drum occurred east of the wash rack and steam cleaning area. Employees indicated that these fire extinguishing drills took place in the early 1980s (and may have taken place prior to then) and continued into the 1990s. This area is currently paved. No other information is available regarding this unit.

This area is located mostly within the footprint of AOC 17 and was investigated in conjunction with AOC 17 (Section 4.2.13).

4.2.24.3 Analytical Results

Not applicable. AOC 33 was investigated as part of AOC 17 (Section 4.2.13).

4.2.24.4 AOC 33 Conceptual Site Model

A combined CSM for AOC 17 and AOC 33 has been developed and is included in Section 4.2.13 and copied in this section.

A graphical CSM has been developed for AOC 17 based on site history and background reported in the Soil RFI/RI Work Plan (CH2M, 2013a), as shown on Figure 4-17a. Exhibit 4-26 presents primary sources, primary source media, potential release mechanisms, secondary source media, and potential secondary release mechanisms for AOC 17. A detailed discussion of the migration pathways, exposure media, exposure routes, and potential receptors is included in the Soil Part B DQOs TM (CH2M, 2011b) and is summarized in this section with updated information.

The primary sources of contamination at AOC 17 are likely to be historical liquid discharges from the laboratory. The quantity of liquid released to the septic system is unknown. Weekly testing of plant cooling water would have resulted in the disposal of approximately 6.5 gallons of liquid per year, whereas daily testing would have resulting in the disposal of approximately 45.5 gallons of liquid per year (assuming approximately 1 pint of liquid waste per test event). In addition to the laboratory waste, the septic system received sanitary waste from the Auxiliary Building as well as the other buildings listed.

The primary source of contamination at AOC 33 is likely to have been diesel fuel that may have spilled from a modified drum that was used in potential fire-training exercises and potential release of burn material.

The presence of lead above the background concentration in shallow (0- to 1-foot-bgs) samples may be from runoff from nearby roads and buildings. The presence of cadmium and zinc above background concentrations in 5 to 6 feet bgs may indicate these compounds were released through the septic system, which likely discharged below 4 feet bgs.

The presence of TPH-d and TPH-mo may be from potential fire-training exercises at AOC 33 or runoff from the surrounding roads and buildings. Dioxins and furans, as TEQ human, were not detected above the background concentration, indicating burned materials did not contribute to contamination in this area.

The primary source medium at AOC 17 is subsurface soil. The depth of the leach lines is approximately 4 feet bgs. The continuous release of liquids in AOC 17 would have possibly caused wastes to infiltrate to deeper soils. Because the liquids were discharged below the ground surface and the entire area is currently paved, there are no surface migration pathways for this AOC.

The primary source medium at AOC 33 is surface soil and may also have included pavement if fire-training activities occurred after the area was paved. The primary release mechanisms are direct releases of contaminated particulates or leaching of contaminants from potential fire-training exercises in this area. Contaminants present in burned materials could have been deposited on surface soil as particulates or entered surface soil as dissolved constituents through infiltration of rainfall. However,

analytical results (i.e., dioxins and furans) and soil boring logs for AOC 17 (Attachment B1) do not support the presence of burned materials in this area.

Contaminants could have leached from surface soils and shallow soil into underlying deeper soils. Potential migration from subsurface soil to groundwater was identified as a potential secondary pathway. Windblown dust contamination from contaminated surface soil within AOC 33 is a potential secondary release mechanism. Windblown contamination, if any, is expected to be limited to surface soils. Surface runoff from AOC 33 to the East Ravine could also have transported COPCs or COPECs in surface soil.

4.2.24.5 Evaluation of Data Against Data Quality Objectives for AOC 33

Not applicable. AOC 33 was investigated as part of AOC 17 (Section 4.2.13).

Contaminants, if present, in AOC 33 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway, as areas within this unit are paved or otherwise covered with an impermeable surface. No surface migration pathway exists.

4.2.25 Unit 4.3, 4.4, and 4.5 – Oily Water Holding Tank, Oil/Water Separator, Portable Waste Oil Holding Tank

4.2.25.1 Setting

Units 4.3, 4.4, and 4.5 are located in the southern portion of the lower yard near the western fence line, as shown on Figure 2-2. Unit 4.3 is the Oily Water Holding Tank. Unit 4.4 was the OWS located adjacent to Unit 4.3 (the API OWS relocated from AOC 24, discussed in Section 4.2.20). Unit 4.5 was the portable waste oil storage tank adjacent to the Unit 4.3 and 4.4.

4.2.25.2 Unit History

Unit 4.3

Unit 4.3, Oily Water Holding Tank, was installed in 1970. It was a 15 feet long by 5 feet in diameter cylindrical steel tank that had a capacity of 3,000 gallons. The tank was mounted horizontally on two concrete supports; the area beneath the tank was unpaved. The tank was used to collect oily water from the compressor floor drainage (about 200,000 gallons per year), engine cleaning operations (about 10,000 gallons per year), and steam-cleaning operations (about 10,000 gallons per year) (Kearny, 1987). Wastewater that was collected in this tank was discharged by gravity flow via an aboveground 3-inch-diameter steel pipe to the adjacent OWS (Unit 4.4). The Oily Water Holding Tank was removed in conjunction with the sludge drying beds (SWMU 5) between November 1988 and February 1989 (CH2M, 2007a). Soils beneath the tank and concrete foundation were inspected, and no visible contamination was found; therefore, no confirmation samples were collected from this area at that time.

Unit 4.4

Unit 4.4, OWS, was approximately 4.5 feet deep, 15 feet long, and 6 feet wide, and it was constructed of 6-inch-thick concrete (Kearny, 1987). The Unit 4.4 OWS received wastewater from Unit 4.3. The OWS was equipped with an underflow weir to control discharge, and the floating oil was transferred by hose to a portable waste oil storage tank. From 1967 to 1969, effluent from the OWS may have been directed to the former sludge drying beds (SWMU 5) and processed along with the cooling-water blowdown through the single-step chromium treatment system prior to discharge. From 1969 through October 1985, effluent from the separator was routed to the Chromate Reduction Tank (SWMU 6) and was processed along with the cooling-water blowdown through the two-step chromium treatment system prior to being discharged.

The separator was closed and removed between November 1989 and March 1990. Stained soils were removed until confirmation testing showed that the residual concentrations met clean-up targets.

Unit 4.5

Unit 4.5, Portable Waste Oil Storage Tank, consisted of an enclosed steel tank about 6 feet long and 2 feet in diameter mounted horizontally on a trailer (Kearny, 1987). The tank was connected to a suction pump within the OWS with a flexible hose. The portable tank was stationed on a concrete pad that was bermed on three sides with a 6-inch-high curb. The fourth side of the pad was left open to allow removal of the unit. The Unit 4.5 tank was used to collect skimmed oil from the Unit 4.4 OWS. When the tank was full, it was transported to the eastern side of the facility and pumped into the stationary waste oil tank that is part of AOC 32. Starting in 1975, the waste oil was either sold for reuse or transported to a recycling center.

Unit 4.5 was removed from service in 1989. The waste oil was removed from the tank, and the tank was then transported offsite to Chemical Transportation in Wilmington, California (Mittelhauser, 1990a). No indication of a release associated with the portable waste oil storage tank was observed during a facility inspection performed as part of the RFI (Kearny, 1987).

4.2.25.3 Analytical Results

General field and sample collection methods are summarized in Appendix B. Analytical results for Units 4.3, 4.4, and 4.5 are presented in Tables 3-35a through 3-35g, and sampling locations are shown on Figure 3-1. Screening level exceedances are summarized in this section. Results are presented on Figures 3-10a through 3-10h. There were no exceedances of screening level values in Units 4.3, 4.4, and 4.5.

Metals: Samples were collected from two locations, and no samples had detected results that exceeded their respective background levels (Table 3-35a).

CLP Inorganics: Samples were collected from two locations, and no samples had detected results that exceeded their respective background levels (Table 3-35b).

PAHs: Samples were collected from two locations from 0 to 3 feet bgs (Table 3-35c). PAHs were evaluated by calculating B(a)P equivalents for human health. No samples had detected results that exceeded the B(a)P equivalent CSL (2,100 µg/kg).

TPH: Samples were collected from up to four locations, and no samples had detected results that exceeded their respective CSLs (Table 3-35d).

VOCs and SVOCs: VOCs and SVOCs were not a COPC for this unit; therefore, samples were not analyzed for VOCs and SVOCs.

General Chemistry: Samples were collected from two locations and were only analyzed for pH, which has no CSL or background level (Table 3-35e).

Pesticides: Pesticides were not a COPC for this unit; therefore, samples were not analyzed for pesticides.

PCBs: Samples were collected from two locations, and no samples had detected results that exceeded their respective CSLs (Table 3-35f).

Dioxins and Furans: Dioxin and furans were not a COPC for this unit; therefore, samples were not analyzed for dioxins and furans.

4.2.25.4 Units 4.3, 4.4, and 4.5 Conceptual Site Model

Due to their proximity to each other, a combined CSM has been developed for SWMU 5, SWMU 6, SWMU 9, and Units 4.3, 4.4, and 4.5 based on the site history and background reported for these units in the RFI/RI Work Plan (CH2M, 2013a). The written and tabular CSM for these units can be found in Section 4.2.1 (SWMU 5).

4.2.25.5 Evaluation of Data Against Data Quality Objectives for Units 4.3, 4.4, and 4.5

Decision 1 (Nature and Extent Determination): Nature and extent have been sufficiently defined laterally and vertically given laboratory results and current data density. Analytical results are presented in Tables 3-35a through 3-35f and on Figures 3-10a through 3-10h. A summary of the frequency of detection, maximum detected value, and number of exceedances of the data against each screening value is presented in Table 3-35g.

Only Category 1 and 2 data were used to delineate the nature and extent of contamination. Considering these data only, four samples were collected from two locations at depths ranging from 0 to 3 feet bgs for Units 4.3, 4.4, and 4.5. The samples were analyzed for one or more of the following analytes: metals, CLP inorganics, PAHs, TPHs, PCBs, and general chemistry parameters.

Decision 2 (Data Sufficiency for EPC Calculation): Data are sufficient to estimate representative EPCs. At the time of the RFI/RI Work Plan, existing data for the Part B investigation units were determined to be adequate to support EPC development, except for data regarding PAHs in shallow soil. This data gap was filled during implementation of the RFI/RI Work Plan. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): No current or potential threat to groundwater was identified. The potential impact to groundwater from source areas in the vadose zone was evaluated using a conservative, three-tiered approach and Category 1 and Category 2 data from the Combined Soil RFI/RI Data Set. A full description of the three-tiered approach and the associated results and conclusions are provided in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations in Units 4.3, 4.4, and 4.5 do not pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. One surface soil sample was collected from an unpaved area associated with Unit 4.3 between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, CLP inorganics, PAHs, VOCs, SVOCs, TPH, general chemistry, and PCBs. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISL for locations outside the compressor station fence line (equal to the EPA RRSL, residential DTSC-SL, ECV, or background). No ISLs were exceeded.

Decision 5 (Data Sufficiency to Support CMS/FS): Data are sufficient to support CMS/FS and IM decisions. During implementation of the RFI/RI Work Plan, samples were collected and analyzed to determine soil physical parameters. Samples collected at SWMU 5 and AOC 21 (nearby units) can be used to support characterization of Units 4.3, 4.4, and 4.5. Results are presented in Table 3-37. These data, along with the nature and extent data collected, are sufficient to support CMS/FS and IM decisions.

4.3 Storm Drain System Investigation Results

The results of the storm drain investigation are described below by storm drain line. A detailed discussion of the storm drain investigation methodology is provided in Appendix B. Briefly, the field investigation consisted of the following steps: field verification, including flow testing, video camera tracing, and storm drain soil investigation.

- **Field verification** including flow testing– Features documented in records were visually verified. Catch basins and trench drains were located, sediment accumulated in the catch basins and trench drains was sampled, and any remaining sediment was removed and disposed of. Flow testing was used to establish which catch basins were connected to other catch basins and specific outfalls. In some cases, blockages were encountered and PG&E attempted to pressure wash and vacuum segments of storm drain lines to remove accumulated material. Samples of the water used for flow testing (also referred to as storm drain flush water samples) were collected and analyzed.
- **Video camera tracing** – Video surveys were conducted within the pipes and catch basins to confirm pipe alignment and locate breaks, obstacles, presence of sediment and blockages within drain lines, and known and unknown service connections. The majority of the storm drain lines evaluated in the storm drain investigation had video surveys completed.
- **Storm drain soil investigation** – Soil samples were collected at the storm drain outfalls and along storm drain lines. Repairs were made and blockages removed from several storm drain lines, as described below in the individual storm drain line discussions.

Analytical results of storm drain flush water samples and catch basin sediment are provided in Tables 3-39 and 3-40, respectively. Detailed results of the storm drain survey are summarized in Table 3-41. Table 3-41 summarizes pipe diameters, storm drain lengths, pipe materials, locations and distances of connections and bends, key observations from field and video surveys, associated catch basins (CB), Trench Drain lines (TDL), and storm drain outfall (SD) sample names associated with each drain line, constituents exceeding screening levels in sediment samples from CB, TDL, SD samples, and constituents in flow test water exceeding concentrations in source water. Storm drain lines and subsegments, storm drain soil sample locations, and catch basin sediment sample locations are shown on Figure 3-19. Figure 3-19 also identifies segments of storm drain lines that were video surveyed. Some storm drain line sections could not be video surveyed due to blockages or access constraints.

Sediment was removed from catch basins after being sampled, so catch basin sediment results do not represent current conditions. Several debris samples collected from blockages within storm drain lines were also removed and also do not represent current conditions.

4.3.1 Storm Drain Line 2

Storm Drain Line 2 (SDL-2) is located in the southeast portion of the compressor station and originates on the southeast side of the Auxiliary Building at Trench Drain Line 1 (TDL-1) and exits in the vicinity of AOC 10a. SDL-2 is a 6-inch-diameter pipe approximately 122 feet long. The pipe composition varies between cast iron, PVC, and corrugated steel. The bottom of a portion of the pipe composed of corrugated steel was corroded with possible small holes between approximately 90 to 100 feet from TDL-1. The corroded portion of SDL-2 is located on the slope within AOC 9, near the terminus between the compressor station fence line and the compressor station access road.

Soil Samples – One soil sample, SD-01, was collected at the outfall of SDL-2 and evaluated as part of AOC 10. ISLs were exceeded for copper, total chromium, nickel, and zinc at SD-01. The factors of exceedance ranged from just over 1 (total chromium) to 3.3 (zinc). There were no exceedances for organics (Table 3-6). The lateral and vertical extent of exceedances were determined to be generally defined in the vicinity of SD-01, with any data gaps being minor and not requiring further investigation (Section 4.1.4).

Catch Basin Sediment Samples – No catch basin sediment was collected for SDL-2 as TDL-1 did not have any accumulated sediment to sample.

Storm Drain Flush Water Samples – The storm drain flush water sample (SDOF-02) had elevated concentrations of metals and TPH compared to the source water (Table 3-39). The detected concentrations in SDOF-02 were less than two times greater than the source water for all compounds except for the following:

- Metals – Concentrations of total chromium and CrVI were 4.4 times and at least 45 times greater than those of the source water, respectively.
- TPH – Concentrations of TPH as motor oil and TPH as diesel were 126 times and at least 18 times greater than those of the source water, respectively.

The presence of elevated levels of CrVI, total chromium, TPH as diesel, and TPH as motor oil in the storm drain flush sample may indicate that sediment accumulated within SDL-2 was impacted by these compounds; however, sediment within the line was not noted in the video log. The location of the possible small holes near the terminus of the line are not recommended for repair.

4.3.2 Storm Drain Line 3

SDL-3 is located on the eastern side of the compressor station and captures stormwater from up to six catch basins (CB-1 through CB-4 and potentially CB-5 and CB-6), from areas near the north end of the auxiliary building, southeast of AOC 15 (Auxiliary Jacket Water Coolers), and near AOC 32 (Oil Storage Tanks and Waste Oil Sump). SDL-3 is comprised of three storm drain line segments (A, B, and C) that combine to discharge to one outfall point (SD-03) along the slope east of the compressor station fence line above the East Ravine (AOC 10).

- SDL-3 Segment A begins at CB-4 and joins SDL-3 Segment B at CB-3. Segment A is a 4-inch-diameter pipe approximately 65 feet long and is composed of red clay and PVC. Cracks and blockage were identified near a 90-degree elbow; the affected portion was replaced with CPVC pipe during the storm drain investigation. Opportunistic soil samples SD-OS34 and SD-OS34A were collected from the two locations where cracks were noted.
- SDL-3 Segment B begins at CB-1 and joins SDL-3 Segment C. Segment B is a 5-inch red clay pipe approximately 20 feet long. Opportunistic soil sample SD-OS36 was collected from where Segment B joins Segment C.
- SDL-3 Segment C begins at CB-5 and ends where Segment B joins. Segment C is an 8-inch red clay pipe approximately 94 feet long. SDL-3 was previously connected to CB-6. A valve 1 foot south of CB-6 was locked. Soil sample SD-SD44 was collected at the junction of SDL-3 and where the line from CB-6 appears to connect. Opportunistic soil samples SD-OS35 and SD-OS35A were collected downstream of CB-6 when the valve and pipe section was replaced in December 2016.
- SDL-3 from end of Segment C to the outfall as SD-03 is approximately 65 feet.

Soil Samples – Two soil samples, SD-02 and SD-03, were collected at the outfall of SDL-3, and multiple opportunistic samples were collected as described below.

Outfall soil samples SD-02 and SD-03 were collected at the outfall of SDL-3 and evaluated as part of AOC 10. ISLs were exceeded for multiple metals, HMW PAH, B(a)P equivalents, and TPH as diesel at SD-03 (Table 3-6). However, approximately 30 feet downgradient at SD-02, only a minor exceedance of lead (FOE 1.2) was measured. The lateral extent of exceedances were determined to be generally defined in the vicinity of SD-02 and SD-03, with any data gaps being minor and not requiring further investigation (Section 4.1.4).

Opportunistic soil samples (SD-OS43, -OS34A, -OS35, -OS35A, -OS36, and -SD44) were evaluated as part of AOC 13 (Section 4.2.10). The results of these soil samples were compared to background and/or CSLs and there were exceedances of the following:

- Background was exceeded for barium, cadmium, CrVI, total chromium, cobalt, copper, lead, molybdenum, nickel, and zinc. Sample location SD-OS34 had the highest concentrations and the greatest number of background exceedances. Copper and lead exceeded background at all five

depths samples, with background FOEs ranging from 1.4 to 49 (copper) and from 3.1 to 130 (lead). SD-OS34 from 0.5 to 1 ft bgs exceeded TTLC values for mercury and lead.

- CSLs were exceeded for cadmium, CrVI, lead, mercury, and dioxins and furans (as TEQ human). All CSL exceedances occurred in samples from location SD-OS34. CSL FOEs ranged from 1.3 to 5.6.

The lateral extent of exceedances in soil has been defined in the vicinity if SDL-3. The vertical extent of exceedances was not defined at SD-OS35A (CrVI, total chromium, copper, lead, and zinc), SD-OS35 (lead), or SD-OS34 (copper and lead). However, as these were opportunistic samples collected during other site activities (e.g., pipe repair), deeper samples could not be collected (Section 4.2.10).

Catch Basin Sediment Samples - Up to six catch basins may be associated with SDL-3: CB-01 through CB-04 and potentially CB-05 and CB-06. There was no sediment in CB-02 and CB-04. Analytical results for catch basin samples CB-01, CB-03, CB-05, and CB-06 are presented in Table 3-40. The catch basin sediment sample results were compared to the background and/or commercial screening levels; there were exceedances of the following:

- Background was exceeded for barium, cadmium, CrVI, total chromium, copper, lead, molybdenum, nickel, zinc, and iron. The highest background FOEs were for lead (32 to 167), copper (7 to 107), and zinc (12 to 43).
- CSLs were exceeded for lead (FOE 1.6 to 4.4), mercury (FOE 2.4 and 2.9), B(a)P equivalents (FOE 3.8), and TPH as diesel (FOE 1.1 and 1.3).
- Lead was detected in CB-6 at 1,400 mg/kg, exceeding the California TTLC hazardous waste concentration. This was the only catch basin sample that exceeded TTLC limits.

Storm Drain Flush Water Samples - Storm drain flush water sample (SDOF-03) contained elevated concentrations of metals, PAHs, and TPH compared to the source water (Table 3-39). The detected concentrations in SDOF-02 were greater than two times the source water for the following:

- Metals – Barium, CrVI, total chromium, copper, lead and molybdenum with concentrations ranging from 2.2 times (molybdenum) to 55 times (CrVI) greater than source water.
- TPH – TPH as diesel was 3.2 times higher than source water.

Cracks to SDL-3 Segment A were repaired in 2016. No cracks or breakages were noted for other segments. The presence of slightly elevated levels of metals and TPH in the storm drain flush sample and lack of sediment within the catch basins and drain lines does not indicate an ongoing source of contamination from SDL-3 to AOC 10.

4.3.3 Storm Drain Line 4

SDL-4 is located on the eastern side of the compressor station and captures stormwater from catch basin CB-32, near the northern side of AOC 17 (Onsite Septic Systems). SDL-4 appears to be located entirely outside the compressor station fence line. SDL-4 is a 4-inch-diameter PVC pipe approximately 13 feet long.

Soil Samples – One soil sample, SD-04, was collected near the outfall of SDL-4 and evaluated as part of AOC 10. No screening levels were exceeded at SD-04 (Table 3-6). The lateral and vertical extent of exceedances were determined to be generally defined in the vicinity of SD-04, with any data gaps being minor and not requiring further investigation (Section 4.1.4).

Catch Basin Sediment Samples – There was no sediment in catch basin CB-32; therefore, no sediment samples were collected.

Storm Drain Flush Water Samples – There is no storm drain flush water sample for this storm drain line.

Based on the sampling results, SDL-4 does not appear to contribute to contamination in AOC 10 and no data gaps requiring further investigation have been identified.

4.3.4 Storm Drain Line 4B

SDL-4B is located on the eastern side of the compressor station, south of the access road and in the vicinity of the former trench drain. This line is no longer active as no catch basin was identified for this storm drain. SDL-4B is a 5-inch-diameter PVC pipe and is approximately 48 feet long. Gravel and debris were found blocking SDL-4B near the start of the line. This blockage was likely associated with the decommissioning of the former trench drain.

Soil Samples – One soil sample, SD-21, was collected at the outfall of SDL-4B. Three additional soil samples (SD-05, SD-06, and SD-22) were collected in the vicinity of SDL-4B. Soil samples were evaluated as part of AOC 10. ISLs were exceeded for lead, molybdenum, and zinc (Table 3-6). The FOEs were less than two for all exceedances except for lead at SD-05, which had an FOE of 4.4. The lateral and vertical extent of exceedances were determined to be generally defined in the vicinity of SDL-4B, with any data gaps being minor and not requiring further investigation (Section 4.1.4).

Catch Basin Sediment Samples – As no catch basin was identified for SDL-4B, there is no catch basin sediment sample.

Storm Drain Flush Water Samples – There is no storm drain flush water sample for this storm drain line because no catch basin was identified.

Based on the soil sampling results no data gaps requiring further investigation have been identified.

4.3.5 Storm Drain Line 5

SDL-5 is located just north of the station access road below the office building; it captures stormwater from catch basin CB-7 and exits approximately 34 feet to the south at the station access road. SDL-5 is an 8-inch-diameter corrugated steel pipe. During the video survey it was discovered that there was a slight gap in the pipe at 26 feet. The pipe sections were pushed back together after the video survey to try to reduce the size of the gap.

Soil Samples – One soil sample, SD-07, was collected at the outfall of SDL-5 and was evaluated as part of AOC 13. There were background exceedances of lead (FOE 23) and zinc (FOE 6.9). There were no exceedances of CSLs (Table 3-23). The lateral and vertical extent of soil exceedances were determined to be defined in the vicinity of SDL-5 (Section 4.2.10).

Catch Basin Sediment Samples – No sediment was present in catch basin CB-7; therefore, there is no catch basin sediment sample.

Storm Drain Flush Water Samples – Storm drain flush water sample SDOF-05 had elevated concentrations for some metals compared to the source water. The detected concentrations in SDOF-05 were greater than two times the source water for the following:

- Metals – Concentrations for zinc, total chromium, and CrVI were 2.9 times, 5.3 times, and at least 4.4 times greater than source water, respectively.

Based on the soil sample result from the SDL-5 outfall, SDL-5 may have contributed to elevated concentrations of lead and zinc in soil in the vicinity of SDL-5. Based on the storm drain flush water sample, accumulated sediment inside SDL-5 may have been impacted by CrVI, total chromium, and zinc. As the accumulated sediment was removed by the storm drain flushing activities, it is not anticipated that SDL-5 is a current source of chromium or zinc to soil.

4.3.6 Storm Drain Line 6

SDL-6 is located on the eastern side of the compressor station and captures stormwater from catch basin CB-8 near the office building and exits outside the compressor station fence line near AOC 11. SDL-6 is an 8-inch corrugated steel pipe approximately 52 feet long. There is a “T” joint at 37 feet. Palm tree roots block the “T” joint and the camera could not be advanced into the unnamed branch to the south. The pipe was found to be very corroded and broken 5-10 feet inside the compressor station fence line; a soil sample (SD-24) was collected from this area.

Soil Samples – One soil sample, SD-08, was collected at the outfall of SDL-6 and was evaluated as part of AOC 11. The soil sample collected from the corroded and broken section of pipe, SD-24, was evaluated as part of AOC 13. At SD-08, ISLs were exceeded for CrVI, copper, and zinc (Table 3-7). At SD-24, background concentrations were exceeded for cadmium, copper, lead, molybdenum, and zinc. SD-24 had no exceedances of CSLs (Table 3-23). The lateral extent of exceedances was determined to be defined in the vicinity of both SD-08 (Section 4.1.5) and SD-24 (Section 4.2.10). The vertical extent of exceedances was determined to be defined at SD-24 but not at SD-08 for CrVI or copper. These gaps may be filled during remediation if implemented in this area.

Catch Basin Sediment Samples – Catch basin sediment from CB-8 exceeded background concentrations for copper (FOE 4.2), lead (3.5), molybdenum (1.9), and zinc (2.1). Sediment from CB-8 also exceeded the CSL for B(a)P equivalents (FOE 3.9) (Table 3-40).

Storm Drain Flush Water Samples – Storm drain flush water sample SDOF-06 had elevated concentrations of metals, PAHs, and TPH compared to the source water (Table 3-439). The detected concentrations in SDOF-06 were greater than two times the source water for the following:

- Metals – Concentrations of barium, CrVI, total chromium, cobalt, copper, lead, nickel, vanadium, and zinc ranged from 2.3 times (vanadium) to 43 times (CrVI) greater than source water concentrations.
- B(a)P equivalents was at least 9.6 times greater than source water.
- TPH as motor oil and TPH as diesel were 16 times and at least 4.8 times greater than source water, respectively.

Soil and catch basin sediment samples may indicate SDL-6 was a source of metals to soil near the line break and at the storm drain outfall. The storm drain flush water sample was also elevated compared to the source water for some metals along with some PAHs and TPH. As catch basin sediment was removed and accumulated material in the storm drain line was flushed with site activities, SDL-6 is not anticipated to be a current source of contamination to AOC 11. Repairing the broken section of pipe and surveying the unnamed pipe branch to the south may be considered during station maintenance operations.

4.3.7 Storm Drain Line 7

SDL-7 is located on the eastern side of the compressor station, just north of the covered parking area. SDL-7 captures stormwater from catch basins CB-9 and CB-10. SDL-7 originates at catch basin CB-9, flows through catch basin CB-10, and exits outside the compressor station fence line near AOC 11. SDL-7 is a 4-inch-diameter pipe composed of PVC, corrugated steel, and an unknown material and is approximately 107 feet long.

Soil Samples – One soil sample, SD-10, was collected near the outfall of SDL-7. A second soil sample, SD-09, was collected along the pipeline. Both soil samples were evaluated as part of AOC 11. There were no exceedances of ISLs at SD-09 (Table 3-7). There were ISL exceedances at SD-10 for metals (CrVI, lead, mercury, and zinc), with FOEs ranging from 1.7 (CrVI) to 30 (mercury). The lateral and vertical extent of soil exceedances were determined to be defined in the vicinity of SDL-7 (Section 4.1.5).

Catch Basin Sediment Samples – Catch basin sediment from CB-9 exceeded background concentrations for copper (FOE 3.9), lead (FOE 4.6), molybdenum (4.7), and zinc (6.9). Sediment from

CB-9 exceeded the CSL for B(a)P equivalents (FOE 2.3) (Table 3-40). No sediment was found in catch basin CB-10; therefore, no sample was collected.

Storm Drain Flush Water Samples – Storm drain flush water sample SDOF-07 had elevated concentrations of metals and TPH compared to the source water (Table 3-39). The detected concentrations in SDOF-07 were greater than two times the source water for the following:

- Metals – Concentrations of total chromium and copper were 2.3 times and at least 3.5 times greater than source water, respectively.

The concentrations in soil near the outfall of SDL-7 may indicate that SDL-7 was a source of metals to AOC 11. There were also elevated metals concentration in catch basin sediment (CB-9), with lead and zinc exceeding applicable screening levels in both soil and catch basin sediment. SDL-7 is not anticipated to be a current source of contamination to AOC 11 because catch basin sediment was removed and accumulated material in the SDL-7 was flushed during site activities. No data gaps requiring further investigation have been identified.

4.3.8 Storm Drain Line 8

SDL-8 is located on the eastern side of the compressor station northeast of the Compressor Building. SDL-8 captures stormwater from catch basin CB-11 north of AOC 25 and south of AOC 6 (Cooling Tower B) and exits outside the compressor station fence line near AOC 11. SDL-8 is an 8-inch-diameter pipe approximately 140 feet in length, composed of red clay, PVC, corrugated steel, and potentially concrete. Cracks or scale are present in several locations between 9 and 29 feet from CB-11. During flow testing a leak was noticed at a pipe material transition between red clay and PVC. A soil sample, SD-OS37, was collected at this location.

There is an abandoned parallel storm drain line on the south side of SDL-8. Soil samples were collected above and below the abandoned line immediately upslope of where the pipe exits the side of the hill (SD-27). The abandoned pipeline was not video surveyed.

Soil Samples – Multiple soil samples were collected in association with SDL-8 and all were evaluated as part of AOC 11. Four soil samples were collected from near the outfall of SDL-8: SD-11A, SD-11, SD-23, and SD-12. One soil sample was collected near a leaking portion of SDL-8 (SD-OS37). One soil sample was collected along the abandoned pipeline south of SDL-8 (SD-27). There were exceedances of the ISLs for metals, PAHs, TPH, PCBs, and dioxins and furans (Table 3-7). The most ISL exceedances occurred near the outfall of the abandoned pipeline (SD-11 and SD-11A):

- The FOEs for metals ranged from 1.1 (copper) to 19 (zinc).
- The FOEs for TPH as diesel ranged from 2.6 to 4.1.
- The FOE for B(a)P equivalents was 1.8.
- The FOEs for PCBs ranged from just over 1 (Aroclor 1254) to 6.5 (total PCBs).
- The FOEs for dioxins and furans ranged from 1.3 (TEQ human) to 25 (TEQ mammal).

There were lower concentrations and fewer exceedances near the outfall of SDL-8 (SD-23), with FOEs less than 2 for all compounds except TEQ mammal (FOE 2.5). Further downgradient at SD-12 there were no exceedances, indicating minimal downslope transport. The exceedances of the TEQ mammal ISL are not considered data gaps requiring further investigation because, as agreed upon during the investigation process, the TEQ avian and TEQ human ISLs were used to define nature and extent for dioxin and furans because the TEQ mammal ISL of 5.58 ng/kg, based on background, is very conservative and extremely low.

There were exceedances of metals, PAHs, and PCBs at location SD-OS37, where the pipe was found to be leaking. The highest FOEs at SD-OS37 were for PAHs (4.9 to 6.9) and PCBs (1.3 to 9.5), and only one metal had an FOE greater than 2 (lead, at 4.3). The lateral and vertical extent of soil exceedances were determined to be defined in the vicinity of SDL-8 (Section 4.1.5).

Catch Basin Sediment Samples – Catch basin sediment from CB-11 exceeded background concentrations for metals and CLP inorganics, with the FOEs ranging from 1.2 (cadmium) to 26 (molybdenum). The CSL was exceeded for arsenic (FOE 1.7) (Table 3-40).

Storm Drain Flush Water Samples – Storm drain flush water sample SDOF-08 had elevated concentrations of metals and TPH compared to the source water (Table 3-39). The detected concentrations in SDOF-08 were greater than two times the source water for the following:

- Metals – Concentrations of copper and molybdenum were 3.8 times and 3.2 times greater than source water, respectively.
- TPH – Concentrations of TPH as motor oil and TPH as diesel were 21 times and at least 9.4 times greater than source water, respectively.

The concentrations in soil near the outfall of SDL-8 and abandoned pipe may indicate SDL-8 was a source of metals, TPH, PAHs, PCBs, and dioxins/furans to AOC 11. Based on the storm drain flush water sample, accumulated sediment inside SDL-8 may have been impacted by metals and TPH. As the accumulated material was removed by the storm drain flushing activities, it is not anticipated that SDL-8 is a current source of metals or TPH to soil. Repairing the cracks and leaks in the pipe may be considered as part of station operations.

4.3.9 Storm Drain Line 9

SDL-9, which is located southeast of AOC 6 (Cooling Tower B), captures stormwater from catch basin CB-13 east of AOC 6 and exits upslope from AOC 11. SDL-9 is an 8-inch-diameter pipe composed of PVC and corrugated steel, approximately 215 feet long. The pipe was heavily corroded and had holes at approximately 25 feet from CB-13. A soil sample was collected from this location (SD-OS39) and the pipe was repaired during the storm drain investigation. A separation in an aboveground portion of the pipe was discovered during the survey; a soil sample was collected from this location (SD-20). A leak at the separation was noticed during flow testing and water that continued down the line was found to discharge through large holes in the bottom of the pipe at about 90 feet.

Soil Samples – Soil samples were collected from leaking portions of the pipe (SD-OS39 and SD-20) and near the outfall of SDL-9 (SD-13); these samples were evaluated as part of AOC 11 and AOC 13. Applicable screening levels were exceeded for CrVI, lead, zinc, sodium, and B(a)P equivalents; all FOEs were less than 1.5 (Table 3-7 and 3-23). The lateral and vertical extent of soil exceedances were determined to be defined in the vicinity of SDL-9 (Section 4.1.5).

Catch Basin Sediment Samples – Catch basin sediment from CB-13 exceeded background concentrations for metals, with the FOEs ranging from 1.1 (lead) to 4.1 (zinc). The CSL was exceeded for TPH as diesel (FOE 10) (Table 3-40).

Storm Drain Flush Water Samples – Storm drain flush water sample SDOF-09 had elevated concentrations of metals, PAHs, and TPH compared to the source water (Table 3-39). The detected concentrations in SDOF-08 were more than two times greater than the source water for the following:

- Metals – Concentrations of copper and CrVI were 4.6 and at least 5.5 times greater than source water, respectively.
- PAHs – Concentration of B(a)P equivalents was 9.2 times greater than source water.
- TPH – Concentrations of TPH as motor oil and TPH as diesel were 11.7 and at least 3.1 times greater than source water, respectively.

Catch basin sediment and storm drain flush water indicate sediment and accumulated material inside SDL-9 may have been impacted by metals, PAHs, and TPH. However, the concentrations in soil near the SDL-9 outfall and leaking areas of pipe do not indicate SDL-9 was a source of contamination to AOC 11. As any potentially impacted material (i.e., catch basin sediment and accumulated material inside SDL-9) would have been removed during the storm drain investigation, SDL-9 is not anticipated to be a current

source of contamination to AOC 11. Repairing the pipe separation and large holes may be considered during station operations and maintenance.

4.3.10 Storm Drain Line 10

SDL-10 is located on the northwest side of the compressor station and captures stormwater from catch basin CB-15, at the northern end of the lower yard, and exits into AOC 1 (Area Around Former Percolation Bed). SDL-10 is a 10-inch-diameter PVC pipe approximately 156 feet long. The pipe was in good condition at the time of the storm drain survey and no sediment was noted within the line.

Soil Samples – Soil samples were collected along SLD-10 (SD-OS33) and near the outfall (SD-14); these samples were evaluated as part of AOC 1. There were no exceedances of ISLs at SD-OS33 (Table 3-2). There were ISL exceedances at SD-14 for metals, PAHs, TPH, PCBs, and dioxins/furans, as follows:

- The FOEs for metals ranged from 1.1 (total chromium) to 14 (lead).
- The FOEs for PAHs (B(a)P equivalents and PAH high molecular weight) were less than 1.3.
- The FOEs for PCBs ranged from 1.3 (Aroclor 1256) to 6.6 (total PCBs).
- The FOEs for dioxins/furans ranged from 1.3 (TEQ avian) to 34 (TEQ mammal).

The lateral and vertical extent of contamination in the vicinity of the SDL-10 outfall was determined to be defined (Section 4.1.1). The lateral extent of exceedances was determined to be undefined along the slope between upper and the lower yard (in the vicinity of CB-15) for dioxins/furans, B(a)P equivalents, and multiple metals. The vertical extent of exceedances was also determined to be undefined in this area for dioxins and furans, CrVI, and lead (Section 4.2.10). The exceedance of the TEQ mammal ISL is not considered a data gap requiring further investigation because, as agreed upon during the investigation process, the TEQ avian and TEQ human ISLs were used to define nature and extent for dioxin and furans because the TEQ mammal ISL of 5.58 ng/kg, based on background, is very conservative and extremely low.

Catch Basin Sediment Samples – Catch basin sediment from CB-15 exceeded background concentrations for metals, with FOEs ranging from 1.2 (cadmium) to 6.0 (lead). The CSLs were exceeded for Aroclor 1254 (FOE 2.1), total PCBs (FOE 2.2), and TEQ human (FOE 5.9) (Table 3-40).

Storm Drain Flush Water Samples – There is no storm drain flush water sample for this storm drain line.

The concentrations in soil near the SDL-10 outfall indicate that SDL-10 may have been a source of metals, PAHs, TPH, PCBs, and dioxins/furans to AOC 1. As catch basin sediment was removed during the storm drain survey, SDL-10 is not anticipated to be a current source of contamination to AOC 1. Additional soil sampling or migration control on the slope above CB-15 may be considered during the CMS/FS.

4.3.11 Storm Drain Line 11

SDL-11 extends across the western half of the upper yard and the entirety of the lower yard, originating near the northwest corner of the Auxiliary Generator Building (AOC 25) and exiting outside the fence line near AOC 1 (Area Around Former Percolation Bed). SDL-11 is divided into five areas/segments, A through E, and has eleven catch basins (CB-17, CB-19, CB-20, CB-21, CB-22, CB-25, CB-26, CB-27, CB-28, CB-30, and CB-31).

- **SDL-11 Area A** begins at catch basin CB-28, continues south to catch basin CB-30, then turns west and stops at catch basin CB-22. This portion of Area A is an 8-inch-diameter pipe composed of PVC and red clay, approximately 186 feet long.

  Area A also contains the pipe from catch basin CB-31 to catch basin CB-30. This portion of Area A is approximately 17.5 feet long and is composed of 4-inch-diameter PVC pipe. Blockage was encountered downstream of catch basin CB-26, but it was assumed that that CB-26 and CB-27 are also plumbed to the SDL-11 main line. This portion of Area A is approximately 66 feet long and is

composed of 8-inch-diameter PVC (CB-27 to CB-26) and 6-inch-diameter red clay (CB-26 to SDL-11 main line).

An excavation was conducted east of CB-22 to remove an 8-foot section of pipe that was nearly entirely filled with imbricated, oily debris. A sample of the debris, SD-OS42 at 3-4 feet bgs, was collected. Upstream of the excavation, 25 feet of pipe was cleared. The blockage from this portion of the pipe had been causing water to back up east of CB-22 and leak from CB-25. A soil sample, SD-29, was collected from this leaking area. Material from the blockage was removed during repairs to this section.

There are seven catch basins associated with Area A; sediment samples were collected from five (CB-22, CB-26, CB-27, CB-28, and CB-30) and there was no sediment in two (CB-25 and CB-31).

- **SDL-11 Area B** begins west of catch basin CB-22 and continues to the outfall near soil sample SD-15. This portion of Area B, which is part of the main line for SDL-11, consists of 8-inch and 10-inch-diameter pipe composed of red clay and PVC, approximately 500 feet long. Several cracks were observed at the bottom of the steep slope between the upper and lower yards; soil sample SD-OS41 was collected from this area. From the bottom of the slope to catch basin CB-19, the pipe was full of debris (sand and gravel). Soil sample SD-28 was collected at an offset in the pipe where the pipe material transitioned from red clay to PVC.

  Area B also contains the pipe from trench drain TDL-3 to the SDL-11 main line, from catch basin CB-21 to the main line, and from catch basin CB-20 to the main line. The pipe from TDL-3 to the main line is an 8-inch-diameter pipe composed of red clay and PVC, approximately 185 feet long. Soil sample SD-OS43 was collected along this portion of the pipe. The first 5 feet of red clay pipe is missing where it meets TDL-3. Soil sample SD-OS30 was collected from this area of broken pipe.

  The pipe from catch basin CB-21 to the main line is approximately 18 feet long, 8 inches in diameter, and composed of PVC. A 1- to 2-inch gap was discovered at the transition from red clay to PVC pipe. The gap was encased in concrete and soil sample SD-OS38 was collected from this area.

  The pipe from catch basin CB-20 to the main line is an 8-inch-diameter pipe composed of PVC, approximately 48 feet long. Blockage was found about 2 feet downstream of where the line from CB-20 joins the SDL-11 main line. The area was excavated and the blockage removed. Soil sample SD-OS40 was collected from this area.

  There are three catch basins associated with Part B; sediment samples were collected from two (CB-20 and CB-21) and there was no sediment in one (CB-19). SDL-11 Segments D and E overlap within Area B and are discussed below.

- **SDL-11 Segment C** begins at trench drain TDL-2 and ends at catch basin CB-17. Segment C is a 10-inch-diameter PVC pipe approximately 46 feet long. The outfall from catch basin CB-18 connects to this segment. Catch basin CB-18 could not be opened; therefore, no sediment sample was collected. Sediment was collected from catch basin CB-17.

- **SDL-11 Segment D** begins at catch basin CB-17, connects with the main line, and continues to the outfall near SD-15. Segment D is a 10-inch-diameter pipe composed of red clay and PVC, approximately 92 feet long.

- **SDL-11 Segment E** encompasses approximately the last 67 feet of SDL-11 before the outfall.

Soil Samples – Soil samples were collected from nine locations; SD-15 was evaluated as part of AOC 1 (Table 3-2) and all other locations were evaluated as part of AOC 13 (Table 3-23). There were no exceedances of applicable screening levels at SD-28 or SD-29, and there were minor metal exceedances (FOE less than 1.2) at SD-OS43 and SD-OS30. Metal exceedances at SD-OS38 and SD-OS40 were also generally low (FOE less than 2) except for molybdenum at SD-OS38 (FOE 2.8) and copper at SD-OS40 (FOE 3.8). Dioxins and furans slightly exceeded for TEQ avian (FOE 1.6) near the SDL-11 outfall at SD-15.

The most exceedances of screening levels occurred at SD-OS41 and SD-OS42. SD-OS41 soil samples were collected above and next to pipe cracks near the bottom of the slope between the upper and lower yards. There were exceedances of background concentrations for metals (CrVI, total chromium, lead, and

molybdenum) at this location, with FOEs ranging from 1.5 (total chromium) to 5.6 (molybdenum). The highest concentrations of metals, TPH, and PCBs were detected at location SD-OS42 at 3-4 feet bgs. SD-OS42 was collected from inside SDL-11 where the pipe was almost entirely blocked with oily debris. Most metal concentrations from this location exceeded background, with FOEs ranging from just over one (vanadium) to 160 (molybdenum). There were also exceedances of CSLs for cadmium, lead, TPH as diesel, Aroclor 1254, and total PCBs, with FOEs from 2.0 (Aroclor 1254) to 7.7 (TPH as diesel). Lead exceeded the TTLC value in SD-OS42 in the 3 to 6 ft bgs sample.

The lateral extent of exceedances were determined to be defined for AOC 13 (Section 4.2.10). The vertical extent of exceedances were determined to be defined for the SDL-11-relevant portions of AOC 13 except for molybdenum at SD-OS41. The lateral and vertical extent of exceedances for AOC 1 in the vicinity of the SDL-11 outfall were determined to be defined (Section 4.1.1).

Catch Basin Sediment Samples – Catch basin sediment samples were collected from eight of the eleven catch basins in SDL-11. Analytical results for catch basin samples are presented in Table 3-40. The highest concentrations of most metals and B(a)P equivalents were detected in CB-30. The catch basin sediment sample results were compared to the background and/or commercial screening levels; there were exceedances of the following:

- Background was exceeded for cadmium, CrVI, total chromium, copper, lead, molybdenum, nickel, selenium, and zinc. The highest background FOEs were for copper (1.1 to 36), lead (1.3 to 20), molybdenum (4.0 to 37), and zinc (1.1 to 22).
- CSLs were exceeded for CrVI (2.5) and TPH as diesel (6.1).

Storm Drain Flush Water Samples – Two storm drain flushes were conducted, with water added to CB-28 and CB-20 and storm drain flush samples collected at SD-15 for SDOF-11-01 and SDOF-11-02, respectively. Storm drain flush water had elevated concentrations of metals and TPH compared to source water (Table 3-39). The detected concentrations in SDL-11 flush water samples were more than two times greater than the source water for the following:

- Metals – Concentrations of barium, CrVI, total chromium, copper, lead, molybdenum, and nickel were 2.3 times (barium) to 6.7 times (copper) greater than source water concentrations.
- TPH – Concentrations of TPH were 2.6 and 11 times (TPH as motor oil) and at least 6 times (TPH as diesel) greater than source water.

The concentrations in soil at SD-OS41 and SD-OS42 indicate that cracks and/or blockages in SDL-11 may have contributed to soil contamination. As the blockage associated with SD-OS42 was removed and an 8-foot portion of the pipe replaced, this segment of SDL-11 is not anticipated to be a current source of contamination to the compressor station. Repair of the pipe cracks in SD-OS41 and removal of debris blocking SDL-11 between SD-OS41 and CB-19 may be considered during future station operations. The concentrations in soil at SD-15 do not indicate SDL-11 was a source of contamination to AOC 1.

As catch basin sediment was removed and portions of SDL-11 were flushed of accumulated material during the storm drain survey, sediment and accumulated material in SDL-11 are not anticipated to be a current source of contamination to AOC 1.

4.3.12 Storm Drain Line 12

SDL-12 is located on the western side of the compressor station and appears to originate at trench drain TDL-4 and exit near AOC 1 (Area Around Former Percolation Bed). SDL-12 is a 10-inch-diameter pipe composed of PVC, approximately 97 feet long. The pipe was free of debris during the storm drain survey.

Soil Samples – One soil sample was collected along SDL-12 (SD-17) and one soil sample was collected near the outfall (SD-16). Both samples were evaluated as part of AOC 1. Concentrations of lead, zinc, and manganese exceeded ISLs. The FOE for all compounds was less than 2.3. Lateral and vertical extent of contamination was determined to be defined in AOC 1 in the vicinity of SDL-12 (Section 4.1.1).

Catch Basin Sediment Samples – Catch basin sediment from CB-16 exceeded background concentrations for copper (FOE 3.5), lead (FOE 1.4), molybdenum (3.1), and zinc (8.8) (Table 3-40).

Storm Drain Flush Water Samples – Storm drain flush water sample SDOF-12 had elevated concentrations for some metals and TPH compared to the source water (Table 3-39). The detected concentrations in SDOF-12 were more than two times greater than the source water for the following:

- Metals – Concentrations for arsenic and vanadium were 2.2 times and 2.4 times greater than source water, respectively.

The concentrations in soil near the outfall of SDL-12 do not indicate that SDL-12 was a source of contamination to AOC 1. The elevated concentrations of TPH and/or metals in catch basin sediment and storm drain flush water may indicate that sediment and accumulated material inside SDL-12 was impacted by these compounds. SDL-12 is not anticipated to be a current source of contamination to AOC 1 because catch basin sediment was removed and accumulated material inside SDL-12 was flushed during site activities. No data gaps requiring further investigation have been identified.

4.3.13 Storm Drain Line 13

SDL-13 is located on the southwest side of the compressor station and consists of two lines, SDL-13a and SDL-13b. Both lines appear to originate in the vicinity of Valve Nest A and exit outside the compressor station fence line between AOC 1 (Area Around Former Percolation Bed) and AOC 4 (Debris Ravine). SDL-13a and SDL-13b appear to exit at the same location.

- SDL-13a is a 5.5- to 6-inch-diameter pipe composed of corrugated steel and PVC, approximately 118 feet long. No catch basin was identified for SDL-13a; however, the pipe was potentially associated with catch basin CB-24, which has been disconnected or removed during upgrades to Valve Nest A (Table 3-39). The storm drain video survey was conducted from the outfall; sand and gravel blockage was encountered at 118 feet, which is where the pipe is shown to start on Figure 3-19. This does not appear to be an active storm drain line.
- SDL-13b is an 8-inch-diameter pipe composed of corrugated steel and PVC, approximately 125 feet long. Catch basin CB-23 is connected to SDL-13b at approximately 46 feet from the outfall. The line appears inactive upstream from CB-23 as no catch basin was identified further upstream. The storm drain video survey was conducted from the outfall and the camera could not be advanced past a 90-degree elbow in the pipe at 125 feet, potentially because the pipe is capped. A distance of 125 feet from the outfall is where the pipe is shown to start on Figure 3-19.

Soil Samples – One soil sample, SD-18, was collected near the outfall of SDL-13a and SDL-13b. A second sample, SD-19, was collected downgradient of SD-18. Both samples were evaluated as part of AOC 1. There were exceedances of applicable screening levels for copper (FOE just over 1) and zinc (FOE 5.3) at SD-18, and for mercury (FOE 9.6) at SD-19 (Table 3-2).

Catch Basin Sediment Samples – Catch basin sediment from CB-23 exceeded background concentrations for copper (FOE just over 1), lead (FOE 2.0), and zinc (FOE 5.8) (Table 3-40).

Storm Drain Flush Water Samples – A storm drain flush water sample was collected for SDL-13b. As no catch basin was identified for SDL-13a, no storm drain flush could be conducted. Storm drain flush water sample SDOF-13b had elevated concentrations for some metals, PCBs, and TPH compared to the source water (Table 3-39). The detected concentrations in SDOF-13b were more than two times greater than the source water for the following:

- Metals – Concentrations for total chromium, zinc, and CrVI were 4.7 times, 5.3 times, and at least 44 times greater than source water, respectively.
- PCBs – Concentrations for Aroclor 1260 and Aroclor 1254 were at least 2.1 times and at least 3.0 times greater than source water, respectively.

The concentrations in soil near the outfall (SD-18) may indicate that SDL-13 was a source of zinc to AOC 1 and/or AOC 4. The elevated concentrations of PCBs, TPH and/or metals in catch basin sediment and storm drain flush water may indicate sediment and accumulated material inside SDL-13b was impacted by these compounds. SDL-13b is not anticipated to be a current source of contamination to AOC 1 or AOC 4 because catch basin sediment was removed and accumulated material in the SDL-13b was flushed during site activities. No data gaps requiring further investigation have been identified.

4.3.14 Storm Drain Line 14

SDL-14 is an inactive drain line located on the southwest side of the compressor station and appears to originate in a ditch near the southwest corner of the compressor station. SDL-14 is an 11-inch-diameter pipe composed of corrugated steel and is approximately 59 feet long. Corrosion and debris was observed in the bottom of the pipe at 19 feet.

Soil Samples – One soil sample, SD-25, was collected near the outfall of SDL-14. SD-25 was evaluated as part of AOC 1. Concentrations in SD-25 exceeded ISLs for mercury (FOE 8.0), Aroclor 1254 (FOE 1.3), and total PCBs (1.6) (Table 3-2). The FOE for mercury is relatively high compared to the other compounds because the screening level for mercury is low (0.0125 mg/kg). The mercury screening level is based on the ECV as no background concentration has been established for the site.

Catch Basin Sediment Samples – As no catch basin was identified for SDL-14, there is no catch basin sediment sample.

Storm Drain Flush Water Samples – There is no storm drain flush water sample for this storm drain line because no catch basin was identified.

The concentrations in soil near the outfall (SD-25) had only minor exceedances (FOE less than 2) of PCBs and an exceedance of mercury. As the screening level for mercury is low and based on ECV not background, this is not identified as a data gap requiring further investigation.

4.3.15 Storm Drain Line 15

SDL-15 is an inactive drain line located on the southwest corner of the compressor station. The pipe extends out of the hillside between AOC 1 (Area Around Former Percolation Bed) and AOC 4 (Debris Ravine). No catch basin was identified and SDL-15 was not video surveyed. SDL-15 is a 10-inch-diameter pipe composed of red clay. The length of the pipe is not known as only the portion of the pipe that extends out of the hillside was investigated.

Soil Samples – One soil sample, SD-26, was collected near the outfall of SDL-15. SD-26 was evaluated as part of AOC 1. There were exceedances of applicable screening levels for metals (copper, lead, and zinc), total PCBs, and dioxins and furans (as TEQ avian and TEQ mammal). The FOE was greater than 2 for zinc (FOE 3.8) and TEQ mammal (7.3). The exceedance of the TEQ mammal ISL is not considered a data gap requiring further investigation because, as agreed upon during the investigation process, the TEQ avian and TEQ human ISLs were used to define nature and extent for dioxin and furans because the TEQ mammal ISL of 5.58 ng/kg, based on background, is very conservative and extremely low.

Catch Basin Sediment Samples – As no catch basin was identified for SDL-14, there is no catch basin sediment sample.

Storm Drain Flush Water Samples – There is no storm drain flush water sample for this storm drain line because no catch basin was identified.

4.3.16 Unlocated, Isolated, or Decommissioned Catch Basins and Storm Drain Lines

Catch basin 14 could not be located in the field. Catch Basin 24 was removed during construction upgrades to Valve Nest A in the southern portion of the lower yard.

4.3.17 Storm Drain Lines Summary

The Storm Drain Line investigation defined and located storm drain catch basins and storm drain lines within and around the station through onsite reconnaissance, field verification, flow testing, and video camera tracing. Sediment was sampled, when present, from all identified catch basins; soil samples were also collected along storm drain lines at regular intervals, where joints and/or breaks were identified, and at storm drain outfalls.

Sediment was removed from catch basins and sediment was flushed and cleaned from storm drain lines where accessible. Several repairs were made to broken or clogged sections of drain lines. Catch basins are designed to collect sediment, which reduces the potential for solids to migrate offsite.

Corrective measures such as storm drain monitoring, regular cleaning and removal of accumulated sediments with catch basins, implementation of stormwater Best Management Practices, and prevention and/or mitigation of erosion of surface soils are recommended and will be evaluated as part of the CMS/FS.

4.4 Perimeter Area Investigation

The Perimeter Area is defined as the area extending from the facility fence line to the toe of the slope, outside of the fence line. The majority of the facility is currently bermed or curbed. Figure 3-18 shows the current bermed and curbed areas, as well as the areas that have neither berms nor curbs. The perimeter does not include any areas that are currently defined as being part of an existing unit (i.e., AOCs 4, 9, 10, and 11 and SWMU 1 are all located in part or in their entirety on the slope).

As described in Section 2.5.1, Perimeter Area sample locations were identified based on areas with visible discoloration or other potential direct impacts, and/or that may experience or have experienced surface water runoff through sheet flow. Perimeter sampling locations were originally selected during a field walk with DTSC and DOI on October 18, 2007. The proposed locations were modified following the site walk with DTSC, DOI, and the Tribes on December 15, 2011. In addition, while berms and curbs are present along most of the TCS fence line, historical sheet flow pathways could have been different than current pathways along the perimeter. DTSC and DOI therefore directed PG&E to collect perimeter samples along the entire perimeter, regardless of the location of current or historical berms/curbs (CH2M, 2013a). The proposed Perimeter Area investigation program was included as Appendix C of the Soil RFI/RI Work Plan. Perimeter sampling was conducted in a phased manner, as directed by DTSC and DOI, and consistent with the phased sampling approach for the investigation within the fence line.

The Perimeter Area investigation data have been used to help evaluate whether human and ecological receptors outside the fence line could be exposed to surface soil impacted by chemicals originating within the fence line of the compressor station through the offsite migration pathway.

4.4.1 Analytical Results

Perimeter Area samples were assigned to Part A and Part B investigation units. Analytical results are presented in the appliable units.

4.4.2 Perimeter Area Conceptual Site Model

CSMs have been developed for the Part A and Part B investigation units to which Perimeter Area samples were assigned. A separate CSM has not been developed for the Perimeter Area.

4.4.3 Evaluation of Data Against Data Quality Objectives for Perimeter Area

Decision 1 (Nature and Extent Determination): Not applicable. Perimeter area samples were assigned to relevant Part A and Part B investigation units during the nature and extent evaluation and are included in the discussion of those units.

Decision 2 (Data Sufficiency for EPC Calculation): Not applicable. Perimeter area samples were assigned to nearby units and will be assessed in the risk assessment for the applicable unit. Existing data for all analytes are sufficient.

Decision 3 (Threat to Groundwater Determination): Not applicable. Perimeter area samples were assigned to nearby units during the threat to groundwater evaluation and are included in the discussion of those units. Further detail is presented in Appendix C.

Decision 4 (Offsite Migration Assessment): Concentrations at Perimeter Area locations outside the compressor station fence line may pose a potentially unacceptable risk to receptors outside the fence line via the surface migration pathway based on evaluation of surface soil data, screening comparison values, and potential transport mechanisms and pathways. Perimeter Area samples were collected both inside and outside the compressor station fence line during the combined soil investigations. Samples collected inside the fence line have been evaluated with their assigned Part B Investigation unit for purposes of evaluation against Part B DQO #4. Additional Perimeter Area samples collected outside the fence line, which were assigned to Part A Investigation units, are evaluated here. These Perimeter Area samples were assigned to AOC 1, AOC, 9, AOC 10, AOC 11, AOC 27, and AOC 31.

Surface soils samples were collected in unpaved areas outside the fence line in the Perimeter Area between 0 and 1 foot bgs and submitted for analysis of one or more of the following analytical groups: metals, PAHs, VOCs, SVOCs, TPH, general chemistry parameters, PCBs, and dioxins/furans. The full analytical results are presented in Tables 3-38a through 38j. Results were screened against the relevant ISLs for locations outside the compressor station fence line (equal to the USEPA RRSL, Residential California Department of Toxic Substances Control Screening Level [DTSC-SL], ECV, or background [BK]). One or more samples exceeded the ISLs for the following analytes and equivalency factors:

- Several metals were detected at concentrations exceeding ISLs (CrVI, total chromium, copper, lead, molybdenum, nickel, and zinc). The highest factor of exceedance was for zinc, which was detected at a concentration exceeding the ISL (BK) of 58 mg/kg at 17 of 20 locations with a maximum concentration of 550 mg/kg at PA-19.
- High molecular weight PAHs were detected at a concentration exceeding the ISL (ECV) of 1,160 micrograms per kilogram(µg/kg) at 9 of 21 locations with a maximum concentration of 32,900 µg/kg at PA-19.
- B(a)P equivalent exceeded the ISL (RRSL) of 110 µg/kg at 11 of 21 locations with a maximum concentration of 8,200 µg/kg at PA-19.
- Total PCBs exceeded the ISL (RRSL) of 230 µg/kg at 6 of 21 locations with a maximum concentration of 615.5 µg/kg at PA-10.
- TEQ avian exceeded the ISL (DTSC-SL) of 16 ng/kg at 10 of 12 locations with a maximum concentration of 1,100 ng/kg at PA-20.
- TEQ human exceeded the ISL (DTSC-SL) of 50 ng/kg at 8 of 12 locations with a maximum concentration of 1,600 ng/kg at PA-20.
- TEQ mammal exceeded the ISL (BK) of 5.58 ng/kg at 12 of 12 locations with a maximum concentration of 1,600 ng/kg at PA-20.

A summary of the highest exceedances is shown on Table 3-38j and presents the highest factors of exceedances for each of the locations. Based on potential migration pathways and mechanisms including surface water flow offsite (via sheet flow and storm drains), soil erosion, and wind dispersion, concentrations exceeding ISLs at several Perimeter Area locations outside the fence line suggest potential migration from units inside the fence line to outside the fence line may have occurred. The Perimeter Area is also a potential source of contamination to downgradient Part A investigation units.

Sufficient data have been collected outside the compressor station fence line to assess any potential offsite migration, and the nature and extent of these analytes have been evaluated as part of the applicable Part B units in Section 4.2 and in the risk assessment.

Decision 5 (Data Sufficiency to Support CMS/FS and/or Interim Measures): Not Applicable

Additional Considerations: The need for run-off and erosion controls or removal of contaminated soil for those locations where exceedances indicate a threat of offsite migration will be evaluated in the CMS/FS. Based on the perimeter samples, the following perimeter surface locations will be carried forward for evaluation based on screening level exceedances of ten times or greater:

- SD-24, PA-09, PA-10, PA-11, and PA-12 (associated with AOC 11)
- PA-02, AOC13-19, AOC13-20, AOC13-21, PA-15, AOC16-4, AOC16-grit, AOC18-11, and AOC21-OS2 (associated with AOC 1)
- AOC22-3, PA-18, PA-19, PA-20, and PA-21 (associated with AOC-10)

4.5 Summary of Data Gaps

Exhibit 4-37 summarizes the data gaps that have been identified in Part A and Part B Investigation Units, storm and floor drain systems, and the Perimeter Area. As stated in Exhibits 4-1 and 4-2, data gaps may be filled during remedial design if remediation is necessary.

Exhibit 4-37. Summary of Data Gaps in Part A and Part B Investigation Units, Storm and Floor Drain Systems, and Perimeter Area
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation,
PG&E Topock Compressor Station, Needles, California

Unit	Data Gap Identified[1]	Description of Data Gap[2]
Part A Investigation		
AOC 4: Debris Ravine	DQO 4	• No samples analyzed for soil physical parameters
AOC 9: Southeast Fence Line	DQO 1]	• Vertical extent not defined for mercury, PAHs, PCBs, and dioxins/furans
AOC 10: East Ravine	DQO 1 & 4	• Vertical extent not defined for copper, mercury, molybdenum, and dioxins/furans • No samples analyzed for soil physical parameters
AOC 11: Topographic Low Areas	DQO 1	• Vertical extent not defined for barium, CrVI, copper, zinc, lead, and molybdenum at specific locations • Lateral extent not defined for zinc
AOC 12: Fill Areas	DQO 4	• No samples analyzed for soil physical parameters
AOC 27: MW-24 Bench	DQO 4	• No samples analyzed for soil physical parameters
AOC 29: IM-3 Treatment Plant	DQO 1 through 4 deferred	• Data gap analysis has been deferred until after confirmation sampling to be conducted as part of the IM-3 decommissioning and removal is completed.
AOC 30: MW-20 Bench	DQO 1 through 4 deferred	• Data gap analysis has been deferred until after the groundwater remedy decommissioning sampling is completed
AOC 31 – Former Teapot Dome Oil Pit	DQO 4	• No samples analyzed for soil physical parameters
UA-2 – Former 300B Pipelines Liquid Tanks	DQO 4	• No samples analyzed for soil physical parameters
Part B Investigation		
SWMU 6: Chromate Reduction Tank	DQO 1	• Vertical extent not defined for dioxins/furans

Unit	Data Gap Identified[1]	Description of Data Gap[2]
AOC 13: Unpaved Areas within the TCS	DQO 1	• Vertical extent not defined for dioxins/furans, CrVI, lead, B(a)P equivalents, copper, and molybdenum • Lateral extent not defined for dioxins/furans, B(a)P equivalents, CrVI, total chromium, copper, lead, zinc, and PCBs
AOC 15: Aux. Jacket Cooling Water Pumps	DQO 1	• Vertical extent not defined for total chromium, lead, and molybdenum • Lateral extent not defined for CrVI, total chromium, copper, lead, molybdenum, and zinc
AOC 18: Combine Wastewater Transference Pipelines	DQO 1	• Vertical extent not defined for dioxins/furans • Lateral extent not defined for B(a)P equivalents and dioxins/furans
AOC 19: Former Cooling Liquid Mixing and Hotwell Area	DQO 1	• Vertical extent not defined for CrVI, total chromium, lead, mercury, and molybdenum • Lateral extent not defined for CrVI, total chromium, and lead
AOC 20: Industrial Floor Drains	DQO 1	• Vertical extent not defined for molybdenum and zinc • Lateral extent not defined for CrVI, total chromium, copper, and lead
AOC 23: Former Water Conditioning Bldg.	DQO 1	• Vertical extent not defined for sample location AOC23-3
AOC 25: Compressor and Generator Engine Basements	DQO 1 deferred DQO 3 deferred	• Soil data will be collected when AOC 25 is available for sampling
AOC 32: Oil Storage Tanks and Waste Oil Sump	DQO 1 deferred DQO 3 deferred	• Soil data will be collected in AOC 32 is available for sampling
Storm Drain Line 6	DQO 1	• Vertical extent not defined for CrVI or copper at SD-08

Notes:

[1] For the purposes of this exhibit, “DQO” refers to the Data Quality Objective Decisions, as follows:

Decision 1 (Nature and Extent Determination): Determine the nature and extent of residual soil and/or sediment concentrations resulting from historical compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.

Decision 2 (Data Sufficiency for EPC Calculation): Determine representative EPCs for residual soil and/or sediment contamination resulting from historical compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

Decision 3 (Threat to Groundwater Determination): Determine whether residual soil concentrations resulting from historical compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.

Decision 4 (Data Sufficiency to Support CMS/FS and/or IMs): Determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design and IMs, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, then document impediments and address uncertainties in the risk assessment and/or CMS/FS or IMs

[2] Data gap may be filled during remedial design if remediation necessary.

5. Summary of PG&E's Risk Assessment

A soil human health and ecological risk assessment (HHERA) was completed for the TCS site. The HHERA was finalized October 2019 (Arcadis, 2019). The objectives of the HHERA were to:

- Help determine the need for remedial action with respect to soil conditions
- Provide a basis for determining levels of constituents that can remain in soil at the site and still be adequately protective of public health and the environment

The HHERA was conducted using methodology presented in the associated agency-approved HHERA Work Plans (Arcadis, 2008a, 2009, 2015) and as directed by DTSC in the November 17, 2017 directive letter to PG&E (DTSC, 2017b) which included evaluating all constituents evaluated during the RFI/RI soil investigations to identify COPCs and/or COPECs that could potentially pose an unacceptable risk to human health or the ecological environment.

5.1 Data Evaluation and Exposure Point Concentration Calculation

As discussed in the HHERA report (Arcadis, 2019), only the highest quality data collected during the RFI/RI (Category 1) were used in the HHERA. Samples representative of soil that has since been removed as part of a removal action were not included. Data were grouped into datasets by individual potential exposure areas (for example, Bat Cave Wash or AOC 10) and into combined exposure areas (for example, all exposure areas outside the Compressor Station [OCS]).

Data for each potential exposure area were also grouped according to exposure depth. Humans were assumed to contact soil from 0 to 10 feet bgs and ecological receptors were assumed to contact soil from 0 to 6 feet bgs. Additionally, for the two soil potential exposure areas encompassing wash areas (Bat Cave Wash and AOC 10), two scouring scenarios were evaluated. The 2-foot scouring scenario assumes that the top 2 feet of soil is removed during potential future scouring resulting from surface runoff following heavy rainfalls. Similarly, in the 5-foot scouring scenario, 5 feet of soil is assumed to be removed during scouring. Datasets were adjusted so that potential exposures for the human health receptors were from the 'new' surface to a depth of 10 feet bgs, and the ecological exposures were from the 'new' surface to 6 feet bgs.

Within each depth interval, interim intervals were defined based on specific receptor activities. COPCs and COPECs were identified using various statistical comparisons and tests to assess whether the constituents were detected at concentrations above background levels; organic constituents without background values were selected as COPCs/COPECs if detected. EPCs (the representative concentration potentially contacted by the potential receptors), based on the 95% upper confidence limit on the mean (95UCL) were estimated for the specific depth intervals relevant to various receptors and exposure scenarios.

5.2 Human Health Risk Assessment Overview

Potential human receptors were evaluated as four main categories: worker, recreational user, tribal user, and hypothetical resident. The primary potentially complete exposure pathways evaluated were soil direct contact exposure pathways (that is, incidental ingestion, inhalation, and dermal exposure). Worker types evaluated were long-term maintenance worker, short-term maintenance worker, and commercial worker (assumed to work inside the TCS fence line only). Worker activities outside the TCS fence line could include intrusive activities associated with contacting soil up to 10 feet bgs. Recreation user types evaluated were camper, hiker, hunter, and off-highway vehicle (OHV) rider (or all-terrain vehicle rider). Recreational users were evaluated for exposure to soil up to 3 feet bgs outside the TCS fence line. Tribal use was associated with exposure outside the TCS fence line (that is, inhalation of dust arising from wind erosion or volatile organic compounds that may volatilize from soil). The hypothetical future residential user was evaluated as requested by the BLM and was assumed to contact soil up to 10 feet bgs and to grow and consume vegetables, fruits, and poultry from the TCS site. As specified by DOI in a March 23,

2015 letter (DOI, 2015b), DOI will not utilize a future residential scenario on Federal Lands within the project area when evaluating cleanup options in the Feasibility Study phase.

Incremental lifetime cancer risks (ILCRs) and noncancer hazard indices were estimated for potential exposures to constituents in soil and/or soil gas. Cumulative ILCRs (sum of chemical-specific ILCRs) posed by the site should not exceed 1×10^{-6} to 1×10^{-4}. As stated in the HHERA, the DTSC point of departure for excess incremental lifetime cancer risk is 1×10^{-6}. A cumulative non-cancer hazard index that is less than or equal to 1 implies that the predicted exposure is not expected to result in adverse, non-cancer health effects.

As described in the HHERA Work Plan (Arcadis, 2008a) and HHERA (Arcadis, 2019), the human populations that could be present in the areas outside the TCS (i.e., maintenance workers, recreational users, and tribal users) would more likely be exposed randomly, over the course of a lifetime, to soil present in all potential exposure areas outside of TCS, rather than have a lifetime of contact limited to the area of a single exposure area. Therefore, the combination of all exposure areas outside the TCS fence line (the OCS exposure area) is the scenario in the HHERA considered to most appropriately represent both current and potential future exposures for maintenance workers, recreational users, and tribal users.

Furthermore, to address the Tribes' comments on the HHERA exposure assumptions for the recreational users and that due to the physical and topographical barriers that exist at the TCS site,certain recreational activities are unlikely to occur, the following statements were included in Section 5.6.3.2 of the HHERA, "In addition, as recommended by DOI (Arcadis 2015), it is assumed that each of the recreational activities could take place at any location on federal land. In reality, specific locations may be preferred for certain activities, while other locations may be less attractive or may have limited recreational options. No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. Therefore, potential receptor populations would more likely be exposed randomly, over the course of a lifetime, to soils present across the OCS potential exposure area, rather than have a lifetime of contact limited to a potential exposure area based on an individual AOC (as evaluated in the area-specific appendices at the request of DTSC)." Also as stated in Section 5.6.3.2 of the HHERA, "The exposure time, frequency, and duration for the recreational user provided by DOI and used in the HHRA erred on the side of conservatism to be protective of human health and may not represent "reasonably anticipated use" of the site. Therefore, the health risks estimated for recreational users may be overestimated and lower than presented in the HHRA…. In sum, the risk assessment meets the regulatory requirement to address an upper bound for potential exposures for current and reasonably foreseeable future receptor populations; the actual exposures to soil at the site that could be incurred by workers, recreators, and tribal use would probably be much lower than has been estimated in this HHRA.".

5.3 Ecological Risk Assessment Overview

Potential ecological receptors evaluated included plants, terrestrial invertebrates, and representative small- and large home range wildlife (i.e., birds and mammals). The primary potential exposure pathways for soil were determined to be direct contact or incidental ingestion of surface soil (0 to 0.5 feet bgs), shallow soil (0 to 3 feet bgs), and/or subsurface soil (0 to 6 feet bgs) and, for mammals and birds, uptake and subsequent ingestion of COPECs in biota. Hazard quotients (HQs) were estimated for each potential receptor population and exposure area using EPCs developed for each COPEC over the appropriate soil exposure intervals in accordance with the agency-approved HHERA Work Plans (Arcadis, 2008a; 2009; 2015). Multiple sets of exposure (e.g., EPCs) and toxicity assumptions (e.g., toxicity reference values [TRVs]) were evaluated, proceeding from generic to more refined assumptions. Risk drivers were identified based on those COPECs for which unacceptable community/population level risk (i.e., HQs greater than 1 for plants and soil invertebrate communities and lowest observable adverse effect level (LOAEL)-based HQs for wildlife populations [or LOAEL-based HQs greater than 10 for dioxin TEQ]) were predicted using the most refined exposure and effects assumptions (i.e., selected TRVs, area-weighted EPCs, and site-specific site use factor) and additional supporting lines of evidence. For threatened or endangered species and other species of concern observed onsite (ring-tail cat and bats, respectively), a qualitative assessment was completed based on surrogate and representative receptors.

5.4 Conclusions

Several complete pathways of exposure to COPCs/COPECs are present at the site, both now and potentially in the future. The HHERA generally found no unacceptable risk for most human and ecological receptors. Of the potential human receptors, no unacceptable risk was identified for all relevant potential exposure areas for tribal users, hunters, and commercial and short- and long- term maintenance workers. Of the potential ecological receptors, no unacceptable risk was identified for all relevant potential exposure areas for special-status species, large home-range receptors, herbivorous and insectivorous birds, and herbivorous small mammals.

For various human recreators and desert shrew (insectivorous small mammals), the potential for unacceptable risk was identified in localized areas in the following exposure areas: SWMU 1 (within Bat Cave Wash), AOC 9 (including portions of the RFI/RI investigation area known as AOC 10), and/or AOC 10. For various human recreators and desert shrew (insectivorous small mammals), the potential for unacceptable risk was identified in localized areas in the following exposure areas: SWMU 1 (within Bat Cave Wash), AOC 9 (including portions of the RFI/RI investigation area known as AOC 10), and/or AOC 10. The risk drivers for human recreators[4] and the desert shrew are dioxin/furan TEQ, total chromium (desert shrew only), Cr(VI) (recreator only), and copper (desert shrew only).

The potential for unacceptable risk was also identified for plants and invertebrates; however, only generic risk-based screening levels were available to estimate HQs and, as discussed in the HHERA, there is low confidence in the ability to predict risk to plants and invertebrates at the site based on these generic screening levels. Because chemical impacts, if they are occurring, are indistinguishable from changes associated with physical human disturbances, the potential for adverse effects to the health of the plant community is considered to be low;therefore, risk drivers were not identified for plants. The risk drivers for human recreators and the desert shrew are dioxin/furan TEQ, total chromium (desert shrew only), CrVI (recreator only), and copper (desert shrew only). The exceedances of low-confidence generic plant screening values, which are widely acknowledged to have low ability to predict toxicity in plants were not recommended for soil management decisions.

The information from floristic surveys (GANDA and CH2M 2013, CH2M 2017c) was used as a stronger line of evidence in the HHERA to assess plant community health at the site, rather than simply using the exceedances of generic and low-confidence screening levels. It was not feasible to incorporate information from the floristic surveys at the Site as a line of evidence for soil management decision-making because soil samples collected as part of the groundwater remedy may have been from areas or depths where plants are not currently present/exposed. Therefore, for plants, risk conclusions were primarily based on communities observed during floristic surveys at the site.

5.5 Risk-Based Remedial Goals for Risk Drivers

The HHERA (Arcadis, 2019) presents risk-based remedial goals (RBRGs) for COPCs/COPECs in soil that most significantly contribute to estimates of unacceptable risk to human health and/or ecological receptors (that is, “risk drivers” or COCs). RBRGs are concentrations that do not present unacceptable risk to human health and ecological receptors. An RBRG is a proposed health-protective target cleanup concentration that can be used, in combination with other factors such as background concentrations, as

[4] Note that to address the Tribes’ comments on the HHERA exposure assumptions for the recreational users and that due to the physical and topographical barriers that exist at the TCS site, certain recreational activities are unlikely to occur, the following statements were included in Section 5.6.3.2 of the HHERA, “In addition, as recommended by DOI (Arcadis 2015), it is assumed that each of the recreational activities could take place at any location on federal land. In reality, specific locations may be preferred for certain activities, while other locations may be less attractive or may have limited recreational options. No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. Therefore, potential receptor populations would more likely be exposed randomly, over the course of a lifetime, to soils present across the OCS potential exposure area, rather than have a lifetime of contact limited to a potential exposure area based on an individual AOC (as evaluated in the area-specific appendices at the request of DTSC).” Also as stated in Section 5.6.3.2 of the HHERA, “The exposure time, frequency, and duration for the recreational user provided by D O I and used in the HHRA erred on the side of conservatism to be protective of human health and may not represent “reasonably anticipated use” of the site. Therefore, the health risks estimated for recreational users may be overestimated and lower than presented in the HHRA…. In sum, the risk assessment meets the regulatory requirement to address an upper bound for potential exposures for current and reasonably foreseeable future receptor populations; the actual exposures to soil at the site that could be incurred by workers, recreators, and tribal use would probably be much lower than has been estimated in this HHRA.”

a starting point for making risk management decisions. RBRGs are calculated for constituents in soil for a given potential receptor where the findings of the HHERA suggest some form of risk management or remediation may be warranted. As stated in the HHERA, the RBRGs are not intended to be a bright line, nor used on a point by point basis to identify locations that may warrant risk management. Rather, and consistent with the HHERA approach, RBRGs are applied based on the potential exposure area of interest (that is, the 95UCL of the mean for the potential exposure area should be less than or equal to the RBRG).

5.5.1 Human Health RBRGs

Consistent with EPA guidance (1991), a risk-based process was used in the HHERA to estimate RBRGs for COPCs that drive soil risk concerns above *de minimis* risk levels (Arcadis, 2019). For compounds identified as carcinogens, negligible or *de minimis* risk levels were defined in accordance with state and federal guidance as one in one million (1×10^{-6}). DTSC and EPA ultimately have authority to allow for residual risks to be within the risk management range of 1×10^{-4} to 1×10^{-6}. As indicated in the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300), cancer risks between 1×10^{-6} and 1×10^{-4} fall within a risk management range. This is generally referred to as the acceptable risk range. Within this estimated cancer risk range, there is flexibility for risk managers in deciding what action, if any, is necessary and appropriate for the protection of human health.

For dioxins TEQ, the HHERA notes that DTSC's Human and Ecological Risk Office supports the use of residential and indoor commercial worker remedial goals equal to 10 times the theoretical potential cancer risk of 1×10^{-6} (equal to that associated with a theoretical potential cancer risk of 1×10^{-5}). This regulatory approach is based on studies of bioavailability of dioxins that demonstrate exposure under normal residential and indoor commercial conditions has minimal influence of the serum of exposed individuals. Recreational users[5] are assumed to have the same intake rates via ingestion, dermal contact, and inhalation exposure pathways as under a residential scenario, but exposure occurs on a less frequent basis than assumed under a residential scenario. Therefore, potential exposure to dioxin TEQ in soil for the recreational users over a lifetime would be less than for a hypothetical resident. As such, the HHERA concludes that RBRGs for recreational users equal to 10 times the theoretical potential cancer risk of 1×10^{-6} (that is, 1×10^{-5}) may be appropriate for the site.

As described in the HHERA, human health RBRGs were calculated for CrVI and dioxin TEQ, as these were the significant contributors to risks above *de minimis* levels, under the camper, hiker and OHV rider potential exposure scenarios. As none of the risk drivers were based on the potential for adverse noncancer effects (i.e., the noncancer Hazard Indices (HIs) were below 1 for relevant exposure scenarios), the human health RBRGs are all based on the potential for carcinogenic effects. RBRGs protective of potential human receptors are summarized in Exhibit 5-1. Risk levels of 1×10^{-4}, 1×10^{-5}, and 1×10^{-6} are shown in the exhibit.

[5] Note that, to address the Tribes' comments on the HHERA exposure assumptions for the recreational users and that due to the physical and topographical barriers that exist at the TCS site, certain recreational activities are unlikely to occur, the following statements were included in Section 5.6.3.2 of the HHERA, "In addition, as recommended by DOI (Arcadis 2015), it is assumed that each of the recreational activities could take place at any location on federal land. In reality, specific locations may be preferred for certain activities, while other locations may be less attractive or may have limited recreational options. No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. Therefore, potential receptor populations would more likely be exposed randomly, over the course of a lifetime, to soils present across the OCS potential exposure area, rather than have a lifetime of contact limited to a potential exposure area based on an individual AOC (as evaluated in the area-specific appendices at the request of DTSC)." Also as stated in Section 5.6.3.2 of the HHERA, "The exposure time, frequency, and duration for the recreational user provided by D O I and used in the HHRA erred on the side of conservatism to be protective of human health and may not represent "reasonably anticipated use" of the site. Therefore, the health risks estimated for recreational users may be overestimated and lower than presented in the HHRA.… In sum, the risk assessment meets the regulatory requirement to address an upper bound for potential exposures for current and reasonably foreseeable future receptor populations; the actual exposures to soil at the site that could be incurred by workers, recreators, and tribal use would probably be much lower than has been estimated in this HHRA."

Exhibit 5-1. Human Health Risk-Based Remediation Goals
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California

Risk Drivers for Potential Recreational Users	Human Health RBRG	RBRG Basis
Chromium, hexavalent	3.1 mg/kg	Off-highway vehicle rider at 1 x 10^{-6} risk
	31 mg/kg	Off-highway vehicle rider at 1 x 10^{-5} risk
	310 mg/kg	Off-highway vehicle rider at 1 x 10^{-4} risk
Dioxin/furan TEQ	100 ng/kg	Hiker at 1 x 10^{-6} risk
	1,000 ng/kg	Hiker at 1 x 10^{-5} risk
	10,000 ng/kg	Hiker at 1 x 10^{-4} risk

mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
RBRG = risk-based remedial goal
TEQ = toxicity equivalent

5.5.2 Ecological RBRGs

The HHERA identified the following risk drivers and potential exposure areas as presenting an unacceptable risk to one or more potential ecological receptors:

- Bat Cave Wash exposure area (baseline) – dioxin TEQ for small mammals
- AOC 9 exposure area (including portions of RFI/RI investigation area known as AOC 10) – CrVI and copper for plants; CrVI, total chromium, and copper for invertebrates; total chromium, copper, and dioxin TEQ for small mammals
- AOC 10 exposure area – CrVI and total chromium for plants; total chromium for invertebrates; and total chromium and dioxin TEQ for small mammals.

Vegetation communities observed at the site during the floristic surveys conducted in 2013 (GANDA and CH2M, 2013a) and in 2017 (CH2M, 2017c) are typical of Mojave Desert plant communities. As noted above in Section 5.4 and in the HHERA, “no obvious impairment of the plant community was observed in the vicinity of the Site, and it provides the important habitat functions necessary for ecological receptors that inhabit the area…Because chemical impacts, if they are occurring, are difficult to distinguish from changes associated with physical human disturbances, the potential for adverse effects to the health of the plant community can be considered low; therefore, risk drivers were not identified for plants.” The exceedances of low-confidence generic plant screening values are widely acknowledged to have low ability to predict toxicity in plants. Therefore, these generic screening levels for plants and soil invertebrates are not recommended for use as RBRGs at the site. Because the key risk drivers for plants and soil invertebrates (CrVI and total chromium) tend to be co-located, risk-management or remedial actions considered for the protection of wildlife receptors potentially exposed to total chromium will also reduce risk to plants and invertebrates.

For potential wildlife receptors, RBRGs based on protection of wildlife populations (i.e., based on lowest observed effect level toxicity reference values) were derived for insectivorous small mammals (desert shrew), the only potential wildlife receptor identified with the potential for unacceptable risk associated with exposure to COPECs in soil at this site. The RBRGs for small home range insectivorous mammals (desert shrew) were derived using the dietary dose model used to estimate hazard quotients (HQs) in the predictive ERAs. The RBRGs were calculated using Microsoft® Excel SolverTM software that determines the soil concentration for a target HQ equal to 1.

For dioxin TEQ, a range of RBRGs were calculated using alternate and more robust bioaccumulation factor (BAF) and TRV approaches/values. The congener-specific BAFs (EPA 1999, Fagervold et al. 2010) and a recommended mammalian dioxin TRV developed in Section 6.7.5 of the HHERA Report of

30 nanograms per kilogram body weight per day (ng/kg-bw/day) derived using the EPA's Ecological Screening Level approach were used to calculate the RBRGs protective of insectivorous small mammals.

Ecological RBRGs are summarized in Exhibit 5-2.

Exhibit 5-2. Ecological Risk-Based Remediation Goals
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Risk Driver for Shrew	BAF	LOAEL-based Mammalian TRV	Ecological RBRG
Chromium, total	ERA / RAWP	ERA / HHERA Work Plan	145 mg/kg
Copper	ERA / RAWP	ERA / HHERA Work Plan	145 mg/kg
Dioxin/furan TEQ	EPA 1999	30 ng/kg-day (geomean of rodent studies)	190 ng/kg
Dioxin/furan TEQ	Fagervold et al. 2010	30 ng/kg-day (geomean of rodent studies)	360 ng/kg

BAF = bioaccumulation factor
ERA = ecological risk assessment
HHERA = Human Health and Ecological Risk Assessment
LOAEL = lowest observed adverse effects level
RAWP = Risk Assessment Work Plan
RBRG = risk-based remedial goal
TEQ = toxicity equivalent
TRV = toxicity reference value

5.6 Risk-Based Concentrations for Soil Management

Risk Based Concentrations (RBCs) were also developed and presented in Appendix RBC of the HHERA. The RBCs were developed for the Soil Management Plan to be used to support decisions for the handling, management, and storage of potentially contaminated and displaced soil at the site during implementation of a groundwater remedy at the site to address chromium contamination in groundwater.

For protection of human health, the RBCs were developed for the list of COPCs identified in the HHERA using the same approach and equations as for the development of the human health RBRGs for risk drivers.

For ecological receptors, the RBCs were developed for the list of COPECs identified in the HHERA using the same approach and equations as for the development of the ecological RBRGs for risk drivers. Note that ecological RBCs recommended for soil management decisions were based only on wildlife receptors. Similar to the approach in the HHERA, exceedances of low confidence generic plant screening values were not recommended for soil management decisions. Additionally, it was not feasible to incorporate information from the floristic surveys at the Site as a line of evidence for soil management decision-making because soil samples collected as part of the groundwater remedy may have been from areas or depths where plants are not currently present/exposed.

Subsequent to submittal of the HHERA, revised hexavalent chromium RBCs were calculated for plants and soil invertebrates at the request of DTSC. The revised RBCs were calculated from historical and recent data available in the peer-reviewed literature. The updated RBCs are 8.1 mg/kg for plants and 25.7 mg/kg for soil invertebrates. These values were presented in Table RBC-3.1 of the Errata to the HHERA. The development of revised RBCs for hexavalent chromium do not impact the nature and extent evaluation, since the RBCs are only to to be used to support decisions for the handling, management, and storage of potentially contaminated and displaced soil at the siteand not for evaluating the extent of contamination.

5.7 HHERA Key Findings

Overall, the HHERA conducted herein found no potentially unacceptable risk to most human and ecological receptors exposed to COPCs/COPECs in soil at the site, both within the TCS (inside the compressor station exposure area) and exposure areas outside the TCS. Estimated risks were determined to be acceptable for all relevant exposure areas for the following receptors:

- Human Health Receptors
  - Tribal User and hunter
  - Workers (Commercial and Short- and Long-term Maintenance Workers).
- Ecological Receptors
  - Special-status species (state- and federal-listed threatened and endangered wildlife species and state species of concern), including ring-tailed cat, cave myotis, and pallid bats
  - Large home range receptors (desert kit fox, Nelson's desert bighorn sheep, red-tailed hawk, and Yuma myotis)
  - Herbivorous and insectivorous birds (Gambel's quail and cactus wren)
  - Herbivorous small mammals (Merriam's kangaroo rat).

For the remaining receptors (camper, hiker, OHV rider, and desert shrew), the potential for unacceptable risk was identified as being driven by a limited number of compounds (i.e., dioxin TEQ and CrVI for human health; dioxin TEQ, total chromium, and copper for ecological receptors) in areas within SWMU 1, AOC 9, and/or AOC 10.

The RBRGs calculated for the risk drivers and relevant human and ecological receptors were used in an example of applying the RBRGs using a risk-based approach to identify locations driving risk above acceptable levels for both human[6] and ecological populations. As stated in Section 8 of the HHERA, this evaluation also constitutes a hot spot analysis in that it identifies the locations with elevated COPC/COPEC concentrations associated with unacceptable risk for an area. That process revealed a total of nine locations in three exposure areas (SWMU 1, AOC 9, and AOC 10) as associated with unacceptable risk. Those locations are as follows:

Protection of human recreators (four total locations for the 0 to 3 feet bgs interval):

- Dioxin TEQ: SWMU1-25 in OCS / SWMU 1
- CrVI: AOC10-20, #10 in AOC 9, and MW-58BR_S in AOC 10.

Protection of desert shrew (seven total locations for the 0 to 0.5 feet bgs interval):

- Dioxin TEQ (based on RBRG of 190 ng/kg[7]): SWMU1-25 in Bat Cave Wash; PA-20, AOC10-23, and PA-21 in AOC 9; and AOC10c-4 in AOC 10

[6] Note that, to address the Tribes' comments on the HHERA on exposure assumptions for the recreational users and that due to the physical and topographical barriers that exist at the TCS site, certain recreational activities are unlikely to occur, the following statements were included in Section 5.6.3.2 of the HHERA, "In addition, as recommended by DOI (Arcadis 2015), it is assumed that each of the recreational activities could take place at any location on federal land. In reality, specific locations may be preferred for certain activities, while other locations may be less attractive or may have limited recreational options. No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. Therefore, potential receptor populations would more likely be exposed randomly, over the course of a lifetime, to soils present across the OCS potential exposure area, rather than have a lifetime of contact limited to a potential exposure area based on an individual AOC (as evaluated in the area-specific appendices at the request of DTSC)." Also as stated in Section 5.6.3.2 of the HHERA, "The exposure time, frequency, and duration for the recreational user provided by D O I and used in the HHRA erred on the side of conservatism to be protective of human health and may not represent "reasonably anticipated use" of the site. Therefore, the health risks estimated for recreational users may be overestimated and lower than presented in the HHRA…. In sum, the risk assessment meets the regulatory requirement to address an upper bound for potential exposures for current and reasonably foreseeable future receptor populations; the actual exposures to soil at the site that could be incurred by workers, recreators, and tribal use would probably be much lower than has been estimated in this HHRA."

[7] Per direction from the agencies (call on November 19, 2019), the lower of the dioxin TEQ RBRGs (i.e., 190 ng/kg) was used in this example. Note, using the higher dioxin TEQ RBRG of 360 ng/kg would include only three locations PA-20 and AOC10-23 in AOC 9.

- Total chromium: AOC10-20 in AOC 9
- Copper: AOC10-21 in AOC 9.

The overall results of the HHERA support that focusing remedial planning on limited specific locations should be effective in reducing overall risks to levels that are protective of human health and ecological receptors.

In total, the nine locations fall within three main exposure areas: SWMU 1 (near SWMU1-25), AOC 9 along the TCS fence line (which is within the RFI/RI investigation area known as AOC 10), and AOC 10 within the AOC10c subarea (i.e., drainage depression behind the middle berm in the East Ravine).

The HHERA notes that the locations identified using this approach are intended to help focus remedial planning efforts on those areas and COPCs/COPECs that contribute most significantly to levels of calculated unacceptable risk for ecological receptors and risks above *de minimis* levels for potential human receptors. The overall results of the HHERA support that focusing remedial planning on these locations, as demonstrated by the hypothetical remediation, should be effective in reducing overall calculated risks to levels that are protective of human health and potential ecological receptors.

6. Conclusions and Recommendations

This Volume 3 Soil RFI/RI report presents the results of soil investigations and data collection conducted at the PG&E Topock site from 2008 through 2020. PG&E has 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.

The investigated areas include:

- Areas outside the compressor station fence line (Part A investigation areas)
- Areas inside the compressor station fence line (Part B investigation areas)
- Perimeter areas adjacent to the compressor station fence line
- Storm drains leading from the compressor station to areas outside the fence line

As described in Section 2, multiple rounds of soil sampling activities were performed in order to satisfy and fulfill both Part A and Part B DQOs. Multiple workplan documents were prepared and provided to agencies, Tribes and stakeholders for review and comment prior to implementation; comments on those work plans and responses to the comments are included in the final work plan documents. In addition, position letters from Tribes and/or stakeholders, if any, are included in DTSC/DOI administrative records. Throughout the soil investigation process, as data gaps were identified, PG&E conducted additional field investigations to address the data gaps. Data gap-driven soil sampling activities were most recently presented in a series of three data gap work plans (CH2M, 2016a, 2016b, 2016c). On June 20, 2017, DOI determined that the Soil RFI/RI field work was complete and sufficient data had been collected to proceed with the risk assessment (DOI, 2017).

As described in Section 3, data collected during the RFI/RI Investigations were evaluated against the Part A and Part B DQOs on a unit-by-unit basis. Data were collected to satisfy the following DQO decisions:

For the Part A units:

- Decision 1 – Nature and extent determination.
- Decision 2 – Data sufficiency for risk assessment EPC calculation.
- Decision 3 – Threat to groundwater determination.
- Decision 4 – Data sufficiency to support CMS/FS and/or IMs.

For the Part B units:

- Decision 1 – Nature and extent determination.
- Decision 2 – Data sufficiency for EPC calculation.
- Decision 3 – Threat to groundwater determination.
- Decision 4 – Offsite migration assessment.
- Decision 5 – Data sufficiency to support CMS/FS and/or IMs.

Sections 4.1 through 4.4 present a detailed evaluation of the Combined Soil RFI/RI Data Set and soil parameter data against the Part A and Part B DQOs, respectively. Conceptual site models were updated for investigation areas based on updated information. A summary of the evaluation against the DQOs for all investigation areas and units at the site are presented in Exhibits 4-1 and 4-2. The results of the evaluation indicate that DQOs have been satisfied for most investigation areas and identified areas where determination of the full nature and extent of contamination was not feasible or warranted. uUncertainties regarding nature and extent of impacts can be addressed during remediation, if needed.

As described in Section 4, based on the findings of the HHERA, there is minimal unacceptable risk to most human and ecological receptors exposed to COPCs/COPECs in soil at the site, both within the TCS and at exposure areas outside the TCS. Estimated risks were determined to be acceptable for all relevant exposure areas for most human and ecological receptors.

The potential for unacceptable risk was identified in areas within SWMU 1, AOC 9, and AOC 10 for the camper, hiker, OHV rider, and desert shrew receptors, driven by a limited number of compounds. These compounds were dioxin TEQ and CrVI (for human health) and dioxin TEQ, total chromium, and copper (for ecological receptors).

In total, nine locations fall within three main areas: SWMU 1 near SWMU1-25, AOC 9/AOC 10 along the TCS fenceline, and AOC 10 within the AOC10c subarea (i.e., drainage depression behind the middle berm in the East Ravine). Addressing these locations through the risk management decision making processes will be effective in reducing overall risks to levels that are protective of human health and ecological receptors. It is recommended these areas be carried forward into the CMS/FS, or mitigated via interim measures.

In addition to the areas identified within the HHERA, several unpaved areas inside the compressor station have surficial contaminant concentrations in soil that may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway. Figure 3-18 identifies locations considered in the offsite migration assessment and Exhibit 4-2 identifies which areas had surficial soil concentrations that may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway. It is recommended these areas be carried forward into the CMS/FS, or mitigated via interim measures. These areas are listed in Exhibit 6-1.

Exhibit 6-1. Potential Offsite Migration Areas
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation
PG&E Topock Compressor Station, Needles, California

Area of Concern/Solid Waste Management Unit	
• SWMU 5: Sludge Drying Beds • AOC 7: Haz. Materials Storage Area • AOC 8: Paint Shed • AOC 13: Unpaved Areas within the TCS • AOC 16: Former Sandblast Shelter • AOC 18: Combined Wastewater Transference Pipelines	• AOC 21: Round Depression Near Sludge Drying Bed • AOC 22: Unidentified Three-Sided Structure • Portions of AOC 4 Inside the Fence Line • Perimeter Area – several locations

Hazardous debris, trash, and potentially asbestos-containing material (ACM) are present in areas within AOC 10, AOC 14, AOC 27, and on the hillside within the TCS between the upper and lower yards. It is recommended these areas be carried forward into the CMS/FS, or mitigated via interim measures to gather, collect, and properly dispose of debris, trash and ACM. Non-hazardous debris or trash may be managed by compressor station maintenance and general housekeeping.

Exhibit 6-2 provides a summary of areas proposed to be carried forward for evaluation in the CMS/FS. The exhibit provides the justification and proposed actions for evaluation.

Exhibit 6-2. Areas Recommended to be Carried Forward to CMS/FS
RFI/RI Report, Volume 3: Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California

Investigation Area	Justification	Action
SWMU 1: Former Percolation Bed Sample location: SWMU1-25	Unacceptable risk to human recreators	Evaluate remediation options
AOC 4: Debris Ravine	Soil accumulates above the dam or the gabion after rainfall events	Evaluate removal of accumulated sediment Measures may be considered as part of an administrative control
Exposure Unit AOC 9: Southeast Fence Line Sample locations: #10, AOC10-20, AOC10-21, AOC10-23, PA-20, and PA-21 [1]	Unacceptable risk to human recreators and desert shrew	Evaluate remediation options
Exposure Unit AOC 10: East Ravine Sample locations: MW-58BR_S and AOC10c-4	Unacceptable risk to human recreators and desert shrew Presence of debris	Evaluate remediation options Evaluate removal of hazardous debris
AOC 14: Railroad Debris Site	Presence of debris	Evaluate removal of hazardous debris
AOC 27: MW-24 Bench	Presence of debris	Evaluate removal of hazardous debris
AOC 13: Unpaved Areas within the TCS	Presence of debris on slope between upper and lower yards Data gaps on slope between upper and lower yards requiring further investigation	Evaluate removal of hazardous debris Collect additional soil samples and/or evaluate remediation options
Potential Offsite Migration Areas[2]	Contaminant concentrations in soil in unpaved areas inside the station may pose a potentially unacceptable risk to receptors outside the compressor station fence line via the surface migration pathway	Evaluate measures for the control and prevention of migration of soil from unpaved areas inside the TCS fence line to outside the TCS fence line
Storm Drain System	Presence of damaged pipes Presence of potential pathway from inside to outside the station fence line	Evaluate measures to repair damaged portions of Storm Drain system Evaluate implementation of storm drain monitoring, regular cleaning, and/or stormwater Best Management Practices
Perimeter Area[3] Associated with AOC 1: PA-02, AOC13-19, AOC13-20, AOC13-21, PA-15, AOC16-4, AOC16-grit, AOC18-11, and AOC21-OS2 Associated with AOC 10: PA-18, PA-19, PA-20, and PA-21 Associated with AOC 11: SD-24, PA-09, PA-10, PA-11, and PA-12	The Perimeter Area is a potential source of contamination to downgradient Part A investigation units	Evaluate run-off and erosion control measures and/or removal of contaminated soil

Notes:

[1] Samples locations AOC10-20, AOC10-21, AOC10-23, PA-20, and PA-21 are located in AOC 10 but were used as part of the AOC 9 exposure unit in the HHERA

[2] Investigation units in the Potential Offsite Migration Areas with potentially unacceptable risk via the surface migration pathway are: AOC 1, AOC 4, AOC 7, AOC 8, AOC 9, AOC 10, AOC 11, AOC 13, AOC 16, AOC 18, AOC 21, AOC 22, AOC 31, and SWMU 5.

[3] Sample locations are assigned to the downgradient investigation units.

A soil CMS/FS will be completed after approval of this RFI/RI Report Volume 3. The objective of the soil CMS/FS will be to develop and evaluate corrective measure alternatives and recommend the most appropriate alternatives to manage contaminated soil and sediment where required. The soil CMS/FS will define media cleanup levels that will be protective of human health and the environment, evaluate potential cleanup technologies, and develop and recommend alternatives that are both protective of human health and the environment and consistent with remedial objectives.

Conclusions from the Final Topock Soil EE/CA and associated potential non-time critical removal action will be incorporated into the overall remedial planning and decisions for soil at the Topock site.

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