

Pacific Gas and Electric Company

**APPENDIX A O C 27
POST- SOIL NON-TIME CRITICAL
REMOVAL ACTION HUMAN HEALTH
AND ECOLOGICAL RISK
ASSESSMENT FOR A O C 27
EXPOSURE AREA**

Topock Compressor Station
Needles, California

May 2026

CONTENTS

Acronyms and Abbreviations	iv
1 Introduction	1-1
1.1 Summary of Site Use	1-2
1.2 Summary of NTCRA in AOC 27	1-2
2 Data Evaluation and COPC/COPEC Selection	2-1
2.1 Data Evaluation for Risk-Driving COPC s and COPEC s	2-1
2.2 Data Evaluation for Non-Risk-Driving COPCs	2-2
2.3 Evaluation of Additional Data.....	2-3
3 Exposure Point Concentrations	3-1
4 Human Health Risk Assessment	4-1
4.1 Human Health Conceptual Site Model	4-1
4.2 Constituents of Potential Concern	4-1
4.3 Exposure Point Concentration Summary	4-2
4.4 Estimation of Exposure Dose	4-2
4.5 Toxicity Assessment	4-2
4.6 Human Health Risk Characterization.....	4-3
4.6.1 Risk Characterization for Exposure to Soil (Baseline Scenario and Depth-Weighted EPCs)	4-3
4.6.2 Uncertainties in the Risk Assessment.....	4-4
5 Ecological Risk Assessment	5-6
5.1 Ecological Conceptual Site Model	5-6
5.2 Constituents of Potential Ecological Concern.....	5-6
5.3 Exposure Point Concentration Summary	5-7
5.4 Estimation of Exposure Dose	5-7
5.5 Effects Assessment	5-8
5.6 Ecological Risk Characterization	5-8
5.6.1 Desert Shrew Risk Characterization Using Depth-Weighted EPCs.....	5-10
5.6.2 Desert Shrew Risk Characterization Using Area-Weighted EPCs.....	5-10
5.6.3 Desert Shrew Baseline Risk Characterization Using Congener-Specific Bioaccumulation Factors for Dioxin TEQ.....	5-11

APPENDIX AOC27
 POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

5.6.4 Risk Conclusions for Desert Shrew.....5-11

6 Summary and Conclusions for the HHERA.....6-1

6.1 Summary and Conclusions for the HHRA6-1

6.2 Summary and Conclusions for the ERA.....6-3

7 References.....7-1

EXHIBITS

AOC 27-4.1 Baseline Depth-Weighted Estimated Cumulative Incremental Lifetime Cancer Risk and Hazard Index for the AOC 27 Potential Exposure Area for Recreational Users

AOC 27-6.1 Baseline Scenario Estimated Cumulative Incremental Lifetime Cancer Risk and Hazard Index for the AOC 27 Potential Exposure Area

AOC 27-6.2 Potential for Unacceptable Risk to Desert Shrew at the AOC 27 Potential Exposure Area

TABLES

AOC 27-1.1 Samples and Sampling Locations Included in the AOC 27 Exposure Area

AOC 27-2.1 Comparison of Soil Data for Non-Risk-Driving Constituents in the 2019 HHERA and NTCRA/RFI Additions for the Baseline (No Scouring) Scenario for AOC 27 (0 to 0.5 ft bgs and 0 to 3 ft bgs)

Exposure Point Concentration Tables

AOC 27-3.1 Summary Statistics and Exposure Point Concentrations for Soil Data in the Baseline (No Scouring) Scenario for AOC 27 (0 to 0.5 ft bgs and 0 to 3 ft bgs)

HHRA Tables

AOC 27-4.1 Summary of COPCs Evaluated in the HHRA for AOC27: Baseline Scenario

AOC 27-4.2a Baseline Scenario Depth-Weighted Exposure Point Concentrations and Predicted Outdoor Air Concentrations for Recreational Users: COPCs in AOC 27 Surface Soil (0 to 0.5 foot bgs)

AOC 27-4.2b Baseline Scenario Depth-Weighted Exposure Point Concentrations and Predicted Outdoor Air Concentrations for Recreational Users: COPCs in AOC 27 Shallow Soil (0 to 3 feet bgs)

AOC 27-4.3 Human Health Risk and Hazard Estimate Summary at AOC 27 for the Baseline Scenario Using Depth-Weighted Exposure Point Concentrations

APPENDIX AOC27
POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

ERA Tables

AOC 27-5.1	Depth-Weighted Exposure Point Concentrations for Soil and Biota for AOC 27
AOC 27-5.2	Area-Weighted Exposure Point Concentrations for Soil and Biota for AOC 27
AOC 27-5.3	Toxic Equivalency Factors for Dioxin Congeners and Calculated Tissue Exposure Point Concentrations for Dioxin TEQ for AOC 27
AOC 27-5.4	Desert Shrew Risk Estimate Summary Using Depth-Weighted Exposure Point Concentrations (Wildlife SUF = 1, TRVs used for RBRG Development, and Selected BAFs) for AOC 27
AOC 27-5.5	Desert Shrew Risk Estimate Summary Using Area-Weighted Exposure Point Concentrations (SUF = 1, TRVs used for RBRG Development, and Selected BAFs) for AOC 27
AOC 27-5.6	Desert Shrew Risk Estimate Summary Using Depth-Weighted Exposure Point Concentrations and Congener-Specific BAFs (Wildlife SUF = 1, TRVs used for RBRG Development) for AOC 27

Summary Tables

AOC 27-6.1	Desert Shrew Risk Estimate Summary Using Depth-Weighted and Area-Weighted Exposure Point Concentrations for AOC 27
------------	--

FIGURES

AOC 27-1.1	Soil Sampling Locations AOC 27 Exposure Area (Pre-NTCRA)
AOC 27-1.2	Current Soil Sampling Locations and NTCRA Areas for AOC 27 Exposure Area

ATTACHMENTS

A	Dataset and Exposure Point Concentration Calculations for the AOC 27 HHERA Addendum
B	Dose, Exposure Concentration, Risk, and Hazard Calculations for Human Health Receptors at AOC 27 Using Depth-Weighted EPCs
C	Dose and Risk Calculations for Desert Shrew Receptors at AOC 27 Using Depth-Weighted EPCs and Area-Weighted EPCs

ACRONYMS AND ABBREVIATIONS

2019 HHERA	2019 Soil Human Health and Ecological Risk Assessment Report
2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
AOC	Area of Concern
Arcadis	Arcadis U.S., Inc.
BAF	bioaccumulation factor
B(a)PEQ	benzo(a)pyrene equivalent
BCW	Bat Cave Wash
bgs	below ground surface
BTAG	Biological Technical Assistance Group
BTV	background threshold value
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
DOI	U.S. Department of the Interior
DTSC	Department of Toxic Substances Control (California)
EC	exposure concentration
EPC	exposure point concentration
ERA	ecological risk assessment
HHERA	human health and ecological risk assessment
HHERA Addendum	human health and ecological risk assessment addendum
HHRA	human health risk assessment
HI	hazard index
HMW	high molecular weight
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
LMW	low molecular weight
LOAEL	lowest-observed adverse effects level
LOE	line of evidence
main report	Post-Soil Non-Time Critical Removal Action Human Health and Ecological Risk Assessment Report
ng/kg	nanogram per kilogram

APPENDIX AOC27
POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

NA	not applicable
NOAEL	no-observed adverse effects level
NTCRA	non-time-critical removal action
OHV	off-highway vehicle
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
RAWP	Human Health and Ecological Risk Assessment Work Plan
RBRG	risk-based remedial goal
site	Pacific Gas and Electric Company Topock Compressor Station site
SUF	site use factor
SWMU	Solid Waste Management Unit
TAA	target action area
TCS	Topock Compressor Station
Technical Memo	Soil Risk Assessment Addendum: Proposed Approach to Update the Human Health and Ecological Risk Assessment after Completion of the 2023 Non-Time-Critical Removal Action
TEQ	toxicity equivalent
TPH	total petroleum hydrocarbon
TRV	toxicity reference value
UA	undesignated area
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WOE	weight-of-evidence

1 INTRODUCTION

This appendix presents the human health and ecological risk assessment (HHERA) for the Area of Concern (AOC) 27 potential soil exposure area located outside the Topock Compressor Station (TCS) in Needles, California. The risk characterization presented in this HHERA evaluates the current conditions in AOC 27 following completion of the non-time-critical removal action (NTCRA) completed in 2023. Consistent with the approach for the Post-NTCRA HHERA detailed in the January 30, 2024 Soil Risk Assessment Addendum: Proposed Approach to Update the Human Health and Ecological Risk Assessment after Completion of the 2023 Non-Time-Critical Removal Action (Technical Memo; Arcadis U.S., Inc. [Arcadis] 2024) to U.S. Department of the Interior (DOI) and Department of Toxic Substances Control (California) (DTSC), the updated risk characterization is presented only for risk-driving receptors.

The AOC 27 potential exposure area, shown on Figure AOC27-1.1, is approximately 3.8 acres in total. Table AOC 27-1.1 presents historical sample locations evaluated in the 2019 Soil Human Health and Ecological Risk Assessment Report (2019 HHERA; Arcadis 2019) as well as recent samples collected in 2023 as part of the NTCRA as described in the text that follows.

The 2019 HHERA (Arcadis 2019) did not identify potential risk to human or ecological receptors within the AOC 27 potential exposure area. However, the NTCRA targeted soil removal in areas where metals (i.e., total chromium, hexavalent chromium, copper, lead, molybdenum, and zinc) and dioxin toxicity equivalent (TEQ) exceeded removal action goals (Jacobs 2022). The NTCRA soil removal areas in AOC 27 and current in-place sample locations (i.e., historical and NTCRA confirmation samples remaining in place) are shown on Figure AOC 27-1.2.

Available soil data from the AOC 27 potential exposure area remaining in place after completion of the NTCRA were used to conduct a quantitative forward HHERA as presented herein to update the risk characterization presented in the 2019 HHERA (Arcadis 2019). Details of the NTCRA are presented in Section 2.2.3 of the Post-NTCRA HHERA Report (the “main report”). A summary of the updated human health risk assessment (HHRA) and the ecological risk assessment (ERA) results are presented in Sections 5 and 6, respectively, of the main report. This Post-NTCRA HHERA refers to “HHRA” when discussing specific information for assessing risks to human health, “ERA” when discussing specific information for assessing risks to potential ecological receptors, and “HHERA” when discussing topics that are common to both the HHRA and the ERA.

Descriptions of the physical location and characteristics of the AOC 27 potential exposure area and the HHERA methodologies are provided in the main report and the final Human Health and Ecological Risk Assessment Work Plan (RAWP) documents (Arcadis 2008, 2009, 2015) and are not repeated in this Post-NTCRA HHERA. Detailed discussions of the historical uses and sampling and analysis are presented in the 2019 HHERA (Arcadis 2019).

This Post-NTCRA HHERA summarizes use of the Pacific Gas and Electric Company (PG&E) TCS site (site), data evaluation, potential receptors, potential exposure pathways and the updated results of the HHERA risk characterization for soil in the AOC 27 potential exposure area for risk-driving receptors following completion of the NTCRA. Tables and figures specific to the AOC 27 potential exposure area Post-NTCRA HHERA are also presented in this appendix.

1.1 Summary of Site Use

AOC 27, also referred to as the MW-24 Bench Exposure Area, is located outside the fence line north of the lower yard of the TCS and south of Interstate 40 (Figure AOC 27-1.1) on property owned by PG&E and Havasu National Wildlife Refuge. The primary source of contamination at AOC 27 is disposal of debris. As summarized in the Final Soil Remedial Facility Investigation/Remedial Investigation Work Plan (CH2M Hill, Inc. 2013), during interviews conducted by PG&E in late 2009 and early 2010, a former PG&E employee indicated this area was used as a potential waste disposal area. Before construction of Interstate 40, this area was contiguous with AOC 14—Railroad Debris Site. Miscellaneous construction debris is present in AOC 27.

In January 2008, during trenching activities in AOC 27 associated with installation of a control panel related to the upland in situ pilot test, debris consisting mostly of treated wood, concrete, and scrap steel/tin (including a possible fragment of a storage tank) was encountered at a depth of approximately 3 feet below ground surface (bgs). The California Environmental Protection Agency, DTSC, and the DOI were notified of this discovery in an e-mail dated January 12, 2008.

During a 2011 site walk, DTSC and DOI noted discolored soil in the embankment of an unpaved access road leading from the MW-24 Bench to Bat Cave Wash (BCW). In 2011, DTSC identified potential burn waste in the eastern edge of the road cut on the road from AOC 27 to BCW. Potential sources of dioxins and furans in the vicinity of the TCS may include historical industrial activities as well as other sources unrelated to TCS activities (i.e., unauthorized dumping and burning; regional wildfires; combustion of diesel and leaded gas; and exhaust from cars, trucks, and trains) (CH2M 2017).

Subsequently, PG&E collected samples of the waste material and defined the lateral and vertical extent of waste and any associated contamination observed in the in situ pilot study trench.

Constituents 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. Therefore, primary source media consist of surface, shallow, and subsurface soils.

1.2 Summary of NTCRA in AOC 27

As summarized in the NTCRA Completion Report (Jacobs 2025), the DOI selected a removal action of excavation of contaminated soil and debris at target action areas (TAAs) within the site, located in Needles, California (DOI 2021). PG&E commenced the NTCRA soil removal action on July 25, 2022, according to the DOI-approved Soil NTCRA Work Plan (Jacobs 2022), which incorporated comments from stakeholders, including DOI, U.S. Bureau of Land Management, and tribal stakeholders.

The removal action consisted of the following activities:

- Soil excavation;
- Mechanical separation and size separation of rocks, debris, and soil; and
- Disposal of the contaminated soil and debris in approved and permitted landfills.

Work associated with the NTCRA was completed on May 20, 2024.

APPENDIX AOC27
POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

In AOC 27, removal activities associated with the NTCRA were completed at one TAA. The TAA, extents of the NTCRA removal areas (including step-out locations), and confirmation samples remaining in place are presented on Figure AOC27-1.2. Details of the removal actions, remaining contamination (if any), and confirmation sampling is presented in Section 3 of the NTCRA Completion Report (Jacobs 2025) and summarized briefly for the AOC 27 TAA in the text that follows.

- AOC27 TAA1: AOC27 TAA1 is located along the eastern slope of BCW, northwest of TCS on Havasu National Wildlife Refuge property. The TAA slopes to the southwest; is sparsely vegetated; and is covered with a mixture of depositional sands, gravels, and fill material containing miscellaneous construction debris and burnt material. AOC27 was formerly used as a waste disposal area for miscellaneous trash and construction debris. Before construction of I-40, this area was contiguous with AOC14 to the north. Minor amounts of nonfriable asbestos containing material, such as floor tiles and transite pipe pieces, are present in the area. Historical soil sample results indicate soils contaminated with metals and dioxin/furan was present within the TAA, with the greatest contaminant concentrations within 3 feet of the surface. Soil NTCRA activities at AOC27 TAA1 began in October 2023 and concluded in October 2023, resulting in the removal of debris and 744 cubic yards of soil (Section 3.15 of the NTCRA Completion Report [Jacobs 2025]). Contamination at AOC27 TAA1 consisted of discolored soil and debris to a depth of approximately 7 feet bgs. Minor amounts of nonfriable asbestos-containing material were encountered throughout the TAA. Eight confirmation soil samples were collected from the excavation sidewalls and floor. Confirmation soil sample results at the TAA boundary were less than the numerical removal action goals, but approved step-out locations were conducted to address debris outside the TAA. Additional debris, such as metal pipe, trash, and wood not associated with contamination, remains on the surface in the area beyond the TAA and was not removed during the soil NTCRA. Backfill and stabilization of the TAA was conducted to restore the MW-24 Bench access road to BCW. Well-graded aggregate base material from Campbell's Quarry in Lake Havasu, Arizona, was used to backfill the MW-24 Bench access road area to an appropriate grade for vehicle travel into BCW.

2 DATA EVALUATION AND COPC/COPEC SELECTION

This section summarizes the data considered for the AOC 27 potential exposure area Post-NTCRA HHERA and presents the constituents of potential concern (COPCs) for human health and constituents of potential ecological concern (COPECs) identified as risk drivers in the 2019 HHERA (Arcadis 2019) as well as non-risk-driving COPCs/COPECs evaluated for AOC 27.

For AOC 27, the 2019 HHERA (Arcadis 2019) did not identify potential risk to human or ecological receptors exposed to any COPCs/COPECs. However, consistent with the approach for the Post-NTCRA HHERA detailed in the January 30, 2024 Technical Memo (Arcadis 2024), the HHERA evaluated post-NTCRA exposures (i.e., considering NTCRA-related excavation and placement of backfill) to hexavalent chromium, total chromium, copper, and dioxin TEQ, and pre-NTCRA exposures for the remaining non-risk-driving COPCs (i.e., using exposure point concentrations [EPCs] from the 2019 HHERA). For AOC 27 potential exposure area, no risk-driving COPECs were identified in the 2019 HHERA. Along with debris, soil and/or white powder in AOC 27 with metals and/or dioxin TEQ exceeded numerical RAGs and were targeted for removal. However, COPCs/COPECs that were identified as potential risk drivers at other site AOCs were evaluated for this Post-NTCRA HHERA, including hexavalent chromium, total chromium, copper, and dioxin TEQ.

The data evaluation steps for these risk-driving and non-risk-driving COPCs/COPECs are described in the sections that follow. Additionally, some additional data for non-risk-driving COPCs/COPECs were collected on a limited basis as part of the NTCRA and were evaluated as described in the sections that follow.

2.1 Data Evaluation for Risk-Driving COPCs and COPECs

No risk-driving COPCs or COPECs were identified in the 2019 HHERA (Arcadis 2019). For hexavalent chromium, total chromium, copper, and dioxin TEQ (risk-driving COPCs and/or COPECs identified at other site AOCs), all soil sampling locations currently in place (i.e., not excavated as part of the NTCRA) at the AOC 27 potential exposure area were evaluated in this Post-NTCRA HHERA. The Post-NTCRA HHERA dataset for AOC 27 includes results for in-place samples evaluated in the 2019 HHERA and in-place NTCRA confirmation samples. It should be noted that additional NTCRA data for other non-risk-driving constituents are discussed in Section 2.3.

All soil sampling locations currently in place at the AOC 27 potential exposure area are presented on Figure AOC27-1.1 and in Table AOC27-1.1. Details of the soil sampling and analysis conducted as part of the NTCRA are presented in the forthcoming NTCRA Completion Report (Jacobs 2025); details of the soil sampling and analysis for the remaining samples are described in the RAWP documents (Arcadis 2008, 2009, 2015) and 2019 HHERA (Arcadis 2019). For the baseline scenario, only soil data from 0 to 3 feet bgs were evaluated in this Post-NTCRA HHERA to account for potential soil exposures for risk-driving receptors (i.e., camper, hiker, OHV rider, and desert shrew) that may occur at surface soils (e.g., 0 to 0.5 foot bgs) or shallow soils (e.g., 0 to 3 feet bgs). Because potential soil contact does not extend below 3 feet bgs for the baseline scenario, deeper soil data (i.e., greater than 3 feet bgs) were excluded from the risk evaluation, as noted in Table AOC27-1.1.

Following the steps outlined in Section 3 of the main report, soil data considered usable for the risk assessment were identified and used in the quantitative HHERA. Samples representing soil that was

excavated as part of the NTCRA were excluded from the dataset, and current sample top and bottom depths (reflecting excavation and/or placement of fill material) were used (Table AOC 27-1.1). The post-NTCRA soil data are presented in Attachment AOC27-A1 and include the following:

- Pre-NTCRA Data: For pre-NTCRA data, the dataset includes results for site risk drivers (i.e., hexavalent chromium, total chromium, copper, and dioxin TEQ) from the 2019 HHERA dataset (Arcadis 2019) where those samples remain in place.
- NTCRA Confirmation Sampling Data: The dataset includes results for site risk drivers (i.e., hexavalent chromium, total chromium, copper, and dioxin TEQ) from confirmation samples that currently remain in place.

2.2 Data Evaluation for Non-Risk-Driving COPCs

As noted above, EPCs for non-risk-driving COPCs used in the 2019 HHERA (Arcadis 2019) were also used in this HHERA Addendum, as calculated from the pre-NTCRA soil dataset. As discussed in Section 5.5.2 of the main report, use of pre-NTCRA soil data for non-risk-driving COPCs is a conservative approach that is likely to overestimate post-NTCRA concentrations of these COPCs. Thus, the data evaluation steps are as described in detail in Section 3 of the 2019 HHERA. The soil sampling locations for the 2019 HHERA dataset at AOC 27 are presented on Figure AOC27-1.1 and in Table AOC27-1.1 of the 2019 HHERA. The data were evaluated based on methodology described in the RAWP documents (Arcadis 2008, 2009, 2015). It should be noted that for this Post-NTCRA HHERA, only surface soil (0 to 0.5 foot bgs) and shallow soil (0 to 3 feet bgs) were evaluated.

Data processed for the HHERA (e.g., calculation of total concentrations for low molecular weight [LMW] and high molecular weight [HMW] polycyclic aromatic hydrocarbons [PAHs], benzo(a)pyrene equivalent [B(a)PEQ], polychlorinated biphenyls [PCBs], and dioxin/furan TEQs) are described in detail in Section 3 of the 2019 HHERA (Arcadis 2019).

The process for identifying COPCs and COPECs is detailed in Section 3.4 of the 2019 HHERA (Arcadis 2019). COPCs and COPECs were selected for the AOC 27 potential exposure area using soil data encompassing all relevant exposure depths for the HHERA (i.e., 0 to 10 feet bgs for the AOC 27 potential exposure area), as presented in Attachment AOC27-A1 to the 2019 HHERA. Inorganic compounds, LMW PAHs, HMW PAHs, B(a)PEQ, and dioxin TEQ had concentrations above the background levels in AOC 27 soil (i.e., 0 to 10 feet bgs), and, therefore, are included as COPCs and/or COPECs in the baseline exposure depths. When detected above background levels, carcinogenic PAHs (i.e., benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenzo[a,h]anthracene, chrysene, and indeno[1,2,3-cd]pyrene) associated with B(a)PEQ were also selected as COPCs in the HHERA for the evaluation of the noncancer endpoint for each individual PAH. All other detected organic constituents in AOC 27 potential exposure area soil in the baseline exposure depths are included as COPCs and/or COPECs in the 2019 HHERA. COPCs and/or COPECs selected for exposure depths and scenarios evaluated in the 2019 HHERA for the AOC 27 potential exposure area and relevant to the applicable depths evaluated in this Post-NTCRA HHERA are summarized in Section 3.

2.3 Evaluation of Additional Data

In some cases, NTCRA confirmation samples were also analyzed for other constituents, including a few metals (lead, mercury, molybdenum, and zinc). These data for metals were not included in the Post-NTCRA HHERA exposure estimates. Instead, measured concentrations of in-place confirmation samples were compared to the range of concentrations observed in the 2019 HHERA dataset (Arcadis 2019). This evaluation is presented in Table AOC27-2.1 for the baseline scenario. The maximum and mean concentrations for the in-place NTCRA confirmation samples for lead, mercury, molybdenum, and zinc were less than the maximum and mean concentrations for these metals in the 2019 HHERA dataset. This indicates that the EPCs evaluated for lead, mercury, molybdenum, and zinc in the HHRA based on values calculated for the 2019 HHERA dataset (Arcadis 2019) are likely a conservative estimate of current post-NTCRA exposures in AOC 27. Exclusion of the in-place NTCRA confirmation samples for these constituents is not expected to materially change the risk estimates or conclusions of this Post-NTCRA HHERA.

3 EXPOSURE POINT CONCENTRATIONS

Depth-weighted and area-weighted EPCs for COPCs/COPECs in soil at the AOC 27 potential exposure area were calculated as described in Section 4.2 of the main report. As noted in Section 2, EPCs for hexavalent chromium, total chromium, copper, and dioxin TEQ were calculated from the post-NTCRA dataset. In addition, EPCs from the 2019 HHERA (Arcadis 2019) for remaining non-risk-driving COPCs were used in the HHERA to estimate cumulative risks to human receptors. Consistent with the scenario evaluated in the 2019 HHERA, one scenario was evaluated for the AOC 27 potential exposure area: baseline (no scouring).

The following exposure depths were evaluated:

- Surface soil (0 to 0.5 foot bgs); and
- Shallow soil (0 to 3 feet bgs).

Deeper soil intervals were not evaluated as the risk-driving receptors are potentially exposed only to surface and shallow soil.

The depth-weighted data used in the calculation of depth-weighted EPCs for hexavalent chromium, total chromium, copper, and dioxin TEQ are presented in Attachment AOC27-A2. The summary statistics for these AOC 27 potential exposure area soil depth-weighted datasets and depth-weighted EPCs were calculated in a manner consistent with the RAWP documents (Arcadis 2008, 2009, 2015). In accordance with the RAWP (Arcadis 2008), area-weighted EPCs for the HHERA are evaluated only if depth-weighted EPCs suggest that cumulative cancer risks and/or noncancer hazards may be significant for any given HHERA exposure scenario (i.e., cumulative cancer risks exceed a 10^{-6} cancer risk level, and/or the noncancer hazard index [HI] exceeds 1). Similarly, for the ERA, area-weighted EPCs are evaluated but only discussed if depth-weighted EPCs suggested potential risk to potential ecological receptors (i.e., hazard quotient [HQ] exceeds 1 for any COPEC). The area-weighted data used in the calculation of area-weighted EPCs and the Thiessen polygons figures representing the area-weighted EPCs are presented in Attachment AOC27-A3.

Soil summary statistics for constituents measured at the AOC 27 potential exposure area and depth- and area-weighted EPCs for COPCs/COPECs calculated using depth-weighted data from the exposure depths listed previously for the AOC 27 potential exposure area for the baseline scenario are presented in Table AOC27-3.1. It should be noted that the list of constituents shown in Table AOC27-3.1 is based on analytes that were detected at least once at the site (including all potential exposure areas inside or outside the TCS) in the 2019 HHERA (Arcadis 2019) and measured at AOC 27.

In accordance with the 2019 HHERA (Arcadis 2019), if the soil dataset had fewer than four detected values (i.e., concentrations reported above the detection limit) or fewer than eight total observations, the EPC defaulted to the maximum depth-weighted concentration in that dataset. Table AOC27-3.1 also presents the basis of the calculated depth- and area-weighted EPCs, including whether the EPC is based on the maximum detected concentration.

4 HUMAN HEALTH RISK ASSESSMENT

This section briefly summarizes the HHRA approach used for this Post-NTCRA HHERA; presents the COPCs, EPCs, risk, and hazard summary tables; and discusses the results of the risk characterization and uncertainties in the risk assessment for the AOC 27 potential exposure area. Details of the overall HHRA approach are presented in Section 5 of the 2019 HHERA (Arcadis 2019). Dose, exposure concentration (EC), risk, and hazard calculation tables for human health receptors at the AOC 27 potential exposure area are presented in Attachment AOC27-B.

As stated in the 2019 HHERA (Arcadis 2019), risks/hazards estimated for an individual AOC, Solid Waste Management Unit (SWMU), or undesignated area (UA) potential exposure area such as AOC 27 are not considered representative of the realistic or likely potential exposures for the human populations that could be present in the areas outside the TCS (such as recreational users). Risks/hazards calculated separately for individual AOCs are conservative and likely overestimate site risks/hazards. As described in the RAWP documents (Arcadis 2008, 2009, 2015), these human populations would more likely be exposed randomly, over the course of a lifetime, to soil present in all individual AOC/SWMU/UA potential exposure areas located outside the TCS, rather than have a lifetime of contact limited to the area of a single potential exposure area. Therefore, estimated risks/hazards presented for individual AOC/SWMU/UA potential exposure areas are not believed to be representative of the potential health risks to humans potentially contacting the soil outside the TCS. As stated previously, the Post-NTCRA HHERA provides updated risk estimates for human health and the environment based on potential exposures to current soil conditions in the N T C R A areas. Therefore, updated risk estimates were not performed for the OCS potential exposure area in the Post-NTCRA HHERA. It is noted that due to N T C R A soil removal, the potential post-N T C R A soil risks for the OCS are likely lower than estimated in the 2019 HHERA. The HHRA results and conclusions of the 2019 HHERA and of this Post-NTCRA HHERA will be considered for making risk-management decisions for the site in the Corrective Measure Study/Feasibility Study to be prepared for the site.

4.1 Human Health Conceptual Site Model

Following the steps outlined in Section 5.5 of the 2019 HHERA (Arcadis 2019), risks were estimated for potentially complete and significant exposure pathways identified in the human health conceptual site model for risk-driving receptors potentially exposed to COPCs in soil present at the AOC 27 potential exposure area, as identified in the 2019 HHERA. These included incidental ingestion of soil, dermal contact with soil, and inhalation of particulates and volatile organic compound (VOC) vapors in ambient outdoor air from soil for recreational users (child and/or adult campers, hikers, and off-highway vehicle [OHV] riders).

Potential exposure pathways considered incomplete or insignificant were not quantitatively evaluated and are discussed in Section 5.3.1 of the 2019 HHERA (Arcadis 2019).

4.2 Constituents of Potential Concern

COPCs for the AOC 27 potential exposure area were selected in accordance with the RAWP (Arcadis 2008) and as described in Section 3.4 of the 2019 HHERA (Arcadis 2019). COPCs for the AOC 27 potential exposure area evaluated in this Post-NTCRA HHERA are the same as the COPCs for the AOC 27 potential

exposure area evaluated in the 2019 HHERA. The COPC selection process using soil data encompassing all relevant exposure depths for this Post- NTCRA HHERA (i.e., 0 to 6 feet bgs for the AOC 27 potential exposure area) are presented in Attachment AOC27-A. COPCs for the two exposure depths (surface and shallow soil) and one scenario (baseline) evaluated for the AOC 27 HHERA are summarized in Table AOC27-4.1. COPCs selected for Subsurface II soil in the 2019 HHERA are also shown in Table AOC27-4.1, however, only the EPCs for volatile compounds for these depth intervals are used in the estimates of outdoor vapor concentrations in the quantitative HHERA for the evaluation of the outdoor vapor inhalation pathway. The EPCs for COPCs for Subsurface II soil were not updated in this this Post- NTCRA HHERA and are the same as presented in the 2019 HHERA.

COPCs included metals (antimony, cadmium, hexavalent chromium, copper, lead, mercury, and zinc), VOCs (bromomethane and chloromethane), PAHs, PCBs, total petroleum hydrocarbons (TPHs) as diesel, TPHs as motor oil, and dioxin TEQ in surface, shallow, subsurface I, and/or subsurface II soil.

4.3 Exposure Point Concentration Summary

For the potentially complete and significant exposure pathways identified in the conceptual site model, EPCs were calculated as described in Section 4.2 of the main report and presented in Section 3 of this appendix. Depth-weighted data used in the calculation of depth-weighted EPCs are presented in Attachment AOC27-A. Depth-weighted EPCs for COPCs in soil and estimated outdoor air concentrations associated with dust and vapors and used to estimate risk in the HHERA are summarized in Tables AOC27-4.2a and AOC27-4.2b, for the two exposure depths.

As described in detail in Section 5.3.3 of the 2019 HHERA (Arcadis 2019), surface and shallow soil exposure depths and corresponding EPC datasets for recreational users (child and/or adult campers, hikers, and OHV riders) were used to evaluate potential exposure to COPCs in soil for potential human receptors in the 2019 HHERA.

4.4 Estimation of Exposure Dose

The EC and chronic daily intake for potential carcinogenic and noncarcinogenic effects were calculated, as described in Section 5.5.1 of the 2019 HHERA (Arcadis 2019), for COPCs in soil for potentially complete exposure pathways. The calculated EC and chronic daily intake values using depth-weighted EPCs are presented in Tables AOC27-B1.1a through AOC27-B1.1c (carcinogenic effects) and Tables AOC27-B1.2a through AOC27-B1.2c (noncarcinogenic effects) in Attachment AOC27-B1 for the receptors evaluated. Exposure parameters for recreational users used in the dose calculations were presented in Table 5-1 of the 2019 HHERA and are presented in Table 5-1 of the main report.

4.5 Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure to a constituent and the potential for adverse health effects. More specifically, the toxicity assessment identifies agency-promulgated or derived toxicity values that can be used to estimate the likelihood of adverse health effects occurring in humans at different exposure levels. The approach for the toxicity assessment was provided in Section 4.5 of the RAWP (Arcadis 2008) and in Section 4.2 of the Final Human Health and Ecological Risk Assessment Work Plan Addendum 2 (Arcadis 2015). In a manner consistent with regulatory risk assessment

policy, adverse health effects resulting from potential chemical exposures were evaluated in two categories: carcinogenic effects and noncarcinogenic effects. The hierarchy of sources for the toxicity criteria to be used for this Post- NTCRA HHERA has been updated from the 2019 HHERA (Arcadis 2019) and is compliant with the September 4, 2018, “Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals” rule (Title 22, California Code of Regulations, Sections 68400.5, 69020-69022). Toxicity values for carcinogenic and noncarcinogenic effects for COPCs selected and used for the HHRA are described in Section 5.3 of the main report and were used to estimate potential cancer risks and noncancer hazards described in this Post- NTCRA HHERA.

4.6 Human Health Risk Characterization

For potential human receptors, assuming lifetime soil exposure is limited to AOC 27 potential exposure area, the estimated incremental lifetime cancer risks (ILCRs) and/or noncancer HQs were calculated for each COPC and potentially complete exposure pathway. Estimated cumulative ILCRs (i.e., sum of chemical-specific ILCRs for each exposure depth for a scenario) were calculated and compared to the DTSC point of departure for risk management decision of 1×10^{-6} . It should be noted that risk management decisions may increase this criterion depending on site-specific conditions. As indicated in the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations 300), cancer risks between a one in a million and a one hundred in a million probability of occurrence (1×10^{-6} and 1×10^{-4}) fall within a risk management range that 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. Fish and Wildlife’s cancer risk threshold level is ten in a million (1×10^{-5}) for soil deeper than 2 feet below ground surface (February 12, 2021 Topock Soil EE/CA Response to Comment Consultation Meeting Agenda). Estimated cumulative noncancer hazards (i.e., HIs) are calculated and compared to an HI of 1 (DTSC 2015). Chemical exposures that yield HIs of less than or equal to 1 are not expected to result in adverse noncancer health effects (United States Environmental Protection Agency [USEPA] 1989).

4.6.1 Risk Characterization for Exposure to Soil (Baseline Scenario and Depth-Weighted EPCs)

Table AOC27-4.3 summarizes cumulative ILCRs and HIs estimated for exposure to soil for each potential human receptor at the AOC 27 potential exposure area, calculated using depth-weighted EPCs. The dose, EC, ILCR, and HI equations are presented in detail in Section 5.5.1 of 2019 HHERA (Arcadis 2019). The detailed cancer risk estimates (Tables AOC27-B1.3a through AOC27-B1.3c) and noncancer hazard calculations (Tables AOC27-B1.4a through AOC27-B1.4c) are presented in Attachment AOC27-B.

Risk/hazard estimates for the AOC 27 potential exposure area are summarized in Exhibit AOC 27-4.1 and discussed in this section. Assuming lifetime soil contact is limited to AOC 27 potential exposure area, the depth-weighted estimated cumulative ILCRs and HIs for camper, hiker, and OHV rider potentially exposed to COPCs in AOC 27 soil at all exposure depths are at or below the de minimis levels of 1×10^{-6} and 1, respectively.

Exhibit AOC 27-4.1 Baseline Depth-Weighted Estimated Cumulative Incremental Lifetime Cancer Risk and Hazard Index AOC 27 Potential Exposure Area for Recreational Users

Potential Receptor	Exposure Depth	Cumulative ILCR	ILCR Drivers	HI	HI Drivers
Camper	Surface	7E-07	NA	0.02	NA
Camper	Shallow	4E-07	NA	0.01	NA
Hiker	Surface	1E-06	NA	0.04	NA
Hiker	Shallow	9E-07	NA	0.03	NA
OHV rider	Surface	9E-07	NA	0.01	NA
OHV rider	Shallow	6E-07	NA	0.008	NA

Notes:

1. ILCR and HI drivers are presented only for estimated cumulative ILCRs above 1×10^{-6} and estimated HIs above 1.

NA = not applicable

Assuming that lifetime soil contact is limited to the AOC 27 potential exposure area, the depth-weighted estimated cumulative ILCRs for the camper, hiker, and OHV rider potentially exposed to COPCs in post-NTCRA surface and shallow soil are at or below the de minimis level of 1×10^{-6} , the point of departure for risk management decisions (Tables AOC27-B1.3a through AOC27-B1.3c in Attachment AOC27-B).

Assuming lifetime soil contact is limited to the AOC 27 potential exposure area, the depth-weighted estimated cumulative HIs for the camper, hiker, and OHV rider potentially exposed to COPCs in surface and shallow soil are below an HI of 1 (Tables AOC27-B1.4a through AOC27-B1.4c in Attachment AOC27-B). The depth-weighted EPCs for lead in AOC 27 potential exposure area surface and shallow soil are not expected to result in an increase in blood lead levels above the O E H H A Office of Environmental Health Hazard Assessment benchmark value of 1 microgram per deciliter for child recreational users (Tables AOC 27-B1.5a through AOC 27-B1.5f in Attachment AOC27-B).

4.6.2 Uncertainties in the Risk Assessment

The risk assessment includes several uncertainties that warrant discussion. Many of the assumptions used in this risk assessment regarding the representativeness of the sampling data, potential human exposures, fate and transport modeling, and chemical toxicity are conservative. As agreed in the RAWP (Arcadis 2008), the values follow agency guidance and reflect a 90th or 95th percentile value rather than a typical or average value. The use of several conservative exposure assumptions and toxicity estimates can introduce considerable uncertainty into the risk assessment. By using conservative exposure assumptions or toxicity estimates, the assessment can develop a significant conservative bias that may result in the calculation of significantly higher estimates for cancer risks or noncancer hazards than are actually posed by the chemicals present in soil. These uncertainties are discussed in detail in Section 5.6 of the 2019 HHERA (Arcadis 2019). Uncertainties applicable only to the risk assessment for the AOC 27 potential exposure area are discussed in detail in this section.

APPENDIX AOC27
POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

Uncertainties for the AOC 27 potential exposure area include the use of the maximum depth-weighted soil concentration as the EPC. The maximum depth-weighted soil concentration was used for COPCs when the soil dataset had fewer than four detected values (i.e., concentrations reported above the detection limit) or fewer than eight total observations as shown in Table AOC27-3.1.

For the AOC 27 potential exposure area, the maximum depth-weighted concentration was used as the EPC for the following COPCs:

- Surface soil: one metal (cadmium) and PAHs (acenaphthene, dibenzo[a,h]anthracene, fluorene, and naphthalene); and
- Shallow soil: one metal (antimony), VOCs (bromomethane and chloromethane), and PAHs (acenaphthene, acenaphthylene, dibenzo[a,h]anthracene, fluorene, and naphthalene).

The use of the maximum depth-weighted soil concentration as the EPC for the COPCs listed previously may not appropriately represent exposures and resulting risks/hazards. This approach to estimating EPCs does not materially impact the results of the HHRA because the AOC 27 potential exposure area COPCs with low frequency of detection and/or fewer than eight observations are not risk drivers at the site.

This baseline risk assessment assumes that contact with soil is not limited by the presence of engineering or institutional controls in the future. The potential health risks estimated for recreational users do not account for potential vegetative covering, unsuitable topography (e.g. steep slopes) and backfill material cover placed during or after completion of N T C R A activities outside the TCS that would reduce exposure below that assumed in this analysis. In addition, as recommended by D O I (Arcadis 2015), it is assumed that each of the recreational activities could take place at any location on federal land. However, specific locations may be preferred for certain activities, while other locations may be less attractive or may have limited recreational options. A O C 27, also referred to as the MW-24 Bench Exposure Area, is located outside the fence line north of the lower yard of the TCS and south of Interstate 40 (Figure A O C 27-1.1) on property owned by PG&E and Havasu National Wildlife Refuge. Before construction of Interstate 40, this area was contiguous with A O C 14—Railroad Debris Site. AOC 27 potential exposure area is located between the TCS and Interstate 40 and may have limited accessibility and may be less attractive or limited for certain recreational activities. As such, the estimated risks are likely overestimated.

5 ECOLOGICAL RISK ASSESSMENT

This section summarizes the ERA approach evaluated in this Post-NTCRA HHERA; presents the COPECs, EPCs, dose, and risk tables for the post-NTCRA AOC 27 ERA Addendum; and characterizes potential risk to desert shrew exposed to COPECs in soil currently present at the AOC 27 potential exposure area. Details of the overall ERA approach are presented in Section 6 of the main report. Supporting tables for the AOC 27 ERA based on risk calculations conducted using depth-weighted EPCs and area-weighted EPCs are presented in Attachment AOC 27-C and described in this section.

Ecological risks were not calculated using maximum depth-weighted concentrations because they would be considered overly conservative and would generally be used for screening-level purposes. Maximum concentrations were not used for making risk management decisions for the NTCRA at the AOC 27 potential exposure area and were not evaluated in this ERA.

5.1 Ecological Conceptual Site Model

In the 2019 HHERA (Arcadis 2019), risks were estimated for potentially complete and significant exposure pathways identified for a suite of potential ecological receptors exposed to COPECs in soil at the AOC 27 potential exposure area. These included plants, invertebrates, and small home-range receptors (Merriam's kangaroo rat, desert shrew, cactus wren, and Gambel's quail). Potential large home-range receptors (desert kit fox, red-tailed hawk, and Nelson's desert bighorn sheep) were evaluated for larger potential exposure areas (combined AOCs/investigation areas). For AOC 27, these larger exposure areas included (1) all AOCs outside the TCS, and (2) AOCs outside the TCS excluding BCW and AOC 4. Semi-quantitative and qualitative evaluations for special-status species were also conducted, as described in the 2019 HHERA.

The 2019 HHERA (Arcadis 2019) found no potential risk to ecological receptors, including special-status species, in AOC 27 and the larger exposure area relevant to large home-range receptors. However, consistent with the approach for the Post-NTCRA HHERA detailed in the January 30, 2024 Technical Memo (Arcadis 2024) to DOI and DTSC, an updated risk characterization for risk-driving receptors and COPECs for other site AOCs was completed to evaluate post-NTCRA conditions in AOC 27. Therefore, for transparency and consistency, this Post-NTCRA HHERA presents risk estimates for desert shrew and hexavalent chromium, total chromium, copper, and dioxin TEQ in surface soil that reflect current conditions in AOC 11 following soil remediation associated with the NTCRA.

The exposure assumptions for desert shrew, which are consistent with those of the 2019 HHERA (Arcadis 2019), are as follows: desert shrew—representative of invertivorous small mammal populations—are exposed only to surface soil (incidental and through biota uptake).

5.2 Constituents of Potential Ecological Concern

As stated in Section 5.1, for AOC 27, the 2019 HHERA (Arcadis 2019) found no potential risk to ecological receptors in AOC 27 and the larger exposure area relevant to large home-range receptors. However, consistent with the approach for the Post-NTCRA HHERA detailed in the January 30, 2024 Technical Memo (Arcadis 2024), to DOI and DTSC, updated risk estimates are presented for risk-driving receptors and

COPECs found at other site AOCs to evaluate post-NTCRA conditions. Therefore, risk estimates are provided for desert shrew and hexavalent chromium, total chromium, copper, and dioxin TEQ.

5.3 Exposure Point Concentration Summary

Soil EPCs were calculated as described in Section 4.2 of the main report and presented in Section 3 of this Post-NTCRA HHERA. For the AOC 27 potential exposure area, risks to desert shrew were estimated using depth-weighted EPCs and area-weighted EPCs. Depth-weighted data used in the calculation of depth-weighted EPCs are presented in Attachment AOC 27-A2. Area-weighted data used in the calculation of area-weighted EPCs are presented in Attachment AOC 27-A3.

Biota tissue (i.e., terrestrial invertebrate) EPCs were calculated from the soil EPCs using soil-to-biota uptake relationships (i.e., bioaccumulation factors [BAFs]) for invertebrates, as described in Section 6.4.3 of the main report. As described in Section 6.4.2 of the main report, the surface soil (e.g., 0 to 0.5 foot bgs) depth interval was selected to represent exposure to soil and biota tissue for the risk calculations for desert shrew. For dioxin TEQ, the BAFs selected in the RAWP (Arcadis 2008) are based on uptake of a single congener: 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). Because of the uncertainty associated with use of a single congener-based BAF (e.g., differences in congener uptake due to differences in their structure and physico-chemical properties are ignored), dioxin TEQ uptake was also estimated using two congener-specific approaches: congener-specific BAFs for soil invertebrates from USEPA (1999) and congener-specific BAFs for soil invertebrates from Fagervold et al. (2010), as discussed in detail in the Section 6.4.3.2 of the main report.

Depth-weighted soil EPCs and biota tissue EPCs calculated from depth-weighted soil EPCs are presented in Table AOC 27-5.1 for the baseline scenario. Similarly, area-weighted soil EPCs and biota tissue EPCs calculated from area-weighted soil EPCs are presented in Table AOC 27-5.2. The alternate congener-specific BAFs and resulting biota tissue EPCs are presented in Table AOC 27-5.3.

Risk calculations based on depth-weighted concentration upper confidence limits (UCLs) and area-weighted UCLs for each COPEC are provided. As mentioned earlier, use of the maximum depth-weighted concentrations results in overly conservative risks and is not considered for evaluation of post-NTCRA potential exposures.

5.4 Estimation of Exposure Dose

Potential exposures for wildlife (i.e., desert shrew) are quantified as doses (e.g., in units of milligram per kilogram body weight per day). Exposure doses for COPECs in soil and potentially complete pathways were calculated using the equations as described in Section 6.4.3 of the main report. The exposure parameters selected to evaluate wildlife in this ERA include upper bound values from literature (e.g., ingestion rates) or assumed (e.g., 100% of one type of diet), which may result in conservative estimates of exposure dose and potential overestimation of actual exposure at the site.

For desert shrew, doses were calculated using the exposure parameters and equations presented in Section 6.4.3 of the main report. Exposure doses were calculated using depth-weighted soil and biota tissue presented in Table AOC 27-5.1 for the depth-weighted risk evaluations, and area-weighted soil and biota tissue EPCs presented in Table AOC 27-5.2 for the area-weighted risk evaluations. Alternate congener-specific BAFs and resulting biota tissue EPCs are presented in Table AOC 27-5.3.

Dose calculations using depth-weighted EPCs for desert shrew potentially exposed to COPECs via ingestion of soil and biota tissue for the baseline scenario are presented in Attachment AOC27-C. Dose calculations using area-weighted EPCs for desert shrew potentially exposed to COPECs via ingestion of soil and biota tissue for the baseline scenario are also presented in Attachment AOC27-C.

5.5 Effects Assessment

Dose-based toxicity reference values (TRVs) for wildlife for COPECs were used to estimate risks to desert shrew potentially exposed to COPECs in soil and biota tissue at the AOC 27 potential exposure area. A range of risks to desert shrew was estimated using the TRVs based on a no-observed adverse effects level (NOAEL) and based on a lowest-observed adverse effects level (LOAEL). For hexavalent chromium, total chromium, and copper, the NOAEL- and LOAEL-based TRVs used in this Post-NTCRA HHERA are the selected TRVs from the RAWP documents (Arcadis 2008, 2009, 2015).

For dioxin TEQ, the selected mammalian TRVs in the RAWP documents (Arcadis 2008, 2009, 2015) are from Toxicological Benchmarks for Wildlife from Oak Ridge National Laboratory (Sample et al. 1996). However, as described in Section 6.5 of the main report, an alternate set of mammalian TRVs were evaluated, consistent with the 2019 HHERA (Arcadis 2019). Following the approach used by USEPA in developing TRVs for the ecological soil screening levels (USEPA 2008), alternate dioxin TEQ TRVs were developed for mammals based the geometric mean of the reproduction and growth endpoints for the NOAEL and LOAEL effect levels, respectively. These alternate TRVs for dioxin TEQ, presented in Section 6.5 of the main report, were used to estimate potential risk to desert shrew in this Post-NTCRA HHERA.

The LOAEL-based TRVs used in this Post-NTCRA HHERA are the same as the TRVs used to develop ecological risk-based remedial goals (RBRGs) in the 2019 HHERA (Arcadis 2019); RAGs selected based on RBRGs were then used to define the extent of NTCRA soil removals.

Although other additional sets of TRVs (i.e., Navy/Biological Technical Assistance Group [BTAG] TRVs [DTSC 2002, 2009]) were also evaluated in the 2019 HHERA (Arcadis 2019), BTAG TRVs are not available for hexavalent chromium, total chromium, or dioxin TEQ, and they were ultimately not used for making remedial decisions. BTAG TRVs were not evaluated in this Post-NTCRA HHERA.

Wildlife TRVs used for RBRG development are presented in Table 6-4 of the main report.

5.6 Ecological Risk Characterization

The risk characterization integrates the results of the exposure assessment and effects assessment and is subject to uncertainties in both those efforts. Risk characterization includes two major components: risk estimation and risk description. As presented in the tables and discussed in this section, risk estimates (HQs) involved the integrating of exposure profiles with the exposure-effects information. For each potential receptor and COPEC, risk descriptions including various lines of evidence (LOEs) and uncertainties, including HQs, supporting statistical and site use information, and the direction of uncertainty in the risk estimates, are discussed in this section for interpreting the risk results and identifying potential unacceptable risk to desert shrew. Uncertainties specific to the AOC 27 potential exposure area are discussed in context with the risk characterization results presented in this section. Generic uncertainties in the ERA are discussed in Section 6.7 of the main report.

APPENDIX AOC27
POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

The 2019 HHERA (Arcadis 2019) found no potential risk to ecological receptors, including special-status species, in AOC 27 and the larger exposure areas relevant to large home-range receptors. However, consistent with the approach for the Post-NTCRA HHERA detailed in the January 30, 2024 Technical Memo (Arcadis 2024) to DOI and DTSC, this Post-NTCRA HHERA presents the risk characterization for desert shrew and risk-driving COPEC s for other site AOCs (i.e., hexavalent chromium, total chromium, copper, and dioxin TEQ) to evaluate current conditions in the AOC 27 potential exposure area following soil remediation associated with the NTCRA.

For desert shrew, a range of HQs was calculated using the NOAEL- and LOAEL-based TRVs that were used in this Post-NTCRA HHERA (see Section 5.5). HQs based on the LOAEL-based TRVs are referred to as “LOAEL-based HQs.” HQs based on NOAEL-based TRVs are referred to as “NOAEL-based HQs.” As noted above, the 2019 HHERA (Arcadis 2019) did not identify potential for unacceptable risk to sensitive species and therefore protection of individual invertivorous small mammals is not warranted. This Post-NTCRA HHERA presents NOAEL-based HQs for completeness, however, LOAEL-based HQs were used to evaluate population-level protection of invertivorous small mammals.

Risk conclusions for populations of desert shrew used the following criteria:

- COPEC s with NOAEL-based HQs less than or equal to 1 pose *de minimis* risk to individuals and populations of potential wildlife receptors.
- COPEC s with a NOAEL-based HQ greater than 1, but a LOAEL-based HQ less than or equal to 1, pose no unacceptable risk to wildlife populations. As described in the RAWP (Arcadis 2008), unacceptable risk to individuals is uncertain because the NOAEL-based TRVs are thresholds with an interval that is an artifact of the dosing study and the nature and magnitude of the effects, if any, that may occur at exposures between these values is unknown. Because protection at the individual level is not warranted for desert shrew, COPECs with NOAEL-based HQs greater than 1 and LOAEL-based HQs less than 1 were not further evaluated using a weight-of-evidence (WOE) approach.
- COPEC s with LOAEL-based HQs greater than 1 indicate unacceptable risk is possible for populations of potential wildlife receptors. However, these LOAEL-based HQs are based on individual-level effects thresholds and only account for one LOE. In such cases, a WOE approach was used to reduce uncertainty for characterizing potential risk to wildlife populations at the AOC 27 potential exposure area.

Ultimately, three risk outcomes are possible for desert shrew based on the LOAEL-based HQs greater than 1 and WOE: (1) unacceptable risk to wildlife populations is possible (i.e., indicated by sufficient and strong supporting LOEs); (2) unacceptable risk to wildlife populations is unlikely (i.e., indicated by sufficient and strong LOEs supporting a conclusion of no unacceptable risk); or (3) unacceptable risk to wildlife populations is uncertain (i.e., indicated by insufficient LOEs). The results of individual LOE evaluations were evaluated collectively to derive an overall WOE conclusion. Key uncertainties were considered along with the strength, relevance, and other qualities of the LOEs in reaching the WOE conclusions. In this post-NTCRA ERA, the additional LOEs were evaluated and discussed when LOAEL-based HQs greater than 1 were estimated.

For the AOC 27 potential exposure area, evaluations were completed for the following scenarios and are discussed in this section:

- Baseline scenario using depth-weighted EPCs; and
- Baseline scenario using area-weighted EPCs.

In these evaluations, risk calculations were completed for hexavalent chromium, total chromium, copper, and dioxin TEQ, as presented in Tables AOC 27-5.4 using depth-weighted EPCs, AOC27-5.5 using area-weighted EPCs, and Table AOC27-5.6 using depth-weighted EPCs and refined BAFs for dioxin TEQ. Risk results were discussed in the evaluations using area-weighted EPCs only if the depth-weighted EPC evaluation indicated potential for unacceptable risk to desert shrew populations. For example, wildlife (i.e., desert shrew), COPECs with LOAEL-based HQs greater than 1 based on the depth-weighted EPC were discussed in the area-weighted EPC evaluations. If any COPEC s were identified with LOAEL-based HQs greater than 1 in the area-weighted EPC evaluations that had HQs less than 1 in the depth-weighted evaluations, these results were also discussed in the area-weighted EPC evaluation.

At the conclusion of the baseline scenario evaluation, risk conclusions were based on whether COPECs remain for which unacceptable population-level risk was predicted using LOAEL-based HQs calculated from the most refined exposure and effects assumptions and LOEs supporting the conclusion of unacceptable risk.

5.6.1 Desert Shrew Risk Characterization Using Depth-Weighted EPCs

Desert shrew is an invertivorous small mammal that could potentially be exposed to COPEC s in surface soil (0 to 0.5 foot bgs) directly and through its diet. Risk estimates for desert shrew for the baseline scenario using depth-weighted EPCs, a site use factor (SUF) of 1, and TRVs used for RBRG development are summarized in this section and presented in Table AOC27-5.4.

Site-specific SUFs were not evaluated for desert shrew. Based on the AOC 27 potential exposure area and home ranges for desert shrew, the site-specific SUF was estimated as 1 (i.e., home range is less than or equal to the size of the potential exposure area). Therefore, the risk results would be the same as when calculated using a generic SUF of 1.

Detailed dose and risk calculations for desert shrew are presented in Attachment AOC27-C. Hexavalent chromium, total chromium, copper, and dioxin TEQ in soil were evaluated to determine potential risks associated with post-NTCRA conditions.

LOAEL-based HQs for desert shrew are less than 1 for total chromium, hexavalent chromium, copper, and dioxin TEQ. Only the NOAEL-based HQ for dioxin TEQ is greater than 1. Potential risk from these constituents is characterized below.

- For dioxin TEQ, the NOAEL-based H Q is greater than 1 but the LOAEL-based HQ is less than 1, indicating that no unacceptable risk is expected for desert shrew populations.
- For hexavalent chromium, total chromium, and copper at the AOC 27 potential exposure area, NOAEL- and LOAEL-based HQs are less than 1, indicating de minimis risk to individuals and populations of invertivorous small mammals.

Based on the risk estimates and potential uncertainties associated with the baseline risk to invertivorous small mammals from exposure to dioxin TEQ, area-weighted EPCs were also evaluated as discussed in Section 5.6.2.

5.6.2 Desert Shrew Risk Characterization Using Area-Weighted EPCs

Risks to the desert shrew were characterized for dioxin TEQ using area-weighted EPCs. Risk estimates for hexavalent chromium, total chromium, and copper were also presented using area-weighted EPCs.

Potential risks to desert shrew from COPECs listed in this section and characterized for the baseline scenario using area-weighted EPCs, a SUF of 1, selected BAFs, and TRVs used for RBRG development are presented in Table AOC27-5.5. Detailed dose and risk calculations for desert shrew are presented in Attachment AOC 27-C.

In the baseline scenario using area-weighted EPCs, the LOAEL-based HQs for desert shrew remain less than 1 for total chromium, hexavalent chromium, copper, and dioxin TEQ.

- For dioxin TEQ, the magnitude of NOAEL- and LOAEL-based HQs were the same as in the depth-weighted EPC analysis. The LOAEL-based HQ less than 1 indicates no unacceptable risk to desert shrew populations.
- Similar to the evaluation using depth-weighted EPCs, for hexavalent chromium, total chromium, and copper, the NOAEL- and LOAEL-based HQs using area-weighted EPCs are also less than 1 indicating de minimis risk to individuals and populations of invertivorous small mammals from exposure to these constituents at the AOC 27 potential exposure area.

Based on the risk estimates and potential uncertainties associated with the baseline scenario risk from dioxin TEQ, congener-specific BAFs were evaluated for dioxin TEQ, as discussed in Section 5.6.3.

5.6.3 Desert Shrew Baseline Risk Characterization Using Congener-Specific Bioaccumulation Factors for Dioxin TEQ

Based on the risk characterization using area-weighted EPCs (Section 5.6.2), risks were characterized for dioxin TEQ using alternate BAFs (i.e., BAFs used for RBRG development in the 2019 HHERA[Arcadis 2019]). Consistent with the 2019 HHERA, depth-weighted EPCs were used in this evaluation. Risk estimates for total chromium, hexavalent chromium, and copper were not refined further in this section.

As discussed in Section 6.4.3.2 of the main report and summarized above in Section 5.3, the BAFs used for RBRG development in the 2019 HHERA (Arcadis 2019) are based on congener-specific uptake from soil to biota, rather than on the assumption that all dioxin congener uptake is equivalent to the soil-to-biota uptake of 2,3,7,8-TCDD. Two sets of congener-specific uptake factors were evaluated: congener-specific uptake factors available from USEPA (1999) as well as congener-specific uptake factors from Fagervold et al. (2010). These are described in Section 6.4.3.2 of the main report. The congener-specific uptake factors and estimated biota tissue EPCs for dioxin TEQ in AOC 27 in this post-NTCRA ERA are presented in Table AOC27-5.3.

Potential risks to desert shrew for dioxin TEQ characterized for the baseline scenario using depth-weighted EPCs, a SUF of 1, congener-specific BAFs, and alternate TRVs are presented in Table AOC27-5.6. Using these assumptions, the NOAEL- and LOAEL-based HQs are less than 1 in the baseline scenario using both sets of congener-specific BAFs, indicating de minimis risk to individuals and populations of invertivorous small mammals from exposure to dioxin TEQ at the AOC 27 potential exposure area.

Detailed dose and risk calculations for desert shrew are presented in Attachment AOC27-C.

5.6.4 Risk Conclusions for Desert Shrew

The 2019 HHERA (Arcadis 2019) found no potential risk to ecological receptors, including special-status species, in AOC 27 and the larger potential exposure areas relevant to large home-range receptors. However,

consistent with the approach for the Post- NTCRA HHERA detailed in the January 30, 2024 Technical Memo (Arcadis 2024) to DOI and DTSC, this Post- NTCRA HHERA presents the risk characterization for desert shrew and risk-driving COPEC s for other site AOCs (i.e., hexavalent chromium, total chromium, copper, and dioxin TEQ) to evaluate current conditions in the AOC 27 potential exposure area following soil remediation associated with the NTCRA. This Post- NTCRA HHERA presents risk estimates for desert shrew and hexavalent chromium, total chromium, copper, and dioxin TEQ in surface soil that reflect current conditions in the AOC 27 potential exposure area following soil remediation associated with the NTCRA. Risk conclusions for desert shrew populations are presented in the following list.

- For dioxin TEQ, risk conclusions are based on LOAEL-based HQs estimated in the most refined exposure scenario (Section 5.6.3) using the assumptions used for RBRG development (i.e., a SUF of 1, congener-specific BAFs, and alternate TRVs) and depth-weighted EPCs. Using these assumptions, NOAEL-based and LOAEL-based HQs are less than 1 using both sets of congener-specific BAFs (i.e., USEPA 1999, Fagervold et al. 2010) indicating de minimis risk to individuals and populations of invertivorous small mammals from exposure to dioxin TEQ at the AOC 27 potential exposure area.
- For hexavalent chromium, total chromium, and copper, the NOAEL- and LOAEL-based HQs are less than 1 for the baseline scenario, indicating de minimis risk to individuals and populations of invertivorous small mammals at the AOC 27 potential exposure area. Risk conclusions are based on HQs estimated in the most refined exposure scenario applicable to this AOC (Section 5.6.2) using an SUF of 1, selected BAFs, and TRVs used for RBRG development and area-weighted EPCs.

In conclusion, no unacceptable risk wildlife receptor populations is identified at the AOC 27 potential exposure area. For desert shrew, the conclusions are based on post-NTCRA conditions as evaluated in this Post-NTCRA HHERA and summarized above. For the remaining ecological receptors, the conclusions are based on pre-NTCRA conditions as evaluated in the 2019 HHERA (Arcadis 2019).

6 SUMMARY AND CONCLUSIONS FOR THE HHERA

Potential cumulative cancer risks and noncancer hazards for potential human receptors were estimated in this Post-NTCRA HHERA, as presented previously in Section 4. For potential ecological receptors, potential risks were estimated as presented previously in Section 5. Uncertainties related to the HHRA and ERAs at the site in general are discussed in detail in Sections 5.6 and 6.7 of the 2019 HHERA (Arcadis 2019) and are summarized in Section 5.5 and 6.7 of the main report. Uncertainties specific to the evaluation of post-NTCRA conditions in the AOC 27 potential exposure area are discussed in this appendix. The approach for the Post-NTCRA HHERA was detailed in the January 30, 2024 Technical Memo (Arcadis 2024) to DOI and DTSC which specified that updated risk characterization would be presented only for risk-driving receptors.

One potential exposure scenario (baseline [no scouring]) was evaluated consistent with the scenario evaluated in the 2019 HHERA (Arcadis 2019). Risks were estimated for various potential receptors using depth-weighted EPCs and area-weighted EPCs. For desert shrew, additional refinements to the soil-to-invertebrate uptake factors were also evaluated in a manner consistent with the approach used for RBRG development in the 2019 HHERA (Arcadis 2019).

At the AOC 27 potential exposure area, the COPCs evaluated for this Post-NTCRA HHERA included metals (antimony, cadmium, hexavalent chromium, copper, lead, mercury, and zinc), VOCs (bromomethane and chloromethane), LMW PAHs, HMW PAHs, PAHs, PCBs, TPHs as diesel, TPHs as motor oil, and dioxins and furans. Although the 2019 HHERA (Arcadis 2019) did not identify risk-driving COPECs for AOC 27, hexavalent chromium, total chromium, copper, and dioxin TEQ were evaluated for the Post-NTCRA HHERA based on unacceptable risk estimated for desert shrew in the 2019 HHERA for other site AOCs. A summary of these results and conclusions regarding potential risk associated with exposure to these COPCs/COPECs in soil at the AOC 27 potential exposure area based on the risk/hazard estimates and uncertainties inherent in the risk assessment process are presented in this section.

6.1 Summary and Conclusions for the HHRA

The cumulative ILCRs and HIs associated with potential exposure to COPCs in post-NTCRA soil at the AOC 27 potential exposure area using depth-weighted EPCs under the baseline scenario were estimated. Assuming that lifetime soil contact is limited to the AOC 27 potential exposure area for the receptors evaluated, the estimated potential ILCR and HI results are summarized in the table and discussed below.

Exhibit AOC 27-6.1 Baseline Scenario Estimated Cumulative Incremental Lifetime Cancer Risk and Hazard Index for the AOC 27 Potential Exposure Area

Potential Receptor	Exposure Depth	Cumulative ILCR Depth-Weighted	Cumulative ILCR Area-Weighted	HI—Depth-Weighted	HI—Area-Weighted
Camper	Surface	Less than or equal to 1×10^{-6}	Not calculated	Less than or equal to 1	Not calculated
Camper	Shallow	Less than or equal to 1×10^{-6}	Not calculated	Less than or equal to 1	Not calculated

APPENDIX AOC27
 POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

Potential Receptor	Exposure Depth	Cumulative ILCR Depth-Weighted	Cumulative ILCR Area-Weighted	HI—Depth-Weighted	HI—Area-Weighted
Hiker	Surface	Less than or equal to 1×10^{-6}	Not calculated	Less than or equal to 1	Not calculated
Hiker	Shallow	Less than or equal to 1×10^{-6}	Not calculated	Less than or equal to 1	Not calculated
OHV rider	Surface	Less than or equal to 1×10^{-6}	Not calculated	Less than or equal to 1	Not calculated
OHV rider	Shallow	Less than or equal to 1×10^{-6}	Not calculated	Less than or equal to 1	Not calculated

Note:

not calculated = area-weighted estimate was not calculated because the depth-weighted estimates for the receptor were below *de minimis* levels

Depth-weighted potential exposures that are at or below *de minimis* levels include the following:

- **HI less than or equal to 1 for all soil depths**—camper, hiker, and OHV rider; and
- **ILCR less than or equal to 1×10^{-6} for all soil depths**—camper, hiker, and OHV rider.

Assuming that lifetime soil contact is limited to the AOC 27 potential exposure area, the estimated cumulative ILCRs and HIs are at or below 1×10^{-6} and 1, respectively, for potential exposure to COPCs in post-NTCRA soil at the AOC 27 potential exposure area using depth-weighted EPCs for the camper, hiker, and OHV rider.

The depth-weighted EPCs for lead in AOC 27 potential exposure area soil at all exposure depths are not expected to result in an increase in blood lead levels above the Office of Environmental Health Hazard Assessment benchmark value of 1 microgram per deciliter in the child recreational user.

Risks/hazards estimated for an individual potential exposure area like AOC 27 potential exposure area are not considered representative of the realistic or likely potential exposures for the human populations that could be present in the areas outside the TCS (such as recreational users). Risks/hazards calculated separately for individual AOCs are conservative and likely overestimate site risks/hazards. As described in the RAWP documents (Arcadis 2008, 2009, 2015), these human populations would more likely be exposed randomly, over the course of a lifetime, to soil present in all potential exposure areas located outside the TCS, rather than have a lifetime of contact limited to the area of a single potential exposure area. Therefore, estimated risks/hazards presented for individual potential exposure areas are not believed to be representative of the potential health risks to humans potentially contacting the soil outside the TCS. As stated previously, the Post- NTCRA HHERA provides updated risk estimates for human health and the environment based on potential exposures to current soil conditions in the N T C R A areas. Therefore, updated risk estimates were not performed for the OCS potential exposure area in the Post- NTCRA HHERA. It is noted that due to N T C R A soil removal, the potential post-N T C R A soil risks for the OCS are likely lower than estimated in the 2019 HHERA. The HHERA results and conclusions of the 2019 HHERA and of this Post- NTCRA HHERA will be considered for making risk-management decisions for the site in the Corrective Measure Study/Feasibility Study to be prepared for the site.

6.2 Summary and Conclusions for the ERA

At the AOC 27 potential exposure area, hexavalent chromium, total chromium, copper, and dioxin TEQ were evaluated in this Post-NTCRA HHERA to evaluate post-NTCRA conditions. Updated risk estimates for hexavalent chromium, total chromium, copper, and dioxin TEQ are presented only for desert shrew. The 2019 HHERA (Arcadis 2019) did not identify a potential for unacceptable risk to sensitive species and therefore protection of individual invertivorous small mammals is not warranted. This Post-NTCRA HHERA presents NOAEL-based HQs for completeness; however, only the LOAEL-based HQs were used to population-level protection of invertivorous small mammals.

Risks were estimated using depth-weighted and area-weighted EPCs as well as refined BAFs based on congener-specific soil-to-biota uptake for dioxin TEQ. HQs are summarized in Table AOC27-6.1. Risk conclusions for desert shrew populations were based on the following criteria:

- COPECs with NOAEL-based HQs less than or equal to 1 pose *de minimis* risk to potential wildlife receptors.
- COPECs with NOAEL-based HQs greater than 1 but LOAEL-based HQs less than or equal to 1 pose no unacceptable risk to wildlife populations; however, the potential for unacceptable risk to individuals is uncertain based on the HQ. Because protection at the individual level is not warranted for desert shrew, COPECs with NOAEL-based HQs greater than 1 and LOAEL-based HQs less than 1 were not further evaluated using a WOE approach.
- COPECs with LOAEL-based HQs greater than 1 pose possible unacceptable risk to populations of potential wildlife receptors based on the HQ. In such cases, a WOE approach was used in reducing uncertainty for characterizing potential risk to wildlife populations at the AOC 11 potential exposure area.

The risk estimates (HQs) represent only a single LOE for risk characterization. A qualitative WOE approach, incorporating other LOEs and uncertainties, was used to characterize risk to wildlife populations at the AOC 27 potential exposure area. Alternate congener-specific BAFs and alternate TRVs demonstrating the magnitude of the risk overestimation are evaluated together in Section 5.6.3. These alternate BAFs and TRVs are based on current understanding of uptake and toxicity of TEQ mixtures and represent key LOEs considered for dioxin TEQ.

For COPECs with LOAEL-based HQs greater than 1 using the most refined exposure and effects assumptions, a WOE assessment was used to draw risk conclusions for the AOC 27 potential exposure area.

Overall, no unacceptable risks are expected for populations of invertivorous small mammals (i.e., desert shrew) exposed to hexavalent chromium, total chromium, copper, and dioxin TEQ in post-NTCRA soil at the AOC 27 potential exposure area. Conclusions for the baseline scenario evaluations are presented in Section 5.6.4 and summarized in the following list and Exhibit AOC 27-6.2.

- For dioxin TEQ, NOAEL-based and LOAEL-based HQs are less than 1 using both sets of congener-specific BAFs indicating *de minimis* risk to individuals and populations of invertivorous small mammals.
- For hexavalent chromium, total chromium, and copper, the NOAEL- and LOAEL-based HQs are less than 1 for the baseline scenario indicating *de minimis* risk to individuals and populations of invertivorous small mammals at the AOC 27 potential exposure area.

APPENDIX AOC27
POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

Exhibit AOC 27-6.2 Potential for Unacceptable Risk to Desert Shrew at the AOC 27 Potential Exposure Area

Scenario	Dioxin TEQ	Total Chromium	Hexavalent Chromium	Copper
Baseline	None for wildlife populations	None for wildlife populations	None for wildlife populations	None for wildlife populations

7 REFERENCES

- Arcadis. 2008. Human Health and Ecological Risk Assessment Work Plan (RAWP), Topock Compressor Station, Needles, California. August.
- Arcadis. 2009. Revised Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan (August 2008), Topock Compressor Station, Needles, California. February.
- Arcadis. 2015. Final Human Health and Ecological Risk Assessment Work Plan Addendum 2. Topock Compressor Station, Needles, California. June.
- Arcadis. 2019. Final Soil Human Health and Ecological Risk Assessment Report, Topock Compressor Station, Needles, California.
- Arcadis. 2024. Soil Risk Assessment Addendum: Proposed Approach to Update the Human Health and Ecological Risk Assessment after Completion of the 2023 Non-Time Critical Removal Action. Topock Compressor Station, Needles, California. January 30.
- CH2M Hill, Inc. 2013. Revised Final Soil RCRA Facility Investigation/Remedial Investigation Work Plan, PG&E Topock Compressor Station, Needles, California. January.
- CH2M. 2017. Technical Memorandum. Ambient/Background Study of Dioxins and Furans at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California. July 20.
- DOI. 2021. Request for a Non-Time-Critical Soil Removal Action at Areas of Concern and Solid Waste Management Units, Pacific Gas and Electric Topock Compressor Station. April.
- DTSC. 2002. U.S. EPA Region 9 BTAG Recommended Toxicity Reference Values for Mammals (Revision Date 11/21/2002). Department of Toxic Substances Control: Human and Ecological Risk Division.
- DTSC. 2009. U.S. EPA Region 9 BTAG Recommended Toxicity Reference Values for Birds (Revision Date 02/24/09). Department of Toxic Substances Control: Human and Ecological Risk Division.
- DTSC. 2015. Preliminary Endangerment Assessment Guidance Manual. California Environmental Protection Agency, Department of Toxic Substances Control. October.
- Fagervold, S.K., Y. Chai, J.W. Davis, M. Wilken, G. Cornelissen, and U. Ghosh. 2010. Bioaccumulation of polychlorinated dibenzo-p-dioxins/dibenzofurans in *E. fetida* from floodplain soils and the effect of activated carbon amendment. *Environ Sci Technol.* 44(14):5546-52.
- Jacobs. 2022. Work Plan for Soil Non-Time-Critical Removal Action. Topock Compressor Station, Needles, California. June.
- Jacobs. 2024. Final RCRA Facility Investigation/Remedial Investigation Report, Volume 3 – Results of Soil and Sediment Investigation, PG&E Topock Compressor Station, Needles, California. September.
- Jacobs 2025. Soil Non-Time-Critical Removal Action Completion Report. Topock Compressor Station, Needles, California. February.
- Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. Toxicological Benchmarks for Wildlife. Prepared for the U.S. Department of Energy, Office of Environmental Management by ORNL. June.

APPENDIX AOC27
POST-SOIL NTCRA HHERA FOR AOC 27 EXPOSURE AREA

USEPA. 1989. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response. EPA-540/1-89/002. December. Available online at: https://www.epa.gov/sites/default/files/2015-09/documents/rags_a.pdf.

USEPA. 1999. Region 6 Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities: Appendix E Toxicity Reference Values. August.

USEPA. 2008. Guidance for Developing Ecological Soil Screening Levels, Interim Final Documents. Available online at: <https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documents>.

TABLES

Table AOC27-1.1
 Samples and Sampling Locations Included in the AOC 27 Potential Exposure Area

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

SampleID	Sample Date	Location ID	RFI Area	Original Upper Depth (ft bgs)	Original Lower Depth (ft bgs)	Used for EPCs (2019 H H E R A)?	Original Baseline (ft bgs)	Excavation Status	Excavation Depth (ft)	Backfill Depth (ft)	Current Upper Depth (ft bgs)	Current Lower Depth (ft bgs)	Current Baseline (ft bgs)	Sample Source (2019 H H E R A, N T C R A, or R F I Addition)	Used for Post-N T C R A H H E R A EPCs? ^b
24soil-01	1/31/2008	24soil-01	AOC27	2.5	3	Yes	0-03	In Place	0	0	2.5	3	0-03 ft	2019 HHERA	Yes
24soil-02	1/31/2008	24soil-02	AOC27	2.5	3	Yes	0-03	In Place	0	0	2.5	3	0-03 ft	2019 HHERA	Yes
AOC27-1-28546	3/18/2016	AOC27-1	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-1-28545	3/18/2016	AOC27-1	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-1-28547	3/18/2016	AOC27-1	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-1-28548	3/18/2016	AOC27-1	AOC27	9	10	Yes	0-10	In Place	0	0	9	10	NE	2019 HHERA	No, Depth NA
AOC27-18-28528	3/17/2016	AOC27-18	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-18-28529	3/17/2016	AOC27-18	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-18-28530	3/17/2016	AOC27-18	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-18-28532	3/17/2016	AOC27-18	AOC27	9	10	Yes	0-10	In Place	0	0	9	10	NE	2019 HHERA	No, Depth NA
AOC27-18-28531	3/17/2016	AOC27-18E	AOC27	4	5	Yes	0-06	In Place	0	0	4	5	NE	2019 HHERA	No, Depth NA
AOC27-2-28541	3/18/2016	AOC27-2	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-2-28542	3/18/2016	AOC27-2	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-2-28543	3/18/2016	AOC27-2	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-2-28544	3/18/2016	AOC27-2	AOC27	9	10	Yes	0-10	In Place	0	0	9	10	NE	2019 HHERA	No, Depth NA
AOC27-20-28508	3/1/2016	AOC27-20	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-20-28509	3/1/2016	AOC27-20	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-20-28510	3/1/2016	AOC27-20	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-20-28511	3/1/2016	AOC27-20	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-20-28512	3/1/2016	AOC27-20	AOC27	9	10	Yes	0-10	In Place	0	0	9	10	NE	2019 HHERA	No, Depth NA
AOC27-24-28549	3/18/2016	AOC27-24	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-24-28550	3/18/2016	AOC27-24	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-24-28551	3/18/2016	AOC27-24	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-24-28552	3/18/2016	AOC27-24	AOC27	9	10	Yes	0-10	In Place	0	0	9	10	NE	2019 HHERA	No, Depth NA
AOC27-24SW-28553	3/18/2016	AOC27-24SW	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-24SW-28554	3/18/2016	AOC27-24SW	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-24SW-28555	3/18/2016	AOC27-24SW	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-24SW-28556	3/18/2016	AOC27-24SW	AOC27	9	10	Yes	0-10	In Place	0	0	9	10	NE	2019 HHERA	No, Depth NA
AOC27-27-28517	3/2/2016	AOC27-27	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-27-28518	3/2/2016	AOC27-27	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-36-28524	3/17/2016	AOC27-36	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-36-28525	3/17/2016	AOC27-36	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-36-28526	3/17/2016	AOC27-36	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-36-28527	3/17/2016	AOC27-36	AOC27	9.6	10	Yes	0-10	In Place	0	0	9.6	10	NE	2019 HHERA	No, Depth NA
AOC27-4-28538	3/17/2016	AOC27-4	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-4-28539	3/17/2016	AOC27-4	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-4-28537	3/17/2016	AOC27-4	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-4-28540	3/17/2016	AOC27-4	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-5-28534	3/17/2016	AOC27-5	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-5-28533	3/17/2016	AOC27-5	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-5-28535	3/17/2016	AOC27-5	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-5-28536	3/17/2016	AOC27-5	AOC27	9	10	Yes	0-10	In Place	0	0	9	10	NE	2019 HHERA	No, Depth NA
AOC27-50-28513	3/2/2016	AOC27-50	AOC27	0	1	Yes	0-0.5	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-50-28514	3/2/2016	AOC27-50	AOC27	2	3	Yes	0-03	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-50-28515	3/2/2016	AOC27-50	AOC27	5	6	Yes	0-06	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-50-28516	3/2/2016	AOC27-50	AOC27	9	10	Yes	0-10	In Place	7	7	9	10	NE	2019 HHERA	No, Depth NA
AOC27-51-28557	2/17/2017	AOC27-51	AOC27	0	0.5	Yes	0-0.5	In Place	0	0	0	0.5	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-51-28558	2/17/2017	AOC27-51	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-51-28559	2/17/2017	AOC27-51	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-6-28500	2/29/2016	AOC27-6	AOC27	0	1	Yes	0-0.5	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-6-28501	2/29/2016	AOC27-6	AOC27	2	3	Yes	0-03	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-6-28502	2/29/2016	AOC27-6	AOC27	5	6	Yes	0-06	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-7-28503	2/29/2016	AOC27-7	AOC27	0	1	Yes	0-0.5	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-7-28504	2/29/2016	AOC27-7	AOC27	2	3	Yes	0-03	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-7-28505	3/1/2016	AOC27-7	AOC27	5	6	Yes	0-06	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-8-28506	3/1/2016	AOC27-8	AOC27	1	2	Yes	0-03	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-8-28507	3/1/2016	AOC27-8	AOC27	5	6	Yes	0-06	Removed	--	0	NE	NE	NE	2019 HHERA	No, Excavated
AOC27-9-28519	3/8/2016	AOC27-9	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes

Table AOC27-1.1
Samples and Sampling Locations Included in the AOC 27 Potential Exposure Area

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

SampleID	Sample Date	Location ID	RFI Area	Original Upper Depth (ft bgs)	Original Lower Depth (ft bgs)	Used for EPCs (2019 H H E R A)?	Original Baseline (ft bgs)	Excavation Status	Excavation Depth (ft)	Backfill Depth (ft)	Current Upper Depth (ft bgs)	Current Lower Depth (ft bgs)	Current Baseline (ft bgs)	Sample Source (2019 H H E R A, N T C R A, or R F I Addition)	Used for Post-N T C R A H H E R A EPCs? ^b
AOC27-9-28521	3/8/2016	AOC27-9	AOC27	2	3	Yes	0-03	In Place	0	0	2	3	0-03 ft	2019 HHERA	Yes
AOC27-9-28520	3/8/2016	AOC27-9	AOC27	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes
AOC27-9-28522	3/8/2016	AOC27-9	AOC27	5	6	Yes	0-06	In Place	0	0	5	6	NE	2019 HHERA	No, Depth NA
AOC27-9-28523	3/8/2016	AOC27-9	AOC27	9	10	Yes	0-10	In Place	0	0	9	10	NE	2019 HHERA	No, Depth NA
AOC27TAA1-CW4-1.5	10/13/2023	AOC27TAA1-CW4	AOC27	1.5	2	No	--	In Place	1.5	1.5	1.5	2	0-03 ft	NTCRA	Yes
PA-13-01	1/27/2016	PA-13	Perimeter	0	1	Yes	0-0.5	In Place	0	0	0	1	0-005, 0-03 ft	2019 HHERA	Yes

Notes:

^a Samples evaluated in the 2019 HHERA for the 0 to 10 foot bgs interval for the baseline scenario are presented in this table.

^b Sample locations represent data evaluated in the HHERA for the 0 to 3 foot bgs interval in the baseline scenario.

Abbreviations:

"--" = not applicable

A O C = area of concern

bgs = below ground surface

ft = foot

H H E R A = human health and ecological risk assessment

Depth NA = depth not applicable to the dataset

N E = not evaluated (i.e., sample was excavated or depth interval not applicable to the dataset)

N T C R A = non time critical removal action

R F I = RCRA Facility Investigation

Table AOC27-2.1

Comparison of Soil Data for Non-Risk-Driving Constituents in the 2019 HHERA and NTCRA/RFI Additions for the Baseline (No Scouring) Scenario for AOC 27 (0 to 0.5 foot bgs and 0 to 3 feet bgs)

**Soil Human Health and Ecological Risk Assessment Addendum
PG&E Topock Compressor Station
Needles, California**

Category	Constituent ^a	Units	Soil Depth Interval (ft bgs)	Detects	Total	Frequency of Detection	Minimum Detect	Maximum Detect	Minimum Nondetect	Maximum Nondetect	Mean Detected	Kaplan Meier Mean	Median	Variance	Standard Deviation
HHERA	Lead	mg/kg	0-3	34	34	100	1.4	630	N/A	N/A	56.29	56.29	6.3	20902	144.6
HHERA	Mercury	mg/kg	0-3	9	34	26	0.1	0.95	0.1	0.11	0.337	0.163	0.26	0.0755	0.275
HHERA	Molybdenum	mg/kg	0-3	6	34	18	0.63	26	1	1	8.555	2.057	6.5	89.95	9.484
HHERA	Zinc	mg/kg	0-3	34	34	100	16	1300	N/A	N/A	169.1	169.1	37.5	100006	316.2
NTCRA	Lead	mg/kg	0-3	1	1	100	6.3	6.3	N/A	N/A	6.3	N/A	6.3	N/A	N/A
NTCRA	Mercury	mg/kg	0-3	0	1	0	N/A	N/A	0.11	0.11	N/A	N/A	N/A	N/A	N/A
NTCRA	Molybdenum	mg/kg	0-3	0	1	0	N/A	N/A	1.1	1.1	N/A	N/A	N/A	N/A	N/A
NTCRA	Zinc	mg/kg	0-3	1	1	100	33	33	N/A	N/A	33	N/A	33	N/A	N/A

Notes:

^a The HHERA dataset is consistent with the 2019 HHERA (Arcadis 2019). The NTCRA dataset consists of 1) data collected as part of the NTCRA and 2) data collected after the submittal of the 2019 HHERA to support the RFI.

Abbreviations:

"--" = not applicable

AOC = area of concern

ft bgs = feet below ground surface

HHERA = human health and ecological risk assessment

mg/kg = milligrams per kilogram

References:

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

Table AOC27-3.1
Summary Statistics for Depth-Weighted Soil Data and Exposure Point Concentrations for the Baseline (No Scouring) Scenario for
AOC 27 (0 to 0.5 foot bgs and 0 to 3 feet bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

Category	Constituent ^a	Units	Soil Depth Interval (ft bgs)	Detects	Total Samples	Frequency of Detection	Minimum Detect	Maximum Detect	Minimum Nondetect	Maximum Nondetect	Mean Detected	Kaplan Meier Mean	Median	Variance	Standard Deviation	C O P C / C O P E C ? _b	EPC (Depth-Weighted UCL) ^{c,d}	EPC Basis (Depth-Weighted UCL)	EPC (Area-Weighted UCL) ^{c,d}	EPC Basis (Area-Weighted UCL)
Inorganics	Aluminum	mg/kg	0-0.5	1	1	100	8100	8100	NA	NA	8100	NA	8100	NA	NA	--	--	--	--	--
Inorganics	Antimony	mg/kg	0-0.5	0	16	0	NA	NA	1	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Arsenic	mg/kg	0-0.5	16	16	100	1.9	5.7	NA	NA	3.525	3.525	3.25	1.253	1.119	--	--	--	--	--
Inorganics	Barium	mg/kg	0-0.5	16	16	100	84	200	NA	NA	144	144	145	1419	37.67	--	--	--	--	--
Inorganics	Beryllium	mg/kg	0-0.5	0	16	0	NA	NA	0.5	0.55	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Cadmium	mg/kg	0-0.5	3	16	19	1.5	2.3	0.5	0.5	1.833	0.75	1.7	0.173	0.416	X	2.3	Max Detect	2.3	Max Detect
Inorganics	Chromium, hexavalent	mg/kg	0-0.5	7	13	54	0.2	0.36	0.1	0.105	0.294	0.205	0.3	0.003	0.0547	X	0.26	95% KM (t) UCL	0.23	Bootstrap BCA 95UCL
Inorganics	Chromium, total	mg/kg	0-0.5	13	13	100	13	29	N/A	N/A	17.08	17.08	15	19.08	4.368	--	--	--	--	--
Inorganics	Cobalt	mg/kg	0-0.5	16	16	100	3.2	11	NA	NA	6.225	6.225	6.25	3.599	1.897	--	--	--	--	--
Inorganics	Copper	mg/kg	0-0.5	13	13	100	5.6	36	N/A	N/A	11.83	11.83	11	57.13	7.558	X	15.57	95% Student's-t UCL	13.72	Bootstrap BCA 95UCL
Inorganics	Cyanide	mg/kg	0-0.5	0	1	0	NA	NA	0.105	0.105	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Iron	mg/kg	0-0.5	1	1	100	28000	28000	NA	NA	28000	NA	28000	NA	NA	--	--	--	--	--
Inorganics	Lead	mg/kg	0-0.5	16	16	100	3.8	630	NA	NA	61.62	61.62	6.6	24796	157.5	X	233	95% Chebyshev (Mean, Sd) UCL	125	Bootstrap BCA 95UCL
Inorganics	Manganese	mg/kg	0-0.5	1	1	100	310	310	NA	NA	310	NA	310	NA	NA	--	--	--	--	--
Inorganics	Mercury	mg/kg	0-0.5	4	16	25	0.12	0.51	0.05	0.05	0.27	0.105	0.225	0.0341	0.185	X	0.168	95% KM (t) UCL	0.121	Bootstrap BCA 95UCL
Inorganics	Molybdenum	mg/kg	0-0.5	2	16	13	8.3	11	0.5	0.5	9.65	1.644	9.65	3.645	1.909	--	--	--	--	--
Inorganics	Nickel	mg/kg	0-0.5	16	16	100	5.2	35	NA	NA	12.05	12.05	10	52.43	7.241	--	--	--	--	--
Inorganics	Selenium	mg/kg	0-0.5	0	16	0	NA	NA	0.5	0.55	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Silver	mg/kg	0-0.5	0	16	0	NA	NA	0.5	0.55	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Thallium	mg/kg	0-0.5	0	16	0	NA	NA	1	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Vanadium	mg/kg	0-0.5	16	16	100	19	38	NA	NA	26.38	26.38	26	26.78	5.175	--	--	--	--	--
Inorganics	Zinc	mg/kg	0-0.5	16	16	100	24	1200	NA	NA	188.9	188.9	38	107724	328.2	X	547	95% Chebyshev (Mean, Sd) UCL	194	Bootstrap BCA 95UCL
Volatile Organic Compounds	1,2,4-Trimethylbenzene	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	1,3,5-Trimethylbenzene	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Acetone	µg/kg	0-0.5	0	1	0	NA	NA	32.5	32.5	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Bromomethane	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Chloro methane	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Chloroform	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Ethyl- benzene	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Isopropylbenzene	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Methyl acetate	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Methyl ethyl ketone	µg/kg	0-0.5	0	1	0	NA	NA	32.5	32.5	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Methylene chloride	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	N-Butylbenzene	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	N-Propylbenzene	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	sec-Butylbenzene	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Toluene	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Xylene, m,p-	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Xylene, o-	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Xylenes, total	µg/kg	0-0.5	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	4-Methylphenol	µg/kg	0-0.5	0	16	0	NA	NA	165	175	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	Bis (2-ethylhexyl) phthalate	µg/kg	0-0.5	0	16	0	NA	NA	165	1700	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	Butylbenzylphthalate	µg/kg	0-0.5	0	16	0	NA	NA	165	1700	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	Di-n-butyl phthalate	µg/kg	0-0.5	0	16	0	NA	NA	165	175	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	Isophorone	µg/kg	0-0.5	0	16	0	NA	NA	165	175	NA	NA	NA	NA	NA	--	--	--	--	--

Table AOC27-3.1
Summary Statistics for Depth-Weighted Soil Data and Exposure Point Concentrations for the Baseline (No Scouring) Scenario for
AOC 27 (0 to 0.5 foot bgs and 0 to 3 feet bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

Category	Constituent ^a	Units	Soil Depth Interval (ft bgs)	Detects	Total Samples	Frequency of Detection	Minimum Detect	Maximum Detect	Minimum Nondetect	Maximum Nondetect	Mean Detected	Kaplan Meier Mean	Median	Variance	Standard Deviation	C O P C / C O P E C ? _b	EPC (Depth-Weighted UCL) ^{c,d}	EPC Basis (Depth-Weighted UCL)	EPC (Area-Weighted UCL) ^{c,d}	EPC Basis (Area-Weighted UCL)
Polycyclic Aromatic Hydrocarbons	PAH low molecular weight	µg/kg	0-0.5	8	16	50	5.4	3880	0	0	619.5	309.8	24	1784409	1336	X	2007	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	762	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	PAH high molecular weight	µg/kg	0-0.5	14	16	88	13.3	31500	0	0	3133	2741	199.5	69013893	8307	X	22255	99% KM (Chebyshev) UCL	4560	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	1-Methyl naphthalene	µg/kg	0-0.5	0	16	0	NA	NA	2.55	2.65	NA	NA	NA	NA	NA	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons	2-Methyl naphthalene	µg/kg	0-0.5	0	16	0	NA	NA	2.55	2.65	NA	NA	NA	NA	NA	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons	Acenaphthene	µg/kg	0-0.5	2	16	13	8.3	51	2.55	2.65	29.65	5.938	29.65	911.6	30.19	X	51	Max Detect	51	Max Detect
Polycyclic Aromatic Hydrocarbons	Acenaphthylene	µg/kg	0-0.5	0	16	0	NA	NA	2.55	2.65	NA	NA	NA	NA	NA	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons	Anthracene	µg/kg	0-0.5	5	16	31	6.8	710	2.55	2.65	165	53.3	39	93207	305.3	X	381	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	138	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (a) anthracene	µg/kg	0-0.5	8	16	50	6.1	3400	2.55	26	599.4	301.1	221	1329192	1153	X	1626	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	643	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (a) pyrene	µg/kg	0-0.5	9	16	56	5.4	2000	2.55	26	324.3	183.8	19	413178	642.8	X	933	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	380	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (b) fluoranthene	µg/kg	0-0.5	14	16	88	7.5	3400	2.55	2.55	400.5	350.8	65.5	807013	898.3	X	1680	97.5% KM (Chebyshev) UCL	518	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (ghi) perylene	µg/kg	0-0.5	7	16	44	12	1500	2.55	26	254.9	113.2	25	303723	551.1	X	802	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	211	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (k) fluoranthene	µg/kg	0-0.5	8	16	50	8.5	1300	2.55	26	261.2	132.1	84.5	193904	440.3	X	587	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	253	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Chrysene	µg/kg	0-0.5	13	16	81	5.1	3000	2.55	2.55	345.9	281.5	36	667615	817.1	X	2146	99% KM (Chebyshev) UCL	571	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Dibenzo (a,h) anthracene	µg/kg	0-0.5	2	16	13	20	530	2.55	26	275	36.68	275	130050	360.6	X	530	Max Detect	530	Max Detect
Polycyclic Aromatic Hydrocarbons	Fluoranthene	µg/kg	0-0.5	12	16	75	5.4	8600	2.55	2.55	944.1	708.7	31.5	5965330	2442	X	6076	99% KM (Chebyshev) UCL	1654	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Fluorene	µg/kg	0-0.5	1	16	6	9.2	9.2	2.55	2.65	9.2	2.966	9.2	NA	NA	X	9.2	Max Detect	9.2	Max Detect
Polycyclic Aromatic Hydrocarbons	Indeno (1,2,3-cd) pyrene	µg/kg	0-0.5	7	16	44	8.5	1200	2.55	26	211.6	94.29	24	192277	438.5	X	622	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	241	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Naphthalene	µg/kg	0-0.5	1	16	6	6.4	6.4	2.55	2.65	6.4	2.791	6.4	NA	NA	X	6.4	Max Detect	6.4	Max Detect
Polycyclic Aromatic Hydrocarbons	Phenanthrene	µg/kg	0-0.5	6	16	38	5.4	3100	2.55	2.65	675.6	254.9	222.5	1455928	1207	X	1572	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	612	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Pyrene	µg/kg	0-0.5	12	16	75	6.1	6600	2.55	2.55	736.6	553.1	28.5	3508065	1873	X	4671	99% KM (Chebyshev) UCL	1347	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	B(a)P equivalent	µg/kg	0-0.5	14	16	88	6.4	3300	5.9	5.9	338.4	296.9	25.5	754728	868.8	X	2338	99% KM (Chebyshev) UCL	740	Bootstrap BCA 95UCL
Pesticides	4,4-DDE	µg/kg	0-0.5	0	15	0	NA	NA	1	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Pesticides	4,4-DDT	µg/kg	0-0.5	0	15	0	NA	NA	1	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Pesticides	Alpha-Chlordane	µg/kg	0-0.5	0	15	0	NA	NA	0.5	0.55	NA	NA	NA	NA	NA	--	--	--	--	--
Pesticides	Dieldrin	µg/kg	0-0.5	0	15	0	NA	NA	1	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Pesticides	Gamma-Chlordane	µg/kg	0-0.5	0	15	0	NA	NA	0.5	0.55	NA	NA	NA	NA	NA	--	--	--	--	--
Polychlorinated Biphenyls	Total PCBs	µg/kg	0-0.5	7	16	44	17	49	8.5	9	30.79	18.25	30	173	13.15	X	24.7	95% KM (t) UCL	35.3	Bootstrap BCA 95UCL
Dioxins	TEQ Human	ng/kg	0-0.5	6	6	100	0.84	26	N/A	N/A	11.61	11.61	9.25	85.73	9.259	X	26	Max Detect	26.00	Max Detect
Dioxins	TEQ Avian	ng/kg	0-0.5	6	6	100	0.87	14	N/A	N/A	8.112	8.112	7.8	25.23	5.023	X	14	Max Detect	14.00	Max Detect
Dioxins	TEQ Mammals	ng/kg	0-0.5	6	6	100	0.84	26	N/A	N/A	11.61	11.61	9.25	85.73	9.259	X	26	Max Detect	26.00	Max Detect
Dioxins	2,3,7,8-TCDD	ng/kg	0-0.5	3	9	33	1.3	19	0.033	0.75	8.9	2.989	6.4	83.01	9.111	X	19	Max Detect	19	Max Detect
Total Petroleum Hydrocarbons	TPH as diesel	mg/kg	0-0.5	5	16	31	12	79	5	5	31.2	13.19	18	802.7	28.33	X	22.3	95% KM (t) UCL	16.6	Bootstrap BCA 95UCL
Total Petroleum Hydrocarbons	TPH as gasoline	mg/kg	0-0.5	0	1	0	NA	NA	0.8	0.8	NA	NA	NA	NA	NA	--	--	--	--	--
Total Petroleum Hydrocarbons	TPH as motor oil	mg/kg	0-0.5	9	16	56	16	270	5	5	94.56	55.38	54	7361	85.79	X	90.3	95% KM (t) UCL	55.6	Bootstrap BCA 95UCL

Table AOC27-3.1
Summary Statistics for Depth-Weighted Soil Data and Exposure Point Concentrations for the Baseline (No Scouring) Scenario for
AOC 27 (0 to 0.5 foot bgs and 0 to 3 feet bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

Category	Constituent ^a	Units	Soil Depth Interval (ft bgs)	Detects	Total Samples	Frequency of Detection	Minimum Detect	Maximum Detect	Minimum Nondetect	Maximum Nondetect	Mean Detected	Kaplan Meier Mean	Median	Variance	Standard Deviation	C O P C / C O P E C ? _b	EPC (Depth-Weighted UCL) ^{c,d}	EPC Basis (Depth-Weighted UCL)	EPC (Area-Weighted UCL) ^{c,d}	EPC Basis (Area-Weighted UCL)
Inorganics	Aluminum	mg/kg	0-3	1	1	100	8100	8100	NA	NA	8100	NA	8100	NA	NA	--	--	--	--	--
Inorganics	Antimony	mg/kg	0-3	1	19	5	1.83	1.83	0.2	1.05	1.83	0.286	1.83	NA	NA	X	1.83	Max Detect	1.83	Max Detect
Inorganics	Arsenic	mg/kg	0-3	19	19	100	1.7	10.5	NA	NA	3.681	3.681	3.4	3.487	1.867	--	--	--	--	--
Inorganics	Barium	mg/kg	0-3	19	19	100	79.3	200	NA	NA	139.2	139.2	133	1271	35.65	--	--	--	--	--
Inorganics	Beryllium	mg/kg	0-3	0	19	0	NA	NA	0.05	0.533	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Cadmium	mg/kg	0-3	7	19	37	0.3	2.63	0.5	0.5	1.149	0.613	0.833	0.619	0.787	X	0.872	95% KM (t) UCL	0.675	Bootstrap BCA 95UCL
Inorganics	Chromium, hexavalent	mg/kg	0-3	9	16	56	0.18	0.367	0.1	0.2	0.259	0.191	0.26	0.00324	0.057	X	0.232	95% KM (t) UCL	0.22	Bootstrap BCA 95UCL
Inorganics	Chromium, total	mg/kg	0-3	16	16	100	14	25.7	N/A	N/A	16.44	16.44	15.35	8.673	2.945	--	--	--	--	--
Inorganics	Cobalt	mg/kg	0-3	19	19	100	3.4	12.7	NA	NA	6.084	6.084	6.3	4.61	2.147	--	--	--	--	--
Inorganics	Copper	mg/kg	0-3	16	16	100	6.43	26.5	N/A	N/A	10.64	10.64	9.7	20.18	4.492	X	12.61	95% Student's-t UCL	11.39	Bootstrap BCA 95UCL
Inorganics	Cyanide	mg/kg	0-3	0	1	0	NA	NA	0.105	0.105	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Iron	mg/kg	0-3	1	1	100	28000	28000	NA	NA	28000	NA	28000	NA	NA	--	--	--	--	--
Inorganics	Lead	mg/kg	0-3	19	19	100	4.43	432	NA	NA	52.31	52.31	6.83	13384	115.7	X	168	95% Chebyshev (Mean, Sd) UCL	73.2	Bootstrap BCA 95UCL
Inorganics	Manganese	mg/kg	0-3	1	1	100	310	310	NA	NA	310	NA	310	NA	NA	--	--	--	--	--
Inorganics	Mercury	mg/kg	0-3	5	19	26	0.113	0.53	0.05	0.0517	0.297	0.115	0.243	0.031	0.176	X	0.175	95% KM (t) UCL	0.102	Bootstrap BCA 95UCL
Inorganics	Molybdenum	mg/kg	0-3	5	19	26	0.63	16	0.5	0.5	4.986	1.681	1.9	42.17	6.494	--	--	--	--	--
Inorganics	Nickel	mg/kg	0-3	19	19	100	5.37	55.7	NA	NA	12.47	12.47	9.57	119.6	10.94	--	--	--	--	--
Inorganics	Selenium	mg/kg	0-3	2	19	11	1.4	6.2	0.5	0.533	3.8	0.847	3.8	11.52	3.394	--	--	--	--	--
Inorganics	Silver	mg/kg	0-3	0	19	0	NA	NA	0.125	0.617	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Thallium	mg/kg	0-3	0	19	0	NA	NA	0.5	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Inorganics	Vanadium	mg/kg	0-3	19	19	100	17	34.7	NA	NA	25.33	25.33	25	24.87	4.987	--	--	--	--	--
Inorganics	Zinc	mg/kg	0-3	19	19	100	16	809	NA	NA	159.1	159.1	38	60088	245.1	X	404	95% Chebyshev (Mean, Sd) UCL	126	Bootstrap BCA 95UCL
Volatile Organic Compounds	1,2,4-Trimethylbenzene	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	1,3,5-Trimethylbenzene	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Acetone	µg/kg	0-3	0	16	0	NA	NA	26	60	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Bromomethane	µg/kg	0-3	2	16	13	23	26	2.6	6	24.5	5.338	24.5	4.5	2.121	X	26	Max Detect	26	Max Detect
Volatile Organic Compounds	Chloro methane	µg/kg	0-3	3	16	19	5.5	11	2.6	6	8.567	3.733	9.2	7.863	2.804	X	11	Max Detect	11	Max Detect
Volatile Organic Compounds	Chloroform	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Ethyl- benzene	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Isopropylbenzene	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Methyl acetate	µg/kg	0-3	0	1	0	NA	NA	3.25	3.25	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Methyl ethyl ketone	µg/kg	0-3	0	16	0	NA	NA	26	60	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Methylene chloride	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	N-Butylbenzene	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	N-Propylbenzene	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	sec-Butylbenzene	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Toluene	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Xylene, m,p-	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Xylene, o-	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Volatile Organic Compounds	Xylenes, total	µg/kg	0-3	0	16	0	NA	NA	2.6	6	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	4-Methylphenol	µg/kg	0-3	0	19	0	NA	NA	165	175	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	Bis (2-ethylhexyl) phthalate	µg/kg	0-3	0	19	0	NA	NA	165	1700	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	Butylbenzylphthalate	µg/kg	0-3	0	19	0	NA	NA	165	1700	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	Di-n-butyl phthalate	µg/kg	0-3	0	19	0	NA	NA	165	175	NA	NA	NA	NA	NA	--	--	--	--	--
Semi-Volatile Organic Compounds	Isophorone	µg/kg	0-3	0	19	0	NA	NA	165	175	NA	NA	NA	NA	NA	--	--	--	--	--

Table AOC27-3.1
Summary Statistics for Depth-Weighted Soil Data and Exposure Point Concentrations for the Baseline (No Scouring) Scenario for
AOC 27 (0 to 0.5 foot bgs and 0 to 3 feet bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

Category	Constituent ^a	Units	Soil Depth Interval (ft bgs)	Detects	Total Samples	Frequency of Detection	Minimum Detect	Maximum Detect	Minimum Nondetect	Maximum Nondetect	Mean Detected	Kaplan Meier Mean	Median	Variance	Standard Deviation	C O P C / C O P E C ? _b	EPC (Depth-Weighted UCL) ^{c,d}	EPC Basis (Depth-Weighted UCL)	EPC (Area-Weighted UCL) ^{c,d}	EPC Basis (Area-Weighted UCL)
Polycyclic Aromatic Hydrocarbons	PAH low molecular weight	µg/kg	0-3	10	19	53	3.6	2600	0	0	407.5	214.5	29.85	639514	799.7	X	949	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	414	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	PAH high molecular weight	µg/kg	0-3	18	19	95	10.2	22900	0	0	2014	1908	183.5	29874863	5466	X	14098	99% KM (Chebyshev) UCL	3673	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	1-Methyl naphthalene	µg/kg	0-3	0	17	0	NA	NA	2.55	2.65	NA	NA	NA	NA	NA	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons	2-Methyl naphthalene	µg/kg	0-3	0	19	0	NA	NA	2.55	165	NA	NA	NA	NA	NA	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons	Acenaphthene	µg/kg	0-3	2	19	11	6.38	34.9	2.55	165	20.64	4.678	20.64	406.7	20.17	X	34.9	Max Detect	34.9	Max Detect
Polycyclic Aromatic Hydrocarbons	Acenaphthylene	µg/kg	0-3	1	19	5	3.4	3.4	2.55	165	3.4	2.6	3.4	NA	NA	X	3.4	Max Detect	3.4	Max Detect
Polycyclic Aromatic Hydrocarbons	Anthracene	µg/kg	0-3	5	19	26	5.38	476	2.55	165	112.9	32.12	29.1	41341	203.3	X	190	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	77.5	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (a) anthracene	µg/kg	0-3	10	19	53	5.13	2450	2.55	165	389.1	206.6	20.35	580746	762.1	X	898	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	399	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (a) pyrene	µg/kg	0-3	11	19	58	4.47	1640	2.55	165	239.7	140.7	30	238408	488.3	X	593	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	237	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (b) fluoranthene	µg/kg	0-3	17	19	89	5.85	2870	165	165	312.7	283.3	47	512682	716	X	1262	97.5% KM (Chebyshev) UCL	342	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (ghi) perylene	µg/kg	0-3	9	19	47	6.7	1010	2.55	165	142.9	70.92	16.7	106998	327.1	X	411	97.5% KM (Chebyshev) UCL	192	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Benzo (k) fluoranthene	µg/kg	0-3	10	19	53	6.52	1090	2.55	165	198.2	107.2	31.45	116169	340.8	X	384	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	142	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Chrysene	µg/kg	0-3	15	19	79	4.27	2190	2.55	165	247.9	197.9	31	326138	571.1	X	939	97.5% KM (Chebyshev) UCL	290	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Dibenzo (a,h) anthracene	µg/kg	0-3	2	19	11	14.2	356	2.55	165	185.1	21.89	185.1	58414	241.7	X	356	Max Detect	356	Max Detect
Polycyclic Aromatic Hydrocarbons	Fluoranthene	µg/kg	0-3	15	19	79	3.83	5950	2.55	165	611.9	484.3	26.2	2374893	1541	X	3664	99% KM (Chebyshev) UCL	845	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Fluorene	µg/kg	0-3	1	19	5	7	7	2.55	165	7	2.812	7	NA	NA	X	7	Max Detect	7	Max Detect
Polycyclic Aromatic Hydrocarbons	Indeno (1,2,3-cd) pyrene	µg/kg	0-3	9	19	47	6.03	806	2.55	165	118	59.05	13	67722	260.2	X	305	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	138	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Naphthalene	µg/kg	0-3	1	19	5	5.13	5.13	2.55	165	5.13	2.702	5.13	NA	NA	X	5.13	Max Detect	5.13	Max Detect
Polycyclic Aromatic Hydrocarbons	Phenanthrene	µg/kg	0-3	9	19	47	3.4	2080	2.55	165	385	183.9	36.7	448557	669.7	X	745	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	332	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	Pyrene	µg/kg	0-3	15	19	79	3.5	4600	2.55	165	464.2	368.2	19.7	1437134	1199	X	2839	99% KM (Chebyshev) UCL	734	Bootstrap BCA 95UCL
Polycyclic Aromatic Hydrocarbons	B(a)P equivalent	µg/kg	0-3	19	19	100	6.23	2600	NA	NA	258.9	258.9	24	358697	598.9	X	1626	99% Chebyshev (Mean, Sd) UCL	353	Bootstrap BCA 95UCL
Pesticides	4,4-DDE	µg/kg	0-3	0	16	0	NA	NA	1	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Pesticides	4,4-DDT	µg/kg	0-3	0	16	0	NA	NA	1	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Pesticides	Alpha-Chlordane	µg/kg	0-3	0	16	0	NA	NA	0.5	0.533	NA	NA	NA	NA	NA	--	--	--	--	--
Pesticides	Dieldrin	µg/kg	0-3	0	16	0	NA	NA	1	1.05	NA	NA	NA	NA	NA	--	--	--	--	--
Pesticides	Gamma-Chlordane	µg/kg	0-3	0	16	0	NA	NA	0.5	0.533	NA	NA	NA	NA	NA	--	--	--	--	--
Polychlorinated Biphenyls	Total PCBs	µg/kg	0-3	7	17	41	14.2	47.5	8.5	8.83	25.76	15.61	22.8	164.4	12.82	X	20.8	95% KM (t) UCL	29.6	Bootstrap BCA 95UCL
Dioxins	TEQ Human	ng/kg	0-3	9	9	100	0.12	18.3	N/A	N/A	8.137	8.137	6.35	51.92	7.206	X	12.6	95% Student's-t UCL	13.77	Bootstrap BCA 95UCL
Dioxins	TEQ Avian	ng/kg	0-3	9	9	100	0.2	10	N/A	N/A	5.379	5.379	5.27	14.92	3.863	X	7.774	95% Student's-t UCL	8.19	Bootstrap BCA 95UCL
Dioxins	TEQ Mammals	ng/kg	0-3	9	9	100	0.12	18.3	N/A	N/A	8.137	8.137	6.35	51.92	7.206	X	12.6	95% Student's-t UCL	13.77	Bootstrap BCA 95UCL
Dioxins	2,3,7,8-TCDD	ng/kg	0-3	4	12	33	0.883	14.6	0.0265	2.02	8.346	2.809	8.95	48.18	6.941	X	5.94	95% KM (t) UCL	2.83	Bootstrap BCA 95UCL

Table AOC27-3.1
Summary Statistics for Depth-Weighted Soil Data and Exposure Point Concentrations for the Baseline (No Scouring) Scenario for AOC 27 (0 to 0.5 foot bgs and 0 to 3 feet bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

Category	Constituent ^a	Units	Soil Depth Interval (ft bgs)	Detects	Total Samples	Frequency of Detection	Minimum Detect	Maximum Detect	Minimum Nondetect	Maximum Nondetect	Mean Detected	Kaplan Meier Mean	Median	Variance	Standard Deviation	C O P C / C O P E C ? _b	EPC (Depth-Weighted UCL) ^{c,d}	EPC Basis (Depth-Weighted UCL)	EPC (Area-Weighted UCL) ^{c,d}	EPC Basis (Area-Weighted UCL)
Total Petroleum Hydrocarbons	TPH as diesel	mg/kg	0-3	9	19	47	9.33	160	5	5	46.88	24.84	43.3	2277	47.72	X	40.6	95% KM (t) UCL	28.2	Bootstrap BCA 95UCL
Total Petroleum Hydrocarbons	TPH as gasoline	mg/kg	0-3	0	16	0	NA	NA	0.38	1.1	NA	NA	NA	NA	NA	--	--	--	--	--
Total Petroleum Hydrocarbons	TPH as motor oil	mg/kg	0-3	10	17	59	29.7	443	5	5	138.5	83.55	67	18891	137.4	X	187	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	109	Bootstrap BCA 95UCL

Notes:

^a The constituents presented consists of analytes detected at least once at the Topock Compressor Station site and measured in soil in this exposure area. The datasets for chromium (total and hexavalent), copper, and dioxins (TEQ Human, TEQ Mammal, and TEQ Avian) were updated to reflect the non-time critical removal actions outlined in Arcadis (2024).

^b COPCs selected in the 2019 Soil Risk Assessment (Arcadis 2019) were also evaluated in this Post-NTCRA HHERA. However, no COPECs were identified in this AOC.

^c If fewer than eight total locations and four total detected concentrations, the maximum depth-weighted concentration was selected as the EPC. Otherwise, the UCL was selected as the EPC.

^d EPCs and summary statistics were not calculated for some constituents (i.e., dioxin congeners and essential nutrients). Those data, if available, are presented in Attachment A1 of each exposure area-specific appendix in the Soil Human Health and Ecological Risk Assessment Report (Arcadis 2019).

Abbreviations:

"--" = not applicable	mg/kg = milligrams per kilogram
AOC = area of concern	NA = not applicable
B(a)P equivalent = benzo(a)pyrene equivalent	ND = not detected
BCA = Bias-corrected accelerated bootstrap method	ng/kg = nanograms per kilogram
COPC = constituent of potential concern	PAH = polycyclic aromatic hydrocarbons
COPEC = constituent of potential ecological concern	PCB = polychlorinated biphenyls
DDE = Dichlorodiphenyldichloroethylene	PG&E = Pacific Gas and Electric Company
DDT = Dichlorodiphenyltrichloroethane	TCDD = Tetrachlorodibenzo-p-dioxin
EPC = exposure point concentration	TEQ = toxic equivalent
FOD = frequency of detection	TPH = total petroleum hydrocarbons
ft bgs = feet below ground surface	UCL = upper confidence limit
KM = Kaplan-Meier	X = COPC/COPEC in the exposure depth interval
µg/kg = micrograms per kilogram	

References:

Arcadis. 2019. Final Soil Human Health and Ecological Risk Assessment Report, Topock Compressor Station, Needles, California.
 Arcadis. 2024. Soil Risk Assessment Addendum: Proposed Approach to Update the Human Health and Ecological Risk Assessment after Completion of the 2023 Non-Time Critical Removal Action. January 30.

Table AOC27-4.1

Summary of C O P Cs Evaluated in the HHRA for AOC 27: Baseline Scenario

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	C O P Cs in Surface Soil (0 to 0.5 foot bgs)	C O P Cs in Shallow Soil (0 to 3 feet bgs)	C O P Cs in Subsurface II Soil (0 to 10 feet bgs)
Inorganics			
Antimony	--	X	X
Cadmium	X	X	X
Chromium, Hexavalent	X	X	X
Copper	X	X	X
Lead	X	X	X
Mercury (inorganic)	X	X	X
Zinc	X	X	X
Volatile Organic Compounds			
Bromomethane	--	X	X
Chloro methane	--	X	X
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	X	X	X
Acenaphthylene	--	X	X
Anthracene	X	X	X
Benzo (a) anthracene	X	X	X
Benzo (a) pyrene	X	X	X
Benzo (b) fluoranthene	X	X	X
Benzo (ghi) perylene	X	X	X
Benzo (k) fluoranthene	X	X	X
Chrysene	X	X	X
Dibenzo (a,h) anthracene	X	X	X
Fluoranthene	X	X	X
Fluorene	X	X	X
Indeno (1,2,3-cd) pyrene	X	X	X
Naphthalene	X	X	X
Phenanthrene	X	X	X
Pyrene	X	X	X
B(a)P Equivalent	X	X	X

Table AOC27-4.1

Summary of C O P Cs Evaluated in the HHRA for AOC 27: Baseline Scenario

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	C O P Cs in Surface Soil (0 to 0.5 foot bgs)	C O P Cs in Shallow Soil (0 to 3 feet bgs)	C O P Cs in Subsurface II Soil (0 to 10 feet bgs)
Polychlorinated Biphenyls			
Total PCBs	x	x	x
Total Petroleum Hydrocarbons			
TPH as diesel	x	x	x
TPH as motor oil	x	x	x
Dioxins/Furans			
TEQ Human	x	x	x

Abbreviations:

B(a)P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

C O P C = Constituent of Potential Concern.

-- = not detected or not analyzed.

x = Chemical included as C O P C in human health risk assessment.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-4.2a

Baseline Scenario Depth-Weighted Exposure Point Concentrations and Predicted Outdoor Air Concentrations for Recreational Users:
C O P Cs in AOC 27 Surface Soil (0 to 0.5 foot bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

C O P C	Exposure Point Concentration for Surface Soil: 0 to 0.5 foot bgs (mg/kg) ^a	Exposure Point Concentration for Subsurface II Soil: 0 to 10 feet bgs (mg/kg) ^b	Recreational User - Camper Outdoor Airborne Particulate Concentration (mg/m ³) ^c	Recreational User - Camper Outdoor Vapor Concentration (mg/m ³) ^d	Recreational User - Hiker Outdoor Airborne Particulate Concentration (mg/m ³) ^c	Recreational User - Hiker Outdoor Vapor Concentration (mg/m ³) ^d	Recreational User - Off Highway Vehicle Rider Outdoor Airborne Particulate Concentration (mg/m ³) ^e	Recreational User - Off Highway Vehicle Rider Outdoor Vapor Concentration (mg/m ³) ^d
Inorganics								
Antimony	ND	1.8E+00	NA	NV	NA	NV	NA	NV
Cadmium	2.3E+00	7.9E-01	1.7E-09	NV	1.7E-09	NV	2.7E-06	NV
Chromium, Hexavalent	2.6E-01	4.8E-01	1.9E-10	NV	1.9E-10	NV	3.1E-07	NV
Copper	1.6E+01	1.3E+02	1.1E-08	NV	1.1E-08	NV	1.8E-05	NV
Lead	2.3E+02	8.3E+01	1.7E-07	NV	1.7E-07	NV	2.8E-04	NV
Mercury (inorganic)	1.7E-01	1.3E-01	1.2E-10	NV	1.2E-10	NV	2.0E-07	NV
Zinc	5.5E+02	2.2E+02	4.0E-07	NV	4.0E-07	NV	6.5E-04	NV
Volatile Organic Compounds								
Bromomethane	ND	1.8E-02	NA	1.0E-05	NA	1.0E-05	NA	1.0E-05
Chloro methane	ND	7.9E-03	NA	5.4E-06	NA	5.4E-06	NA	5.4E-06
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	5.1E-02	1.2E-02	3.8E-11	6.8E-08	3.8E-11	6.8E-08	6.0E-08	6.8E-08
Acenaphthylene	ND	3.3E-03	NA	NV	NA	NV	NA	NV
Anthracene	3.8E-01	4.9E-02	2.8E-10	7.6E-08	2.8E-10	7.6E-08	4.5E-07	7.6E-08
Benzo (a) anthracene	1.6E+00	3.8E-01	1.2E-09	7.1E-08	1.2E-09	7.1E-08	1.9E-06	7.1E-08
Benzo (a) pyrene	9.3E-01	2.4E-01	6.9E-10	NV	6.9E-10	NV	1.1E-06	NV
Benzo (b) fluoranthene	1.7E+00	4.3E-01	1.2E-09	NV	1.2E-09	NV	2.0E-06	NV
Benzo (ghi) perylene	8.0E-01	9.3E-02	5.9E-10	NV	5.9E-10	NV	9.5E-07	NV
Benzo (k) fluoranthene	5.9E-01	1.7E-01	4.3E-10	NV	4.3E-10	NV	6.9E-07	NV
Chrysene	2.1E+00	2.7E-01	1.6E-09	NV	1.6E-09	NV	2.5E-06	NV
Dibenzo (a,h) anthracene	5.3E-01	1.1E-01	3.9E-10	NV	3.9E-10	NV	6.3E-07	NV
Fluoranthene	6.1E+00	8.6E-01	4.5E-09	NV	4.5E-09	NV	7.2E-06	NV
Fluorene	9.2E-03	3.9E-03	6.8E-12	1.1E-08	6.8E-12	1.1E-08	1.1E-08	1.1E-08
Indeno (1,2,3-cd) pyrene	6.2E-01	7.6E-02	4.6E-10	NV	4.6E-10	NV	7.3E-07	NV
Naphthalene	6.4E-03	3.3E-03	4.7E-12	5.6E-08	4.7E-12	5.6E-08	7.6E-09	5.6E-08
Phenanthrene	1.6E+00	2.4E-01	1.2E-09	NV	1.2E-09	NV	1.9E-06	NV
Pyrene	4.7E+00	6.7E-01	3.4E-09	2.2E-07	3.4E-09	2.2E-07	5.5E-06	2.2E-07
B(a)P Equivalent	2.3E+00	3.8E-01	1.7E-09	NV	1.7E-09	NV	2.8E-06	NV

Table AOC27-4.2a

Baseline Scenario Depth-Weighted Exposure Point Concentrations and Predicted Outdoor Air Concentrations for Recreational Users:
C O P Cs in AOC 27 Surface Soil (0 to 0.5 foot bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

C O P C	Exposure Point Concentration for Surface Soil: 0 to 0.5 foot bgs (mg/kg) ^a	Exposure Point Concentration for Subsurface II Soil: 0 to 10 feet bgs (mg/kg) ^b	Recreational User - Camper Outdoor Airborne Particulate Concentration (mg/m ³) ^c	Recreational User - Camper Outdoor Vapor Concentration (mg/m ³) ^d	Recreational User - Hiker Outdoor Airborne Particulate Concentration (mg/m ³) ^c	Recreational User - Hiker Outdoor Vapor Concentration (mg/m ³) ^d	Recreational User - Off Highway Vehicle Rider Outdoor Airborne Particulate Concentration (mg/m ³) ^e	Recreational User - Off Highway Vehicle Rider Outdoor Vapor Concentration (mg/m ³) ^d
Polychlorinated Biphenyls								
Total PCBs	2.5E-02	1.7E-02	1.8E-11	2.6E-08	1.8E-11	2.6E-08	2.9E-08	2.6E-08
Total Petroleum Hydrocarbons								
TPH as diesel	2.2E+01	3.8E+01	1.6E-08	1.5E-02	1.6E-08	1.5E-02	2.6E-05	1.5E-02
TPH as motor oil	9.0E+01	1.5E+02	6.6E-08	NV	6.6E-08	NV	1.1E-04	NV
Dioxins/Furans								
TEQ Human	2.6E-05	4.0E-05	1.9E-14	1.7E-11	1.9E-14	1.7E-11	3.1E-11	1.7E-11

- Notes:**
- ^a Exposure point concentrations (EPCs) for surface soil (0 to 0.5 foot bgs) are used to evaluate inhalation of particulates in outdoor air.
 - ^b EPCs for subsurface II soil (0 to 10 feet bgs) are used to evaluate inhalation of volatiles in outdoor air.
 - ^c Outdoor airborne particulate concentration is calculated by dividing the soil EPCs by the particulate emission factor (PEF). Default PEF of 1.4×10⁹ m³/kg was used for recreational users (campers and hikers) as recommended by Department of Toxic Substances Control (2014).
 - ^d Chemical-specific volatilization factors (VFs) were estimated as discussed in Section 4.0, Exposure Assessment, of the main report. Outdoor vapor concentration is calculated by dividing the soil EPC by the VF.
 - ^e PEF of 8.5×10⁵ m³/kg was used for recreational users (off-highway vehicle rider) as calculated in United States Environmental Protection Agency (2008, 2009) and recommended in "Revised Technical Memorandum, Recreational Visitor Exposure Scenario for Federal Land, PG&E Topock Compressor Station Remediation Project, California," prepared by the Department of the Interior (DOI).

- Abbreviations:**
- B (a) P equivalent = Benzo(a)pyrene equivalent.
 - bgs = below ground surface.
 - C O P C = Constituent of Potential Concern.
 - mg/kg = milligrams per kilogram.
 - mg/m³ = milligrams per cubic meter.
 - NA = not applicable.
 - ND = Not detected.
 - NV = Not volatile.
 - PCB = Polychlorinated biphenyls.
 - TPH = Total Petroleum Hydrocarbons.
 - TEQ = Toxic Equivalent.

- References:**
- Department of Toxic Substances Control (DTSC). 2014. DTSC/HERO Human Health Risk Assessment (HHRA) Note Number 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities. September 30.
 - United States Environmental Protection Agency (U S E P A). 2008. Clear Creek Management Areas Asbestos Exposure and Human Health Risk Assessment. Region 9. May. Available at: <http://www.epa.gov/region09/toxic/noa/clearcreek/pdf/CCMARiskDoc24Apr08-withoutAppxG.pdf>
 - U S E P A. 2009. Baseline Human Health Risk Assessment for the Standard Mine Site, Gunnison County, CO; Addendum. Prepared by SRC for U S E P A Region 8. November 24. Available at: http://www2.epa.gov/sites/production/files/documents/SM_HHRA_Addendum.pdf

Table AOC27-4.2b

Baseline Scenario Depth-Weighted Exposure Point Concentrations and Predicted Outdoor Air Concentrations for Recreational Users:
C O P Cs in AOC 27 Shallow Soil (0 to 3 feet bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

C O P C	Exposure Point Concentration for Shallow Soil: 0 to 3 feet bgs (mg/kg) ^a	Exposure Point Concentration for Subsurface II Soil: 0 to 10 feet bgs (mg/kg) ^b	Recreational User - Camper Outdoor Airborne Particulate Concentration (mg/m ³) ^c	Recreational User - Camper Outdoor Vapor Concentration (mg/m ³) ^d	Recreational User - Hiker Outdoor Airborne Particulate Concentration (mg/m ³) ^c	Recreational User - Hiker Outdoor Vapor Concentration (mg/m ³) ^d	Recreational User - Off Highway Vehicle Rider Outdoor Airborne Particulate Concentration (mg/m ³) ^e	Recreational User - Off Highway Vehicle Rider Outdoor Vapor Concentration (mg/m ³) ^d
Inorganics								
Antimony	1.8E+00	1.8E+00	1.3E-09	NV	1.3E-09	NV	2.2E-06	NV
Cadmium	8.7E-01	7.9E-01	6.4E-10	NV	6.4E-10	NV	1.0E-06	NV
Chromium, Hexavalent	2.3E-01	4.8E-01	1.7E-10	NV	1.7E-10	NV	2.7E-07	NV
Copper	1.3E+01	1.3E+02	9.3E-09	NV	9.3E-09	NV	1.5E-05	NV
Lead	1.7E+02	8.3E+01	1.2E-07	NV	1.2E-07	NV	2.0E-04	NV
Mercury (inorganic)	1.8E-01	1.3E-01	1.3E-10	NV	1.3E-10	NV	2.1E-07	NV
Zinc	4.0E+02	2.2E+02	3.0E-07	NV	3.0E-07	NV	4.8E-04	NV
Volatile Organic Compounds								
Bromomethane	2.6E-02	1.8E-02	1.9E-11	1.0E-05	1.9E-11	1.0E-05	3.1E-08	1.0E-05
Chloro methane	1.1E-02	7.9E-03	8.1E-12	5.4E-06	8.1E-12	5.4E-06	1.3E-08	5.4E-06
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	3.5E-02	1.2E-02	2.6E-11	6.8E-08	2.6E-11	6.8E-08	4.1E-08	6.8E-08
Acenaphthylene	3.4E-03	3.3E-03	2.5E-12	NV	2.5E-12	NV	4.0E-09	NV
Anthracene	1.9E-01	4.9E-02	1.4E-10	7.6E-08	1.4E-10	7.6E-08	2.2E-07	7.6E-08
Benzo (a) anthracene	9.0E-01	3.8E-01	6.6E-10	7.1E-08	6.6E-10	7.1E-08	1.1E-06	7.1E-08
Benzo (a) pyrene	5.9E-01	2.4E-01	4.4E-10	NV	4.4E-10	NV	7.0E-07	NV
Benzo (b) fluoranthene	1.3E+00	4.3E-01	9.3E-10	NV	9.3E-10	NV	1.5E-06	NV
Benzo (ghi) perylene	4.1E-01	9.3E-02	3.0E-10	NV	3.0E-10	NV	4.9E-07	NV
Benzo (k) fluoranthene	3.8E-01	1.7E-01	2.8E-10	NV	2.8E-10	NV	4.5E-07	NV
Chrysene	9.4E-01	2.7E-01	6.9E-10	NV	6.9E-10	NV	1.1E-06	NV
Dibenzo (a,h) anthracene	3.6E-01	1.1E-01	2.6E-10	NV	2.6E-10	NV	4.2E-07	NV
Fluoranthene	3.7E+00	8.6E-01	2.7E-09	NV	2.7E-09	NV	4.3E-06	NV
Fluorene	7.0E-03	3.9E-03	5.1E-12	1.1E-08	5.1E-12	1.1E-08	8.3E-09	1.1E-08
Indeno (1,2,3-cd) pyrene	3.1E-01	7.6E-02	2.2E-10	NV	2.2E-10	NV	3.6E-07	NV
Naphthalene	5.1E-03	3.3E-03	3.8E-12	5.6E-08	3.8E-12	5.6E-08	6.1E-09	5.6E-08
Phenanthrene	7.5E-01	2.4E-01	5.5E-10	NV	5.5E-10	NV	8.8E-07	NV
Pyrene	2.8E+00	6.7E-01	2.1E-09	2.2E-07	2.1E-09	2.2E-07	3.4E-06	2.2E-07
B(a)P Equivalent	1.6E+00	3.8E-01	1.2E-09	NV	1.2E-09	NV	1.9E-06	NV

Table AOC27-4.2b

Baseline Scenario Depth-Weighted Exposure Point Concentrations and Predicted Outdoor Air Concentrations for Recreational Users:
C O P Cs in AOC 27 Shallow Soil (0 to 3 feet bgs)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

C O P C	Exposure Point Concentration for Shallow Soil: 0 to 3 feet bgs (mg/kg) ^a	Exposure Point Concentration for Subsurface II Soil: 0 to 10 feet bgs (mg/kg) ^b	Recreational User - Camper Outdoor Airborne Particulate Concentration (mg/m ³) ^c	Recreational User - Camper Outdoor Vapor Concentration (mg/m ³) ^d	Recreational User - Hiker Outdoor Airborne Particulate Concentration (mg/m ³) ^c	Recreational User - Hiker Outdoor Vapor Concentration (mg/m ³) ^d	Recreational User - Off Highway Vehicle Rider Outdoor Airborne Particulate Concentration (mg/m ³) ^e	Recreational User - Off Highway Vehicle Rider Outdoor Vapor Concentration (mg/m ³) ^d
Polychlorinated Biphenyls								
Total PCBs	2.1E-02	1.7E-02	1.5E-11	2.6E-08	1.5E-11	2.6E-08	2.5E-08	2.6E-08
Total Petroleum Hydrocarbons								
TPH as diesel	4.1E+01	3.8E+01	3.0E-08	1.5E-02	3.0E-08	1.5E-02	4.8E-05	1.5E-02
TPH as motor oil	1.9E+02	1.5E+02	1.4E-07	NV	1.4E-07	NV	2.2E-04	NV
Dioxins/Furans								
TEQ Human	1.3E-05	4.0E-05	9.3E-15	1.7E-11	9.3E-15	1.7E-11	1.5E-11	1.7E-11

- Notes:**
- ^a Exposure point concentrations (EPCs) for shallow soil (0 to 3 feet bgs) are used to evaluate inhalation of particulates in outdoor air.
 - ^b EPCs for subsurface II soil (0 to 10 feet bgs) are used to evaluate inhalation of volatiles in outdoor air.
 - ^c Outdoor airborne particulate concentration is calculated by dividing the soil EPCs by the particulate emission factor (PEF). Default PEF of 1.4×10^9 m³/kg was used for recreational users (campers and hikers) as recommended by Department of Toxic Substances Control (2014).
 - ^d Chemical-specific volatilization factors (VFs) were estimated as discussed in Section 4.0, Exposure Assessment, of the main report. Outdoor vapor concentration is calculated by dividing the soil EPC by the VF.
 - ^e PEF of 8.5×10^5 m³/kg was used for recreational users (off-highway vehicle rider) as calculated in United States Environmental Protection Agency (2008, 2009) and recommended in "Revised Technical Memorandum, Recreational Visitor Exposure Scenario for Federal Land, PG&E Topock Compressor Station Remediation Project, California," prepared by the Department of the Interior (DOI).

- Abbreviations:**
- B (a) P equivalent = Benzo(a)pyrene equivalent.
 - bgs = below ground surface.
 - C O P C = Constituent of Potential Concern.
 - mg/kg = milligrams per kilogram.
 - mg/m³ = milligrams per cubic meter.
 - NA = not applicable.
 - ND = Not detected.
 - NV = Not volatile.
 - PCB = Polychlorinated biphenyls.
 - TPH = Total Petroleum Hydrocarbons.
 - TEQ = Toxic Equivalent.

- References:**
- Department of Toxic Substances Control (DTSC). 2014. DTSC/HERO Human Health Risk Assessment (HHRA) Note Number 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities. September 30.
 - United States Environmental Protection Agency (U S E P A). 2008. Clear Creek Management Areas Asbestos Exposure and Human Health Risk Assessment. Region 9. May. Available at: <http://www.epa.gov/region09/toxic/noa/clearcreek/pdf/CCMARiskDoc24Apr08-withoutAppxG.pdf>
 - U S E P A. 2009. Baseline Human Health Risk Assessment for the Standard Mine Site, Gunnison County, CO; Addendum. Prepared by SRC for U S E P A Region 8. November 24. Available at: http://www2.epa.gov/sites/production/files/documents/SM_HHRA_Addendum.pdf

Table AOC27-4.3

Human Health Risk and Hazard Estimate Summary at AOC 27 for the Baseline Scenario Using Depth-Weighted Exposure Point Concentrations

**Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California**

Receptor	Depth Interval	ILCR	H I
Recreational User - Camper	Surface	7E-07	2E-02
Recreational User - Camper	Shallow	4E-07	1E-02
Recreational User - Hiker	Surface	1E-06	4E-02
Recreational User - Hiker	Shallow	9E-07	3E-02
Recreational User - OHV Rider	Surface	9E-07	1E-02
Recreational User - OHV Rider	Shallow	6E-07	8E-03

Abbreviations:

ILCR = Incremental Lifetime Cancer Risk

H I = Hazard Index

Table AOC27-5.1
Depth-Weighted Exposure Point Concentrations for Soil and Biota for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

Category	C O P E C	Units	Soil EPC (0-0.5 ft bgs)	Biota EPC (0-0.5 ft bgs)^a
Inorganics	Chromium, hexavalent	mg/kg	2.60E-01	7.96E-02
Inorganics	Chromium, total	mg/kg	1.92E+01	5.89E+00
Inorganics	Copper	mg/kg	1.56E+01	8.02E+00
Dioxins	TEQ Mammals	ng/kg	2.60E+01	1.30E+02

Notes:

^a Calculated using selected soil EPC and uptake model. See Section 6 of the main report.

Abbreviations:

C O P E C = constituent of potential ecological concern
 EPC = exposure point concentration
 ft bgs = feet below ground surface
 ng/kg = nanograms per kilogram
 TEQ = toxicity equivalent

Table AOC27-5.2
Area-Weighted Exposure Point Concentrations for Soil and Biota for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

Category	C O P E C	Units	Soil EPC (0-0.5 ft bgs)	Biota EPC (0-0.5 ft bgs) ^a
Inorganics	Chromium, hexavalent	mg/kg	2.26E-01	6.91E-02
Inorganics	Chromium, total	mg/kg	1.83E+01	5.60E+00
Inorganics	Copper	mg/kg	1.37E+01	7.07E+00
Dioxins	TEQ Mammals	ng/kg	2.60E+01	1.30E+02

Notes:

^a Calculated using selected soil EPC and uptake model. See Section 6 of the main report.

Abbreviations:

C O P E C = constituent of potential ecological concern

EPC = exposure point concentration

ft bgs = feet below ground surface

ng/kg = nanograms per kilogram

TEQ = toxicity equivalent

Table AOC27-5.3

Toxic Equivalency Factors for Dioxin Congeners and Calculated Tissue Exposure Point Concentrations for Dioxin TEQ for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

Constituent	Units	Soil EPC 95% UCL (0-0.5 ft bgs)	Terrestrial Invertebrate Bioaccumulation Factors	Terrestrial Invertebrate Tissue EPC (0-0.5 ft bgs)	Mammal TEFs ^a	Terrestrial Invertebrate Tissue EPCs (0-0.5 ft bgs, Mammal TEF Applied)
Congener-Specific Approach (USEPA 1999)						
1,2,3,4,6,7,8-hpcdd	ng/kg	1100	0.081	89	0.01	0.89
1,2,3,4,6,7,8-hpcdf	ng/kg	67	0.017	1.14	0.01	0.011
1,2,3,4,7,8,9-hpcdf	ng/kg	7.1	0.62	4.40	0.01	0.044
1,2,3,4,7,8-hxcdd	ng/kg	6	0.49	2.94	0.1	0.29
1,2,3,4,7,8-hxcdf	ng/kg	8.9	0.121	1.08	0.1	0.108
1,2,3,6,7,8-hxcdd	ng/kg	20	0.19	3.80	0.1	0.38
1,2,3,6,7,8-hxcdf	ng/kg	5.5	0.3	1.65	0.1	0.17
1,2,3,7,8,9-hxcdd	ng/kg	7.8	0.22	1.72	0.1	0.17
1,2,3,7,8,9-hxcdf	ng/kg	1.6	1	1.60	0.1	0.16
1,2,3,7,8-pecdd	ng/kg	4	1.46	5.84	1	5.84
1,2,3,7,8-pecdf	ng/kg	0.445	0.32	0.14	0.03	0.004
2,3,4,6,7,8-hxcdf	ng/kg	80	1.07	85.60	0.1	8.56
2,3,4,7,8-pecdf	ng/kg	1.5	2.54	3.81	0.3	1.14
2,3,7,8-tcdd	ng/kg	1.3	1.59	2.07	1	2.07
2,3,7,8-tcdf	ng/kg	1.4	1.27	1.78	0.1	0.18
ocdd	ng/kg	11000	0.019	209	0.0003	0.063
ocdf	ng/kg	260	0.025	6.5	0.0003	0.0020
Dioxin TEQ	ng/kg					20.1
Congener-Specific Approach (Fagervold et al. 2010)^b						
1,2,3,4,6,7,8-hpcdd	ng/kg	1100	0.20	217.71	0.01	2.18
1,2,3,4,6,7,8-hpcdf	ng/kg	67	0.36	23.81	0.01	0.24
1,2,3,4,7,8,9-hpcdf	ng/kg	7.1	0.34	2.40	0.01	0.024
1,2,3,4,7,8-hxcdd	ng/kg	6	0.23	1.38	0.1	0.14
1,2,3,4,7,8-hxcdf	ng/kg	8.9	0.48	4.23	0.1	0.42
1,2,3,6,7,8-hxcdd	ng/kg	20	0.19	3.85	0.1	0.39
1,2,3,6,7,8-hxcdf	ng/kg	5.5	0.59	3.22	0.1	0.32
1,2,3,7,8,9-hxcdd	ng/kg	7.8	0.13	1.00	0.1	0.10
1,2,3,7,8,9-hxcdf	ng/kg	1.6	1.22	1.95	0.1	0.20
1,2,3,7,8-pecdd	ng/kg	4	0.18	0.73	1	0.73
1,2,3,7,8-pecdf	ng/kg	0.445	0.79	0.35	0.03	0.010
2,3,4,6,7,8-hxcdf	ng/kg	80	0.33	26.61	0.1	2.66
2,3,4,7,8-pecdf	ng/kg	1.5	0.56	0.85	0.3	0.25
2,3,7,8-tcdd	ng/kg	1.3	1.65	2.15	1	2.15
2,3,7,8-tcdf	ng/kg	1.4	1.21	1.69	0.1	0.17
ocdd	ng/kg	11000	0.25	2776.58	0.0003	0.83
ocdf	ng/kg	260	0.27	71.26	0.0003	0.021
Dioxin TEQ	ng/kg	26				10.8

**Table AOC27-5.3
Toxic Equivalency Factors for Dioxin Congeners and Calculated Tissue Exposure Point Concentrations for Dioxin TEQ for AOC 27**

**Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California**

Constituent	Units	Soil EPC 95% UCL (0-0.5 ft bgs)	Terrestrial Invertebrate Bioaccumulation Factors	Terrestrial Invertebrate Tissue EPC (0-0.5 ft bgs)	Mammal TEFs ^a	Terrestrial Invertebrate Tissue EPCs (0-0.5 ft bgs, Mammal TEF Applied)
ERA Approach^c						
TEQ mammals	ng/kg	26.0	$\ln(C_i) = 1.182 * \ln(C_s) + 3.533$	--	--	130

Notes:

^a Toxic Equivalency Factors (TEFs) from Van den Berg (2006) for mammals.

^b Fagervold et al. (2010) bioaccumulation factors calculated using soil-to-earthworm 2,3,7,8-TCDD BAF for soil at location SW-20 (BAF = 1.65) and congener-specific earthworm bioaccumulation equivalency factors. See Table 6-34 of the 2019 H H E R A (Arcadis 2019).

^c ERA approach bioaccumulation factor based on tetrachlorodibenzo-p-dioxin (TCDD) in Sample et al. (1998).

Abbreviations:

C O P E C = constituent of potential ecological concern

EPC = exposure point concentration

ft bgs = feet below ground surface

ng/kg = nanograms per kilogram

TEQ = toxicity equivalent

TEF = toxic equivalency factor

References:

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

Fagervold, SK, Y Chai, JW Davis, M Wilken, G Cornelissen, and U Ghosh. 2010. Bioaccumulation of polychlorinated dibenzo-p-dioxins/dibenzofurans in *E. fetida* from floodplain soils and the effect of activated carbon amendment. *Environ Sci Technol.* 44(14):5546-52.

Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G.W. Suter, II, and T.L. Ashwood. 1998. Development and Validation of Bioaccumulation Models for Earthworms. ES/ER/TM-220. Oak Ridge National Laboratory, Oak Ridge TN. 93 pp.47

USEPA. 1999. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. U.S. Environmental Protection Agency Peer Review Draft. August

Van den Berg, et al. 1998. Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. *Environ Health Perspect* 106(12):775-792.

Van den Berg, et al. 2006. The 2005 World Health Organization reevaluation of human and mammalian TEFs for dioxins and dioxin-like compounds. *Toxicological Sciences* 93:223-241.

Table AOC27-5.4

Desert Shrew Risk Estimate Summary Using Depth-Weighted Exposure Point Concentrations (Wildlife SUF = 1, TRVs used for RBRG Development, and Selected BAFs) for AOC 27

**Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California**

Scenario	Category	COPEC	Desert Shrew NOAEL HQ TRV Used for RBRG Development SUF = 1	NOAEL HQ TRV Basis ^a	NOAEL HQ Notes	Desert Shrew LOAEL HQ TRV Used for RBRG Development SUF = 1	LOAEL HQ TRV Basis ^a	LOAEL HQ Notes
Baseline	Inorganics	Chromium, hexavalent	2E-03	Selected TRV	None	4E-04	Selected TRV	None
Baseline	Inorganics	Chromium, total	5E-01	Selected TRV	None	1E-01	Selected TRV	None
Baseline	Inorganics	Copper	2E-01	Selected TRV	None	1E-01	Selected TRV	None
Baseline	Dioxins	TEQ Mammals	5E+00	Alternate TRV	Note 1	9E-01	Alternate TRV	None

Notes:

^a Selected TRVs for metals are based on the TRVs used to develop the U S E P A Ecological Soil Screening Levels (U S E P A 2005). Alternate TRVs for dioxin TEQ were developed for mammals based the geometric mean of the reproduction and growth endpoints for the NOAEL and LOAEL effect levels, respectively.

Note 1	NOAEL HQ greater than 1
Note 2	LOAEL HQ greater than 1
Note 3	LOAEL HQ greater than 10
Note 4	LOAEL HQ greater than 100

Abbreviations:

BAF = bioaccumulation factor
COPEC = constituent of potential ecological concern
HQ = hazard quotient
LOAEL = lowest observed adverse effect level
NOAEL = no-observed adverse effect level
RBRG = risk-based remedial goal
SUF = site use factor
TEQ = toxicity equivalent
TRV = toxicity reference value
U S E P A = United States Environmental Protection Agency

Table AOC27-5.5

Desert Shrew Risk Estimate Summary Using Area-Weighted Exposure Point Concentrations (Wildlife SUF = 1, TRVs used for RBRG Development, and Selected BAFs) for AOC 27

**Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California**

Scenario	Category	COPEC	Desert Shrew NOAEL HQ TRV Used for RBRG Development SUF = 1	NOAEL HQ TRV Basis ^a	NOAEL HQ Notes	Desert Shrew LOAEL HQ TRV Used for RBRG Development SUF = 1	LOAEL HQ TRV Basis ^a	LOAEL HQ Notes
Baseline	Inorganics	Chromium, hexavalent	2E-03	Selected TRV	None	4E-04	Selected TRV	None
Baseline	Inorganics	Chromium, total	5E-01	Selected TRV	None	1E-01	Selected TRV	None
Baseline	Inorganics	Copper	2E-01	Selected TRV	None	9E-02	Selected TRV	None
Baseline	Dioxins	TEQ Mammals	5E+00	Alternate TRV	Note 1	9E-01	Alternate TRV	None

Notes:

^a Selected TRVs for metals are based on the TRVs used to develop the U S E P A Ecological Soil Screening Levels (U S E P A 2005). Alternate TRVs for dioxin TEQ were developed for mammals based the geometric mean of the reproduction and growth endpoints for the NOAEL and LOAEL effect levels, respectively.

Note 1	NOAEL HQ greater than 1
Note 2	LOAEL HQ greater than 1
Note 3	LOAEL HQ greater than 10
Note 4	LOAEL HQ greater than 100

Abbreviations:

BAF = bioaccumulation factor
COPEC = constituent of potential ecological concern
HQ = hazard quotient
LOAEL = lowest observed adverse effect level
NOAEL = no-observed adverse effect level
RBRG = risk-based remedial goal
SUF = site use factor
TEQ = toxicity equivalent
TRV = toxicity reference value
U S E P A = United States Environmental Protection Agency

Table AOC27-5.6

Desert Shrew Risk Estimate Summary for Dioxin TEQ Using Depth-Weighted Exposure Point Concentrations and Congener-Specific BAFs (Wildlife SUF = 1, TRVs used for RBRG Development) for AOC 27

**Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California**

Scenario	Category	BAF Type	C O P E C	Desert Shrew N O A E L HQ TRV Used for RBRG Development SUF = 1	N O A E L HQ TRV Basis ^a	N O A E L HQ Notes	Desert Shrew L O A E L HQ TRV Used for RBRG Development SUF = 1	L O A E L HQ TRV Basis ^a	L O A E L HQ Notes
Baseline	Dioxins	Congener-Specific (USEPA 1999)	TEQ Mammals	9E-01	Alternate TRV	None	1E-01	Alternate TRV	None
Baseline	Dioxins	Congener-Specific (Fagervold et al. 2010)	TEQ Mammals	5E-01	Alternate TRV	None	8E-02	Alternate TRV	None

Notes:

^a Selected TRVs for metals are based on the TRVs used to develop the U S E P A Ecological Soil Screening Levels (U S E P A 2005). Alternate TRVs for dioxin TEQ were developed for mammals based the geometric mean of the reproduction and growth endpoints for the NOAEL and LOAEL effect levels, respectively.

Note 1	N O A E L HQ greater than 1
Note 2	L O A E L HQ greater than 1
Note 3	L O A E L HQ greater than 10
Note 4	L O A E L HQ greater than 100

Abbreviations:

BAF = bioaccumulation factor
 C O P E C = constituent of potential ecological concern
 HQ = hazard quotient
 LOAEL = lowest observed adverse effect level
 NOAEL = no-observed adverse effect level
 RBRG = risk-based remedial goal
 S U F = site use factor
 TEQ = toxicity equivalent
 TRV = toxicity reference value
 U S E P A = United States Environmental Protection Agency

Table AOC27-6.1
Desert Shrew Risk Estimate Summary Using Depth-Weighted and Area-Weighted Exposure Point Concentrations for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

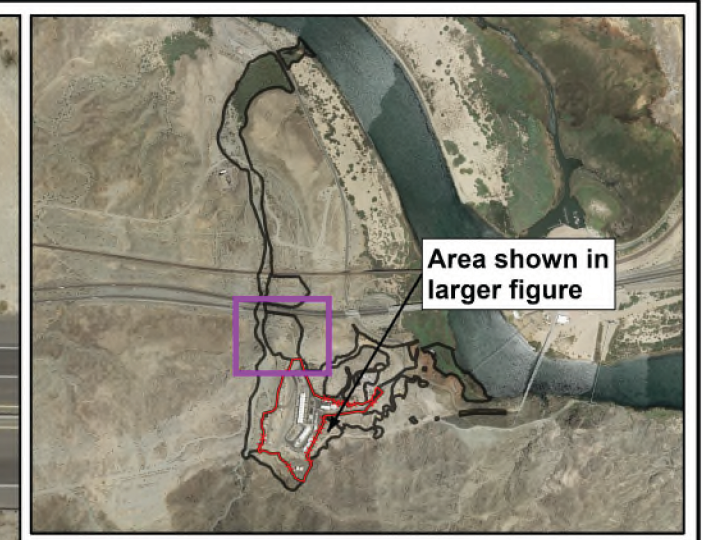
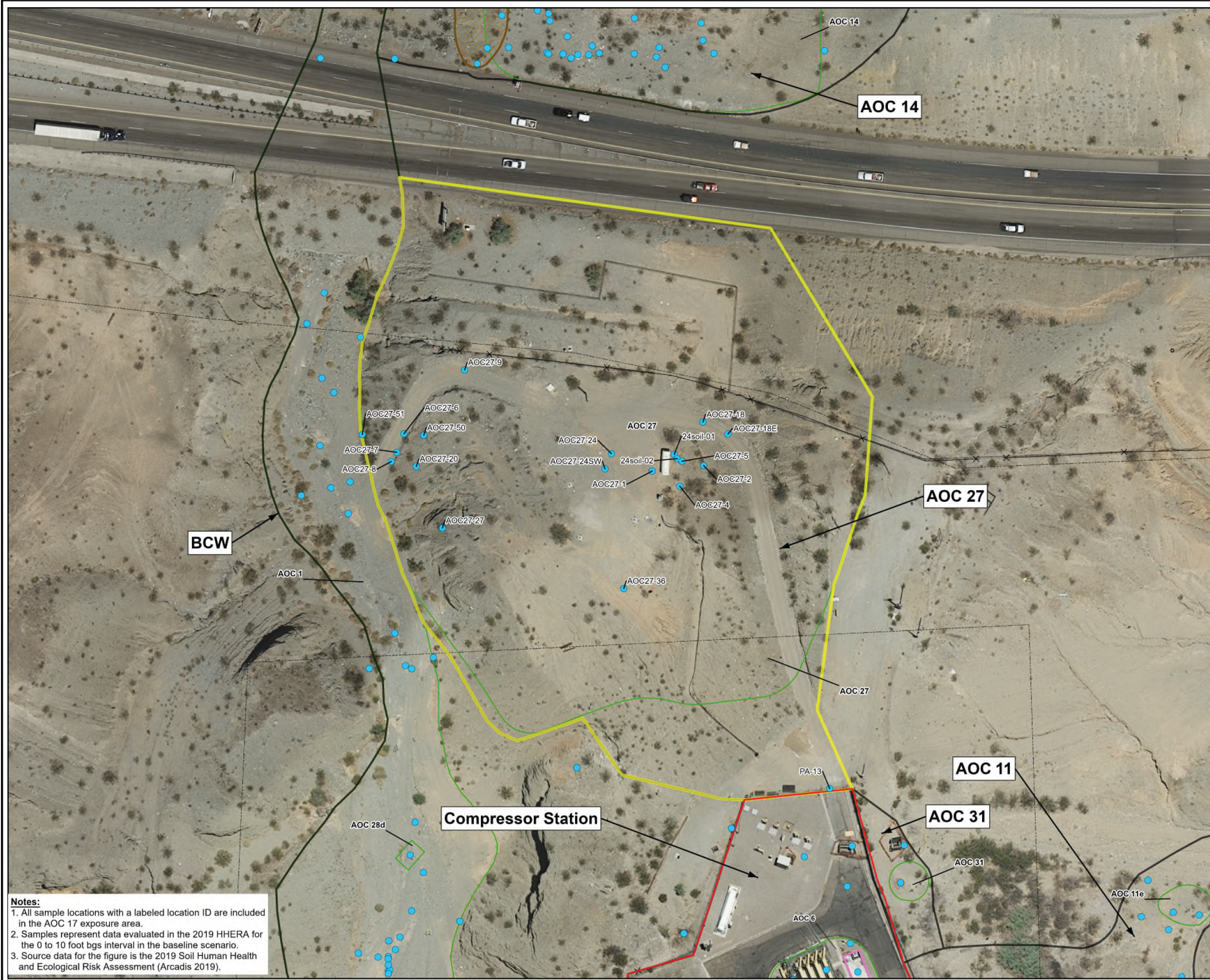
Scenario	Category	C O P E C	BAF Type	Desert Shrew Depth-Weighted N O A E L HQ TRV Used for RBRG Development SUF = 1	Desert Shrew Depth- Weighted N O A E L HQ Notes	Desert Shrew Depth-Weighted L O A E L HQ TRV Used for RBRG Development SUF = 1	Desert Shrew Depth- Weighted L O A E L HQ Notes	Desert Shrew Area-Weighted N O A E L HQ TRV Used for RBRG Development SUF = 1	Desert Shrew Area- Weighted N O A E L HQ Notes	Desert Shrew Area-Weighted L O A E L HQ TRV Used for RBRG Development SUF = 1	Desert Shrew Area- Weighted L O A E L HQ Notes	W O E Result ^a
Baseline	Inorganics	Chromium, hexavalent	Selected BAF	2E-03	None	4E-04	None	2E-03	None	4E-04	None	HQ less than or equal to 1
Baseline	Inorganics	Chromium, total	Selected BAF	5E-01	None	1E-01	None	5E-01	None	1E-01	None	HQ less than or equal to 1
Baseline	Inorganics	Copper	Selected BAF	2E-01	None	1E-01	None	2E-01	None	9E-02	None	HQ less than or equal to 1
Baseline	Dioxins	TEQ Mammals	Selected BAF	5E+00	Note 1	9E-01	None	5E+00	Note 1	9E-01	None	See W O E for Alternate BAFs
Baseline	Dioxins	TEQ Mammals	Alternate BAF (USEPA 1999)	9E-01	None	1E-01	None	--	None	--	None	HQ less than or equal to 1
Baseline	Dioxins	TEQ Mammals	Alternate BAF (Fagervold et al. 2010)	5E-01	None	8E-02	None	--	None	--	None	HQ less than or equal to 1

Notes:
^a W O E result for dioxin TEQ is risk conclusion based on 1) L O A E L HQ based on depth-weighted EPCs and assumptions used for RBRG development (i.e., a SUF of 1, congener-specific BAFs, and alternate TRVs), and 2) supporting L O E s. W O E result for metals is risk conclusion based on 1) L O A E L HQ based on area-weighted EPCs and assumptions used for RBRG development (i.e., a SUF of 1 and selected BAFs and TRVs), and 2) supporting L O E s.

- Note 1 N O A E L HQ greater than 1
- Note 2 L O A E L HQ greater than 1
- Note 3 L O A E L HQ greater than 10
- Note 4 L O A E L HQ greater than 100

Abbreviations:
"--" = not applicable
B A F = bioaccumulation factor
C O P E C = constituent of potential ecological concern
E P C = exposure point concentration
H Q = hazard quotient
L O A E L = lowest observed adverse effect level
L O E = line of evidence
N O A E L = no-observed adverse effect level
R B R G = risk-based remedial goal
S U F = site use factor
T E Q = toxicity equivalent
T R V = toxicity reference value
U S E P A = United States Environmental Protection Agency
W O E = weight of evidence, considering multiple L O E s. If HQs/L O A E L HQs are greater than 1, W O E Result is either 1) not expected, 2) unlikely, or 3) possible.

FIGURE

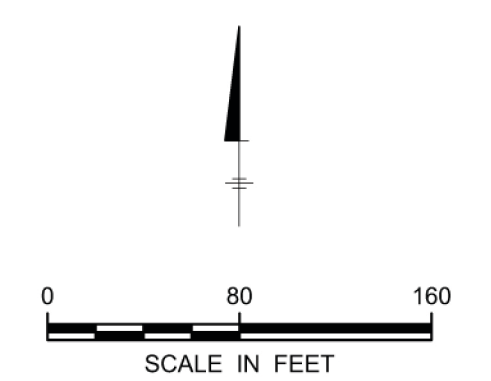


Legend:

- Soil Sampling Location
- Area of Concern
- Solid Waste Management Unit
- Potential Burning Related Location
- AOC 27 Exposure Area
- Exposure Area
- Property Boundaries
- Fencing
- Inside the Topock Compressor Station boundary, as defined by current fenceline

BCW Label for Exposure Area

AOC 1 Label for Area of Concern



Notes:

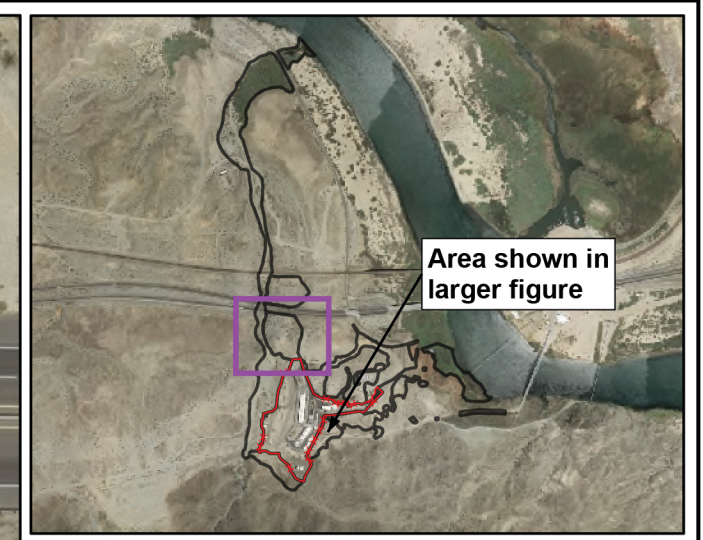
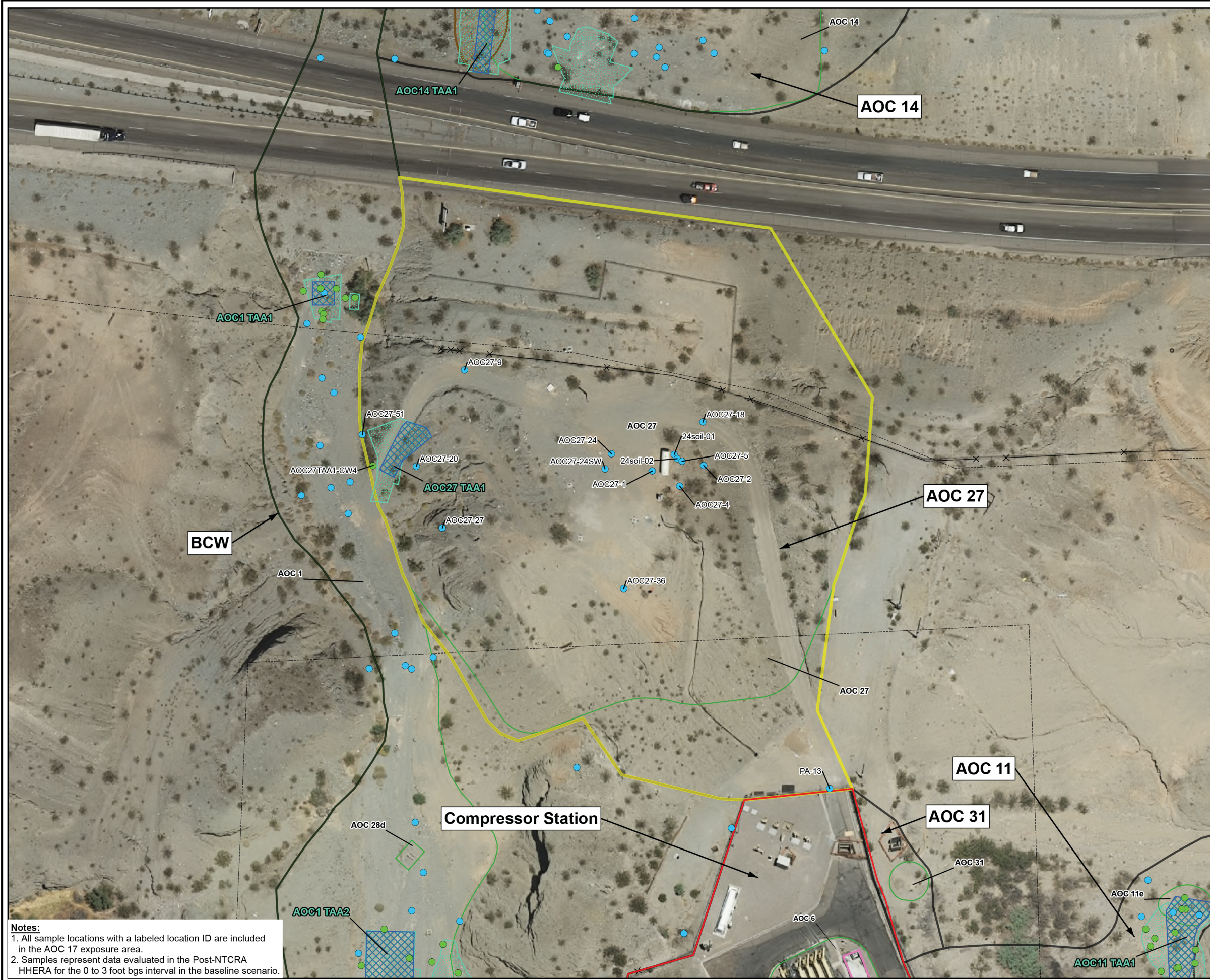
1. All sample locations with a labeled location ID are included in the AOC 17 exposure area.
2. Samples represent data evaluated in the 2019 HHERA for the 0 to 10 foot bgs interval in the baseline scenario.
3. Source data for the figure is the 2019 Soil Human Health and Ecological Risk Assessment (Arcadis 2019).

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
POST-SOIL NTCRA HUMAN HEALTH
AND ECOLOGICAL RISK ASSESSMENT REPORT

**SOIL SAMPLING LOCATIONS
AOC 27 EXPOSURE AREA (PRE-NTCRA)**




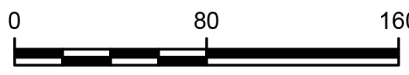
FIGURE
AOC27-1.1



Legend:

- Soil Sampling Location
- NTCRA Confirmation Samples
- Area of Concern
- Solid Waste Management Unit
- Potential Burning Related Location
- AOC 27 Exposure Area
- Exposure Area
- Property Boundaries
- Fencing
- Inside the Topock Compressor Station boundary, as defined by current fenceline
- Target Action Area
- NTCRA Removal Area
- BCW** Label for Exposure Area
- AOC 1** Label for Area of Concern
- AOC27 TAA1** Target Action Area (TAA)





SCALE IN FEET

Notes:
 1. All sample locations with a labeled location ID are included in the AOC 17 exposure area.
 2. Samples represent data evaluated in the Post-NTCRA HHERA for the 0 to 3 foot bgs interval in the baseline scenario.

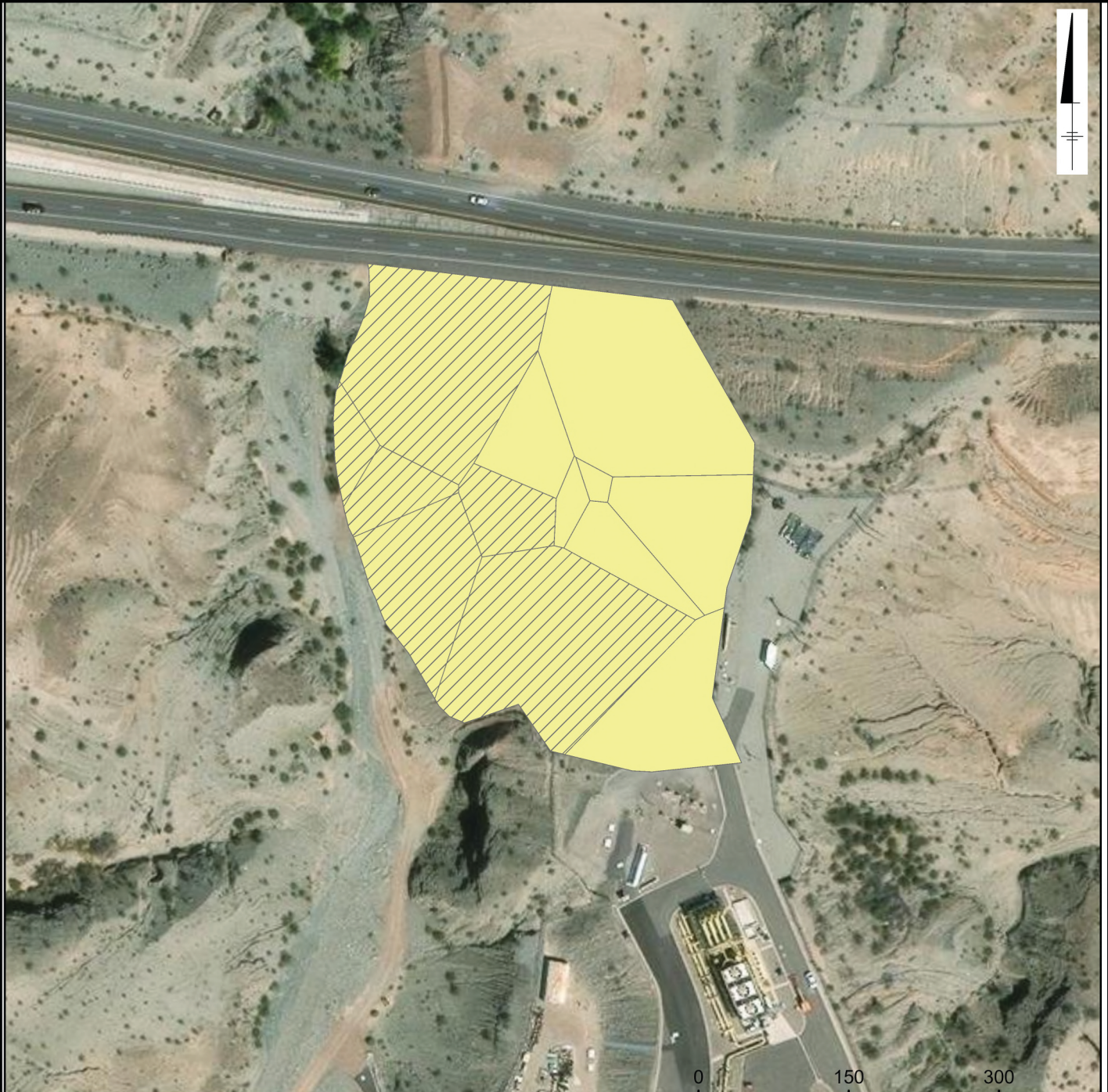
ATTACHMENT A

**Dataset and Exposure Point Concentration Calculations for the
AOC 27 HHERA**

AOC 27

0 - 0.5 FEET BELOW GROUND SURFACE

CHROMIUM, HEXAVALENT



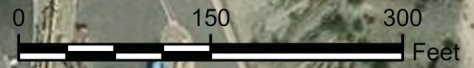
LEGEND:
CHROMIUM, HEXAVALENT
(MG/KG)

- 0 - 0.83
- >0.83 - 3.1
- >3.1 - 31
- >31
- NOT DETECTED

NOTES:

1. SAMPLE LOCATIONS FOR ALL COPCS/COPECS AND ALL EXPOSURE DEPTHS EVALUATED FOR THIS EXPOSURE AREA ARE PRESENTED IN FIGURE(S) AOC27-1.2.
2. DEPTH-WEIGHTED CONCENTRATIONS ARE DISPLAYED FOR EACH LOCATION.
3. SOIL REMOVAL ACTION GOALS AS SELECTED IN THE SOIL ENGINEERING EVALUATION/COST ANALYSIS (JACOBS 2021).
4. MG/KG = MILLIGRAMS PER KILOGRAM
5. RBRG = RISK-BASED REMEDIAL GOAL
6. THIESSEN POLYGONS WITH A NON-DETECT CONCENTRATION ARE REPRESENTED BY THE REPORTING LIMIT.

Chromium, hexavalent	Units	Value	Basis
Background	mg/kg	0.83	Site-specific Soil Background Value
Human Health RBRG	mg/kg	3.1	Soil Removal Action Goal (Off-highway vehicle rider at 10-6 excess risk)
Human Health RBRG	mg/kg	31	Soil Removal Action Goal (Off-highway vehicle rider at 10-5 excess risk)



PG&E TOPOCK COMPRESSOR STATION
 NEEDLES, CALIFORNIA
**POST-NTCRA HUMAN HEALTH AND
 ECOLOGICAL RISK ASSESSMENT**

THIESSEN POLYGONS FOR AREA WEIGHTING

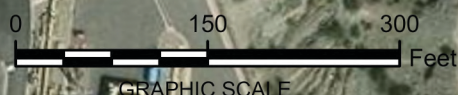


FIGURE
AOC27-A3.1

AOC 27

0 - 0.5 FEET BELOW GROUND SURFACE

CHROMIUM, TOTAL



LEGEND:
CHROMIUM, TOTAL
(MG/KG)

- 0 - 39.8
- >39.8 - 145
- >145

NOTES:

1. SAMPLE LOCATIONS FOR ALL COPCS/COPECS AND ALL EXPOSURE DEPTHS EVALUATED FOR THIS EXPOSURE AREA ARE PRESENTED IN FIGURE(S) AOC27-1.2.
2. DEPTH-WEIGHTED CONCENTRATIONS ARE DISPLAYED FOR EACH LOCATION.
3. SOIL REMOVAL ACTION GOALS AS SELECTED IN THE SOIL ENGINEERING EVALUATION/COST ANALYSIS (JACOBS 2021).
4. MG/KG = MILLIGRAMS PER KILOGRAM
5. RBRG = RISK-BASED REMEDIAL GOAL

Chromium, total	Units	Value	Basis
Background	mg/kg	39.8	Site-specific Soil Background Value
Ecological RBRG	mg/kg	145	Soil Removal Action Goal (Desert shrew)

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
**POST-NTCRA HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT**

**THIESSEN POLYGONS FOR
AREA WEIGHTING**

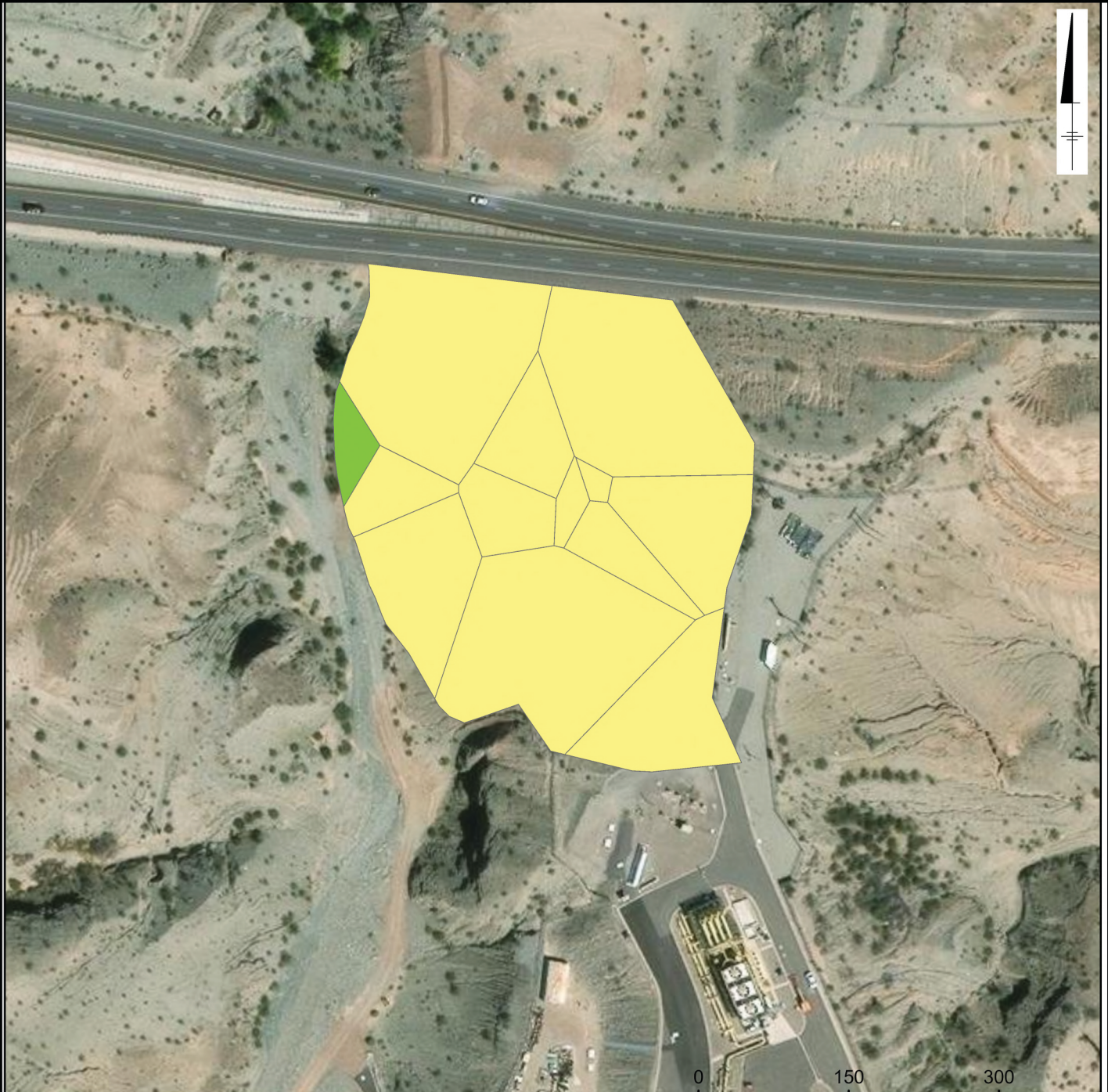


FIGURE
AOC27-A3.2

AOC 27

0 - 0.5 FEET BELOW GROUND SURFACE

COPPER



LEGEND:

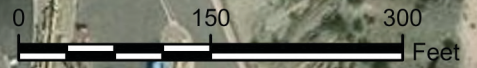
**COPPER
(MG/KG)**

- 0 - 16.8
- >16.8 - 145
- >145

NOTES:

1. SAMPLE LOCATIONS FOR ALL COPCS/COPECS AND ALL EXPOSURE DEPTHS EVALUATED FOR THIS EXPOSURE AREA ARE PRESENTED IN FIGURE(S) AOC27-1.2.
2. DEPTH-WEIGHTED CONCENTRATIONS ARE DISPLAYED FOR EACH LOCATION.
3. SOIL REMOVAL ACTION GOALS AS SELECTED IN THE SOIL ENGINEERING EVALUATION/COST ANALYSIS (JACOBS 2021).
4. MG/KG = MILLIGRAMS PER KILOGRAM
5. RBRG = RISK-BASED REMEDIAL GOAL

Copper	Units	Value	Basis
Background	mg/kg	16.8	Site-specific Soil Background Value
Ecological RBRG	mg/kg	145	Soil Removal Action Goal (Desert shrew)



GRAPHIC SCALE

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
**POST-NTCRA HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT**

**THIESSEN POLYGONS FOR
AREA WEIGHTING**

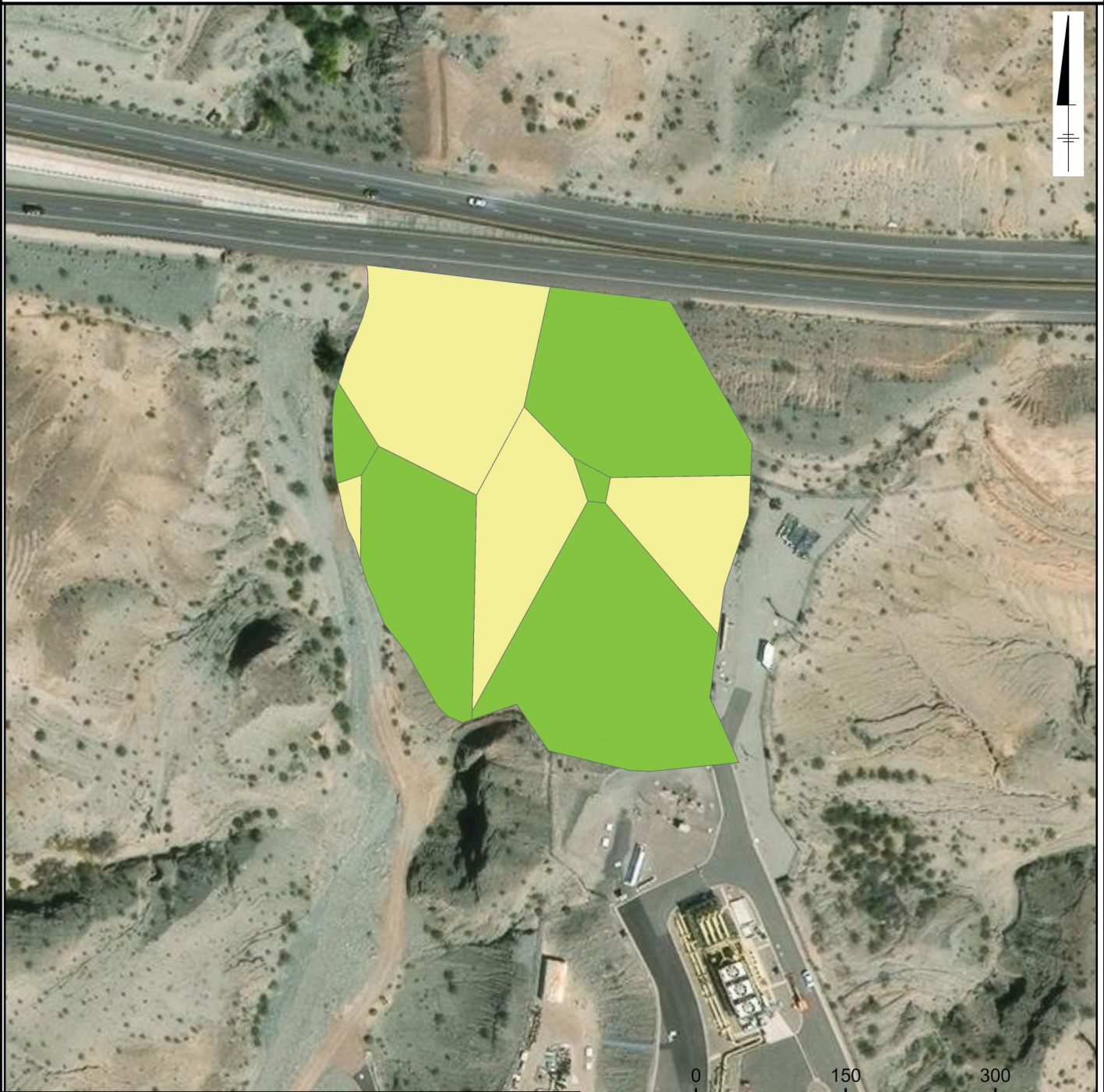


FIGURE
AOC27-A3.3

AOC 27

0 - 3 FEET BELOW GROUND SURFACE

TEQ MAMMALS



LEGEND:

TEQ MAMMALS (NG/KG)

- 0 - 5.58
- >5.58 - 100
- >100 - 190
- >190

NOTES:

1. SAMPLE LOCATIONS FOR ALL COPCS/COPECS AND ALL EXPOSURE DEPTHS EVALUATED FOR THIS EXPOSURE AREA ARE PRESENTED IN FIGURE(S) AOC27-1.2.
2. DEPTH-WEIGHTED CONCENTRATIONS ARE DISPLAYED FOR EACH LOCATION.
3. SOIL REMOVAL ACTION GOALS AS SELECTED IN THE SOIL ENGINEERING EVALUATION/COST ANALYSIS (JACOBS 2021).
4. NG/KG = NANOGRAMS PER KILOGRAM
5. RBRG = RISK-BASED REMEDIAL GOAL

TEQ Mammals	Units	Value	Basis
Background	ng/kg	5.58	Site-specific Soil Background Value
Human Health RBRG	ng/kg	100	Soil Removal Action Goal (Hiker at 10-6 excess risk)
Ecological RBRG	ng/kg	190	Soil Removal Action Goal (Desert shrew)
Human Health RBRG	ng/kg	1000	Hiker at 10-5 excess risk

0 150 300
Feet

GRAPHIC SCALE

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
**POST-NTCRA HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT**

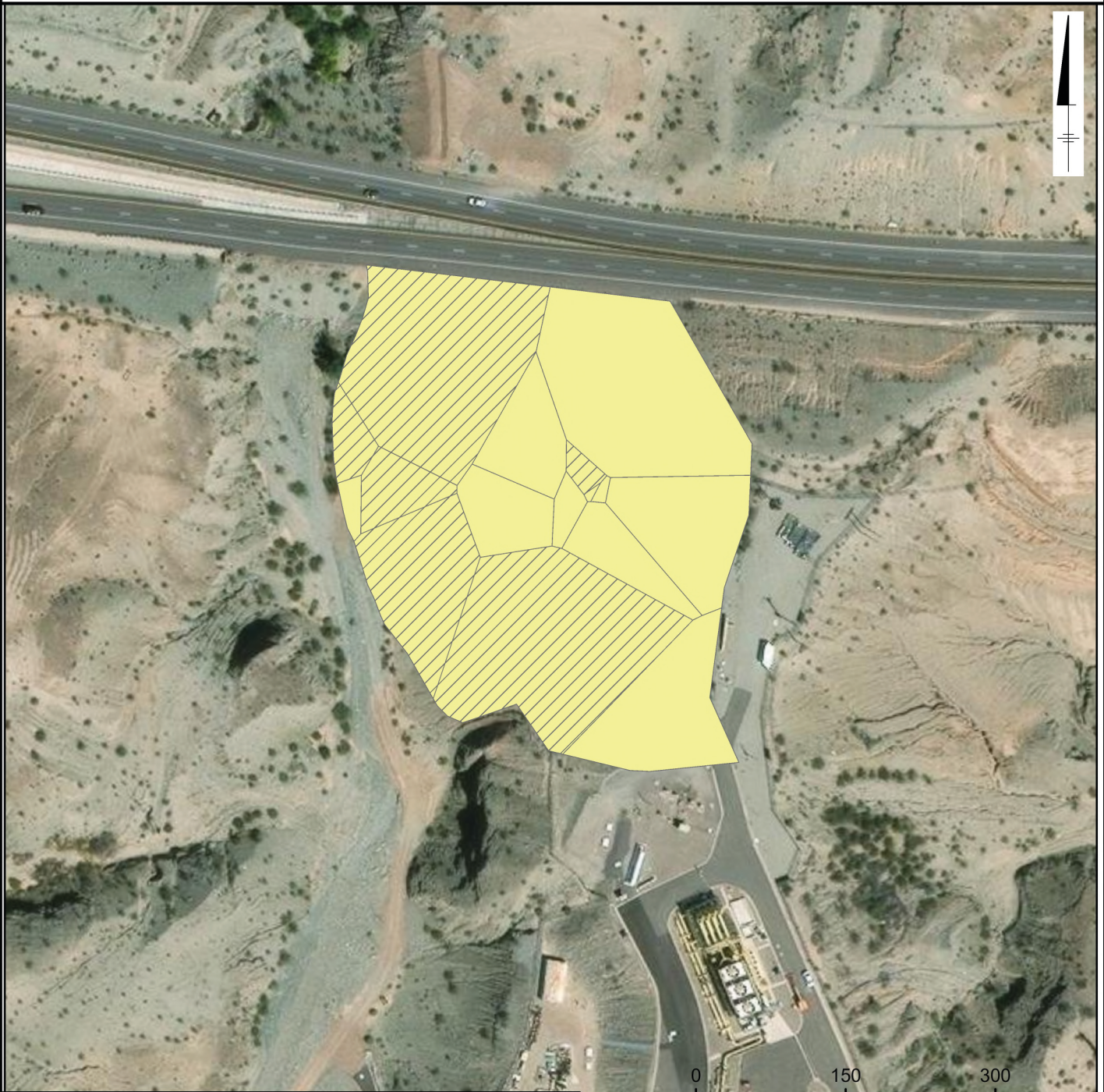
**THIESSEN POLYGONS FOR
AREA WEIGHTING**



FIGURE
AOC27-A3.4

AOC 27

0 - 3 FEET BELOW GROUND SURFACE CHROMIUM, HEXAVALENT



LEGEND:

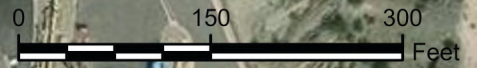
**CHROMIUM, HEXAVALENT
(MG/KG)**

- 0 - 0.83
- >0.83 - 3.1
- >3.1 - 31
- >31
- NOT DETECTED

NOTES:

1. SAMPLE LOCATIONS FOR ALL COPCS/COPECS AND ALL EXPOSURE DEPTHS EVALUATED FOR THIS EXPOSURE AREA ARE PRESENTED IN FIGURE(S) AOC27-1.2.
2. DEPTH-WEIGHTED CONCENTRATIONS ARE DISPLAYED FOR EACH LOCATION.
3. SOIL REMOVAL ACTION GOALS AS SELECTED IN THE SOIL ENGINEERING EVALUATION/COST ANALYSIS (JACOBS 2021).
4. MG/KG = MILLIGRAMS PER KILOGRAM
5. RBRG = RISK-BASED REMEDIAL GOAL
6. THIESSEN POLYGONS WITH A NON-DETECT CONCENTRATION ARE REPRESENTED BY THE REPORTING LIMIT.

Chromium, hexavalent	Units	Value	Basis
Background	mg/kg	0.83	Site-specific Soil Background Value
Human Health RBRG	mg/kg	3.1	Soil Removal Action Goal (Off-highway vehicle rider at 10-6 excess risk)
Human Health RBRG	mg/kg	31	Soil Removal Action Goal (Off-highway vehicle rider at 10-5 excess risk)



GRAPHIC SCALE

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
**POST-NTCRA HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT**

THIESSEN POLYGONS FOR AREA WEIGHTING



FIGURE
AOC27-A3.5

AOC 27

0 - 3 FEET BELOW GROUND SURFACE CHROMIUM, TOTAL



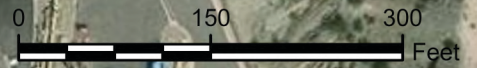
LEGEND:
CHROMIUM, TOTAL
(MG/KG)

- 0 - 39.8
- >39.8 - 145
- >145

NOTES:

1. SAMPLE LOCATIONS FOR ALL COPCS/COPECS AND ALL EXPOSURE DEPTHS EVALUATED FOR THIS EXPOSURE AREA ARE PRESENTED IN FIGURE(S) AOC27-1.2.
2. DEPTH-WEIGHTED CONCENTRATIONS ARE DISPLAYED FOR EACH LOCATION.
3. SOIL REMOVAL ACTION GOALS AS SELECTED IN THE SOIL ENGINEERING EVALUATION/COST ANALYSIS (JACOBS 2021).
4. MG/KG = MILLIGRAMS PER KILOGRAM
5. RBRG = RISK-BASED REMEDIAL GOAL

Chromium, total	Units	Value	Basis
Background	mg/kg	39.8	Site-specific Soil Background Value
Ecological RBRG	mg/kg	145	Soil Removal Action Goal (Desert shrew)



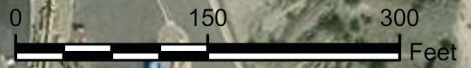
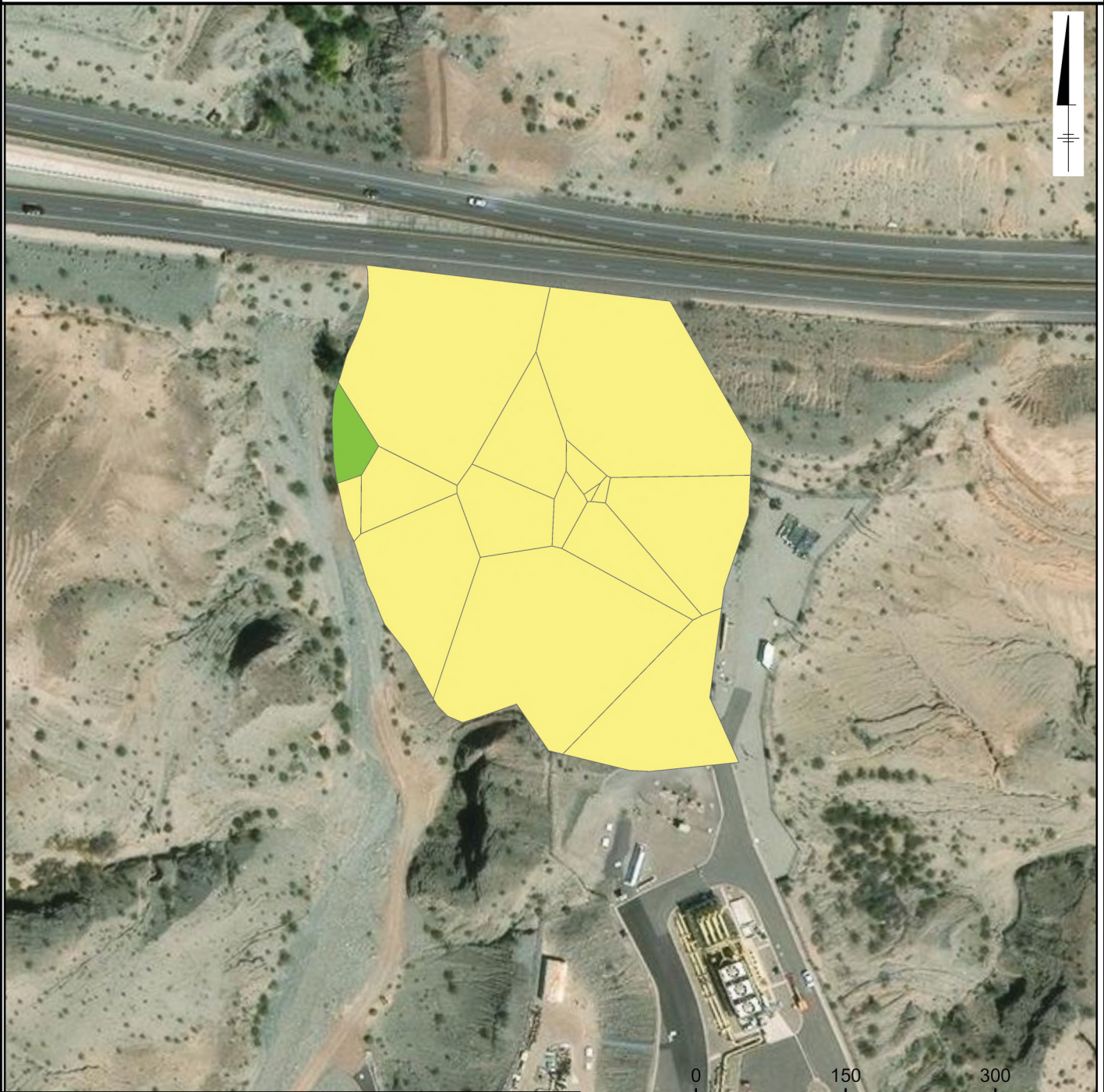
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
**POST-NTCRA HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT**

**THIESSEN POLYGONS FOR
AREA WEIGHTING**



FIGURE
AOC27-A3.6

AOC 27 0 - 3 FEET BELOW GROUND SURFACE COPPER



LEGEND:

**COPPER
(MG/KG)**

- 0 - 16.8
- >16.8 - 145
- >145

NOTES:

1. SAMPLE LOCATIONS FOR ALL COPCS/COPECS AND ALL EXPOSURE DEPTHS EVALUATED FOR THIS EXPOSURE AREA ARE PRESENTED IN FIGURE(S) AOC27-1.2.
2. DEPTH-WEIGHTED CONCENTRATIONS ARE DISPLAYED FOR EACH LOCATION.
3. SOIL REMOVAL ACTION GOALS AS SELECTED IN THE SOIL ENGINEERING EVALUATION/COST ANALYSIS (JACOBS 2021).
4. MG/KG = MILLIGRAMS PER KILOGRAM
5. RBRG = RISK-BASED REMEDIAL GOAL

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
**POST-NTCRA HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT**

**THIESSEN POLYGONS FOR
AREA WEIGHTING**

Copper	Units	Value	Basis
Background	mg/kg	16.8	Site-specific Soil Background Value
Ecological RBRG	mg/kg	145	Soil Removal Action Goal (Desert shrew)



FIGURE
AOC27-A3.7

ATTACHMENT B

Dose, Exposure Concentration, Risk, and Hazard Calculations for Human Health Receptors at AOC 27 Using Depth-Weighted EPCs and Area-Weighted EPCs

For additional help with the information provided in Attachment B, please contact Susan Shiu, Haley and Aldrich Associate Risk Assessor, at 1-510-879-4549.

Table AOC27-B1.1a

Baseline Scenario Exposure Concentration and Dose Calculations for Carcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Camper

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Inorganics								
Antimony	ND	NV	ND	ND	NC	NV	NC	NC
Cadmium	1.4E-11	NV	NC	NC	5.2E-12	NV	NC	NC
Chromium, Hexavalent	4.3E-12	NV	NA	3.9E-08	3.8E-12	NV	NA	3.5E-08
Copper	NC	NV	NC	NC	NC	NV	NC	NC
Lead	na	na	na	na	na	na	na	na
Mercury (inorganic)	NC	NC	NC	NC	NC	NC	NC	NC
Zinc	NC	NV	NC	NC	NC	NV	NC	NC
Volatile Organic Compounds								
Bromomethane	ND	NV	ND	ND	NC	NV	NC	NC
Chloro methane	ND	NV	ND	ND	NC	NV	NC	NC
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	NC	NV	NC	NC	NC	NV	NC	NC
Acenaphthylene	ND	NV	ND	ND	NC	NV	NC	NC
Anthracene	NC	NV	NC	NC	NC	NV	NC	NC
Benzo (a) anthracene	NA	1.6E-09	NA	NA	NA	1.6E-09	NA	NA
Benzo (a) pyrene	NA	NV	NA	NA	NA	NV	NA	NA
Benzo (b) fluoranthene	NA	NV	NA	NA	NA	NV	NA	NA
Benzo (ghi) perylene	NC	NV	NC	NC	NC	NV	NC	NC
Benzo (k) fluoranthene	NA	NV	NA	NA	NA	NV	NA	NA
Chrysene	NA	NV	NA	NA	NA	NV	NA	NA
Dibenzo (a,h) anthracene	NA	NV	NA	NA	NA	NV	NA	NA
Fluoranthene	NC	NV	NC	NC	NC	NV	NC	NC
Fluorene	NC	NV	NC	NC	NC	NV	NC	NC
Indeno (1,2,3-cd) pyrene	NA	NV	NA	NA	NA	NV	NA	NA
Naphthalene	3.8E-14	4.6E-10	1.0E-10	2.1E-10	3.1E-14	4.6E-10	8.1E-11	1.7E-10
Phenanthrene	NC	NV	NC	NC	NC	NV	NC	NC
Pyrene	NC	NV	NC	NC	NC	NV	NC	NC
B(a)P Equivalent	3.9E-11	NV	1.6E-07	3.5E-07	2.7E-11	NV	1.1E-07	2.4E-07

Table AOC27-B1.1a

Baseline Scenario Exposure Concentration and Dose Calculations for Carcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Camper

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Polychlorinated Biphenyls								
Total PCBs	1.5E-13	2.1E-10	3.9E-10	8.1E-10	1.2E-13	2.1E-10	3.3E-10	6.8E-10
Total Petroleum Hydrocarbons								
TPH as diesel	NC	NC	NC	NC	NC	NC	NC	NC
TPH as motor oil	NC	NC	NC	NC	NC	NC	NC	NC
Dioxins/Furans								
TEQ Human	1.6E-16	1.3E-13	8.2E-14	8.5E-13	7.5E-17	1.3E-13	4.0E-14	4.1E-13

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

CDI = Chronic Daily Intake.

C O P C = Constituent of Potential Concern.

EC = Exposure Concentration.

mg/kg-day = milligrams per kilogram per day.

mg/m³ = milligrams per cubic meter.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated using benzo(a)pyrene equivalents. Hexavalent chromium is not absorbed via dermal contact.

NC = Not considered a carcinogen.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.1b

Baseline Scenario Exposure Concentration and Dose Calculations for Carcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Hiker

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Inorganics								
Antimony	ND	NV	ND	ND	NC	NV	NC	NC
Cadmium	2.8E-11	NV	NC	NC	1.0E-11	NV	NC	NC
Chromium, Hexavalent	8.6E-12	NV	NA	7.8E-08	7.7E-12	NV	NA	6.9E-08
Copper	NC	NV	NC	NC	NC	NV	NC	NC
Lead	na	na	na	na	na	na	na	na
Mercury (inorganic)	NC	NC	NC	NC	NC	NC	NC	NC
Zinc	NC	NV	NC	NC	NC	NV	NC	NC
Volatile Organic Compounds								
Bromomethane	ND	NV	ND	ND	NC	NV	NC	NC
Chloro methane	ND	NV	ND	ND	NC	NV	NC	NC
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	NC	NV	NC	NC	NC	NV	NC	NC
Acenaphthylene	ND	NV	ND	ND	NC	NV	NC	NC
Anthracene	NC	NV	NC	NC	NC	NV	NC	NC
Benzo (a) anthracene	NA	3.2E-09	NA	NA	NA	3.2E-09	NA	NA
Benzo (a) pyrene	NA	NV	NA	NA	NA	NV	NA	NA
Benzo (b) fluoranthene	NA	NV	NA	NA	NA	NV	NA	NA
Benzo (ghi) perylene	NC	NV	NC	NC	NC	NV	NC	NC
Benzo (k) fluoranthene	NA	NV	NA	NA	NA	NV	NA	NA
Chrysene	NA	NV	NA	NA	NA	NV	NA	NA
Dibenzo (a,h) anthracene	NA	NV	NA	NA	NA	NV	NA	NA
Fluoranthene	NC	NV	NC	NC	NC	NV	NC	NC
Fluorene	NC	NV	NC	NC	NC	NV	NC	NC
Indeno (1,2,3-cd) pyrene	NA	NV	NA	NA	NA	NV	NA	NA
Naphthalene	7.7E-14	9.2E-10	2.0E-10	4.2E-10	6.1E-14	9.2E-10	1.6E-10	3.4E-10
Phenanthrene	NC	NV	NC	NC	NC	NV	NC	NC
Pyrene	NC	NV	NC	NC	NC	NV	NC	NC
B(a)P Equivalent	7.8E-11	NV	3.2E-07	7.0E-07	5.4E-11	NV	2.2E-07	4.9E-07

Table AOC27-B1.1b

Baseline Scenario Exposure Concentration and Dose Calculations for Carcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Hiker

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Dermal Contact (mg/kg-day)	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Ingestion (mg/kg-day)	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Dermal Contact (mg/kg-day)	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Ingestion (mg/kg-day)
Polychlorinated Biphenyls								
Total PCBs	3.0E-13	4.2E-10	7.8E-10	1.6E-09	2.5E-13	4.2E-10	6.6E-10	1.4E-09
Total Petroleum Hydrocarbons								
TPH as diesel	NC	NC	NC	NC	NC	NC	NC	NC
TPH as motor oil	NC	NC	NC	NC	NC	NC	NC	NC
Dioxins/Furans								
TEQ Human	3.1E-16	2.7E-13	1.6E-13	1.7E-12	1.5E-16	2.7E-13	8.0E-14	8.3E-13

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

CDI = Chronic Daily Intake.

C O P C = Constituent of Potential Concern.

EC = Exposure Concentration.

mg/kg-day = milligrams per kilogram per day.

mg/m³ = milligrams per cubic meter.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated using benzo(a)pyrene equivalents. Hexavalent chromium is not absorbed via dermal contact.

NC = Not considered a carcinogen.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.1c

Baseline Scenario Exposure Concentration and Dose Calculations for Carcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Off-Highway Vehicle Rider

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Inorganics								
Antimony	ND	NV	ND	ND	NC	NV	NC	NC
Cadmium	2.8E-09	NV	NC	NC	1.0E-09	NV	NC	NC
Chromium, Hexavalent	5.5E-10	NV	NA	4.5E-09	4.9E-10	NV	NA	4.0E-09
Copper	NC	NV	NC	NC	NC	NV	NC	NC
Lead	na	na	na	na	na	na	na	na
Mercury (inorganic)	NC	NC	NC	NC	NC	NC	NC	NC
Zinc	NC	NV	NC	NC	NC	NV	NC	NC
Volatile Organic Compounds								
Bromomethane	ND	NV	ND	ND	NC	NV	NC	NC
Chloro methane	ND	NV	ND	ND	NC	NV	NC	NC
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	NC	NV	NC	NC	NC	NV	NC	NC
Acenaphthylene	ND	NV	ND	ND	NC	NV	NC	NC
Anthracene	NC	NV	NC	NC	NC	NV	NC	NC
Benzo (a) anthracene	NA	1.3E-10	NA	NA	NA	1.3E-10	NA	NA
Benzo (a) pyrene	NA	NV	NA	NA	NA	NV	NA	NA
Benzo (b) fluoranthene	NA	NV	NA	NA	NA	NV	NA	NA
Benzo (ghi) perylene	NC	NV	NC	NC	NC	NV	NC	NC
Benzo (k) fluoranthene	NA	NV	NA	NA	NA	NV	NA	NA
Chrysene	NA	NV	NA	NA	NA	NV	NA	NA
Dibenzo (a,h) anthracene	NA	NV	NA	NA	NA	NV	NA	NA
Fluoranthene	NC	NV	NC	NC	NC	NV	NC	NC
Fluorene	NC	NV	NC	NC	NC	NV	NC	NC
Indeno (1,2,3-cd) pyrene	NA	NV	NA	NA	NA	NV	NA	NA
Naphthalene	7.7E-12	5.7E-11	9.8E-10	5.4E-11	6.2E-12	5.7E-11	7.8E-10	4.3E-11
Phenanthrene	NC	NV	NC	NC	NC	NV	NC	NC
Pyrene	NC	NV	NC	NC	NC	NV	NC	NC
B(a)P Equivalent	5.0E-09	NV	6.5E-07	4.1E-08	3.5E-09	NV	4.5E-07	2.8E-08

Table AOC27-B1.1c

Baseline Scenario Exposure Concentration and Dose Calculations for Carcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Off-Highway Vehicle Rider

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Polychlorinated Biphenyls								
Total PCBs	3.0E-11	2.6E-11	3.8E-09	2.1E-10	2.5E-11	2.6E-11	3.2E-09	1.7E-10
Total Petroleum Hydrocarbons								
TPH as diesel	NC	NC	NC	NC	NC	NC	NC	NC
TPH as motor oil	NC	NC	NC	NC	NC	NC	NC	NC
Dioxins/Furans								
TEQ Human	3.1E-14	1.7E-14	8.0E-13	2.2E-13	1.5E-14	1.7E-14	3.9E-13	1.1E-13

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

CDI = Chronic Daily Intake.

C O P C = Constituent of Potential Concern.

EC = Exposure Concentration.

mg/kg-day = milligrams per kilogram per day.

mg/m³ = milligrams per cubic meter.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated using benzo(a)pyrene equivalents. Hexavalent chromium is not absorbed via dermal contact.

NC = Not considered a carcinogen.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.2a
Baseline Scenario Exposure Concentration and Dose Calculations for Noncarcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Camper

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

C O P C	Child Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Child Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Inorganics																
Antimony	ND	NV	ND	ND	ND	NV	ND	ND	2.9E-11	NV	1.6E-08	5.3E-07	2.9E-11	NV	2.1E-09	5.0E-08
Cadmium	3.7E-11	NV	1.9E-09	6.7E-07	3.7E-11	NV	2.7E-10	6.3E-08	1.4E-11	NV	7.4E-10	2.5E-07	1.4E-11	NV	1.0E-10	2.4E-08
Chromium, Hexavalent	4.2E-12	NV	NA	7.6E-08	4.2E-12	NV	NA	7.1E-09	3.7E-12	NV	NA	6.8E-08	3.7E-12	NV	NA	6.4E-09
Copper	2.5E-10	NV	1.3E-07	4.6E-06	2.5E-10	NV	1.8E-08	4.3E-07	2.0E-10	NV	1.1E-07	3.7E-06	2.0E-10	NV	1.5E-08	3.5E-07
Lead	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	2.7E-12	NV	1.4E-09	4.9E-08	2.7E-12	NV	1.9E-10	4.6E-09	2.8E-12	NV	1.5E-09	5.1E-08	2.8E-12	NV	2.0E-10	4.8E-09
Zinc	8.8E-09	NV	4.6E-06	1.6E-04	8.8E-09	NV	6.3E-07	1.5E-05	6.5E-09	NV	3.4E-06	1.2E-04	6.5E-09	NV	4.7E-07	1.1E-05
Volatile Organic Compounds																
Bromomethane	ND	2.2E-07	ND	ND	ND	2.2E-07	ND	ND	4.2E-13	2.2E-07	2.2E-09	7.6E-09	4.2E-13	2.2E-07	3.0E-10	7.1E-10
Chloro methane	ND	1.2E-07	ND	ND	ND	1.2E-07	ND	ND	1.8E-13	1.2E-07	9.3E-10	3.2E-09	1.8E-13	1.2E-07	1.3E-10	3.0E-10
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	8.2E-13	1.5E-09	6.5E-09	1.5E-08	8.2E-13	1.5E-09	8.8E-10	1.4E-09	5.6E-13	1.5E-09	4.4E-09	1.0E-08	5.6E-13	1.5E-09	6.1E-10	9.6E-10
Acenaphthylene	ND	NV	ND	ND	ND	NV	ND	ND	5.5E-14	NV	4.3E-10	9.9E-10	5.5E-14	NV	5.9E-11	9.3E-11
Anthracene	6.1E-12	1.7E-09	4.8E-08	1.1E-07	6.1E-12	1.7E-09	6.6E-09	1.0E-08	3.1E-12	1.7E-09	2.4E-08	5.6E-08	3.1E-12	1.7E-09	3.3E-09	5.2E-09
Benzo (a) anthracene	2.6E-11	1.6E-09	2.1E-07	4.8E-07	2.6E-11	1.6E-09	2.8E-08	4.5E-08	1.4E-11	1.6E-09	1.1E-07	2.6E-07	1.4E-11	1.6E-09	1.6E-08	2.5E-08
Benzo (a) pyrene	1.5E-11	NV	1.2E-07	2.7E-07	1.5E-11	NV	1.6E-08	2.6E-08	9.6E-12	NV	7.5E-08	1.7E-07	9.6E-12	NV	1.0E-08	1.6E-08
Benzo (b) fluoranthene	2.7E-11	NV	2.1E-07	4.9E-07	2.7E-11	NV	2.9E-08	4.6E-08	2.0E-11	NV	1.6E-07	3.7E-07	2.0E-11	NV	2.2E-08	3.5E-08
Benzo (ghi) perylene	1.3E-11	NV	1.0E-07	2.3E-07	1.3E-11	NV	1.4E-08	2.2E-08	6.6E-12	NV	5.2E-08	1.2E-07	6.6E-12	NV	7.1E-09	1.1E-08
Benzo (k) fluoranthene	9.5E-12	NV	7.5E-08	1.7E-07	9.5E-12	NV	1.0E-08	1.6E-08	6.2E-12	NV	4.9E-08	1.1E-07	6.2E-12	NV	6.7E-09	1.1E-08
Chrysene	3.5E-11	NV	2.7E-07	6.3E-07	3.5E-11	NV	3.7E-08	5.9E-08	1.5E-11	NV	1.2E-07	2.7E-07	1.5E-11	NV	1.6E-08	2.6E-08
Dibenzo (a,h) anthracene	8.5E-12	NV	6.7E-08	1.5E-07	8.5E-12	NV	9.2E-09	1.5E-08	5.7E-12	NV	4.5E-08	1.0E-07	5.7E-12	NV	6.2E-09	9.8E-09
Fluoranthene	9.8E-11	NV	7.7E-07	1.8E-06	9.8E-11	NV	1.1E-07	1.7E-07	5.9E-11	NV	4.7E-07	1.1E-06	5.9E-11	NV	6.4E-08	1.0E-07
Fluorene	1.5E-13	2.4E-10	1.2E-09	2.7E-09	1.5E-13	2.4E-10	1.6E-10	2.5E-10	1.1E-13	2.4E-10	8.9E-10	2.0E-09	1.1E-13	2.4E-10	1.2E-10	1.9E-10
Indeno (1,2,3-cd) pyrene	1.0E-11	NV	7.9E-08	1.8E-07	1.0E-11	NV	1.1E-08	1.7E-08	4.9E-12	NV	3.9E-08	8.9E-08	4.9E-12	NV	5.3E-09	8.4E-09
Naphthalene	1.0E-13	1.2E-09	8.1E-10	1.9E-09	1.0E-13	1.2E-09	1.1E-10	1.8E-10	8.3E-14	1.2E-09	6.5E-10	1.5E-09	8.3E-14	1.2E-09	8.9E-11	1.4E-10
Phenanthrene	2.5E-11	NV	2.0E-07	4.6E-07	2.5E-11	NV	2.7E-08	4.3E-08	1.2E-11	NV	9.5E-08	2.2E-07	1.2E-11	NV	1.3E-08	2.0E-08
Pyrene	7.5E-11	4.7E-09	5.9E-07	1.4E-06	7.5E-11	4.7E-09	8.1E-08	1.3E-07	4.6E-11	4.7E-09	3.6E-07	8.3E-07	4.6E-11	4.7E-09	4.9E-08	7.8E-08
B(a)P Equivalent	NA	NV	NA	NA	NA	NV	NA	NA	NA	NV	NA	NA	NA	NV	NA	NA

Table AOC27-B1.2a
Baseline Scenario Exposure Concentration and Dose Calculations for Noncarcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Camper

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

C O P C	Child Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Child Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult Camper (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult Camper (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Polychlorinated Biphenyls																
Total PCBs	4.0E-13	5.6E-10	3.1E-09	7.2E-09	4.0E-13	5.6E-10	4.3E-10	6.8E-10	3.4E-13	5.6E-10	2.6E-09	6.1E-09	3.4E-13	5.6E-10	3.6E-10	5.7E-10
Total Petroleum Hydrocarbons																
TPH as diesel	3.6E-10	3.3E-04	1.9E-06	6.5E-06	3.6E-10	3.3E-04	2.6E-07	6.1E-07	6.5E-10	3.3E-04	3.4E-06	1.2E-05	6.5E-10	3.3E-04	4.7E-07	1.1E-06
TPH as motor oil	1.5E-09	NV	7.7E-06	2.6E-05	1.5E-09	NV	1.0E-06	2.5E-06	3.0E-09	NV	1.6E-05	5.5E-05	3.0E-09	NV	2.2E-06	5.1E-06
Dioxins/Furans																
TEQ Human	4.2E-16	3.6E-13	6.6E-13	7.6E-12	4.2E-16	3.6E-13	9.0E-14	7.1E-13	2.0E-16	3.6E-13	3.2E-13	3.7E-12	2.0E-16	3.6E-13	4.4E-14	3.5E-13

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

CDI = Chronic Daily Intake.

C O P C = Constituent of Potential Concern.

EC = Exposure Concentration.

mg/kg-day = milligrams per kilogram per day.

mg/m³ = milligrams per cubic meter.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Noncancer effects of carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated separately for each chemical (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene). Hexavalent chromium is not absorbed via dermal contact.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.2b

Baseline Scenario Exposure Concentration and Dose Calculations for Noncarcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Hiker

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Child Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Child Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Inorganics																
Antimony	ND	NV	ND	ND	ND	NV	ND	ND	5.9E-11	NV	3.1E-08	1.1E-06	5.9E-11	NV	4.2E-09	1.0E-07
Cadmium	7.4E-11	NV	3.9E-09	1.3E-06	7.4E-11	NV	5.3E-10	1.3E-07	2.8E-11	NV	1.5E-09	5.1E-07	2.8E-11	NV	2.0E-10	4.8E-08
Chromium, Hexavalent	8.4E-12	NV	NA	1.5E-07	8.4E-12	NV	NA	1.4E-08	7.5E-12	NV	NA	1.4E-07	7.5E-12	NV	NA	1.3E-08
Copper	5.0E-10	NV	2.6E-07	9.1E-06	5.0E-10	NV	3.6E-08	8.5E-07	4.1E-10	NV	2.1E-07	7.4E-06	4.1E-10	NV	2.9E-08	6.9E-07
Lead	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	5.4E-12	NV	2.8E-09	9.8E-08	5.4E-12	NV	3.9E-10	9.2E-09	5.6E-12	NV	3.0E-09	1.0E-07	5.6E-12	NV	4.0E-10	9.6E-09
Zinc	1.8E-08	NV	9.3E-06	3.2E-04	1.8E-08	NV	1.3E-06	3.0E-05	1.3E-08	NV	6.8E-06	2.4E-04	1.3E-08	NV	9.3E-07	2.2E-05
Volatile Organic Compounds																
Bromomethane	ND	4.5E-07	ND	ND	ND	4.5E-07	ND	ND	8.4E-13	4.5E-07	4.4E-09	1.5E-08	8.4E-13	4.5E-07	6.0E-10	1.4E-09
Chloro methane	ND	2.4E-07	ND	ND	ND	2.4E-07	ND	ND	3.5E-13	2.4E-07	1.9E-09	6.4E-09	3.5E-13	2.4E-07	2.5E-10	6.0E-10
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	1.6E-12	3.0E-09	1.3E-08	3.0E-08	1.6E-12	3.0E-09	1.8E-09	2.8E-09	1.1E-12	3.0E-09	8.9E-09	2.0E-08	1.1E-12	3.0E-09	1.2E-09	1.9E-09
Acenaphthylene	ND	NV	ND	ND	ND	NV	ND	ND	1.1E-13	NV	8.6E-10	2.0E-09	1.1E-13	NV	1.2E-10	1.9E-10
Anthracene	1.2E-11	3.4E-09	9.7E-08	2.2E-07	1.2E-11	3.4E-09	1.3E-08	2.1E-08	6.1E-12	3.4E-09	4.8E-08	1.1E-07	6.1E-12	3.4E-09	6.6E-09	1.0E-08
Benzo (a) anthracene	5.2E-11	3.1E-09	4.1E-07	9.5E-07	5.2E-11	3.1E-09	5.6E-08	8.9E-08	2.9E-11	3.1E-09	2.3E-07	5.2E-07	2.9E-11	3.1E-09	3.1E-08	4.9E-08
Benzo (a) pyrene	3.0E-11	NV	2.4E-07	5.5E-07	3.0E-11	NV	3.2E-08	5.1E-08	1.9E-11	NV	1.5E-07	3.5E-07	1.9E-11	NV	2.1E-08	3.2E-08
Benzo (b) fluoranthene	5.4E-11	NV	4.3E-07	9.8E-07	5.4E-11	NV	5.8E-08	9.2E-08	4.1E-11	NV	3.2E-07	7.4E-07	4.1E-11	NV	4.4E-08	6.9E-08
Benzo (ghi) perylene	2.6E-11	NV	2.0E-07	4.7E-07	2.6E-11	NV	2.8E-08	4.4E-08	1.3E-11	NV	1.0E-07	2.4E-07	1.3E-11	NV	1.4E-08	2.3E-08
Benzo (k) fluoranthene	1.9E-11	NV	1.5E-07	3.4E-07	1.9E-11	NV	2.0E-08	3.2E-08	1.2E-11	NV	9.8E-08	2.2E-07	1.2E-11	NV	1.3E-08	2.1E-08
Chrysene	6.9E-11	NV	5.5E-07	1.3E-06	6.9E-11	NV	7.4E-08	1.2E-07	3.0E-11	NV	2.4E-07	5.5E-07	3.0E-11	NV	3.3E-08	5.1E-08
Dibenzo (a,h) anthracene	1.7E-11	NV	1.3E-07	3.1E-07	1.7E-11	NV	1.8E-08	2.9E-08	1.1E-11	NV	9.1E-08	2.1E-07	1.1E-11	NV	1.2E-08	2.0E-08
Fluoranthene	2.0E-10	NV	1.5E-06	3.6E-06	2.0E-10	NV	2.1E-07	3.3E-07	1.2E-10	NV	9.3E-07	2.1E-06	1.2E-10	NV	1.3E-07	2.0E-07
Fluorene	3.0E-13	4.7E-10	2.3E-09	5.4E-09	3.0E-13	4.7E-10	3.2E-10	5.0E-10	2.3E-13	4.7E-10	1.8E-09	4.1E-09	2.3E-13	4.7E-10	2.4E-10	3.8E-10
Indeno (1,2,3-cd) pyrene	2.0E-11	NV	1.6E-07	3.6E-07	2.0E-11	NV	2.2E-08	3.4E-08	9.8E-12	NV	7.8E-08	1.8E-07	9.8E-12	NV	1.1E-08	1.7E-08
Naphthalene	2.1E-13	2.5E-09	1.6E-09	3.7E-09	2.1E-13	2.5E-09	2.2E-10	3.5E-10	1.7E-13	2.5E-09	1.3E-09	3.0E-09	1.7E-13	2.5E-09	1.8E-10	2.8E-10
Phenanthrene	5.1E-11	NV	4.0E-07	9.2E-07	5.1E-11	NV	5.5E-08	8.6E-08	2.4E-11	NV	1.9E-07	4.4E-07	2.4E-11	NV	2.6E-08	4.1E-08
Pyrene	1.5E-10	9.4E-09	1.2E-06	2.7E-06	1.5E-10	9.4E-09	1.6E-07	2.6E-07	9.2E-11	9.4E-09	7.2E-07	1.7E-06	9.2E-11	9.4E-09	9.9E-08	1.6E-07
B(a)P Equivalent	NA	NV	NA	NA	NA	NV	NA	NA	NA	NV	NA	NA	NA	NV	NA	NA

Table AOC27-B1.2b

Baseline Scenario Exposure Concentration and Dose Calculations for Noncarcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Hiker

**Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California**

C O P C	Child Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Child Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Polychlorinated Biphenyls																
Total PCBs	8.0E-13	1.1E-09	6.3E-09	1.4E-08	8.0E-13	1.1E-09	8.6E-10	1.4E-09	6.7E-13	1.1E-09	5.3E-09	1.2E-08	6.7E-13	1.1E-09	7.2E-10	1.1E-09
Total Petroleum Hydrocarbons																
TPH as diesel	7.2E-10	6.7E-04	3.8E-06	1.3E-05	7.2E-10	6.7E-04	5.2E-07	1.2E-06	1.3E-09	6.7E-04	6.9E-06	2.4E-05	1.3E-09	6.7E-04	9.4E-07	2.2E-06
TPH as motor oil	2.9E-09	NV	1.5E-05	5.3E-05	2.9E-09	NV	2.1E-06	4.9E-06	6.0E-09	NV	3.2E-05	1.1E-04	6.0E-09	NV	4.3E-06	1.0E-05
Dioxins/Furans																
TEQ Human	8.4E-16	7.3E-13	1.3E-12	1.5E-11	8.4E-16	7.3E-13	1.8E-13	1.4E-12	4.1E-16	7.3E-13	6.4E-13	7.4E-12	4.1E-16	7.3E-13	8.7E-14	6.9E-13

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

CDI = Chronic Daily Intake.

C O P C = Constituent of Potential Concern.

EC = Exposure Concentration.

mg/kg-day = milligrams per kilogram per day.

mg/m³ = milligrams per cubic meter.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Noncancer effects of carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated separately for each chemical (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene). Hexavalent chromium is not absorbed via dermal contact.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.2c

Baseline Scenario Exposure Concentration and Dose Calculations for Noncarcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs:
Recreational User - Off-Highway Vehicle Rider

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

C O P C	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Inorganics																
Antimony	ND	NV	ND	ND	ND	NV	ND	ND	5.9E-09	NV	5.6E-08	7.5E-08	5.9E-09	NV	4.8E-08	3.1E-08
Cadmium	7.4E-09	NV	7.1E-09	9.5E-08	7.4E-09	NV	6.1E-09	3.9E-08	2.8E-09	NV	2.7E-09	3.6E-08	2.8E-09	NV	2.3E-09	1.5E-08
Chromium, Hexavalent	8.4E-10	NV	NA	1.1E-08	8.4E-10	NV	NA	4.4E-09	7.5E-10	NV	NA	9.5E-09	7.5E-10	NV	NA	3.9E-09
Copper	5.0E-08	NV	4.8E-07	6.4E-07	5.0E-08	NV	4.1E-07	2.6E-07	4.1E-08	NV	3.9E-07	5.2E-07	4.1E-08	NV	3.3E-07	2.1E-07
Lead	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	5.4E-10	NV	5.2E-09	6.9E-09	5.4E-10	NV	4.4E-09	2.8E-09	5.7E-10	NV	5.4E-09	7.2E-09	5.7E-10	NV	4.6E-09	3.0E-09
Zinc	1.8E-06	NV	1.7E-05	2.2E-05	1.8E-06	NV	1.4E-05	9.3E-06	1.3E-06	NV	1.2E-05	1.7E-05	1.3E-06	NV	1.1E-05	6.8E-06
Volatile Organic Compounds																
Bromomethane	ND	2.8E-08	ND	ND	ND	2.8E-08	ND	ND	8.4E-11	2.8E-08	8.0E-09	1.1E-09	8.4E-11	2.8E-08	6.9E-09	4.4E-10
Chloro methane	ND	1.5E-08	ND	ND	ND	1.5E-08	ND	ND	3.6E-11	1.5E-08	3.4E-09	4.5E-10	3.6E-11	1.5E-08	2.9E-09	1.9E-10
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	1.6E-10	1.9E-10	2.4E-08	2.1E-09	1.6E-10	1.9E-10	2.0E-08	8.6E-10	1.1E-10	1.9E-10	1.6E-08	1.4E-09	1.1E-10	1.9E-10	1.4E-08	5.9E-10
Acenaphthylene	ND	NV	ND	ND	ND	NV	ND	ND	1.1E-11	NV	1.6E-09	1.4E-10	1.1E-11	NV	1.3E-09	5.8E-11
Anthracene	1.2E-09	2.1E-10	1.8E-07	1.6E-08	1.2E-09	2.1E-10	1.5E-07	6.5E-09	6.1E-10	2.1E-10	8.8E-08	7.8E-09	6.1E-10	2.1E-10	7.5E-08	3.2E-09
Benzo (a) anthracene	5.3E-09	1.9E-10	7.5E-07	6.7E-08	5.3E-09	1.9E-10	6.4E-07	2.8E-08	2.9E-09	1.9E-10	4.2E-07	3.7E-08	2.9E-09	1.9E-10	3.6E-07	1.5E-08
Benzo (a) pyrene	3.0E-09	NV	4.3E-07	3.8E-08	3.0E-09	NV	3.7E-07	1.6E-08	1.9E-09	NV	2.7E-07	2.4E-08	1.9E-09	NV	2.4E-07	1.0E-08
Benzo (b) fluoranthene	5.4E-09	NV	7.8E-07	6.9E-08	5.4E-09	NV	6.7E-07	2.8E-08	4.1E-09	NV	5.8E-07	5.2E-08	4.1E-09	NV	5.0E-07	2.1E-08
Benzo (ghi) perylene	2.6E-09	NV	3.7E-07	3.3E-08	2.6E-09	NV	3.2E-07	1.4E-08	1.3E-09	NV	1.9E-07	1.7E-08	1.3E-09	NV	1.6E-07	7.0E-09
Benzo (k) fluoranthene	1.9E-09	NV	2.7E-07	2.4E-08	1.9E-09	NV	2.3E-07	1.0E-08	1.2E-09	NV	1.8E-07	1.6E-08	1.2E-09	NV	1.5E-07	6.5E-09
Chrysene	6.9E-09	NV	9.9E-07	8.8E-08	6.9E-09	NV	8.5E-07	3.6E-08	3.0E-09	NV	4.3E-07	3.9E-08	3.0E-09	NV	3.7E-07	1.6E-08
Dibenzo (a,h) anthracene	1.7E-09	NV	2.5E-07	2.2E-08	1.7E-09	NV	2.1E-07	9.0E-09	1.2E-09	NV	1.6E-07	1.5E-08	1.2E-09	NV	1.4E-07	6.0E-09
Fluoranthene	2.0E-08	NV	2.8E-06	2.5E-07	2.0E-08	NV	2.4E-06	1.0E-07	1.2E-08	NV	1.7E-06	1.5E-07	1.2E-08	NV	1.5E-06	6.2E-08
Fluorene	3.0E-11	2.9E-11	4.3E-09	3.8E-10	3.0E-11	2.9E-11	3.6E-09	1.6E-10	2.3E-11	2.9E-11	3.2E-09	2.9E-10	2.3E-11	2.9E-11	2.8E-09	1.2E-10
Indeno (1,2,3-cd) pyrene	2.0E-09	NV	2.9E-07	2.6E-08	2.0E-09	NV	2.5E-07	1.1E-08	9.9E-10	NV	1.4E-07	1.3E-08	9.9E-10	NV	1.2E-07	5.2E-09
Naphthalene	2.1E-11	1.5E-10	3.0E-09	2.6E-10	2.1E-11	1.5E-10	2.5E-09	1.1E-10	1.7E-11	1.5E-10	2.4E-09	2.1E-10	1.7E-11	1.5E-10	2.0E-09	8.7E-11
Phenanthrene	5.1E-09	NV	7.3E-07	6.5E-08	5.1E-09	NV	6.2E-07	2.7E-08	2.4E-09	NV	3.4E-07	3.1E-08	2.4E-09	NV	3.0E-07	1.3E-08
Pyrene	1.5E-08	5.9E-10	2.2E-06	1.9E-07	1.5E-08	5.9E-10	1.9E-06	7.9E-08	9.2E-09	5.9E-10	1.3E-06	1.2E-07	9.2E-09	5.9E-10	1.1E-06	4.8E-08
B(a)P Equivalent	NA	NV	NA	NA	NA	NV	NA	NA	NA	NV	NA	NA	NA	NV	NA	NA

Table AOC27-B1.2c

Baseline Scenario Exposure Concentration and Dose Calculations for Noncarcinogenic Effects for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs:
Recreational User - Off-Highway Vehicle Rider

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

C O P C	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Particulate Inhalation (mg/m ³)	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway EC: Outdoor Vapor Inhalation (mg/m ³)	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Dermal Contact (mg/kg-day)	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway CDI: Ingestion (mg/kg-day)
Polychlorinated Biphenyls																
Total PCBs	8.0E-11	7.0E-11	1.1E-08	1.0E-09	8.0E-11	7.0E-11	9.8E-09	4.2E-10	6.7E-11	7.0E-11	9.6E-09	8.5E-10	6.7E-11	7.0E-11	8.2E-09	3.5E-10
Total Petroleum Hydrocarbons																
TPH as diesel	7.2E-08	4.2E-05	6.9E-06	9.2E-07	7.2E-08	4.2E-05	5.9E-06	3.8E-07	1.3E-07	4.2E-05	1.3E-05	1.7E-06	1.3E-07	4.2E-05	1.1E-05	6.9E-07
TPH as motor oil	2.9E-07	NV	2.8E-05	3.7E-06	2.9E-07	NV	2.4E-05	1.5E-06	6.0E-07	NV	5.8E-05	7.7E-06	6.0E-07	NV	4.9E-05	3.2E-06
Dioxins/Furans																
TEQ Human	8.4E-14	4.5E-14	2.4E-12	1.1E-12	8.4E-14	4.5E-14	2.1E-12	4.4E-13	4.1E-14	4.5E-14	1.2E-12	5.2E-13	4.1E-14	4.5E-14	1.0E-12	2.1E-13

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

CDI = Chronic Daily Intake.

C O P C = Constituent of Potential Concern.

EC = Exposure Concentration.

mg/kg-day = milligrams per kilogram per day.

mg/m³ = milligrams per cubic meter.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Noncancer effects of carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated separately for each chemical (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene). Hexavalent chromium is not absorbed via dermal contact.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.3a

Baseline Scenario ILCRs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User- Camper

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway
	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Cancer Risk	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Cancer Risk
Inorganics										
Antimony	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Cadmium	5.8E-11	NV	NC	NC	5.8E-11	2.2E-11	NV	NC	NC	2.2E-11
Chromium, Hexavalent	6.5E-10	NV	NA	1.9E-08	2.0E-08	5.8E-10	NV	NA	1.7E-08	1.8E-08
Copper	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Lead	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Zinc	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Volatile Organic Compounds										
Bromomethane	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Chloro methane	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Acenaphthylene	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Anthracene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Benzo (a) anthracene	NA	1.8E-10	NA	NA	1.8E-10	NA	1.8E-10	NA	NA	1.8E-10
Benzo (a) pyrene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Benzo (b) fluoranthene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Benzo (ghi) perylene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Benzo (k) fluoranthene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Chrysene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Dibenzo (a,h) anthracene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Fluoranthene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Fluorene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Indeno (1,2,3-cd) pyrene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Naphthalene	1.3E-15	1.6E-11	1.2E-11	2.5E-11	5.3E-11	1.0E-15	1.6E-11	9.8E-12	2.0E-11	4.6E-11
Phenanthrene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Pyrene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
B(a)P Equivalent	4.3E-11	NV	1.6E-07	3.5E-07	5.1E-07	3.0E-11	NV	1.1E-07	2.4E-07	3.5E-07

Table AOC27-B1.3a

Baseline Scenario ILCRs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User- Camper

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway Particulate Inhalation	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway Vapor Inhalation	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway Dermal Contact	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway Ingestion	Age-Adjusted Adult Camper (0 to 0.5 foot bgs) ^a Soil Pathway Total Cancer Risk	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway Particulate Inhalation	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway Vapor Inhalation	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway Dermal Contact	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway Ingestion	Age-Adjusted Adult Camper (0 to 3 feet bgs) ^a Soil Pathway Total Cancer Risk
Polychlorinated Biphenyls										
Total PCBs	1.5E-14	2.1E-11	7.8E-10	1.6E-09	2.4E-09	1.2E-14	2.1E-11	6.6E-10	1.4E-09	2.0E-09
Total Petroleum Hydrocarbons										
TPH as diesel	NC	NC	NC	NC	--	NC	NC	NC	NC	--
TPH as motor oil	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Dioxins/Furans										
TEQ Human	5.9E-12	5.1E-09	1.1E-08	1.1E-07	1.3E-07	2.9E-12	5.1E-09	5.2E-09	5.4E-08	6.4E-08
Cumulative ILCR	8E-10	5E-09	2E-07	5E-07	7E-07	6E-10	5E-09	1E-07	3E-07	4E-07

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

-- = not calculated.

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

C O P C = Constituent of Potential Concern.

ILCR = Incremental Lifetime Cancer Risk.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated using benzo(a)pyrene equivalents. Hexavalent chromium is not absorbed via dermal contact.

NC = Not considered a carcinogen.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.3b

Baseline Scenario ILCRs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Hiker

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

C O P C	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway
	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Cancer Risk	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Cancer Risk
Inorganics										
Antimony	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Cadmium	1.2E-10	NV	NC	NC	1.2E-10	4.4E-11	NV	NC	NC	4.4E-11
Chromium, Hexavalent	1.3E-09	NV	NA	3.9E-08	4.0E-08	1.2E-09	NV	NA	3.5E-08	3.6E-08
Copper	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Lead	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Zinc	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Volatile Organic Compounds										
Bromomethane	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Chloro methane	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Acenaphthylene	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Anthracene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Benzo (a) anthracene	NA	3.5E-10	NA	NA	3.5E-10	NA	3.5E-10	NA	NA	3.5E-10
Benzo (a) pyrene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Benzo (b) fluoranthene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Benzo (ghi) perylene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Benzo (k) fluoranthene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Chrysene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Dibenzo (a,h) anthracene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Fluoranthene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Fluorene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Indeno (1,2,3-cd) pyrene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Naphthalene	2.6E-15	3.1E-11	2.4E-11	5.0E-11	1.1E-10	2.1E-15	3.1E-11	2.0E-11	4.0E-11	9.1E-11
Phenanthrene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Pyrene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
B(a)P Equivalent	8.5E-11	NV	3.2E-07	7.0E-07	1.0E-06	5.9E-11	NV	2.2E-07	4.9E-07	7.1E-07

Table AOC27-B1.3b

Baseline Scenario ILCRs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Hiker

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway Particulate Inhalation	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway Vapor Inhalation	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway Dermal Contact	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway Ingestion	Age-Adjusted Adult Hiker (0 to 0.5 foot bgs) ^a Soil Pathway Total Cancer Risk	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway Particulate Inhalation	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway Vapor Inhalation	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway Dermal Contact	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway Ingestion	Age-Adjusted Adult Hiker (0 to 3 feet bgs) ^a Soil Pathway Total Cancer Risk
Polychlorinated Biphenyls										
Total PCBs	3.0E-14	4.2E-11	1.6E-09	3.2E-09	4.9E-09	2.5E-14	4.2E-11	1.3E-09	2.7E-09	4.1E-09
Total Petroleum Hydrocarbons										
TPH as diesel	NC	NC	NC	NC	--	NC	NC	NC	NC	--
TPH as motor oil	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Dioxins/Furans										
TEQ Human	1.2E-11	1.0E-08	2.1E-08	2.2E-07	2.5E-07	5.7E-12	1.0E-08	1.0E-08	1.1E-07	1.3E-07
Cumulative ILCR	2E-09	1E-08	3E-07	1E-06	1E-06	1E-09	1E-08	2E-07	6E-07	9E-07

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

-- = not calculated.

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

C O P C = Constituent of Potential Concern.

ILCR = Incremental Lifetime Cancer Risk.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated using benzo(a)pyrene equivalents. Hexavalent chromium is not absorbed via dermal contact.

NC = Not considered a carcinogen.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.3c

Baseline Scenario ILCRs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Off-Highway Vehicle Rider

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Particulate Inhalation	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Vapor Inhalation	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Dermal Contact	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Ingestion	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Total Cancer Risk	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Particulate Inhalation	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Vapor Inhalation	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Dermal Contact	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Ingestion	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Total Cancer Risk
Inorganics										
Antimony	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Cadmium	1.2E-08	NV	NC	NC	1.2E-08	4.4E-09	NV	NC	NC	4.4E-09
Chromium, Hexavalent	8.3E-08	NV	NA	2.3E-09	8.5E-08	7.4E-08	NV	NA	2.0E-09	7.6E-08
Copper	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Lead	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Zinc	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Volatile Organic Compounds										
Bromomethane	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Chloro methane	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Acenaphthylene	ND	NC	ND	ND	--	NC	NC	NC	NC	--
Anthracene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Benzo (a) anthracene	NA	1.4E-11	NA	NA	1.4E-11	NA	1.4E-11	NA	NA	1.4E-11
Benzo (a) pyrene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Benzo (b) fluoranthene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Benzo (ghi) perylene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Benzo (k) fluoranthene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Chrysene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Dibenzo (a,h) anthracene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Fluoranthene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Fluorene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Indeno (1,2,3-cd) pyrene	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Naphthalene	2.6E-13	2.0E-12	1.2E-10	6.4E-12	1.3E-10	2.1E-13	2.0E-12	9.4E-11	5.2E-12	1.0E-10
Phenanthrene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Pyrene	NC	NC	NC	NC	--	NC	NC	NC	NC	--
B(a)P Equivalent	5.5E-09	NV	6.5E-07	4.1E-08	6.9E-07	3.8E-09	NV	4.5E-07	2.8E-08	4.8E-07

Table AOC27-B1.3c

Baseline Scenario ILCRs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Off-Highway Vehicle Rider

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report

PG&E Topock Compressor Station

Needles, California

C O P C	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Particulate Inhalation	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Vapor Inhalation	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Dermal Contact	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Ingestion	Age-Adjusted Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway Total Cancer Risk	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Particulate Inhalation	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Vapor Inhalation	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Dermal Contact	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Ingestion	Age-Adjusted Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway Total Cancer Risk
Polychlorinated Biphenyls										
Total PCBs	3.0E-12	2.6E-12	7.6E-09	4.1E-10	8.0E-09	2.5E-12	2.6E-12	6.4E-09	3.5E-10	6.7E-09
Total Petroleum Hydrocarbons										
TPH as diesel	NC	NC	NC	NC	--	NC	NC	NC	NC	--
TPH as motor oil	NC	NC	NC	NC	--	NC	NC	NC	NC	--
Dioxins/Furans										
TEQ Human	1.2E-09	6.4E-10	1.0E-07	2.8E-08	1.3E-07	5.8E-10	6.4E-10	5.0E-08	1.4E-08	6.5E-08
Cumulative ILCR	1E-07	7E-10	8E-07	7E-08	9E-07	8E-08	7E-10	5E-07	4E-08	6E-07

Notes:

^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:

-- = not calculated.

B (a) P equivalent = Benzo(a)pyrene equivalent.

bgs = below ground surface.

C O P C = Constituent of Potential Concern.

ILCR = Incremental Lifetime Cancer Risk.

na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.

NA = Not applicable. Carcinogenic polycyclic aromatic hydrocarbons (C P A Hs) are evaluated using benzo(a)pyrene equivalents. Hexavalent chromium is not absorbed via dermal contact.

NC = Not considered a carcinogen.

ND = Not detected.

NV = Not volatile.

PCB = Polychlorinated biphenyls.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AOC27-B1.4a
Baseline Scenario HIs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Camper
Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

C O P C	Child Camper (0 to 0.5 foot bgs) ^a	Child Camper (0 to 0.5 foot bgs) ^a	Child Camper (0 to 0.5 foot bgs) ^a	Child Camper (0 to 0.5 foot bgs) ^a	Child Camper (0 to 0.5 foot bgs) ^a	Adult Camper (0 to 0.5 foot bgs) ^a	Adult Camper (0 to 0.5 foot bgs) ^a	Adult Camper (0 to 0.5 foot bgs) ^a	Adult Camper (0 to 0.5 foot bgs) ^a	Adult Camper (0 to 0.5 foot bgs) ^a	Child Camper (0 to 3 feet bgs) ^a	Child Camper (0 to 3 feet bgs) ^a	Child Camper (0 to 3 feet bgs) ^a	Child Camper (0 to 3 feet bgs) ^a	Child Camper (0 to 3 feet bgs) ^a	Adult Camper (0 to 3 feet bgs) ^a	Adult Camper (0 to 3 feet bgs) ^a	Adult Camper (0 to 3 feet bgs) ^a	Adult Camper (0 to 3 feet bgs) ^a	Adult Camper (0 to 3 feet bgs) ^a	
	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway
	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	
Inorganics																					
Antimony	ND	NV	ND	ND	--	ND	NV	ND	ND	--	9.8E-08	NV	3.9E-05	1.3E-03	1.4E-03	9.8E-08	NV	5.3E-06	1.3E-04	1.3E-04	
Cadmium	3.7E-06	NV	1.9E-06	6.7E-04	6.8E-04	3.7E-06	NV	4.2E-05	1.0E-02	1.0E-02	1.4E-06	NV	7.4E-07	2.5E-04	2.6E-04	1.4E-06	NV	1.6E-05	3.8E-03	3.8E-03	
Chromium, Hexavalent	4.2E-08	NV	NA	2.5E-05	2.5E-05	4.2E-08	NV	NA	2.4E-06	2.4E-06	3.7E-08	NV	NA	2.3E-05	2.3E-05	3.7E-08	NV	NA	2.1E-06	2.2E-06	
Copper	1.6E-09	NV	3.3E-06	1.1E-04	1.2E-04	1.6E-09	NV	4.5E-07	1.1E-05	1.1E-05	1.3E-09	NV	2.7E-06	9.2E-05	9.5E-05	1.3E-09	NV	3.6E-07	8.6E-06	9.0E-06	
Lead	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	9.0E-08	NV	8.9E-06	3.1E-04	3.2E-04	9.0E-08	NV	1.2E-06	2.9E-05	3.0E-05	9.4E-08	NV	9.3E-06	3.2E-04	3.3E-04	9.4E-08	NV	1.3E-06	3.0E-05	3.1E-05	
Zinc	7.3E-09	NV	1.5E-05	5.3E-04	5.5E-04	7.3E-09	NV	2.1E-06	5.0E-05	5.2E-05	5.4E-09	NV	1.1E-05	3.9E-04	4.0E-04	5.4E-09	NV	1.6E-06	3.7E-05	3.8E-05	
Volatile Organic Compounds																					
Bromomethane	ND	4.5E-05	ND	ND	4.5E-05	ND	4.5E-05	ND	ND	4.5E-05	8.4E-11	4.5E-05	1.6E-06	5.4E-06	5.2E-05	8.4E-11	4.5E-05	2.1E-07	5.1E-07	4.5E-05	
Chloro methane	ND	1.3E-06	ND	ND	1.3E-06	ND	1.3E-06	ND	ND	1.3E-06	2.0E-12	1.3E-06	4.1E-08	1.4E-07	1.5E-06	2.0E-12	1.3E-06	5.7E-09	1.3E-08	1.3E-06	
Polycyclic Aromatic Hydrocarbons																					
Acenaphthene	3.4E-12	6.2E-09	1.1E-07	2.5E-07	3.6E-07	3.4E-12	6.2E-09	1.5E-08	2.3E-08	4.4E-08	2.3E-12	6.2E-09	7.4E-08	1.7E-07	2.5E-07	2.3E-12	6.2E-09	1.0E-08	1.6E-08	3.2E-08	
Acenaphthylene	ND	NV	ND	ND	--	ND	NV	ND	ND	--	2.3E-13	NV	7.2E-09	1.7E-08	2.4E-08	2.3E-13	NV	9.8E-10	1.6E-09	2.5E-09	
Anthracene	5.1E-12	1.4E-09	1.6E-07	3.7E-07	5.3E-07	5.1E-12	1.4E-09	2.2E-08	3.5E-08	5.8E-08	2.6E-12	1.4E-09	8.1E-08	1.9E-07	2.7E-07	2.6E-12	1.4E-09	1.1E-08	1.7E-08	3.0E-08	
Benzo (a) anthracene	2.2E-10	1.3E-08	6.9E-06	1.6E-05	2.3E-05	2.2E-10	1.3E-08	9.4E-07	1.5E-06	2.4E-06	1.2E-10	1.3E-08	3.8E-06	8.7E-06	1.3E-05	1.2E-10	1.3E-08	5.2E-07	8.2E-07	1.4E-06	
Benzo (a) pyrene	7.5E-06	NV	4.0E-04	9.1E-04	1.3E-03	7.5E-06	NV	5.4E-05	8.5E-05	1.5E-04	4.8E-06	NV	2.5E-04	5.8E-04	8.3E-04	4.8E-06	NV	3.4E-05	5.4E-05	9.3E-05	
Benzo (b) fluoranthene	2.3E-10	NV	7.1E-06	1.6E-05	2.3E-05	2.3E-10	NV	9.7E-07	1.5E-06	2.5E-06	1.7E-10	NV	5.3E-06	1.2E-05	1.8E-05	1.7E-10	NV	7.3E-07	1.2E-06	1.9E-06	
Benzo (ghi) perylene	1.1E-10	NV	3.4E-06	7.8E-06	1.1E-05	1.1E-10	NV	4.6E-07	7.3E-07	1.2E-06	5.5E-11	NV	1.7E-06	4.0E-06	5.7E-06	5.5E-11	NV	2.4E-07	3.8E-07	6.1E-07	
Benzo (k) fluoranthene	7.9E-11	NV	2.5E-06	5.7E-06	8.2E-06	7.9E-11	NV	3.4E-07	5.4E-07	8.8E-07	5.2E-11	NV	1.6E-06	3.7E-06	5.4E-06	5.2E-11	NV	2.2E-07	3.5E-07	5.7E-07	
Chrysene	2.9E-10	NV	9.1E-06	2.1E-05	3.0E-05	2.9E-10	NV	1.2E-06	2.0E-06	3.2E-06	1.3E-10	NV	4.0E-06	9.1E-06	1.3E-05	1.3E-10	NV	5.4E-07	8.6E-07	1.4E-06	
Dibenzo (a,h) anthracene	4.3E-06	NV	2.2E-04	5.2E-04	7.5E-04	4.3E-06	NV	3.1E-05	4.8E-05	8.3E-05	2.9E-06	NV	1.5E-04	3.5E-04	5.0E-04	2.9E-06	NV	2.1E-05	3.3E-05	5.6E-05	
Fluoranthene	6.1E-10	NV	1.9E-05	4.4E-05	6.4E-05	6.1E-10	NV	2.6E-06	4.2E-06	6.8E-06	3.7E-10	NV	1.2E-05	2.7E-05	3.8E-05	3.7E-10	NV	1.6E-06	2.5E-06	4.1E-06	
Fluorene	9.3E-13	1.5E-09	2.9E-08	6.7E-08	9.8E-08	9.3E-13	1.5E-09	4.0E-09	6.3E-09	1.2E-08	7.1E-13	1.5E-09	2.2E-08	5.1E-08	7.5E-08	7.1E-13	1.5E-09	3.0E-09	4.8E-09	9.3E-09	
Indeno (1,2,3-cd) pyrene	8.4E-11	NV	2.6E-06	6.1E-06	8.7E-06	8.4E-11	NV	3.6E-07	5.7E-07	9.3E-07	4.1E-11	NV	1.3E-06	3.0E-06	4.3E-06	4.1E-11	NV	1.8E-07	2.8E-07	4.5E-07	
Naphthalene	3.4E-11	4.1E-07	4.1E-08	9.4E-08	5.5E-07	3.4E-11	4.1E-07	5.6E-09	8.8E-09	4.3E-07	2.8E-11	4.1E-07	3.3E-08	7.5E-08	5.2E-07	2.8E-11	4.1E-07	4.5E-09	7.0E-09	4.2E-07	
Phenanthrene	2.1E-11	NV	6.7E-07	1.5E-06	2.2E-06	2.1E-11	NV	9.1E-08	1.4E-07	2.3E-07	1.0E-11	NV	3.2E-07	7.3E-07	1.0E-06	1.0E-11	NV	4.3E-08	6.8E-08	1.1E-07	
Pyrene	6.3E-10	3.9E-08	2.0E-05	4.6E-05	6.5E-05	6.3E-10	3.9E-08	2.7E-06	4.3E-06	7.0E-06	3.8E-10	3.9E-08	1.2E-05	2.8E-05	4.0E-05	3.8E-10	3.9E-08	1.6E-06	2.6E-06	4.3E-06	
B(a)P Equivalent	NA	NV	NA	NA	--	NA	NV	NA	NA	--	NA	NV	NA	NA	--	NA	NV	NA	NA	--	
Polychlorinated Biphenyls																					
Total PCBs	5.0E-09	7.0E-06	1.6E-04	3.6E-04	5.2E-04	5.0E-09	7.0E-06	2.1E-05	3.4E-05	6.2E-05	4.2E-09	7.0E-06	1.3E-04	3.0E-04	4.4E-04	4.2E-09	7.0E-06	1.8E-05	2.8E-05	5.4E-05	
Total Petroleum Hydrocarbons																					
TPH as diesel	1.4E-09	1.3E-03	9.9E-05	3.4E-04	1.7E-03	1.4E-09	1.3E-03	1.4E-05	3.2E-05	1.3E-03	2.5E-09	1.3E-03	1.8E-04	6.2E-04	2.1E-03	2.5E-09	1.3E-03	2.5E-05	5.9E-05	1.4E-03	
TPH as motor oil	2.4E-09	NV	5.1E-05	1.8E-04	2.3E-04	2.4E-09	NV	7.0E-06	1.6E-05	2.3E-05	5.0E-09	NV	1.1E-04	3.6E-04	4.7E-04	5.0E-09	NV	1.4E-05	3.4E-05	4.9E-05	
Dioxins/Furans																					
TEQ Human	1.0E-08	9.1E-06	9.4E-04	1.1E-02	1.2E-02	1.0E-08	9.1E-06	1.3E-04	1.0E-03	1.2E-03	5.1E-09	9.1E-06	4.6E-04	5.3E-03	5.7E-03	5.1E-09	9.1E-06	6.2E-05	4.9E-04	5.6E-04	
Total Hazard Index	2E-05	1E-03	2E-03	1E-02	2E-02	2E-05	1E-03	3E-04	1E-02	1E-02	9E-06	1E-03	1E-03	1E-02	1E-02	9E-06	1E-03	2E-04	5E-03	6E-03	

Notes:
^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:
-- = not calculated.
B (a) P equivalent = Benzo(a)pyrene equivalent.
bgs = below ground surface.
C O P C = Constituent of Potential Concern.
H I = Hazard Index
na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.
NA = Not applicable. Hexavalent chromium is not absorbed via dermal contact.
ND = Not detected.
NV = Not volatile.
PCB = Polychlorinated biphenyls.
TPH = Total Petroleum Hydrocarbons.
TEQ = Toxic Equivalent.

Table AOC27-B1.4b
Baseline Scenario HIs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Hiker
Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

C O P C	Child Hiker (0 to 0.5 foot bgs) ^a	Child Hiker (0 to 0.5 foot bgs) ^a	Child Hiker (0 to 0.5 foot bgs) ^a	Child Hiker (0 to 0.5 foot bgs) ^a	Child Hiker (0 to 0.5 foot bgs) ^a	Adult Hiker (0 to 0.5 foot bgs) ^a	Adult Hiker (0 to 0.5 foot bgs) ^a	Adult Hiker (0 to 0.5 foot bgs) ^a	Adult Hiker (0 to 0.5 foot bgs) ^a	Adult Hiker (0 to 0.5 foot bgs) ^a	Child Hiker (0 to 3 feet bgs) ^a	Child Hiker (0 to 3 feet bgs) ^a	Child Hiker (0 to 3 feet bgs) ^a	Child Hiker (0 to 3 feet bgs) ^a	Child Hiker (0 to 3 feet bgs) ^a	Adult Hiker (0 to 3 feet bgs) ^a	Adult Hiker (0 to 3 feet bgs) ^a	Adult Hiker (0 to 3 feet bgs) ^a	Adult Hiker (0 to 3 feet bgs) ^a	Adult Hiker (0 to 3 feet bgs) ^a
	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway	Soil Pathway
	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index
Inorganics																				
Antimony	ND	NV	ND	ND	--	ND	NV	ND	ND	--	2.0E-07	NV	7.8E-05	2.7E-03	2.8E-03	2.0E-07	NV	1.1E-05	2.5E-04	2.6E-04
Cadmium	7.4E-06	NV	3.9E-06	1.3E-03	1.4E-03	7.4E-06	NV	8.4E-05	2.0E-02	2.0E-02	2.8E-06	NV	1.5E-06	5.1E-04	5.1E-04	2.8E-06	NV	3.2E-05	7.6E-03	7.6E-03
Chromium, Hexavalent	8.4E-08	NV	NA	5.1E-05	5.1E-05	8.4E-08	NV	NA	4.7E-06	4.8E-06	7.5E-08	NV	NA	4.5E-05	4.5E-05	7.5E-08	NV	NA	4.2E-06	4.3E-06
Copper	3.1E-09	NV	6.6E-06	2.3E-04	2.3E-04	3.1E-09	NV	9.0E-07	2.1E-05	2.2E-05	2.5E-09	NV	5.3E-06	1.8E-04	1.9E-04	2.5E-09	NV	7.3E-07	1.7E-05	1.8E-05
Lead	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	1.8E-07	NV	1.8E-05	6.1E-04	6.3E-04	1.8E-07	NV	2.4E-06	5.8E-05	6.0E-05	1.9E-07	NV	1.9E-05	6.4E-04	6.6E-04	1.9E-07	NV	2.5E-06	6.0E-05	6.3E-05
Zinc	1.5E-08	NV	3.1E-05	1.1E-03	1.1E-03	1.5E-08	NV	4.2E-06	1.0E-04	1.0E-04	1.1E-08	NV	2.3E-05	7.9E-04	8.1E-04	1.1E-08	NV	3.1E-06	7.4E-05	7.7E-05
Volatile Organic Compounds																				
Bromomethane	ND	8.9E-05	ND	ND	8.9E-05	ND	8.9E-05	ND	ND	8.9E-05	1.7E-10	8.9E-05	3.1E-06	1.1E-05	1.0E-04	1.7E-10	8.9E-05	4.3E-07	1.0E-06	9.1E-05
Chloro methane	ND	2.6E-06	ND	ND	2.6E-06	ND	2.6E-06	ND	ND	2.6E-06	3.9E-12	2.6E-06	8.3E-08	2.9E-07	3.0E-06	3.9E-12	2.6E-06	1.1E-08	2.7E-08	2.7E-06
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene	6.8E-12	1.2E-08	2.2E-07	5.0E-07	7.3E-07	6.8E-12	1.2E-08	2.9E-08	4.7E-08	8.8E-08	4.7E-12	1.2E-08	1.5E-07	3.4E-07	5.0E-07	4.7E-12	1.2E-08	2.0E-08	3.2E-08	6.4E-08
Acenaphthylene	ND	NV	ND	ND	--	ND	NV	ND	ND	--	4.6E-13	NV	1.4E-08	3.3E-08	4.8E-08	4.6E-13	NV	2.0E-09	3.1E-09	5.1E-09
Anthracene	1.0E-11	2.8E-09	3.2E-07	7.4E-07	1.1E-06	1.0E-11	2.8E-09	4.4E-08	7.0E-08	1.2E-07	5.1E-12	2.8E-09	1.6E-07	3.7E-07	5.3E-07	5.1E-12	2.8E-09	2.2E-08	3.5E-08	5.9E-08
Benzo (a) anthracene	4.4E-10	2.6E-08	1.4E-05	3.2E-05	4.5E-05	4.4E-10	2.6E-08	1.9E-06	3.0E-06	4.9E-06	2.4E-10	2.6E-08	7.6E-06	1.7E-05	2.5E-05	2.4E-10	2.6E-08	1.0E-06	1.6E-06	2.7E-06
Benzo (a) pyrene	1.5E-05	NV	7.9E-04	1.8E-03	2.6E-03	1.5E-05	NV	1.1E-04	1.7E-04	2.9E-04	9.6E-06	NV	5.0E-04	1.2E-03	1.7E-03	9.6E-06	NV	6.9E-05	1.1E-04	1.9E-04
Benzo (b) fluoranthene	4.5E-10	NV	1.4E-05	3.3E-05	4.7E-05	4.5E-10	NV	1.9E-06	3.1E-06	5.0E-06	3.4E-10	NV	1.1E-05	2.5E-05	3.5E-05	3.4E-10	NV	1.5E-06	2.3E-06	3.8E-06
Benzo (ghi) perylene	2.2E-10	NV	6.8E-06	1.6E-05	2.2E-05	2.2E-10	NV	9.3E-07	1.5E-06	2.4E-06	1.1E-10	NV	3.5E-06	8.0E-06	1.1E-05	1.1E-10	NV	4.8E-07	7.5E-07	1.2E-06
Benzo (k) fluoranthene	1.6E-10	NV	5.0E-06	1.1E-05	1.6E-05	1.6E-10	NV	6.8E-07	1.1E-06	1.8E-06	1.0E-10	NV	3.3E-06	7.5E-06	1.1E-05	1.0E-10	NV	4.4E-07	7.0E-07	1.1E-06
Chrysene	5.8E-10	NV	1.8E-05	4.2E-05	6.0E-05	5.8E-10	NV	2.5E-06	3.9E-06	6.4E-06	2.5E-10	NV	8.0E-06	1.8E-05	2.6E-05	2.5E-10	NV	1.1E-06	1.7E-06	2.8E-06
Dibenzo (a,h) anthracene	8.5E-06	NV	4.5E-04	1.0E-03	1.5E-03	8.5E-06	NV	6.1E-05	9.7E-05	1.7E-04	5.7E-06	NV	3.0E-04	6.9E-04	1.0E-03	5.7E-06	NV	4.1E-05	6.5E-05	1.1E-04
Fluoranthene	1.2E-09	NV	3.9E-05	8.9E-05	1.3E-04	1.2E-09	NV	5.3E-06	8.3E-06	1.4E-05	7.4E-10	NV	2.3E-05	5.4E-05	7.7E-05	7.4E-10	NV	3.2E-06	5.0E-06	8.2E-06
Fluorene	1.9E-12	2.9E-09	5.8E-08	1.3E-07	2.0E-07	1.9E-12	2.9E-09	8.0E-09	1.3E-08	2.4E-08	1.4E-12	2.9E-09	4.4E-08	1.0E-07	1.5E-07	1.4E-12	2.9E-09	6.1E-09	9.6E-09	1.9E-08
Indeno (1,2,3-cd) pyrene	1.7E-10	NV	5.3E-06	1.2E-05	1.7E-05	1.7E-10	NV	7.2E-07	1.1E-06	1.9E-06	8.2E-11	NV	2.6E-06	5.9E-06	8.5E-06	8.2E-11	NV	3.5E-07	5.6E-07	9.1E-07
Naphthalene	6.9E-11	8.2E-07	8.1E-08	1.9E-07	1.1E-06	6.9E-11	8.2E-07	1.1E-08	1.8E-08	8.5E-07	5.5E-11	8.2E-07	6.5E-08	1.5E-07	1.0E-06	5.5E-11	8.2E-07	8.9E-09	1.4E-08	8.5E-07
Phenanthrene	4.2E-11	NV	1.3E-06	3.1E-06	4.4E-06	4.2E-11	NV	1.8E-07	2.9E-07	4.7E-07	2.0E-11	NV	6.3E-07	1.5E-06	2.1E-06	2.0E-11	NV	8.6E-08	1.4E-07	2.2E-07
Pyrene	1.3E-09	7.9E-08	4.0E-05	9.1E-05	1.3E-04	1.3E-09	7.9E-08	5.4E-06	8.5E-06	1.4E-05	7.6E-10	7.9E-08	2.4E-05	5.5E-05	7.9E-05	7.6E-10	7.9E-08	3.3E-06	5.2E-06	8.5E-06
B(a)P Equivalent	NA	NV	NA	NA	--	NA	NV	NA	NA	--	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Polychlorinated Biphenyls																				
Total PCBs	1.0E-08	1.4E-05	3.1E-04	7.2E-04	1.0E-03	1.0E-08	1.4E-05	4.3E-05	6.8E-05	1.2E-04	8.4E-09	1.4E-05	2.6E-04	6.1E-04	8.9E-04	8.4E-09	1.4E-05	3.6E-05	5.7E-05	1.1E-04
Total Petroleum Hydrocarbons																				
TPH as diesel	2.8E-09	2.6E-03	2.0E-04	6.9E-04	3.4E-03	2.8E-09	2.6E-03	2.7E-05	6.4E-05	2.7E-03	5.0E-09	2.6E-03	3.6E-04	1.2E-03	4.2E-03	5.0E-09	2.6E-03	4.9E-05	1.2E-04	2.7E-03
TPH as motor oil	4.9E-09	NV	1.0E-04	3.5E-04	4.5E-04	4.9E-09	NV	1.4E-05	3.3E-05	4.7E-05	1.0E-08	NV	2.1E-04	7.3E-04	9.4E-04	1.0E-08	NV	2.9E-05	6.8E-05	9.7E-05
Dioxins/Furans																				
TEQ Human	2.1E-08	1.8E-05	1.9E-03	2.2E-02	2.4E-02	2.1E-08	1.8E-05	2.6E-04	2.0E-03	2.3E-03	1.0E-08	1.8E-05	9.2E-04	1.1E-02	1.1E-02	1.0E-08	1.8E-05	1.2E-04	9.9E-04	1.1E-03
Total Hazard Index	3E-05	3E-03	4E-03	3E-02	4E-02	3E-05	3E-03	6E-04	2E-02	3E-02	2E-05	3E-03	3E-03	2E-02	3E-02	2E-05	3E-03	4E-04	9E-03	1E-02

Notes:
^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:
-- = not calculated.
B (a) P equivalent = Benzo(a)pyrene equivalent.
bgs = below ground surface.
C O P C = Constituent of Potential Concern.
H I = Hazard Index
na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.
NA = Not applicable. Hexavalent chromium is not absorbed via dermal contact.
ND = Not detected.
NV = Not volatile.
PCB = Polychlorinated biphenyls.
TPH = Total Petroleum Hydrocarbons.
TEQ = Toxic Equivalent.

Table AOC27-B1.4c
Baseline Scenario HIs for C O P Cs in AOC 27 Soil Using Depth-Weighted EPCs: Recreational User - Off-Highway Vehicle Rider

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

C O P C	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Child OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Adult OHV Rider (0 to 0.5 foot bgs) ^a Soil Pathway	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Child OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway	Adult OHV Rider (0 to 3 feet bgs) ^a Soil Pathway
	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Vapor Inhalation	Dermal Contact	Ingestion	Total Hazard Index
Inorganics																				
Antimony	ND	NV	ND	ND	--	ND	NV	ND	ND	--	2.0E-05	NV	1.4E-04	1.9E-04	3.5E-04	2.0E-05	NV	1.2E-04	7.8E-05	2.2E-04
Cadmium	7.4E-04	NV	7.1E-06	9.5E-05	8.5E-04	7.4E-04	NV	9.7E-04	6.2E-03	7.9E-03	2.8E-04	NV	2.7E-06	3.6E-05	3.2E-04	2.8E-04	NV	3.7E-04	2.3E-03	3.0E-03
Chromium, Hexavalent	8.4E-06	NV	NA	3.6E-06	1.2E-05	8.4E-06	NV	NA	1.5E-06	9.9E-06	7.5E-06	NV	NA	3.2E-06	1.1E-05	7.5E-06	NV	NA	1.3E-06	8.8E-06
Copper	3.1E-07	NV	1.2E-05	1.6E-05	2.8E-05	3.1E-07	NV	1.0E-05	6.6E-06	1.7E-05	2.5E-07	NV	9.7E-06	1.3E-05	2.3E-05	2.5E-07	NV	8.3E-06	5.3E-06	1.4E-05
Lead	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Mercury (inorganic)	1.8E-05	NV	3.2E-05	4.3E-05	9.4E-05	1.8E-05	NV	2.8E-05	1.8E-05	6.4E-05	1.9E-05	NV	3.4E-05	4.5E-05	9.8E-05	1.9E-05	NV	2.9E-05	1.9E-05	6.6E-05
Zinc	1.5E-06	NV	5.6E-05	7.5E-05	1.3E-04	1.5E-06	NV	4.8E-05	3.1E-05	8.1E-05	1.1E-06	NV	4.2E-05	5.5E-05	9.8E-05	1.1E-06	NV	3.6E-05	2.3E-05	6.0E-05
Volatile Organic Compounds																				
Bromomethane	ND	5.6E-06	ND	ND	5.6E-06	ND	5.6E-06	ND	ND	5.6E-06	1.7E-08	5.6E-06	5.7E-06	7.6E-07	1.2E-05	1.7E-08	5.6E-06	4.9E-06	3.1E-07	1.1E-05
Chloro methane	ND	1.7E-07	ND	ND	1.7E-07	ND	1.7E-07	ND	ND	1.7E-07	4.0E-10	1.7E-07	1.5E-07	2.0E-08	3.4E-07	4.0E-10	1.7E-07	1.3E-07	8.3E-09	3.0E-07
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene	6.9E-10	7.7E-10	3.9E-07	3.5E-08	4.3E-07	6.9E-10	7.7E-10	3.4E-07	1.4E-08	3.5E-07	4.7E-10	7.7E-10	2.7E-07	2.4E-08	2.9E-07	4.7E-10	7.7E-10	2.3E-07	9.9E-09	2.4E-07
Acenaphthylene	ND	NV	ND	ND	--	ND	NV	ND	ND	--	4.6E-11	NV	2.6E-08	2.3E-09	2.9E-08	4.6E-11	NV	2.2E-08	9.6E-10	2.3E-08
Anthracene	1.0E-09	1.7E-10	5.9E-07	5.2E-08	6.4E-07	1.0E-09	1.7E-10	5.0E-07	2.2E-08	5.3E-07	5.1E-10	1.7E-10	2.9E-07	2.6E-08	3.2E-07	5.1E-10	1.7E-10	2.5E-07	1.1E-08	2.6E-07
Benzo (a) anthracene	4.4E-08	1.6E-09	2.5E-05	2.2E-06	2.7E-05	4.4E-08	1.6E-09	2.1E-05	9.2E-07	2.2E-05	2.4E-08	1.6E-09	1.4E-05	1.2E-06	1.5E-05	2.4E-08	1.6E-09	1.2E-05	5.1E-07	1.2E-05
Benzo (a) pyrene	1.5E-03	NV	1.4E-03	1.3E-04	3.1E-03	1.5E-03	NV	1.2E-03	5.3E-05	2.8E-03	9.6E-04	NV	9.1E-04	8.1E-05	2.0E-03	9.6E-04	NV	7.8E-04	3.4E-05	1.8E-03
Benzo (b) fluoranthene	4.5E-08	NV	2.6E-05	2.3E-06	2.8E-05	4.5E-08	NV	2.2E-05	9.5E-07	2.3E-05	3.4E-08	NV	1.9E-05	1.7E-06	2.1E-05	3.4E-08	NV	1.7E-05	7.1E-07	1.7E-05
Benzo (ghi) perylene	2.2E-08	NV	1.2E-05	1.1E-06	1.3E-05	2.2E-08	NV	1.1E-05	4.5E-07	1.1E-05	1.1E-08	NV	6.3E-06	5.6E-07	6.9E-06	1.1E-08	NV	5.4E-06	2.3E-07	5.7E-06
Benzo (k) fluoranthene	1.6E-08	NV	9.0E-06	8.0E-07	9.9E-06	1.6E-08	NV	7.8E-06	3.3E-07	8.1E-06	1.0E-08	NV	5.9E-06	5.3E-07	6.5E-06	1.0E-08	NV	5.1E-06	2.2E-07	5.3E-06
Chrysene	5.8E-08	NV	3.3E-05	2.9E-06	3.6E-05	5.8E-08	NV	2.8E-05	1.2E-06	3.0E-05	2.5E-08	NV	1.4E-05	1.3E-06	1.6E-05	2.5E-08	NV	1.2E-05	5.3E-07	1.3E-05
Dibenzo (a,h) anthracene	8.6E-04	NV	8.2E-04	7.3E-05	1.7E-03	8.6E-04	NV	7.0E-04	3.0E-05	1.6E-03	5.8E-04	NV	5.5E-04	4.9E-05	1.2E-03	5.8E-04	NV	4.7E-04	2.0E-05	1.1E-03
Fluoranthene	1.2E-07	NV	7.0E-05	6.2E-06	7.7E-05	1.2E-07	NV	6.0E-05	2.6E-06	6.3E-05	7.4E-08	NV	4.2E-05	3.8E-06	4.6E-05	7.4E-08	NV	3.6E-05	1.6E-06	3.8E-05
Fluorene	1.9E-10	1.8E-10	1.1E-07	9.5E-09	1.2E-07	1.9E-10	1.8E-10	9.1E-08	3.9E-09	9.5E-08	1.4E-10	1.8E-10	8.1E-08	7.2E-09	8.8E-08	1.4E-10	1.8E-10	6.9E-08	3.0E-09	7.3E-08
Indeno (1,2,3-cd) pyrene	1.7E-08	NV	9.6E-06	8.5E-07	1.0E-05	1.7E-08	NV	8.2E-06	3.5E-07	8.6E-06	8.2E-09	NV	4.7E-06	4.2E-07	5.1E-06	8.2E-09	NV	4.0E-06	1.7E-07	4.2E-06
Naphthalene	6.9E-09	5.2E-08	1.5E-07	1.3E-08	2.2E-07	6.9E-09	5.2E-08	1.3E-07	5.4E-09	1.9E-07	5.5E-09	5.2E-08	1.2E-07	1.1E-08	1.9E-07	5.5E-09	5.2E-08	1.0E-07	4.3E-09	1.6E-07
Phenanthrene	4.2E-09	NV	2.4E-06	2.2E-07	2.6E-06	4.2E-09	NV	2.1E-06	8.9E-08	2.2E-06	2.0E-09	NV	1.1E-06	1.0E-07	1.3E-06	2.0E-09	NV	9.8E-07	4.2E-08	1.0E-06
Pyrene	1.3E-07	4.9E-09	7.2E-05	6.4E-06	7.9E-05	1.3E-07	4.9E-09	6.2E-05	2.6E-06	6.5E-05	7.7E-08	4.9E-09	4.4E-05	3.9E-06	4.8E-05	7.7E-08	4.9E-09	3.8E-05	1.6E-06	3.9E-05
B(a)P Equivalent	NA	NV	NA	NA	--	NA	NV	NA	NA	--	NA	NV	NA	NA	--	NA	NV	NA	NA	--
Polychlorinated Biphenyls																				
Total PCBs	1.0E-06	8.8E-07	5.7E-04	5.1E-05	6.2E-04	1.0E-06	8.8E-07	4.9E-04	2.1E-05	5.1E-04	8.4E-07	8.8E-07	4.8E-04	4.3E-05	5.3E-04	8.4E-07	8.8E-07	4.1E-04	1.8E-05	4.3E-04
Total Petroleum Hydrocarbons																				
TPH as diesel	2.8E-07	1.6E-04	3.6E-04	4.8E-05	5.7E-04	2.8E-07	1.6E-04	3.1E-04	2.0E-05	4.9E-04	5.1E-07	1.6E-04	6.6E-04	8.8E-05	9.1E-04	5.1E-07	1.6E-04	5.7E-04	3.6E-05	7.6E-04
TPH as motor oil	4.9E-07	NV	1.9E-04	2.5E-05	2.1E-04	4.9E-07	NV	1.6E-04	1.0E-05	1.7E-04	1.0E-06	NV	3.8E-04	5.1E-05	4.4E-04	1.0E-06	NV	3.3E-04	2.1E-05	3.5E-04
Dioxins/Furans																				
TEQ Human	2.1E-06	1.1E-06	3.4E-03	1.5E-03	5.0E-03	2.1E-06	1.1E-06	2.9E-03	6.3E-04	3.6E-03	1.0E-06	1.1E-06	1.7E-03	7.4E-04	2.4E-03	1.0E-06	1.1E-06	1.4E-03	3.1E-04	1.7E-03
Total Hazard Index	3E-03	2E-04	7E-03	2E-03	1E-02	3E-03	2E-04	7E-03	7E-03	2E-02	2E-03	2E-04	5E-03	1E-03	8E-03	2E-03	2E-04	5E-03	3E-03	1E-02

Notes:
^a EPCs for exposure to subsurface II soil (0 to 10 feet bgs) are used to evaluate the vapor inhalation pathway.

Abbreviations:
 -- = not calculated.
 B (a) P equivalent = Benzo(a)pyrene equivalent.
 bgs = below ground surface.
 C O P C = Constituent of Potential Concern.
 H I = Hazard Index
 na = Not applicable. Potential exposure to lead is evaluated using California Environmental Protection Agency (Cal/E P A) Department of Toxic Substances Control's (DTSC) LeadSpread model. Please see text for discussion.
 NA = Not applicable. Hexavalent chromium is not absorbed via dermal contact.
 ND = Not detected.
 NV = Not volatile.
 PCB = Polychlorinated biphenyls.
 TPH = Total Petroleum Hydrocarbons.
 TEQ = Toxic Equivalent.

Table AOC27-B1.5a

Baseline Scenario Risk Evaluation for Lead in AOC 27 Surface Soil (0 to 0.5 foot bgs) Using Depth-Weighted EPCs:
Recreational User (Camper)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

LEAD RISK ASSESSMENT SPREADSHEET 8
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

[Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8](#)

INPUT MEDIUM	INPUT LEVEL
Lead in Soil/Dust (ug/g)	233.0
Respirable Dust (ug/m ³)	1.5

EXPOSURE PARAMETERS	units	children
Days per week	days/wk	0.25 ^a
Geometric Standard Deviation	ug/dl	1.6
Blood lead level of concern	ug/dl	1
Skin area, residential	cm ²	2900
Soil adherence	ug/cm ²	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001
Soil ingestion	mg/day	100
Soil ingestion, pica	mg/day	200
Ingestion constant	(ug/dl)/(ug/day)	0.16
Bioavailability	unitless	0.44
Breathing rate	m ³ /day	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.192

OUTPUT	Percentile Estimate of Blood Pb (ug/dl) 50th	Percentile Estimate of Blood Pb (ug/dl) 90th	Percentile Estimate of Blood Pb (ug/dl) 95th	Percentile Estimate of Blood Pb (ug/dl) 98th	Percentile Estimate of Blood Pb (ug/dl) 99th	PRG-90 (ug/g)
BLOOD Pb, CHILD	0.059	0.108	0.13	0.16	0.18	2159
BLOOD Pb, PICA CHILD	0.118	0.21	0.25	0.31	0.35	1084

CHILDREN	typical Pathway contribution PEF	typical Pathway contribution ug/dl	typical Pathway contribution percent	with pica Pathway contribution PEF	with pica Pathway contribution ug/dl	with pica Pathway contribution percent
Soil Contact	2.1E-6	4.8E-04	1%	--	4.8E-04	0.4%
Soil Ingestion	2.5E-4	5.9E-02	99%	5.0E-4	1.2E-01	100%
Inhalation	7.0E-8	1.6E-05	0.03%	--	1.6E-05	0.01%

Notes:

^a Highlighted values are Site-specific: days per week based on the assumption of 1 day per month (1 day/4 weeks = 0.25 days/week), 8 months per year. See Table 5.1 of the main report for details.

Table AOC27-B1.5b

Baseline Scenario Risk Evaluation for Lead in AOC 27 Shallow Soil (0 to 3 feet bgs) Using Depth-Weighted EPCs:
Recreational User (Camper)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

LEAD RISK ASSESSMENT SPREADSHEET 8
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

[Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8](#)

INPUT MEDIUM	INPUT LEVEL
Lead in Soil/Dust (ug/g)	168.0
Respirable Dust (ug/m ³)	1.5

EXPOSURE PARAMETERS	units	children
Days per week	days/wk	0.25 ^a
Geometric Standard Deviation	ug/dl	1.6
Blood lead level of concern	ug/dl	1
Skin area, residential	cm ²	2900
Soil adherence	ug/cm ²	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001
Soil ingestion	mg/day	100
Soil ingestion, pica	mg/day	200
Ingestion constant	(ug/dl)/(ug/day)	0.16
Bioavailability	unitless	0.44
Breathing rate	m ³ /day	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.192

OUTPUT	Percentile Estimate of Blood Pb (ug/dl) 50th	Percentile Estimate of Blood Pb (ug/dl) 90th	Percentile Estimate of Blood Pb (ug/dl) 95th	Percentile Estimate of Blood Pb (ug/dl) 98th	Percentile Estimate of Blood Pb (ug/dl) 99th	PRG-90 (ug/g)
BLOOD Pb, CHILD	0.043	0.078	0.09	0.11	0.13	2159
BLOOD Pb, PICA CHILD	0.085	0.15	0.18	0.22	0.25	1084

CHILDREN	typical Pathway contribution PEF	typical Pathway contribution ug/dl	typical Pathway contribution percent	with pica Pathway contribution PEF	with pica Pathway contribution ug/dl	with pica Pathway contribution percent
Soil Contact	2.1E-6	3.5E-04	1%	--	3.5E-04	0.4%
Soil Ingestion	2.5E-4	4.2E-02	99%	5.0E-4	8.4E-02	100%
Inhalation	7.0E-8	1.2E-05	0.03%	--	1.2E-05	0.01%

Notes:

^a Highlighted values are Site-specific: days per week based on the assumption of 1 day per month (1 day/4 weeks = 0.25 days/week), 8 months per year. See Table 5.1 of the main report for details.

Table AOC27-B1.5c

Baseline Scenario Risk Evaluation for Lead in AOC 27 Surface Soil (0 to 0.5 foot bgs) Using Depth-Weighted EPCs:
Recreational User (Hiker)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

LEAD RISK ASSESSMENT SPREADSHEET 8
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

[Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8](#)

INPUT MEDIUM	INPUT LEVEL
Lead in Soil/Dust (ug/g)	233.0
Respirable Dust (ug/m ³)	1.5

EXPOSURE PARAMETERS	units	children
Days per week	days/wk	0.5 ^a
Geometric Standard Deviation	ug/dl	1.6
Blood lead level of concern	ug/dl	1
Skin area, residential	cm ²	2900
Soil adherence	ug/cm ²	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001
Soil ingestion	mg/day	100
Soil ingestion, pica	mg/day	200
Ingestion constant	(ug/dl)/(ug/day)	0.16
Bioavailability	unitless	0.44
Breathing rate	m ³ /day	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.192

OUTPUT	Percentile Estimate of Blood Pb (ug/dl) 50th	Percentile Estimate of Blood Pb (ug/dl) 90th	Percentile Estimate of Blood Pb (ug/dl) 95th	Percentile Estimate of Blood Pb (ug/dl) 98th	Percentile Estimate of Blood Pb (ug/dl) 99th	PRG-90 (ug/g)
BLOOD Pb, CHILD	0.118	0.216	0.26	0.31	0.35	1079
BLOOD Pb, PICA CHILD	0.235	0.43	0.51	0.62	0.70	542

CHILDREN	typical Pathway contribution PEF	typical Pathway contribution ug/dl	typical Pathway contribution percent	with pica Pathway contribution PEF	with pica Pathway contribution ug/dl	with pica Pathway contribution percent
Soil Contact	4.1E-6	9.7E-04	1%	--	9.7E-04	0.4%
Soil Ingestion	5.0E-4	1.2E-01	99%	1.0E-3	2.3E-01	100%
Inhalation	1.4E-7	3.3E-05	0.03%	--	3.3E-05	0.01%

Notes:

^a Highlighted values are Site-specific: days per week based on the assumption of 1 day per month (1 day/4 weeks = 0.25 days/week), 8 months per year. See Table 5.1 of the main report for details.

Table AOC27-B1.5d

Baseline Scenario Risk Evaluation for Lead in AOC 27 Shallow Soil (0 to 3 feet bgs) Using Depth-Weighted EPCs:
Recreational User (Hiker)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

LEAD RISK ASSESSMENT SPREADSHEET 8
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

[Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8](#)

INPUT MEDIUM	INPUT LEVEL
Lead in Soil/Dust (ug/g)	168.0
Respirable Dust (ug/m ³)	1.5

EXPOSURE PARAMETERS	units	children
Days per week	days/wk	0.5 ^a
Geometric Standard Deviation	ug/dl	1.6
Blood lead level of concern	ug/dl	1
Skin area, residential	cm ²	2900
Soil adherence	ug/cm ²	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001
Soil ingestion	mg/day	100
Soil ingestion, pica	mg/day	200
Ingestion constant	(ug/dl)/(ug/day)	0.16
Bioavailability	unitless	0.44
Breathing rate	m ³ /day	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.192

OUTPUT	Percentile Estimate of Blood Pb (ug/dl) 50th	Percentile Estimate of Blood Pb (ug/dl) 90th	Percentile Estimate of Blood Pb (ug/dl) 95th	Percentile Estimate of Blood Pb (ug/dl) 98th	Percentile Estimate of Blood Pb (ug/dl) 99th	PRG-90 (ug/g)
BLOOD Pb, CHILD	0.085	0.156	0.18	0.22	0.25	1079
BLOOD Pb, PICA CHILD	0.170	0.31	0.37	0.45	0.51	542

CHILDREN	typical Pathway contribution PEF	typical Pathway contribution ug/dl	typical Pathway contribution percent	with pica Pathway contribution PEF	with pica Pathway contribution ug/dl	with pica Pathway contribution percent
Soil Contact	4.1E-6	7.0E-04	1%	--	7.0E-04	0.4%
Soil Ingestion	5.0E-4	8.4E-02	99%	1.0E-3	1.7E-01	100%
Inhalation	1.4E-7	2.4E-05	0.03%	--	2.4E-05	0.01%

Notes:

^a Highlighted values are Site-specific: days per week based on the assumption of 1 day per month (1 day/4 weeks = 0.25 days/week), 8 months per year. See Table 5.1 of the main report for details.

Table AOC27-B1.5e

Baseline Scenario Risk Evaluation for Lead in AOC 27 Surface Soil (0 to 0.5 foot bgs) Using Depth-Weighted EPCs:
Recreational User (Off-Highway Vehicle Rider)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

LEAD RISK ASSESSMENT SPREADSHEET 8
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

[Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8](#)

INPUT MEDIUM	INPUT LEVEL
Lead in Soil/Dust (ug/g)	233.0
Respirable Dust (ug/m ³)	1.5

EXPOSURE PARAMETERS	units	children
Days per week	days/wk	0.5 ^a
Geometric Standard Deviation	ug/dl	1.6
Blood lead level of concern	ug/dl	1
Skin area, residential	cm ²	2900
Soil adherence	ug/cm ²	800
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001
Soil ingestion	mg/day	31
Soil ingestion, pica	mg/day	200
Ingestion constant	(ug/dl)/(ug/day)	0.16
Bioavailability	unitless	0.44
Breathing rate	m ³ /day	0.425
Inhalation constant	(ug/dl)/(ug/day)	0.192

OUTPUT	Percentile Estimate of Blood Pb (ug/dl) 50th	Percentile Estimate of Blood Pb (ug/dl) 90th	Percentile Estimate of Blood Pb (ug/dl) 95th	Percentile Estimate of Blood Pb (ug/dl) 98th	Percentile Estimate of Blood Pb (ug/dl) 99th	PRG-90 (ug/g)
BLOOD Pb, CHILD	0.040	0.073	0.09	0.11	0.12	3174
BLOOD Pb, PICA CHILD	0.238	0.44	0.51	0.63	0.71	535

CHILDREN	typical Pathway contribution PEF	typical Pathway contribution ug/dl	typical Pathway contribution percent	with pica Pathway contribution PEF	with pica Pathway contribution ug/dl	with pica Pathway contribution percent
Soil Contact	1.7E-5	3.9E-03	10%	--	3.9E-03	1.6%
Soil Ingestion	1.6E-4	3.6E-02	90%	1.0E-3	2.3E-01	98%
Inhalation	8.7E-9	2.0E-06	0.01%	--	2.0E-06	0.00%

Notes:

^a Highlighted values are Site-specific: days per week based on the assumption of 1 day per month (1 day/4 weeks = 0.25 days/week), 8 months per year. See Table 5.1 of the main report for details.

Table AOC27-B1.5f

Baseline Scenario Risk Evaluation for Lead in AOC 27 Shallow Soil (0 to 3 feet bgs) Using Depth-Weighted EPCs:
Recreational User (Off-Highway Vehicle Rider)

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

LEAD RISK ASSESSMENT SPREADSHEET 8
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

[Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8](#)

INPUT MEDIUM	INPUT LEVEL
Lead in Soil/Dust (ug/g)	168.0
Respirable Dust (ug/m ³)	1.5

EXPOSURE PARAMETERS	units	children
Days per week	days/wk	0.5 ^a
Geometric Standard Deviation	ug/dl	1.6
Blood lead level of concern	ug/dl	1
Skin area, residential	cm ²	2900
Soil adherence	ug/cm ²	800
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001
Soil ingestion	mg/day	31
Soil ingestion, pica	mg/day	200
Ingestion constant	(ug/dl)/(ug/day)	0.16
Bioavailability	unitless	0.44
Breathing rate	m ³ /day	0.425
Inhalation constant	(ug/dl)/(ug/day)	0.192

OUTPUT	Percentile Estimate of Blood Pb (ug/dl) 50th	Percentile Estimate of Blood Pb (ug/dl) 90th	Percentile Estimate of Blood Pb (ug/dl) 95th	Percentile Estimate of Blood Pb (ug/dl) 98th	Percentile Estimate of Blood Pb (ug/dl) 99th	PRG-90 (ug/g)
BLOOD Pb, CHILD	0.029	0.053	0.06	0.08	0.09	3174
BLOOD Pb, PICA CHILD	0.172	0.31	0.37	0.45	0.51	535

CHILDREN	typical Pathway contribution PEF	typical Pathway contribution ug/dl	typical Pathway contribution percent	with pica Pathway contribution PEF	with pica Pathway contribution ug/dl	with pica Pathway contribution percent
Soil Contact	1.7E-5	2.8E-03	10%	--	2.8E-03	1.6%
Soil Ingestion	1.6E-4	2.6E-02	90%	1.0E-3	1.7E-01	98%
Inhalation	8.7E-9	1.5E-06	0.01%	--	1.5E-06	0.00%

Notes:

^a Highlighted values are Site-specific: days per week based on the assumption of 1 day per month (1 day/4 weeks = 0.25 days/week), 8 months per year. See Table 5.1 of the main report for details.

ATTACHMENT C

Dose and Risk Calculations for Ecological Receptors at AOC 27 Using Depth-Weighted EPCs and Area-Weighted EPCs

For additional help with the information provided in Attachment C, please contact Erin Osborn, Arcadis Principal Toxicologist, at 1-510-684-6760.

Table AOC27-C.1
Desert Shrew Risk Calculations Using Depth-Weighted and Area-Weighted Exposure Point
Concentrations (Wildlife SUF = 1, TRVs used for RBRG Development, and Selected BAFs) for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

Scenario	Category	COPEC	Terrestrial Receptors	TRV Type	Soil EPC ng/kg ^a	Diet Composition (Biota)	Diet Composition (Soil Fraction)	Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (F I R) (kg dw/kg-day)	Intake Estimates (S I R) (kg dw/kg-day)	Site Use Factor (unitless)
Baseline (Depth-Weighted)	Inorganics	Chromium, hexavalent	Desert Shrew	Selected	2.6E-01	100% Insects	2.0E-02	8.0E-02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Baseline (Depth-Weighted)	Inorganics	Chromium, total	Desert Shrew	Selected	1.9E+01	100% Insects	2.0E-02	5.9E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Baseline (Depth-Weighted)	Inorganics	Copper	Desert Shrew	Selected	1.6E+01	100% Insects	2.0E-02	8.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Baseline (Depth-Weighted)	Dioxins	TEQ Mammals	Desert Shrew	Alternate	2.6E+01	100% Insects	2.0E-02	1.3E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Baseline (Area-Weighted)	Inorganics	Chromium, hexavalent	Desert Shrew	Selected	2.3E-01	100% Insects	2.0E-02	6.9E-02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Baseline (Area-Weighted)	Inorganics	Chromium, total	Desert Shrew	Selected	1.8E+01	100% Insects	2.0E-02	5.6E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Baseline (Area-Weighted)	Inorganics	Copper	Desert Shrew	Selected	1.4E+01	100% Insects	2.0E-02	7.1E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Baseline (Area-Weighted)	Dioxins	TEQ Mammals	Desert Shrew	Alternate	2.6E+01	100% Insects	2.0E-02	1.3E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00

Table AOC27-C.1
Desert Shrew Risk Calculations Using Depth-Weighted and Area-Weighted Exposure Point
Concentrations (Wildlife SUF = 1, TRVs used for RBRG Development, and Selected BAFs) for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

Scenario	Category	COPEC	Terrestrial Receptors	Dose (Terrestrial Insects) (mg/kg-day)	Dose (Soil) (mg/kg-day)	Total Dose (mg/kg-day)	NOAEL TRV (mg/kg-day)	LOAEL TRV (mg/kg-day)	NOAEL HQ (unitless)	LOAEL HQ (unitless)	HQ Notes
Baseline (Depth-Weighted)	Inorganics	Chromium, hexavalent	Desert Shrew	1.6E-02	1.1E-03	1.7E-02	9.2E+00	3.8E+01	2E-03	4E-04	None
Baseline (Depth-Weighted)	Inorganics	Chromium, total	Desert Shrew	1.2E+00	7.8E-02	1.3E+00	2.4E+00	9.6E+00	5E-01	1E-01	None
Baseline (Depth-Weighted)	Inorganics	Copper	Desert Shrew	1.6E+00	6.3E-02	1.7E+00	9.4E+00	1.6E+01	2E-01	1E-01	None
Baseline (Depth-Weighted)	Dioxins	TEQ Mammals	Desert Shrew	2.6E+01	1.1E-01	2.7E+01	4.9E+00	3.0E+01	5E+00	9E-01	Note 1
Baseline (Area-Weighted)	Inorganics	Chromium, hexavalent	Desert Shrew	1.4E-02	9.2E-04	1.5E-02	9.2E+00	3.8E+01	2E-03	4E-04	None
Baseline (Area-Weighted)	Inorganics	Chromium, total	Desert Shrew	1.1E+00	7.4E-02	1.2E+00	2.4E+00	9.6E+00	5E-01	1E-01	None
Baseline (Area-Weighted)	Inorganics	Copper	Desert Shrew	1.4E+00	5.6E-02	1.5E+00	9.4E+00	1.6E+01	2E-01	9E-02	None
Baseline (Area-Weighted)	Dioxins	TEQ Mammals	Desert Shrew	2.6E+01	1.1E-01	2.7E+01	4.9E+00	3.0E+01	5E+00	9E-01	Note 1

Table AOC27-C.1
Desert Shrew Risk Calculations Using Depth-Weighted and Area-Weighted Exposure Point Concentrations (Wildlife SUF = 1, TRVs used for RBRG Development, and Selected BAFs) for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

Notes:

^a Inorganics presented in mg/kg; dioxin presented in ng/kg.

^b Total dose equation is presented below:

$$\text{Total Dose (mg/kg-day)} = [(EPC_{\text{soil}} \times SIR) + (C_{\text{plants}} \times FIR \times F_{\text{plants}}) + (C_{\text{insects}} \times FIR \times F_{\text{insects}}) + (C_{\text{mammals}} \times FIR \times F_{\text{mammals}})] \times \text{SUF}$$

^c HQ = Total Dose / TRV

Note 1	NO A E L HQ greater than 1
Note 2	LO A E L HQ greater than 1
Note 3	LO A E L HQ greater than 10
Note 4	LO A E L HQ greater than 100

Abbreviations:

AOC = area of concern

B A F = bioaccumulation factor

COPEC = constituent of potential ecological concern

dw = dry weight

EPC_{soil} = exposure point concentration in soil (mg/kg dw)

EPC_{plants} = exposure point concentration in plants (mg/kg dw)

EPC_{insects} = exposure point concentration in insects (mg/kg dw)

EPC_{mammals} = exposure point concentration in mammals (mg/kg dw)

F_{plants} = fraction of plants in diet

F_{insects} = fraction of insects in diet

F_{mammals} = fraction of mammals in diet

FIR = food ingestion rate (kg dw/kg bw-day)

HQ = hazard quotient (unitless)

kg = kilogram

kg dw/kg bw-day = kilograms per kilogram of body weight per day

LOAEL = lowest observed adverse effect level (mg/kg-day)

mg/kg = milligrams per kilogram

mg/kg-day = milligrams per kilogram per day

ND = not detected

ng/kg = nanograms per kilogram

NOAEL = no observed adverse effect level (mg/kg-day)

R B R G = risk-based remedial goal

SIR = soil ingestion rate (kg dw/kg bw-day)

SUF = site use factor (fraction)

TRV = toxicity reference value (mg/kg-day)

Table AOC27-C.2

Desert Shrew Risk Calculations Using Depth-Weighted Exposure Point Concentrations and Congener-Specific BAFs (Wildlife SUF = 1, TRVs used for RBRG Development) for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

Scenario	Category	COPEC	Terrestrial Receptors	TRV Type	BAF Type	Soil EPC (mg/kg or ng/kg) ^a	Diet Composition (Biota)	Diet Composition (Soil Fraction)	Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (F I R) (kg dw/kg-day)	Intake Estimates (S I R) (kg dw/kg-day)	Site Use Factor (unitless)
Baseline (Depth-Weighted)	Dioxins	TEQ Mammals	Desert Shrew	Alternate	Congener-Specific (USEPA 1999)	2.6E+01	100% Insects	2.0E-02	2.0E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Baseline (Depth-Weighted)	Dioxins	TEQ Mammals	Desert Shrew	Alternate	Congener-Specific (Fagervold et al. 2010)	2.6E+01	100% Insects	2.0E-02	1.1E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00

Table AOC27-C.2

Desert Shrew Risk Calculations Using Depth-Weighted Exposure Point Concentrations and Congener-Specific BAFs (Wildlife SUF = 1, TRVs used for RBRG Development) for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
 PG&E Topock Compressor Station
 Needles, California

Scenario	Category	COPEC	Terrestrial Receptors	Dose (Terrestrial Insects) (mg/kg-day)	Dose (Soil) (mg/kg-day)	Total Dose (mg/kg-day)	NOAEL TRV (mg/kg-day)	LOAEL TRV (mg/kg-day)	NOAEL HQ (unitless)	LOAEL HQ (unitless)	HQ Notes
Baseline (Depth-Weighted)	Dioxins	TEQ Mammals	Desert Shrew	4.1E+00	1.1E-01	4.2E+00	4.9E+00	3.0E+01	9E-01	1E-01	None
Baseline (Depth-Weighted)	Dioxins	TEQ Mammals	Desert Shrew	2.2E+00	1.1E-01	2.3E+00	4.9E+00	3.0E+01	5E-01	8E-02	None

Table AOC27-C.2
Desert Shrew Risk Calculations Using Depth-Weighted Exposure Point Concentrations and Congener-Specific BAFs (Wildlife SUF = 1, TRVs used for RBRG Development) for AOC 27

Post-Soil N T C R A Human Health and Ecological Risk Assessment Report
PG&E Topock Compressor Station
Needles, California

Notes:

^a Inorganics presented in mg/kg; dioxin presented in ng/kg.

^b Total dose equation is presented below:

$$\text{Total Dose (mg/kg-day)} = [(EPC_{\text{soil}} \times SIR) + (C_{\text{plants}} \times FIR \times F_{\text{plants}}) + (C_{\text{insects}} \times FIR \times F_{\text{insects}}) + (C_{\text{mammals}} \times FIR \times F_{\text{mammals}})] \times \text{SUF}$$

^c HQ = Total Dose / TRV

Note 1	NO A E L HQ greater than 1
Note 2	LO A E L HQ greater than 1
Note 3	LO A E L HQ greater than 10
Note 4	LO A E L HQ greater than 100

Abbreviations:

AOC = area of concern

B A F = bioaccumulation factor

COPEC = constituent of potential ecological concern

dw = dry weight

EPC_{soil} = exposure point concentration in soil (mg/kg dw)

EPC_{plants} = exposure point concentration in plants (mg/kg dw)

EPC_{insects} = exposure point concentration in insects (mg/kg dw)

EPC_{mammals} = exposure point concentration in mammals (mg/kg dw)

F_{plants} = fraction of plants in diet

F_{insects} = fraction of insects in diet

F_{mammals} = fraction of mammals in diet

FIR = food ingestion rate (kg dw/kg bw-day)

HQ = hazard quotient (unitless)

kg = kilogram

kg dw/kg bw-day = kilograms per kilogram of body weight per day

LOAEL = lowest observed adverse effect level (mg/kg-day)

mg/kg = milligrams per kilogram

mg/kg-day = milligrams per kilogram per day

ND = not detected

ng/kg = nanograms per kilogram

NOAEL = no observed adverse effect level (mg/kg-day)

R B R G = risk-based remedial goal

SIR = soil ingestion rate (kg dw/kg bw-day)

SUF = site use factor (fraction)

TRV = toxicity reference value (mg/kg-day)

Arcadis U.S., Inc.

630 Plaza Drive

Suite 100

Highlands Ranch, Colorado 80129

Tel 720 344 3500

Fax 720 344 3535

www.arcadis.com