Appendix SSTPA
Surface Soil Transport Pathway Analysis for BCW and AOC 10

ARCADIS Design & Consultancy for natural and built assets

Pacific Gas and Electric Company

APPENDIX SSTPA SURFACE SOIL TRANSPORT PATHWAY ANALYSIS FOR BCW AND AOC 10

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ATTACHMENT

A Figures from the *Final Soil RCRA Facility Investigation/Remedial Investigation Work Plan* (CH2M Hill 2013)

ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
Arcadis	Arcadis U.S., Inc.
BCW	Bat Cave Wash
bgs	below ground surface
BTV	background threshold value
ft	foot or feet
GPS	global positioning system
HxCDD	hexachlorodibenzo-p-dioxin
HxCDF	hexachlorodibenzofuran
mg/kg	milligram(s) per kilogram
ng/kg	nanogram(s) per kilogram
PeCDD	pentachlorodibenzo-p-dioxin
PeCDF	pentachlorodibenzofuran
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RL	reporting limit
SWMU	solid waste management unit
TCDD	tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofuran
TCS	Topock Compressor Station
TEQ	toxic equivalent quotients

1 INTRODUCTION

The purpose of this Surface Soil Transport Pathway Analysis is to evaluate whether surface soil constituents entrained in runoff from the Bat Cave Wash (BCW) and Area of Concern (AOC) 10 reach the sediment depositional areas along the edge of the Colorado River (and eventually the river) in potentially significant amounts. This evaluation follows the gradient analysis approach outlined in the *Human Health and Ecological Risk Assessment Work Plan* (Arcadis U.S., Inc. [Arcadis] 2008). The three possible outcomes for this evaluation are to find this transport pathway: (1) potentially complete and significant; (2) potentially complete and insignificant; or (3) incomplete. If the pathway is deemed to be potentially complete and significant, then a quantitative risk characterization for sediment would be included in the *Soil Human Health and Ecological Risk Assessment* (i.e., the "main report"). If the pathway is found to be potentially complete and insignificant, or incomplete, then a quantitative evaluation of potential sediment exposure in these depositional areas is not warranted.

Gradient analyses were completed to evaluate this transport pathway to the sediment depositional areas at the downstream ends of BCW and AOC 10. BCW is a wash extending from AOC 1/ Solid Waste Management Unit (SWMU) 1 in the south and running north toward the Colorado River. AOC 10, also referred to as the East Ravine area, is a small ravine located on the southeast side of the Topock Compressor Station (TCS) and the ravine runs eastward toward the Colorado River (refer to Figure 2-1a of the main report). Soil is present throughout BCW and AOC 10 except near the river's edge, where submerged sediments are located. Soil data for BCW and AOC 10 were used in the gradient analyses presented in this Surface Soil Transport Pathway Analysis.

For the analyses, concentrations of constituents considered to be site-related based on site history and use as reported in the *Final Soil RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan* (CH2M Hill 2013) were used as indicator chemicals representative of the potential transport pathway for BCW and AOC 10. Indicator chemicals included hexavalent chromium, total chromium, and dioxins/furans. For dioxins/furans, the dioxin toxic equivalent quotients (TEQs) were not used for the gradient analyses because TEQs are weighted and the summed concentrations include reporting limits (RLs) for non-detects. Because the RLs for each non-detect congener can influence the total TEQ, especially if the RLs are elevated, concentration trends are harder to interpret and, therefore, are not considered appropriate for this evaluation; (see Section 5.4.1 of the main report for further discussion of TEQ). Instead, the individual dioxin/furan congeners[1] were used for the gradient analyses.

For the gradient analyses, concentrations of the indicator chemicals in surface soil (0 to 1 feet [ft] below ground surface [bgs][2]) were plotted across the site gradient in an orientation starting from the upland/upgradient locations and going downgradient towards the river. Concentrations of indicator chemicals in surface soil along

[1] To focus the analyses for dioxins/furans, the hepta- and octa- dioxin/furan congeners were not included in the analyses because these constituents contribute less significantly to the total TEQ and are more frequently associated with background sources of dioxins/furans. Only the tetrachlorodibenzo-p-dioxin (TCDD)/F, hexa-, and penta- congeners were evaluated.

[2] Surface soil for the risk assessment was defined as soil from 0 to 0.5 ft bgs, but for this evaluation, samples with end depths of 1 ft were included to increase the sample size for the trend analysis. These included data with sampling bottom depth of 1 ft from 45 locations at BCW and 14 locations at AOC 10.

this gradient were compared to background threshold values (BTVs), if available, and the range of background concentrations; (Appendix BKG; CH2M Hill 2009, CH2M 2017). If concentrations of indicator chemicals in site soil decreased downgradient and became less than or equal to background before reaching the sediment in the riparian areas, this pathway was interpreted to be insignificant. If the gradient analysis indicated potential for a complete and significant transport pathway (i.e., concentrations in downgradient locations are similar or greater than the upgradient and potential source areas), further evaluation of the sediment areas would be considered.

The gradient analysis approach and detailed discussions of indicator chemical trends (gradient plots) used for evaluating the surface soil transport pathway for BCW and AOC 10 are presented herein. The approach and conclusions of the gradient analyses for BCW and AOC 10 are also summarized in Section 2.5.2 of the main report.

2 GRADIENT ANALYSIS APPROACH

This transport pathway analysis was performed using surface soil data (i.e., collected from 0 to 1 ft bgs) from BCW and AOC 10. The data are presented in Table SSTPA-1 and Table SSTPA-2, respectively, and sampling locations are depicted on Figures SSTPA-1a,b and SSTPA-2, respectively. For the gradient analyses, concentrations of an indicator chemical in surface soil were plotted along an axis defined by the orientation of potential runoff flow in the wash/ravine for each exposure area (BCW and AOC 10) separately. The gradient plots for BCW are presented on Figures SSTPA-3 through SSTPA-16 and the gradient plots for AOC 10 are presented on Figures SSTPA-17 through SSTPA-30. Landmarks were selected for each exposure area as points of reference along the x-axis of the gradient plots.

In the gradient plots, concentrations of indictor chemicals in surface soil were color-coded to distinguish between detected and non-detect results. Non-detect concentrations are represented as the specified RL. Each figure also presents the BTV for comparison, when available. Additionally, the shaded range on each figure represents the range of concentrations (detected and non-detected values) from the background soil datasets.

Stormwater runoff, when present in BCW, flows from south to north, with the upgradient southern sampling locations representing areas closest to the TCS and the northern downgradient sampling locations in the Tamarisk Thicket, the northernmost area of BCW before it transitions to sediment east of National Trails Highway (Figures SSTPA-1 a and 1b). For orientation of BCW and potential downstream movement during flow events, please see Figures C2-3 and C2-4 of the *Final RFI/RI Work Plan* [CH2M Hill 2013], Appendix A Subappendix C, the conceptual site model for AOC 1 South and AOC 1 North, respectively. For ease of review, these figures are included as Attachment A of this appendix.

For BCW gradient plots, the Y-global positioning system (GPS) coordinate for a soil sample was used to indicate the relative position of that sample along the x-axis, and the surface soil concentration was plotted on the y-axis of each gradient plot.

Stormwater runoff, when present at AOC 10, flows from west to east, with the upgradient western sampling locations representing areas closest to the TCS and the eastern downgradient sampling locations within or adjacent to subarea AOC10d. This is the drainage depression area west of the eastern most berm closest to the service road, before it transitions to sediment along the Colorado River (Figure SSTPA-2). For orientation of AOC 10 and potential downstream movement during flow events, please see Figure C4-2 of the *Final RFI/RI Work Plan* [CH2M Hill 2013], Appendix A Subappendix C, the conceptual site model for AOC 10 and Figure C4-2, the conceptual site model cross section for AOC 10. For ease of review, these figures are included as Attachment A.

For AOC 10 gradient plots, the X-GPS coordinate of a soil sample was used as an indicator of the relative position of that sample along the x-axis, and the surface soil concentration was plotted on the y-axis of each gradient plot.

3 TRANSPORT PATHWAY RESULTS FOR BCW

Historically, constituents in surface soil in BCW may have been eroded and entrained in stormwater/surface water runoff during flooding events and may have been subsequently re-deposited in downgradient areas, including potentially in the Tamarisk Thicket area. The Tamarisk Thicket area is approximately 5.1 acres in total and includes the area of BCW between locations AOC1-BCW2 through AOC1-BCW5 on its southern edge (closer to the TCS) and locations AOC1-BCW22, AOC1-BCW27 through AOC1-BCW30, AOC10-BCW6, and SS-1 on the northern edge (west of National Trails Highway, prior to the sediment area which is east of the National Trails Highway) as shown on Figure SSTPA-1b. The thick vegetation, widening of the channel near in the northern part of BCW (Tamarisk Thicket area), and blockage of flow by National Trails Highway greatly reduces the energy of flow during runoff events, resulting in deposition of entrained soil within the vegetated area in the Tamarisk Thicket area. This heavily vegetated portion of BCW is a long-term depositional area that has existed since before the compressor station was built (CH2M Hill 2013).

Figures SSTPA-3 through SSTPA-16 present the gradient plots for indicator chemicals for BCW. For orientation of BCW and potential transport pathway, refer to Figures C2-3 and C2-4 of the *Final RFI/RI Work Plan* [CH2M Hill 2013], Appendix A Subappendix C, the conceptual site model for AOC 1 South and AOC 1 North, respectively. For ease of review, these figures are included as Attachment A.

Note that all surface soil (0 to 1 ft bgs) sample locations at BCW are presented on Figures SSTPA-1a (south BCW) and SSTPA-1b (north BCW). Concentrations of indicator chemicals for surface soil at BCW are presented in Table SSTPA-1. To minimize overcrowding the plots with sample ID labels, only the sample locations referenced in the text below are labeled with sample IDs on the gradient plots (Figures SSTPA-3 through SSTPA-16) and these generally include the highest detected concentrations in the upgradient locations closer to the TCS (i.e., south of the Tamarisk Thicket area), the highest detected concentrations in the Tamarisk Thicket area (the area described above), and the northernmost locations in the BCW (i.e., locations on the northern edge of the Tamarisk Thicket just west of the National Trails Highway [AOC1-BCW22, AOC1-BCW27 through AOC1-BCW30, AOC1-BCW6, and SS-1], if surface soil data are available).

Results

For hexavalent chromium (Figure SSTPA-3a), surface soil concentrations above the BTV (0.83 milligram per kilogram [mg/kg]) were frequently detected in the upland locations, primarily in the SWMU 1 area. Concentrations of hexavalent chromium in surface soil samples decrease down the wash towards the river and are within the range of the background dataset for all samples north of Highway 40. The three samples with the highest concentrations downgradient in the Tamarisk Thicket area (AOC1-BCW4, AOC1-BCW6, and AOC1-BCW19), although they are above the BTV, are within the range of detected background concentrations (0.05 mg/kg to 4.3 mg/kg). These three sample concentrations, ranging from 1.3 mg/kg to 2.6 mg/kg (see Figure SSTPA-3b showing a truncated concentration scale to better visualize the downgradient soil concentrations), are considerably lower than upland concentrations (maximum of 47.5 mg/kg at WP-1 within SWMU 1). Note, hexavalent chromium in the remaining northern most locations within the Tamarisk Thicket were either non-detect (SS-1, AOC1-BCW22, AOC1-BCW27,

AOC1-BCW29, and AOC1-BCW30) or detected below the BTV (AOC1-BCW28 at 0.3 mg/kg) prior to the sediment area.

For total chromium (Figure SSTPA-4a), surface soil concentrations above the BTV (39.8 mg/kg) were detected across BCW, with elevated concentrations primarily in the SWMU 1 area. Concentrations of total chromium in surface soil samples decrease down the wash towards the river. Concentrations of total chromium are at or below the range of background concentrations (4.2 mg/kg to 53 mg/kg) in all samples north of Highway 40, except for two samples in the Tamarisk Thicket area (AOC1-BCW19 [58 mg/kg] and AOC1-BCW6 [71 mg/kg]). Total chromium concentrations in these two samples in the Tamarisk Thicket area (AOC-BCW19 and AOC1-BCW6) are less than two times the BTV and slightly above the maximum concentration (53 mg/kg) in the background dataset; (see Figure SSTPA-4b showing a truncated concentration scale to better visualize the downgradient soil concentrations). In the Tamarisk Thicket area, five samples (AOC1-BCW10, AOC1-BCW18, AOC1-BCW21, AOC1-BCW28, AOC1-BCW30) have concentrations ranging from 42 mg/kg to 52 mg/kg, which are within the range of background concentrations, but above the BTV. These highest sample concentrations in downgradient locations are considerably lower than upgradient locations (maximum of 2,600 mg/kg at SWMU1-WP-7 within the SWMU 1 area). Note, concentrations of total chromium are below the BTV or within the range background concentrations in the remaining northern most (downgradient) locations within the Tamarisk Thicket area (SS-1, AOC1-BCW22, AOC1-BCW27, and AOC1-BCW29), prior to the sediment area.

For dioxins/furan congeners, the trends indicate that concentrations generally decrease downgradient with the northernmost locations within the Tamarisk Thicket area. Where data are available (AOC1-BCW27 through AOC1-BCW30, and AOC10-BCW6; Figure SSTPA-1b) the dioxins/congeners are at low concentrations or non-detect.

For the three hexachlorodibenzo-p-dioxin (HxCDD) congeners (Figures SSTPA-5 through SSTPA-7), elevated detected concentrations are in the upland locations, primarily in the SWMU 1 area. The highest detected concentrations range from 1,600 nanograms per kilogram (ng/kg) [SWMU1-24] to 14,000 ng/kg [SWMU1-25], both for 1,2,3,6,7,8-HxCDD congener (Figure SSTPA-6). Concentrations decrease downgradient and the northern most locations within the Tamarisk Thicket area (AOC1-BCW27 through AOC1-BCW30 and AOC1-BCW6) either have low detected concentrations ranging from 1.3 ng/kg to 180 ng/kg or not detected (RLs ranging from 0.68 ng/kg to 13 ng/kg), which are considerably lower than the concentrations in the upgradient locations closer to the TCS.

For the four hexachlorodibenzofuran (HxCDF) congeners (Figures SSTPA-8 through SSTPA-11), elevated concentrations are in the upland locations, primarily in the SWMU 1 area. The highest detected concentration is 1,600 ng/kg [SWMU1-25] for 1,2,3,6,7,8-HxCDF (Figure SSTPA-8). The remaining HxCDF congeners (1,2,3,7,8,9-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,4,7,8-HxCDF) were infrequently detected at BCW and at low concentrations (ranging from 0.3 ng/kg [AOC1-T6D for 1,2,3,7,8,9-HxCDF; Figure SSTPA-10] to 150 ng/kg [SWMU1-24 for 1,2,3,4,7,8-HxCDF; Figure SSTPA-9]). However, the detected concentrations and the RLs for the non-detect samples follow the same general trend; (highest RLs for the non-detect congeners are in the SWMU 1 area and the maximum RL is 14,000 ng/kg [SWMU1-25; Figure SSTPA-11]). The trends indicate concentrations decrease downgradient and the northern most locations within the Tamarisk Thicket area (AOC1-BCW27 through AOC1-BCW30 and AOC1-BCW6) either have low detected concentrations (AOC1-BCW6 and AOC1-BCW30 at 14 ng/kg to 34 ng/kg), or are not detected (at RLs generally from 0.14 ng/kg to 86 ng/kg except for four locations:

AOC1-BCW28 [1,000 ng/kg], AOC1-BCW29 [600 ng/kg], AOC1-BCW30 [890 ng/kg], and AOC1-BCW6 [350 ng/kg] for 2,3,4,6,7,8-HxCDF), which are considerably lower than the concentrations in the upgradient locations closer to the TCS.

For the pentachlorodibenzo-p-dioxin (PeCDD) congener (Figure SSTPA-12), elevated concentrations are in the upland locations, primarily in the SWMU 1 area (highest detected concentration is 900 ng/kg at SWMU1-25). Concentrations decrease downgradient and the northern most locations within the Tamarisk Thicket area (AOC1-BCW27 through AOC1-BCW30 and AOC1-BCW6) either have low detected concentrations (AOC1-BCW6 at 14 ng/kg and AOC1-BCW30 at 12 mg/kg) or are non-detect (at RLs ranging from 0.82 ng/kg to 5.3 ng/kg), which are considerably lower than the concentrations in the upgradient locations closer to the TCS.

For the two pentachlorodibenzofuran (PeCDF) congeners (Figures SSTPA-13 and SSTPA-14), elevated concentrations are in the upland locations, primarily in the SWMU 1 area. The highest detected concentration is 1,600 ng/kg [SWMU1-25] for 2,3,4,7,8-PeCDF congener (Figure SSTPA-14). Both the congeners were infrequently detected at BCW. However, the detected concentrations and the RLs for the nondetect samples (maximum RL for the non-detect congeners is 92 ng/kg in the SWMU 1 area) follow the same general trend. The trends indicate concentrations decrease downgradient and the northern most locations within the Tamarisk Thicket area (AOC1-BCW27 through AOC1-BCW30 and AOC1-BCW6) either have low detected concentrations (AOC1-BCW28 [8.9 to 15 ng/kg]) or have no detected concentrations (at RLs ranging from 0.18 ng/kg to 8.8 ng/kg), which are considerably lower than the concentrations in the upgradient locations closer to the TCS.

For the TCDD congener (Figure SSTPA-15), elevated detected concentrations are in the upland locations, primarily in the SWMU 1 area (highest detected concentration is 67 ng/kg at SWMU1-25). TCDD was infrequently detected at BCW. Concentrations decrease downgradient and the northern most locations within the Tamarisk Thicket area has detected concentration at one location (AOC1-BCW30 at 0.5 ng/kg) and nondetects at remaining locations (AOC1-BCW27 through AOC1-BCW29 and AOC1-BCW6 at RLs ranging from 0.19 ng/kg to 1 ng/kg), which are considerably lower than the concentrations in the upgradient locations closer to the TCS.

For the tetrachlorodibenzofuran (TCDF) congener (Figure SSTPA-16), elevated detected concentrations are in the upland locations, primarily in the SWMU 1 area (highest detected concentration is 89 ng/kg at SWMU1-25). TCDF was infrequently detected at BCW. Concentrations decrease downgradient and the northern most locations within the Tamarisk Thicket area (AOC1-BCW27 through AOC1-BCW30 and AOC1-BCW6) either have low detected concentrations (ranging from 2 ng/kg to 2.7 ng/kg) or are not detected (at RLs ranging from 1.2 ng/kg to 2 ng/kg), which are considerably lower than the concentrations in the upgradient locations closer to the TCS.

To summarize, the gradient analyses for BCW indicate that concentrations of indicator chemicals decrease downgradient from the southern or upgradient locations (near the TCS) to northern locations in the Tamarisk Thicket area (towards the river). At BCW, the highest concentrations are located closer to the TCS and decrease down to the range of background concentrations or are not detected in the most downgradient locations west of the National Trails Highway prior to the sediment area at the mouth of BCW.

4 TRANSPORT PATHWAY RESULTS FOR AOC 10

As mentioned, AOC 10 is approximately 1,600 ft long and is bisected by three constructed berms (one constructed berm and two dirt roads, also constructed berms) and three drainage depressions referred to as subareas AOC10b, c, and d. For orientation of AOC 10 and potential transport pathway, refer to Figure C4-2 of the *Final RFI/RI Work Plan* [CH2M Hill 2013], Appendix A Subappendix C, the conceptual site model for AOC 10 and Figure C4-2, and the conceptual site model cross section for AOC 10. For ease of review, these figures are included as Attachment A. For discussion purposes, the berms are referred to as follows, facing eastward: the "western berm" (i.e., the berm closest to the TCS and east/front of subarea AOC10c); the "middle berm" (i.e., the berm east/front of subarea AOC10d); and the "eastern berm" (i.e., the berm farthest east, east of the service road and on top of the culvert). The eastern berm is the only berm that contains a culvert. Due to the berms, surface flow from most of the length of this ravine (i.e., west of the eastern berm that forms the eastern boundary of AOC10d) does not typically reach the Colorado River (CH2M Hill 2013). The drainage for this ravine includes runoff from the compressor station access road (a curb was installed along the access road in 2006), runoff from the mountains to the south, and runoff from the compressor station itself.

The gradient plots for AOC 10 are presented on Figures SSTPA-17 through SSTPA-30. Note that all surface soil (0 to 1 ft bgs) sample locations at AOC 10 are presented on Figure SSTPA-2. Concentrations of indicator chemicals in surface soil at AOC 10 are presented in Table SSTPA-2. To minimize overcrowding the plots with sample ID labels, only the sample locations referenced in the text below are labeled with sample IDs on the gradient plots (Figures SSTPA-17 through SSTPA-30) and these generally include the highest detected concentrations in the upgradient locations (from western locations near the TCS to eastern locations at or near subarea AOC10d) and the easternmost locations, where data are available (AOC10-6, AOC10-7, and AOC10-8).

Results

For hexavalent chromium (Figure SSTPA-17), surface soil concentrations above the BTV (0.83 mg/kg) were detected in several samples and the two highest concentrations are in the upgradient locations: DTSC-AOC10-10d-1 (31.5 mg/kg) located on the west end of subarea AOC10d (behind the middle berm) and AOC10b-3 (27.7 mg/kg) located on the west end of subarea AOC10b (behind the western berm). Detected concentrations of hexavalent chromium decrease moving further east towards the river down to concentrations below the BTV or within the range of background concentrations (0.05 mg/kg to 4.3 mg/kg). Hexavalent chromium was not detected in any of the samples east of subarea AOC10d (i.e., past the middle berm) including the eastern most locations (AOC10-6, AOC10-7, and AOC10-8 at RL of 0.4 mg/kg).

For total chromium (Figure SSTPA-18), surface soil concentrations above the BTV (39.8 mg/kg) were detected in several samples and the two highest concentrations are in the upgradient locations (same as hexavalent chromium): DTSC-AOC10-10d-1 (652 mg/kg) located on the west end of subarea AOC10d (behind the middle berm) and AOC10b-3 (820 mg/kg) located on the west end of subarea AOC10b (behind the western berm). Detected concentrations of total chromium decrease moving further east towards the river down to concentrations below the BTV or within the range of background concentrations (4.2 mg/kg to 53 mg/kg). Total chromium concentrations are less than the BTV for all samples east of

subarea AOC10d (i.e., past the middle berm) including the eastern most locations (AOC10-6, AOC10-7, and AOC10-8).

For dioxins/furan congeners, the trends indicate that concentrations generally decrease downgradient with the eastern most locations at low concentrations or not detected.

For the three HxCDD congeners (Figures SSTPA-19 through SSTPA-21), elevated detected concentrations are in the upgradient locations, primarily at subarea AOC10c (highest concentration detected at AOC10c-4 [330 ng/kg of 1,2,3,6,7,8-HxCDD], behind the western berm) and at AOC10-15 (210 ng/kg of 1,2,3,6,7,8-HxCDD) located on the eastern edge of subarea AOC10d (behind the middle berm). Concentrations decrease downgradient. The eastern most location sampled for dioxins/furans (AOC10-6, before the service road and behind the eastern berm) has low congener concentrations ranging from 2.2 ng/kg to 4.5 ng/kg.

For the four HxCDF congeners (Figures SSTPA-22 through SSTPA-25), concentrations are below the RL for the majority of the samples. The highest detected concentration was at AOC10-15 (62 ng/kg for 1,2,3,4,7,8-HxCDF; this congener was not detected in remaining samples with RLs ranging from 0.22 ng/kg to 100 ng/kg [AOC10c-4]; Figure SSTPA-22). Congeners 2,3,4,6,7,8-HxCDF (Figure SSTPA-25) and 1,2,3,7,8,9-HxCDF (Figure SSTPA-24) were not detected in any of the samples at AOC 10 with RLs ranging from 0.2 ng/kg (AOC10-26) to 2600 ng/kg (AOC10c-4). Congener 1,2,3,6,7,8-HxCDF was only detected in four samples in the upgradient locations, with the maximum detected concentration of 32 ng/kg at AOC10-12 (Figure SSTPA-23); the highest RL for non-detects is 92 ng/kg(AOC410c-4). The detected concentrations and the RLs for the non-detect samples follow the same trend. The trends indicate concentrations decrease downgradient. HxCDF congeners were not detected (RLs ranging from 0.75 ng/kg to 17 ng/kg) in the eastern most location sampled (AOC10-6).

For the PeCDD congener (Figure SSTPA-26), concentrations are below the RLs for the majority of the samples. The highest detected concentration was at AOC10-24 (3.4 ng/kg), located in subarea AOC10d (behind the middle berm); the highest RL for non-detects is 11 ng/kg (AOC10-15). Concentrations decrease downgradient. PeCDD was not detected (RL of 0.26 ng/kg) in the eastern most location sampled (AOC10-6).

For the two PeCDF congeners (Figures SSTPA-27 and SSTPA-28), concentrations are below the RLs for the majority of the samples. The highest detected concentration of 1,2,3,7,8-PeCDF is at AOC10-26 (0.51 ng/kg; highest RL for non-detects is 1 ng/kg [AOC10-15]) located at subarea AOC10d (Figure SSTPA-27). The highest detected concentration of 2,3,4,7,8-PeCDF is at AOC10-27 (7.7 ng/kg; highest RL for non-detects is 16 ng/kg [AOC10-15]), located in subarea AOC10d (Figure SSTPA-28). Concentrations decrease downgradient. PeCDF congeners were either not detected (RL of 0.34 ng/kg for 1,2,3,7,8-PeCDF) or detected at low concentrations (1.9 ng/kg for 2,3,4,7,8-PeCDF) in the eastern most location sampled (AOC10-6).

For the TCDD congener (Figure SSTPA-29), concentrations are below the RLs for the majority of the samples. The highest detected concentration was at AOC10-15 (4.1 ng/kg). Concentrations decrease downgradient. TCDD was not detected (RL of 0.099 ng/kg) in the eastern most location sampled (AOC10-6).

For the TCDF congener (Figure SSTPA-30), concentrations are below the RLs for the majority of the samples. The highest detected concentration was at AOC10-15 (8.2 ng/kg). Concentrations decrease

downgradient. TCDF was not detected (RL of 0.39 ng/kg) in the eastern most location sampled (AOC10-6).

To summarize, the gradient analyses for AOC 10 indicate that concentrations of indicator chemicals decrease in downgradient direction from the western or upgradient locations (near the TCS) to eastern most locations (towards the river). At AOC 10, the highest concentrations are located closer to the TCS and decrease down to the range of background concentrations or are not detected in the downgradient eastern most locations of AOC 10 prior to the sediment area in the mouth of East Ravine.

5 CONCLUSIONS

The purpose of this Surface Soil Transport Pathway Analysis is to evaluate whether surface soil constituents entrained in runoff reach the sediment depositional areas along the edge of the Colorado River (and eventually the river) in potentially significant amounts. Gradient analyses were completed to evaluate this transport pathway to the sediment depositional areas at the downstream ends of BCW and AOC 10. Conclusions of the gradient analyses for BCW and AOC 10 are discussed below.

5.1 BCW

For BCW, the gradient analyses indicate that concentrations of indicator chemicals decrease in the downgradient direction, from the southern or upgradient locations (near the TCS) to northern locations in the Tamarisk Thicket area (towards the river). At BCW, the highest concentrations are located closer to the TCS and decrease down to the range of background concentrations or are not detected in the most downgradient locations west of the National Trails Highway prior to the sediment area at the mouth of BCW.

Based on the gradient analyses and the physical characteristics of BCW, specifically the Tamarisk Thicket area, potential transport of indicator chemicals and other constituents from surface soil entrained in runoff from upland areas at BCW may potentially be complete. However, this pathway is not considered significant based on the low concentrations and non-detects in the northern most locations west of the National Trails Highway, before soil transitions to sediment. Therefore, an evaluation of the BCW sediment area east of the National Trails Highway was not required, as subsequent exposure pathways would be insignificant.

This conclusion is further supported by the fact that concentrations of the indicator chemicals (and dioxin TEQ) are low (below the BTVs) or not detected in the BCW sediment area. Hexavalent chromium was not detected in any of the eight historical sediment samples collected in 2003 (RLs ranging from 4.8 mg/kg to 6 mg/kg), total chromium was detected in all the 8 historical sediment samples at low concentrations below the soil BTV of 39.8 mg/kg collected in 2003 (ranging from 2.4 mg/kg to 24 mg/kg), and dioxin/furan congeners were detected at low concentrations in the two samples collected in 2017 (TEQ concentrations ranging from 0.13 ng/kg to 1.9 ng/kg, less than the BTV of 5.58 ng/kg).

5.2 AOC 10

For AOC 10, the gradient analyses indicate that concentrations of indicator chemicals decrease moving in the downgradient direction from the western or upgradient locations (near the TCS) to eastern most locations (towards the river). At AOC 10, the highest concentrations are located closer to the TCS and decrease down to the range of background concentrations or are not detected in the downgradient eastern most locations of AOC 10 prior to the sediment area in the mouth of East Ravine.

Based on the gradient analysis and the physical characteristics of AOC 10, potential transport of indicator chemicals and other constituents from surface soil entrained in runoff from upland areas at AOC 10 may potentially be complete. However, this pathway is not considered significant based on the low concentrations and non-detects in the eastern most locations of AOC 10, before soil transitions to

sediment. Therefore, an evaluation of the East Ravine sediment area was not required, as subsequent exposure pathways would be insignificant.

This conclusion is further supported by the fact that concentrations of the indicator chemicals (and dioxin TEQ) are low or not detected in the East Ravine sediment area. The 2016 sediment sampling and analysis from 10 locations at the mouth of East Ravine indicated that hexavalent chromium was not detected in any of the sediment samples (RLs ranging from 0.22 mg/kg to 0.79 mg/kg), total chromium was detected in all the samples at low concentrations below the BTV of 39.8 mg/kg (ranging from 2.3 mg/kg to 34 mg/kg), and dioxin/furan congeners were detected at low concentrations (TEQs ranging from 0.29 ng/kg to 0.44 ng/kg below the BTV of 5.58 ng/kg).

6 REFERENCES

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TABLES

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
AOC1-1	7614921.764	2100807.064	Soil	1/23/2016	0	0.5	Metal	Chromium, Hexavalent	12		mg/kg
AOC1-1	7614921.764	2100807.064	Soil	1/23/2016	0	0.5	Metal	Chromium, total	410		mg/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.66	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.41	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	1.5	J	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.45	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	1.1	J	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.23	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.4	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.4	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	5.3	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.16	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.08	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.14	U	ng/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-2	7614864.161	2100743.777	Soil	1/23/2016	0	0.5	Metal	Chromium, total	20		mg/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	62	J	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	40	U	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	230	J	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	35	U	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	140	J	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	47	U	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	37	J	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	3.4	U	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	3100	U	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	15	J	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.47	U	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Dioxins	2,3,7,8-TCDF	3.4	U	ng/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Metal	Chromium, Hexavalent	14		mg/kg
AOC1-3	7614900.933	2100818.751	Soil	1/25/2016	0	0.5	Metal	Chromium, total	410		mg/kg
AOC1-4	7614905.701	2100752.646	Soil	1/23/2016	0	0.5	Metal	Chromium, Hexavalent	0.2	U	mg/kg
AOC1-4	7614905.701	2100752.646	Soil	1/23/2016	0	0.5	Metal	Chromium, total	13		mg/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.37	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.44	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	0.47	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.58	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	1.6	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.25	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.47	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.11	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	6	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.12	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.087	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.098	U	ng/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-5	7614924.637	2102337.002	Soil	1/9/2017	0	0.5	Metal	Chromium, total	14		mg/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	1.6	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1.3	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	12	J	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	2.8	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	5.1	J	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	1.6	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.52	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	110	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.55	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.18	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.25	U	ng/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Metal	Chromium, Hexavalent	0.22		mg/kg
AOC1-6	7614846.11	2102777.087	Soil	1/9/2017	0	0.5	Metal	Chromium, total	23		mg/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	1.4	J	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1.8	J	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	7.7	J	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	1.8	U	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	0.29	U	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.8	U	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.8	U	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.13	U	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	61	U	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.65	U	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.33	U	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.38	J	ng/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-7	7614534.654	2103787.83	Soil	1/9/2017	0	0.5	Metal	Chromium, total	14		mg/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	1.2	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.54	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	5.4	J	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	1.9	J	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	2.9	J	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	4.4	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.84	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.35	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	41	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.26	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.19	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.35	U	ng/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-8	7614895.056	2101940.85	Soil	1/5/2017	0	0.5	Metal	Chromium, total	26		mg/kg
AOC1-BCW1	7614783.616	2103160.39	Soil	9/20/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-BCW1	7614783.616	2103160.39	Soil	9/20/2008	0	0.5	Metal	Chromium, total	23		mg/kg
AOC1-BCW2	7614565.407	2103958.328	Soil	10/4/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-BCW2	7614565.407	2103958.328	Soil	10/4/2008	0	0.5	Metal	Chromium, total	21		mg/kg
AOC1-BCW3	7614559.349	2104023.094	Soil	10/4/2008	0	0.5	Metal	Chromium, Hexavalent	0.42		mg/kg
AOC1-BCW3	7614559.349	2104023.094	Soil	10/4/2008	0	0.5	Metal	Chromium, total	25		mg/kg
AOC1-BCW4	7614623.415	2103860.799	Soil	10/4/2008	0	0.5	Metal	Chromium, Hexavalent	1.3		mg/kg
AOC1-BCW4	7614623.415	2103860.799	Soil	10/4/2008	0	0.5	Metal	Chromium, total	36		mg/kg
AOC1-BCW5	7614606.949	2103912.307	Soil	10/4/2008	0	0.5	Metal	Chromium, Hexavalent	0.45		mg/kg
AOC1-BCW5	7614606.949	2103912.307	Soil	10/4/2008	0	0.5	Metal	Chromium, total	35		mg/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	14	J	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	14	J	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	75	J	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	14	J	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	25	J	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	5.5	UJ	ng/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	1,2,3,7,8-PeCDD	5.3	UJ	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	1,2,3,7,8-PeCDF	4	UJ	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	350	UJ	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	2,3,4,7,8-PeCDF	5.5	UJ	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	2,3,7,8-TCDD	0.31	UJ	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Dioxins	2,3,7,8-TCDF	2	UJ	ng/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Metal	Chromium, Hexavalent	2.6		mg/kg
AOC1-BCW6	7615012.989	2104445.388	SoilSediment	8/22/2008	0	0.5	Metal	Chromium, total	71		mg/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.87	J	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1.8	J	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	5.6	J	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	3.2	U	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	2	U	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.59	J	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.35	U	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.19	U	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	37	U	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.39	U	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.17	J	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.26	J	ng/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.29		mg/kg
AOC1-BCW7	7614748.934	2103252.677	Soil	2/5/2016	0	0.5	Metal	Chromium, total	18		mg/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	3.2	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	4.9	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	15		ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	4.3	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	5.9	J	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	5.6	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.5	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.73	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	120	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.63	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.18	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.66	U	ng/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.22	U	mg/kg
AOC1-BCW8	7614652.598	2103899.738	Soil	2/4/2016	0	0.5	Metal	Chromium, total	21		mg/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	3.7	J	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	11	U	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	22		ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	9.7	U	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	7.7	J	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	1.8	U	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.23	U	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	1.2	U	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	220	U	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	1.9	U	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.13	U	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	1.5	J	ng/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.22	U	mg/kg
AOC1-BCW9	7614606.192	2103987.815	Soil	2/4/2016	0	0.5	Metal	Chromium, total	35		mg/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	7.1	U	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1.1	U	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	88		ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	45	U	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	23		ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	1.3	U	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	4.2	U	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.58	U	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	570	U	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	5.1	J	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.4	U	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	2.3	J	ng/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-BCW10	7614563.574	2104042.745	Soil	2/4/2016	0	0.5	Metal	Chromium, total	52		mg/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	1.9	J	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	2.8	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	8.6	J	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	4.9	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	3.7	J	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	1.1	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.35	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.19	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	58	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.21	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.36	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.36	U	ng/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	UJ	mg/kg
AOC1-BCW11	7614673.433	2104054.109	Soil	2/4/2016	0	0.5	Metal	Chromium, total	19		mg/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	13		ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	7.7	U	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	41		ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	6.8	U	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	15		ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	8.7	U	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	4.4	J	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	7.5	U	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	380	U	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	5.8	J	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.32	U	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	2.5	J	ng/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.23	U	mg/kg
AOC1-BCW12	7614628.921	2104110.933	Soil	2/4/2016	0	0.5	Metal	Chromium, total	29		mg/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	2.6	J	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	5	J	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	16		ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	10	U	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	5.4	U	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.78	U	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.3	U	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.26	U	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	140	U	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	2.1	J	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.27	J	ng/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.9	J	ng/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-BCW13	7614749.198	2104109.986	Soil	2/4/2016	0	0.5	Metal	Chromium, total	29		mg/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	3.8	J	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	3.1	J	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	0.4	U	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	1.5	J	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	7.4	J	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	3.7	U	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1	U	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	1.6	U	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	1.1	J	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	1.6	U	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.52	U	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.9	J	ng/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-BCW14	7614683.851	2104199.01	Soil	2/4/2016	0	0.5	Metal	Chromium, total	28		mg/kg
AOC1-BCW15	7614826.857	2104175.333	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.23	U	mg/kg
AOC1-BCW15	7614826.857	2104175.333	Soil	2/4/2016	0	0.5	Metal	Chromium, total	21		mg/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	4.5	J	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	7.1	U	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	24	J	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	2	U	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	9.4	J	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	2.4	U	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	3.8	J	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	1.1	U	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	190	U	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	1.2	U	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.48	U	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.3	U	ng/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.22	U	mg/kg
AOC1-BCW16	7614770.981	2104252.992	Soil	2/4/2016	0	0.5	Metal	Chromium, total	30		mg/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.24	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.26	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	0.21	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.23	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	0.21	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.3	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.13	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.28	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	0.26	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.12	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.06	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.17	U	ng/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.23	U	mg/kg
AOC1-BCW17	7614727.416	2104306.975	Soil	2/4/2016	0	0.5	Metal	Chromium, total	15		mg/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	2.8	U	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	6.8	J	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	21		ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.46	U	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	7.4	J	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	1.2	U	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.7	U	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	1.1	J	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	110	U	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.8	U	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.21	U	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.49	U	ng/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.26	U	mg/kg
AOC1-BCW18	7614965.84	2104187.137	Soil	2/5/2016	0	0.5	Metal	Chromium, total	46		mg/kg
AOC1-BCW19	7614913.987	2104252.045	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	1.4		mg/kg
AOC1-BCW19	7614913.987	2104252.045	Soil	2/5/2016	0	0.5	Metal	Chromium, total	58		mg/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	1.3	J	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.24	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	6.1	J	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	3.1	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	2.7	J	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.28	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.26	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.32	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	42	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.34	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.068	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.064	U	ng/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-BCW20	7614860.004	2104318.34	Soil	2/5/2016	0	0.5	Metal	Chromium, total	20		mg/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	5.2	J	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	14		ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	44		ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	23	U	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	16		ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	3.8	J	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	4.6	J	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.2	U	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	5.5	J	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	3.5	J	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.29	U	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.48	U	ng/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.23	U	mg/kg
AOC1-BCW21	7614804.128	2104383.687	Soil	2/5/2016	0	0.5	Metal	Chromium, total	42		mg/kg
AOC1-BCW22	7615139.986	2104171.75	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-BCW22	7615139.986	2104171.75	Soil	2/5/2016	0	0.5	Metal	Chromium, total	12		mg/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	4	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	3.4	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	16		ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	4.5	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	4.9	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	1.5	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	2.3	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	5.7	J	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	170	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	2.3	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.34	U	ng/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	3.1	J	ng/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.26	U	mg/kg
AOC1-BCW23	7615058.887	2104231.21	Soil	2/5/2016	0	0.5	Metal	Chromium, total	38		mg/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	4.9	J	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	4.7	U	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	20		ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	4.1	U	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	12	J	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	5.3	U	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.7	J	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	2	U	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	160	U	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	2	U	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.15	U	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.93	U	ng/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.24	U	mg/kg
AOC1-BCW24	7614991.646	2104306.975	Soil	2/5/2016	0	0.5	Metal	Chromium, total	30		mg/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	7.8	J	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1.7	U	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	50	J	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	29	U	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	16		ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	2	U	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	4.7	J	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	1	U	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	400	U	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	1.1	U	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.16	U	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	1.4	J	ng/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.26	U	mg/kg
AOC1-BCW25	7614935.769	2104394.104	Soil	2/5/2016	0	0.5	Metal	Chromium, total	39		mg/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	16		ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	18		ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	95		ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	15		ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	30		ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	13	U	ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.7	U	ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	3.1	U	ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	540	U	ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	7.8	J	ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.5	U	ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	2.6	J	ng/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.22	U	mg/kg
AOC1-BCW26	7614878.945	2104449.981	Soil	2/4/2016	0	0.5	Metal	Chromium, total	35		mg/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.68	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.14	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	3.5	J	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	2.9	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	1.3	J	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.25	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.82	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.18	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	25	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	2	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.19	U	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.7	J	ng/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.24	U	mg/kg
AOC1-BCW27	7615108.377	2104274.661	Soil	2/5/2016	0	0.5	Metal	Chromium, total	33		mg/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	23		ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	74	U	ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	180		ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	68	U	ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	53		ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	86	U	ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	14		ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	8.9	J	ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	1000	U	ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	15		ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDD	1	U	ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Dioxins	2,3,7,8-TCDF	2.7	J	ng/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Metal	Chromium, Hexavalent	0.3		mg/kg
AOC1-BCW28	7615052.349	2104365.163	Soil	2/5/2016	0	0.5	Metal	Chromium, total	49		mg/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	13	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	12	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	68		ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	12	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	12	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	14	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	2.4	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	10	J	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	600	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	4.1	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.39	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	1.2	U	ng/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.26	U	mg/kg
AOC1-BCW29	7615004.916	2104437.237	Soil	2/4/2016	0	0.5	Metal	Chromium, total	33		mg/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	22		ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	34		ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	5.8	U	ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	32		ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	49		ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	9.1	U	ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	12	J	ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	8.8	U	ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	890	U	ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	13		ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.5	J	ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Dioxins	2,3,7,8-TCDF	7		ng/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Metal	Chromium, Hexavalent	0.24	U	mg/kg
AOC1-BCW30	7614961.575	2104488.167	Soil	2/4/2016	0	0.5	Metal	Chromium, total	42		mg/kg
AOC1-T1a	7614836.272	2100989.848	Soil	10/16/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
AOC1-T1a	7614836.272	2100989.848	Soil	10/16/2008	0	0.5	Metal	Chromium, total	19		mg/kg
AOC1-T1b	7614885.649	2100966.933	Soil	10/16/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
AOC1-T1b	7614885.649	2100966.933	Soil	10/16/2008	0	0.5	Metal	Chromium, total	43	J	mg/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
AOC1-T1c	7614934	2100944.838	Soil	10/16/2008	0	0.5	Metal	Chromium, Hexavalent	0.6		mg/kg
AOC1-T1c	7614934	2100944.838	Soil	10/16/2008	0	0.5	Metal	Chromium, total	44		mg/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	4	J	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	3	U	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	15		ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	4	J	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	8.9	J	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	3.5	U	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	2.1	J	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.8	U	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	84	U	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.31	U	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	2,3,7,8-TCDD	0.23	J	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Dioxins	2,3,7,8-TCDF	0.12	U	ng/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-T1e	7614984.48	2101004.412	Soil	1/11/2016	0	1	Metal	Chromium, total	26		mg/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	3.6	J	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	11	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	13		ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	9.1	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	0.54	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	12	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.76	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.66	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	140	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.69	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	2,3,7,8-TCDD	0.11	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Dioxins	2,3,7,8-TCDF	0.51	U	ng/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Metal	Chromium, Hexavalent	0.71		mg/kg
AOC1-T1f	7614964.635	2100976.839	Soil	1/12/2016	0	1	Metal	Chromium, total	49		mg/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	1.4	J	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.79	J	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.34	J	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.5	U	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.06	U	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Metal	Chromium, Hexavalent	0.2	U	mg/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Metal	Chromium, total	26		mg/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1.2	J	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	7.7	J	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	2.7	J	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.31	U	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.55	U	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	28	U	ng/kg
AOC1-T1g	7614895.779	2101007.825	Soil	2/17/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.066	U	ng/kg
AOC1-T2a	7614885.644	2101093.455	Soil	10/5/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T2a	7614885.644	2101093.455	Soil	10/5/2008	0	0.5	Metal	Chromium, total	26		mg/kg
AOC1-T2b	7614919.894	2101106.788	Soil	10/16/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
AOC1-T2b	7614919.894	2101106.788	Soil	10/16/2008	0	0.5	Metal	Chromium, total	26		mg/kg
AOC1-T2c	7614969.441	2101119.868	Soil	10/8/2008	0	0.5	Metal	Chromium, Hexavalent	1.3		mg/kg
AOC1-T2c	7614969.441	2101119.868	Soil	10/8/2008	0	0.5	Metal	Chromium, total	60		mg/kg
AOC1-T2d	7614920.312	2101069.299	Soil	10/7/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
AOC1-T2d	7614920.312	2101069.299	Soil	10/7/2008	0	0.5	Metal	Chromium, total	46		mg/kg
AOC1-T2e	7614932.57	2101201.7	Soil	10/16/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
AOC1-T2e	7614932.57	2101201.7	Soil	10/16/2008	0	0.5	Metal	Chromium, total	34		mg/kg
AOC1-T2f	7615066.214	2101246.863	Soil	12/17/2015	0	1	Metal	Chromium, Hexavalent	0.22		mg/kg
AOC1-T2f	7615066.214	2101246.863	Soil	12/17/2015	0	1	Metal	Chromium, total	14		mg/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	3.4	J	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	1.1	U	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	23		ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	27	U	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	5.9	J	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	1.3	U	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.86	U	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.66	U	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	290	UJ	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.59	U	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	2,3,7,8-TCDD	0.13	U	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Dioxins	2,3,7,8-TCDF	0.18	U	ng/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Metal	Chromium, Hexavalent	2.5		mg/kg
AOC1-T2h	7614910.163	2101053.484	Soil	3/4/2016	0	1	Metal	Chromium, total	100	J	mg/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	1.7	J	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.62	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	14		ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	20	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	2.6	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.72	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.12	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.42	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	220	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.13	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	2,3,7,8-TCDD	0.044	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Dioxins	2,3,7,8-TCDF	0.22	U	ng/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Metal	Chromium, Hexavalent	0.61		mg/kg
AOC1-T2i	7614910.628	2101103.63	Soil	3/5/2016	0	1	Metal	Chromium, total	28		mg/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	0.93	J	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.31	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	4.6	J	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.3	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	1.4	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.36	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.25	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.098	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	21	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.26	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	2,3,7,8-TCDD	0.052	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Dioxins	2,3,7,8-TCDF	0.1	U	ng/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Metal	Chromium, Hexavalent	0.6		mg/kg
AOC1-T2j	7614910.421	2101090.583	Soil	3/5/2016	0	1	Metal	Chromium, total	31		mg/kg
AOC1-T3a	7614894.603	2101328.894	Soil	10/5/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T3a	7614894.603	2101328.894	Soil	10/5/2008	0	0.5	Metal	Chromium, total	24		mg/kg
AOC1-T3b	7614924.51	2101331.299	Soil	10/5/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T3b	7614924.51	2101331.299	Soil	10/5/2008	0	0.5	Metal	Chromium, total	23		mg/kg
AOC1-T3c	7614947.53	2101338.068	Soil	10/5/2008	0	0.5	Metal	Chromium, Hexavalent	0.42		mg/kg
AOC1-T3c	7614947.53	2101338.068	Soil	10/5/2008	0	0.5	Metal	Chromium, total	27		mg/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
AOC1-T4a	7614838.383	2101471.969	Soil	10/3/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T4a	7614838.383	2101471.969	Soil	10/3/2008	0	0.5	Metal	Chromium, total	28		mg/kg
AOC1-T4b	7614863.01	2101478.305	Soil	10/2/2008	0	0.5	Metal	Chromium, Hexavalent	1.3		mg/kg
AOC1-T4b	7614863.01	2101478.305	Soil	10/2/2008	0	0.5	Metal	Chromium, total	21		mg/kg
AOC1-T4c	7614878.662	2101483.188	Soil	10/4/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T4c	7614878.662	2101483.188	Soil	10/4/2008	0	0.5	Metal	Chromium, total	19		mg/kg
AOC1-T5a	7614855.449	2101568.989	Soil	10/4/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T5a	7614855.449	2101568.989	Soil	10/4/2008	0	0.5	Metal	Chromium, total	21		mg/kg
AOC1-T5b	7614843.088	2101613.991	Soil	10/4/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T5b	7614843.088	2101613.991	Soil	10/4/2008	0	0.5	Metal	Chromium, total	26		mg/kg
AOC1-T5c	7614887.335	2101602.915	Soil	10/4/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T5c	7614887.335	2101602.915	Soil	10/4/2008	0	0.5	Metal	Chromium, total	15		mg/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	1.4	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	1.2	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	9.1	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	1.1	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	3.7	J	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	1.4	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.19	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.6	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	96	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	1.3	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	2,3,7,8-TCDD	0.1	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Dioxins	2,3,7,8-TCDF	0.54	U	ng/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Metal	Chromium, Hexavalent	0.2	U	mg/kg
AOC1-T5D	7614857.361	2101639.552	Soil	1/12/2016	0	1	Metal	Chromium, total	23		mg/kg
AOC1-T6a	7614878.765	2102015.762	Soil	9/30/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T6a	7614878.765	2102015.762	Soil	9/30/2008	0	0.5	Metal	Chromium, total	20		mg/kg
AOC1-T6b	7614899.594	2102012.569	Soil	9/30/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T6b	7614899.594	2102012.569	Soil	9/30/2008	0	0.5	Metal	Chromium, total	26		mg/kg
AOC1-T6c	7614914.324	2102008.861	Soil	9/30/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC1-T6c	7614914.324	2102008.861	Soil	9/30/2008	0	0.5	Metal	Chromium, total	18		mg/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.84	U	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.051	U	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	3.8	J	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.34	U	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	1.7	J	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.34	J	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.49	U	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.23	U	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	58	U	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.27	U	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.4	U	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.31	J	ng/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Metal	Chromium, Hexavalent	0.2	UJ	mg/kg
AOC1-T6D	7614923.82	2102061.481	Soil	2/9/2016	0	0.5	Metal	Chromium, total	19		mg/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.65	J	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.81	J	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	4	J	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.44	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	0.66	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.43	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.32	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.088	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	37	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.069	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.13	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.038	U	ng/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC1-T7	7614915.667	2101358.054	Soil	2/19/2017	0	0.5	Metal	Chromium, total	23		mg/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	2.2	J	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	2.2	J	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	11	J	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	1.2	U	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	4.9	J	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.69	J	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.2	U	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	1	J	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	110	U	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.64	U	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.17	U	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.25	J	ng/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Metal	Chromium, Hexavalent	0.23		mg/kg
AOC1-T8	7614853.952	2101513.294	Soil	2/18/2017	0	0.5	Metal	Chromium, total	43		mg/kg
AOC4-1	7614727.511	2100224.495	Soil	10/14/2008	0	0.5	Metal	Chromium, Hexavalent	0.49		mg/kg
AOC4-1	7614727.511	2100224.495	Soil	10/14/2008	0	0.5	Metal	Chromium, total	47		mg/kg
AOC4-1	7614727.511	2100224.495	Soil	10/14/2008	0.5	1	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC4-1	7614727.511	2100224.495	Soil	10/14/2008	0.5	1	Metal	Chromium, total	32		mg/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	16		ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	21	U	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	88		ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	13	U	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	29		ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	12.5	U	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8-PeCDD	12.5	U	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8-PeCDF	12.5	U	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	12.5	U	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	2,3,4,7,8-PeCDF	6.5	J	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	2,3,7,8-TCDD	5	U	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Dioxins	2,3,7,8-TCDF	5	U	ng/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Metal	Chromium, Hexavalent	0.44	U	mg/kg
AOC4-GB10	7614751.611	2100201.206	Soil	2/10/2010	0	0.5	Metal	Chromium, total	35	J	mg/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	28	U	ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	17	U	ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	12.5	U	ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8-PeCDD	12.5	U	ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8-PeCDF	3.7	J	ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	2,3,7,8-TCDF	5	U	ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Metal	Chromium, total	31		mg/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	5.5	J	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	12.5	U	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	14		ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	12.5	U	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	12.5	U	ng/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	12.5	U	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8-PeCDD	12.5	U	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8-PeCDF	12.5	U	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	12.5	U	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	2,3,4,7,8-PeCDF	1.4	J	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	2,3,7,8-TCDD	5	U	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Dioxins	2,3,7,8-TCDF	5	U	ng/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Metal	Chromium, Hexavalent	0.44	U	mg/kg
AOC4-GB12	7614764.114	2100194.108	Soil	2/10/2010	0	0.5	Metal	Chromium, total	35		mg/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	21		ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	160		ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	39		ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	22		ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	2,3,4,7,8-PeCDF	14		ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Dioxins	2,3,7,8-TCDD	1.7	J	ng/kg
AOC4-GB11	7614751.456	2100190.097	Soil	2/10/2010	0	0.5	Metal	Chromium, Hexavalent	0.57		mg/kg
MW-10	7614886.6	2100984.2	Soil	6/27/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
MW-10	7614886.6	2100984.2	Soil	6/27/1997	1	1	Metal	Chromium, total	14.2		mg/kg
MW-11	7614865.33	2101557.09	Soil	6/29/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
MW-11	7614865.33	2101557.09	Soil	6/29/1997	1	1	Metal	Chromium, total	12.2		mg/kg
SS-1	7615042.386	2104421.874	SoilSediment	6/29/1997	0.5	0.5	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SS-1	7615042.386	2104421.874	SoilSediment	6/29/1997	0.5	0.5	Metal	Chromium, total	38.2		mg/kg
SS-2	7614585.016	2103872.136	Soil	6/29/1997	0.5	0.5	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SS-2	7614585.016	2103872.136	Soil	6/29/1997	0.5	0.5	Metal	Chromium, total	18.9		mg/kg
SS-3	7614793.031	2100765.402	Soil	6/29/1997	0.5	0.5	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SS-4	7614939.355	2101160.2	Soil	6/29/1997	0.5	0.5	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SS-5	7614877.236	2101456.989	Soil	6/29/1997	0.5	0.5	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SS-6	7614891.04	2101956.699	Soil	6/29/1997	0.5	0.5	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SS-7	7614759.901	2103194.931	Soil	6/29/1997	0.5	0.5	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SS-8	7614608.055	2103642.185	Soil	6/29/1997	0.5	0.5	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-1	7614726.771	2100269.833	Soil	6/25/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-1	7614726.771	2100269.833	Soil	6/25/1997	1	1	Metal	Chromium, total	13.7		mg/kg
SSB-6	7614929.692	2101128.451	Soil	6/30/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-6	7614929.692	2101128.451	Soil	6/30/1997	1	1	Metal	Chromium, total	13.7		mg/kg
SSB-7	7614929.692	2101328.611	Soil	6/30/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-7	7614929.692	2101328.611	Soil	6/30/1997	1	1	Metal	Chromium, total	19.8		mg/kg
SSB-8	7614859.291	2102754.579	Soil	7/10/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-8	7614859.291	2102754.579	Soil	7/10/1997	1	1	Metal	Chromium, total	53.1		mg/kg
SSB-9	7614581.827	2103694.641	Soil	7/10/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-9	7614581.827	2103694.641	Soil	7/10/1997	1	1	Metal	Chromium, total	17.3		mg/kg
RR-1	7614854.175	2101833.645	Soil	2/2/2000	0	0	Metal	Chromium, Hexavalent	0.5	U	mg/kg
RR-1	7614854.175	2101833.645	Soil	2/2/2000	0	0	Metal	Chromium, total	23.4		mg/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	3.8	J	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	9	J	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	26		ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	3.1	U	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	8.4	J	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.23	U	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.16	U	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Metal	Chromium, total	28	J	mg/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	1.3	J	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.3	U	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	260	U	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	2.1	U	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.075	U	ng/kg
AOC16-5	7614882.826	2100611.992	Soil	2/20/2017	0	0.5	Metal	Chromium, Hexavalent	0.61		mg/kg
PA-03	7614884.777	2100463.889	Soil	11/9/2015	0	1	Metal	Chromium, Hexavalent	0.65		mg/kg
PA-03	7614884.777	2100463.889	Soil	11/9/2015	0	1	Metal	Chromium, total	26		mg/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	0.18	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.27	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	0.48	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.16	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	0.17	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.14	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.17	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.1	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	1.5	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.11	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDD	0.029	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDF	0.046	U	ng/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC4-BCW1	7614744.833	2100309.463	Soil	1/6/2016	0	1	Metal	Chromium, total	14		mg/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	0.2	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.16	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	1.5	J	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.15	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	0.77	J	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.18	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.15	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.13	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	4.4	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.14	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDD	0.22	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDF	0.26	U	ng/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC4-BCW2	7614731.437	2100251.155	Soil	1/6/2016	0	1	Metal	Chromium, total	14		mg/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	17		ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	28	U	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	8.9	J	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	5	J	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	8	J	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDF	3	J	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	2.8	U	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	170	J	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	46		ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	3.2	U	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	1400	U	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDD	0.89	U	ng/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Metal	Chromium, Hexavalent	2.3	J	mg/kg
AOC4-BCW3	7614726.761	2100260.486	Soil	1/6/2016	0	1	Metal	Chromium, total	48	J	mg/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	1.7	U	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.51	U	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	9.2	J	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.47	U	ng/kg

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	4	J	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.59	U	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.86	J	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.87	U	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	58	U	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.94	U	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDD	0.15	U	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDF	0.31	U	ng/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC4-BCW4	7614711.959	2100225.185	Soil	1/6/2016	0	1	Metal	Chromium, total	28		mg/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	0.11	J	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	0.036	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	0.033	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	0.39	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Metal	Chromium, Hexavalent	0.22	U	mg/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Metal	Chromium, total	18		mg/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.061	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.056	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.071	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.067	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.057	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.061	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDD	0.053	U	ng/kg
AOC4-BCW5	7614731.275	2100201.761	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDF	0.089	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	0.43	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.18	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	1.8	J	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.26	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	1	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.21	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.32	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.54	J	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	8.9	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.14	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDD	0.031	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Dioxins	2,3,7,8-TCDF	0.17	U	ng/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Metal	Chromium, Hexavalent	0.2	U	mg/kg
AOC4-BCW6	7614700.38	2100185.162	Soil	1/6/2016	0	1	Metal	Chromium, total	13		mg/kg
PA-01	7615154.708	2101109.797	Soil	11/9/2015	0	1	Metal	Chromium, Hexavalent	0.65		mg/kg
PA-01	7615154.708	2101109.797	Soil	11/9/2015	0	1	Metal	Chromium, total	20		mg/kg
PA-04	7614877.749	2100380.887	Soil	11/9/2015	0	1	Metal	Chromium, Hexavalent	0.69		mg/kg
PA-04	7614877.749	2100380.887	Soil	11/9/2015	0	1	Metal	Chromium, total	36		mg/kg
PA-14	7615194.078	2101196.732	Soil	1/27/2016	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
PA-14	7615194.078	2101196.732	Soil	1/27/2016	0	1	Metal	Chromium, total	20		mg/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	21	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	19	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	85	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	25	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	43	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	4.5	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	10	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	4	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	340	UJ	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	6.7	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	2,3,7,8-TCDD	0.93	UJ	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Dioxins	2,3,7,8-TCDF	4.2	J	ng/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Metal	Chromium, Hexavalent	1.1		mg/kg
PA-15	7614965.543	2100659.391	Soil	1/27/2016	0	1	Metal	Chromium, total	170		mg/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	7.2	J	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	6	J	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	24	J	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	7.1	J	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	12	J	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	1.6	J	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.95	UJ	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	2.1	J	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	110	UJ	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	2.3	J	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	2,3,7,8-TCDD	0.63	UJ	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Dioxins	2,3,7,8-TCDF	1.2	UJ	ng/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Metal	Chromium, Hexavalent	1.3		mg/kg
PA-16	7614888.144	2100588.348	Soil	1/27/2016	0	1	Metal	Chromium, total	47		mg/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	1.2	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.51	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	6.5	J	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.84	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	3.1	J	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.59	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.86	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.98	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	19	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.25	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	2,3,7,8-TCDD	0.091	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Dioxins	2,3,7,8-TCDF	0.77	UJ	ng/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
PA-17	7614878.49	2100321.803	Soil	1/27/2016	0	1	Metal	Chromium, total	25		mg/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	49		ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	1.4	U	ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	170		ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	15		ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	85		ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	9	J	ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	24		ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	1.4	U	ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	1200	U	ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	9.1	J	ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	2,3,7,8-TCDD	3.1	J	ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Dioxins	2,3,7,8-TCDF	2.7	J	ng/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Metal	Chromium, Hexavalent	0.72		mg/kg
SD-14	7614984.068	2101029.723	Soil	1/11/2016	0	1	Metal	Chromium, total	29		mg/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	7.1	J	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.71	U	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	36		ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	2.9	J	ng/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	14		ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.83	U	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	3.6	J	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.9	U	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	240	U	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	2.5	J	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.56	U	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Dioxins	2,3,7,8-TCDF	1	U	ng/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Metal	Chromium, Hexavalent	0.77		mg/kg
SD-15	7614962.873	2100824.299	Soil	1/12/2016	0	0.5	Metal	Chromium, total	19		mg/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.1	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.11	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	0.3	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.098	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	0.097	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.12	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.069	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.052	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	1.1	J	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.056	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.041	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.3	U	ng/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
SD-16	7614970.356	2100735.081	Soil	1/12/2016	0	0.5	Metal	Chromium, total	16		mg/kg
SD-17	7615008.932	2100723.675	Soil	12/17/2015	0	0.5	Metal	Chromium, Hexavalent	0.2	U	mg/kg
SD-17	7615008.932	2100723.675	Soil	12/17/2015	0	0.5	Metal	Chromium, total	17		mg/kg
SD-18	7614826.953	2100379.192	Soil	12/17/2015	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
SD-18	7614826.953	2100379.192	Soil	12/17/2015	0	0.5	Metal	Chromium, total	32		mg/kg
SD-19	7614784.082	2100401.339	Soil	1/13/2016	0	0.5	Metal	Chromium, Hexavalent	0.21	U	mg/kg
SD-19	7614784.082	2100401.339	Soil	1/13/2016	0	0.5	Metal	Chromium, total	30		mg/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	0.61	UJ	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	1.4	UJ	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	3.5	J	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	1.7	J	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	2	J	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.28	UJ	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.24	UJ	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.97	UJ	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	9.4	UJ	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	2.4	J	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	2,3,7,8-TCDD	0.099	UJ	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Dioxins	2,3,7,8-TCDF	1.7	J	ng/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
SD-25	7614824.354	2100300.675	Soil	3/10/2016	0	1	Metal	Chromium, total	23		mg/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	14	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	8.3	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	36	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	8.2	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	21	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	2.6	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	6.2	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	2.2	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	93	UJ	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	4.2	J	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	2,3,7,8-TCDD	0.68	UJ	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Dioxins	2,3,7,8-TCDF	2.4	UJ	ng/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Metal	Chromium, Hexavalent	0.32		mg/kg
SD-26	7614824.069	2100238.022	Soil	3/10/2016	0	1	Metal	Chromium, total	24		mg/kg
MW-9	7614780.27	2100673.29	Soil	6/30/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
MW-9	7614780.27	2100673.29	Soil	6/30/1997	1	1	Metal	Chromium, total	15		mg/kg
SSB-2	7614793.031	2100556.959	Soil	6/30/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-2	7614793.031	2100556.959	Soil	6/30/1997	1	1	Metal	Chromium, total	48.7		mg/kg
SSB-3	7614750.238	2100556.959	Soil	6/30/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-3	7614750.238	2100556.959	Soil	6/30/1997	1	1	Metal	Chromium, total	8.2		mg/kg
SSB-4	7614820.639	2100776.445	Soil	6/30/1997	1	1	Metal	Chromium, Hexavalent	0.05	U	mg/kg
SSB-4	7614820.639	2100776.445	Soil	6/30/1997	1	1	Metal	Chromium, total	10.1		mg/kg
SSB-5	7614798.552	2100797.151	Soil	6/30/1997	1	1	Metal	Chromium, Hexavalent	0.06		mg/kg
SSB-5	7614798.552	2100797.151	Soil	6/30/1997	1	1	Metal	Chromium, total	521		mg/kg
SWMU1-1	7614876.02	2100919.295	Soil	10/16/2008	0	0.5	Metal	Chromium, Hexavalent	0.52		mg/kg
SWMU1-1	7614876.02	2100919.295	Soil	10/16/2008	0	0.5	Metal	Chromium, total	44		mg/kg
SWMU1-2	7614843.58	2100875.931	Soil	10/15/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
SWMU1-2	7614843.58	2100875.931	Soil	10/15/2008	0	0.5	Metal	Chromium, total	26		mg/kg
SWMU1-3	7614831.553	2100845.662	Soil	10/6/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
SWMU1-3	7614831.553	2100845.662	Soil	10/6/2008	0	0.5	Metal	Chromium, total	28		mg/kg
SWMU1-4	7614796.22	2100786.216	Soil	10/15/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
SWMU1-4	7614796.22	2100786.216	Soil	10/15/2008	0	0.5	Metal	Chromium, total	17		mg/kg
SWMU1-6	7614782.758	2100747.027	Soil	10/15/2008	0	0.5	Metal	Chromium, Hexavalent	1.3		mg/kg
SWMU1-6	7614782.758	2100747.027	Soil	10/15/2008	0	0.5	Metal	Chromium, total	220		mg/kg
SWMU1-7	7614810.425	2100742.016	Soil	10/15/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
SWMU1-7	7614810.425	2100742.016	Soil	10/15/2008	0	0.5	Metal	Chromium, total	27		mg/kg
SWMU1-8	7614783.835	2100703.71	Soil	10/15/2008	0	0.5	Metal	Chromium, Hexavalent	0.62		mg/kg
SWMU1-8	7614783.835	2100703.71	Soil	10/15/2008	0	0.5	Metal	Chromium, total	120		mg/kg
SWMU1-9	7614779.114	2100683.914	Soil	10/14/2008	0	0.5	Metal	Chromium, Hexavalent	0.7		mg/kg
SWMU1-9	7614779.114	2100683.914	Soil	10/14/2008	0	0.5	Metal	Chromium, total	87		mg/kg
SWMU1-10	7614740.016	2100669.636	Soil	10/14/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
SWMU1-10	7614740.016	2100669.636	Soil	10/14/2008	0	0.5	Metal	Chromium, total	19		mg/kg
SWMU1-11	7614799.647	2100695.945	Soil	10/15/2008	0	0.5	Metal	Chromium, Hexavalent	1.8		mg/kg
SWMU1-11	7614799.647	2100695.945	Soil	10/15/2008	0	0.5	Metal	Chromium, total	200		mg/kg
SWMU1-12	7614741.61	2100634.657	Soil	10/14/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
SWMU1-12	7614741.61	2100634.657	Soil	10/14/2008	0	0.5	Metal	Chromium, total	19		mg/kg
SWMU1-13	7614759.505	2100628.65	Soil	10/14/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
SWMU1-13	7614759.505	2100628.65	Soil	10/14/2008	0	0.5	Metal	Chromium, total	23		mg/kg
SWMU1-14	7614750.23	2100588.588	Soil	10/14/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
SWMU1-14	7614750.23	2100588.588	Soil	10/14/2008	0	0.5	Metal	Chromium, total	20		mg/kg
SWMU1-15	7614763.628	2100510.278	Soil	9/22/2008	0	0.5	Metal	Chromium, Hexavalent	1.1		mg/kg
SWMU1-15	7614763.628	2100510.278	Soil	9/22/2008	0	0.5	Metal	Chromium, total	25		mg/kg
SWMU1-16	7614749.742	2100447.966	Soil	9/21/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
SWMU1-16	7614749.742	2100447.966	Soil	9/21/2008	0	0.5	Metal	Chromium, total	10		mg/kg
SWMU1-17	7614782.865	2100455.997	Soil	9/21/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
SWMU1-17	7614782.865	2100455.997	Soil	9/21/2008	0	0.5	Metal	Chromium, total	27		mg/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	13		ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.53	U	ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	91		ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	26		ng/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	27		ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.61	U	ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	2.4	U	ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.37	U	ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	1500	U	ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	2.7	J	ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	2,3,7,8-TCDD	0.44	U	ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Dioxins	2,3,7,8-TCDF	0.13	U	ng/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Metal	Chromium, Hexavalent	2.6		mg/kg
SWMU1-18	7614768.172	2100551.288	Soil	1/7/2016	0	1	Metal	Chromium, total	16		mg/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	0.82	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.35	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	3.3	J	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.33	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	1.5	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.41	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.41	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.27	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	41	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.29	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	2,3,7,8-TCDD	0.1	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Dioxins	2,3,7,8-TCDF	0.31	U	ng/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Metal	Chromium, Hexavalent	1.3		mg/kg
SWMU1-19	7614813.135	2100760.385	Soil	1/9/2016	0	1	Metal	Chromium, total	1400		mg/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	12	U	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	28		ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	130	J	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	9.3	U	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	12	U	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	12	U	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	2.6	U	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	7.9	U	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	220	U	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	7.9	J	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	2,3,7,8-TCDD	0.69	J	ng/kg
SWMU1-21	7614875.859	2100919.81	Soil	1/26/2016	0	1	Dioxins	2,3,7,8-TCDF	1.3	U	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDD	1.9	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDF	2.7	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDD	6.1	J	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDF	2.3	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDD	2.8	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDF	3.2	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	1,2,3,7,8-PeCDD	0.36	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	1,2,3,7,8-PeCDF	0.99	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	2,3,4,6,7,8-HxCDF	24	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	2,3,4,7,8-PeCDF	0.64	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	2,3,7,8-TCDD	0.26	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Dioxins	2,3,7,8-TCDF	1.5	UJ	ng/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Metal	Chromium, Hexavalent	0.2	U	mg/kg
SWMU1-22	7614855.328	2100571.098	Soil	12/17/2015	0	1	Metal	Chromium, total	18		mg/kg
SWMU1-23	7614856.16	2100536.535	Soil	12/17/2015	0	1	Metal	Chromium, Hexavalent	0.36		mg/kg

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Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
SWMU1-23	7614856.16	2100536.535	Soil	12/17/2015	0	1	Metal	Chromium, total	23		mg/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDD	540	UJ	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDF	150	J	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDD	1600	J	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDF	260	J	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDD	470	UJ	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDF	38	UJ	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	1,2,3,7,8-PeCDD	150	J	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	1,2,3,7,8-PeCDF	80	UJ	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	2,3,4,6,7,8-HxCDF	4000	UJ	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	2,3,4,7,8-PeCDF	81	UJ	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	2,3,7,8-TCDD	18	J	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Dioxins	2,3,7,8-TCDF	7.4	J	ng/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Metal	Chromium, Hexavalent	1.6		mg/kg
SWMU1-24	7614855.744	2100521.544	Soil	12/17/2015	0	1	Metal	Chromium, total	55		mg/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	1900		ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	400	U	ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	14000		ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	1600		ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	2900		ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	470	U	ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	910		ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	92	U	ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	140000	U	ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	1600		ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	2,3,7,8-TCDD	67		ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Dioxins	2,3,7,8-TCDF	89		ng/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Metal	Chromium, Hexavalent	42		mg/kg
SWMU1-25	7614804.721	2100694.712	Soil	1/26/2016	0	1	Metal	Chromium, total	2000		mg/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	2	U	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	1.8	U	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	2.3	U	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.25	U	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.79	U	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.62	U	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	2.1	J	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	21		ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	4	J	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.38	U	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	140	U	ng/kg
SWMU1-26	7614771.572	2100701.452	Soil	1/8/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.11	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	1.1	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.42	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	0.37	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	2.3	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	3	J	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	1.2	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.53	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	2.1	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	78	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.4	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.13	U	ng/kg
SWMU1-27	7614782.038	2100665.329	Soil	1/7/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.28	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.2	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.3	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.2	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	25	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.21	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Metal	Chromium, Hexavalent	0.2	U	mg/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.43	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	3.5	J	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.46	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	0.42	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.13	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.071	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.1	U	ng/kg
SWMU1-28	7614826.826	2100662.296	Soil	2/14/2017	0	0.5	Metal	Chromium, total	16		mg/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	1.2	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1.6	J	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	8.1	J	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.92	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	2.8	J	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.34	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.62	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.93	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	49	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	1.1	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.15	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.57	U	ng/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Metal	Chromium, Hexavalent	0.2	U	mg/kg
SWMU1-29	7614786.838	2100757.499	Soil	2/16/2017	0	0.5	Metal	Chromium, total	19		mg/kg
SWMU1-WP-1h	7614811.733	2100690.326	Soil	10/7/2008	0	0.5	Metal	Chromium, Hexavalent	0.42	U	mg/kg
SWMU1-WP-1h	7614811.733	2100690.326	Soil	10/7/2008	0	0.5	Metal	Chromium, total	25		mg/kg
SWMU1-WP-3a	7614784.657	2100623.168	Soil	10/14/2008	0	0.5	Metal	Chromium, Hexavalent	0.42	U	mg/kg
SWMU1-WP-3a	7614784.657	2100623.168	Soil	10/14/2008	0	0.5	Metal	Chromium, total	27		mg/kg
SWMU1-WP-3h	7614800.359	2100620.315	Soil	10/7/2008	0	0.5	Metal	Chromium, Hexavalent	0.43	U	mg/kg
SWMU1-WP-3h	7614800.359	2100620.315	Soil	10/7/2008	0	0.5	Metal	Chromium, total	17		mg/kg
SWMU1-WP-5a	7614784.657	2100598.626	Soil	10/5/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
SWMU1-WP-5a	7614784.657	2100598.626	Soil	10/5/2008	0	0.5	Metal	Chromium, total	19		mg/kg
SWMU1-WP-5h	7614801.57	2100596.628	Soil	10/7/2008	0	0.5	Metal	Chromium, Hexavalent	0.43	U	mg/kg
SWMU1-WP-5h	7614801.57	2100596.628	Soil	10/7/2008	0	0.5	Metal	Chromium, total	14		mg/kg
SWMU1-WP-6a	7614783.724	2100575.59	Soil	10/5/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
SWMU1-WP-6a	7614783.724	2100575.59	Soil	10/5/2008	0	0.5	Metal	Chromium, total	32		mg/kg
SWMU1-WP-6h	7614803.897	2100576.063	WhitePowder	10/6/2008	0	0.5	Metal	Chromium, Hexavalent	5		mg/kg
SWMU1-WP-6h	7614803.897	2100576.063	WhitePowder	10/6/2008	0	0.5	Metal	Chromium, total	130		mg/kg
SWMU1-WP-7	7614794.64	2100551.566	Soil	10/6/2008	0	0.5	Metal	Chromium, Hexavalent	0.57		mg/kg
SWMU1-WP-7	7614794.64	2100551.566	Soil	10/6/2008	0	0.5	Metal	Chromium, total	2600		mg/kg
SWMU1-WP-8	7614800.657	2100523.155	Soil	10/6/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
SWMU1-WP-8	7614800.657	2100523.155	Soil	10/6/2008	0	0.5	Metal	Chromium, total	35		mg/kg
SWMU1-WP-9	7614753.087	2100545.892	Soil	9/21/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
SWMU1-WP-9	7614753.087	2100545.892	Soil	9/21/2008	0	0.5	Metal	Chromium, total	26		mg/kg
SWMU1-WP-10	7614801.148	2100503.003	Soil	10/5/2008	0	0.5	Metal	Chromium, Hexavalent	6.6		mg/kg
SWMU1-WP-10	7614801.148	2100503.003	Soil	10/5/2008	0	0.5	Metal	Chromium, total	540		mg/kg
SWMU1-WP-T3a	7614781.093	2100548.312	Soil	10/5/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg

Table SSTPA-1
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for BCW

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Final Qualifier	Units
SWMU1-WP-T3a	7614781.093	2100548.312	Soil	10/5/2008	0	0.5	Metal	Chromium, total	25		mg/kg
T-3-B	7614798.762	2100544.336	Soil	11/13/1998	0	0	Metal	Chromium, Hexavalent	3.1		mg/kg
T-3-B	7614798.762	2100544.336	Soil	11/13/1998	0	0	Metal	Chromium, total	619		mg/kg
WP-1	7614801.402	2100655.249	Soil	6/30/1997	0	0	Metal	Chromium, Hexavalent	47.5		mg/kg
WP-1	7614801.402	2100655.249	Soil	6/30/1997	0	0	Metal	Chromium, total	2090		mg/kg
WP-2	7614804.074	2100641.165	Soil	9/18/1997	0	0	Metal	Chromium, Hexavalent	0.5	U	mg/kg
WP-2	7614804.074	2100641.165	Soil	9/18/1997	0	0	Metal	Chromium, total	25.9		mg/kg
WP-3	7614800.831	2100616.681	Soil	9/18/1997	0.5	0.5	Metal	Chromium, Hexavalent	11.8		mg/kg
WP-3	7614800.831	2100616.681	Soil	9/18/1997	0.5	0.5	Metal	Chromium, total	1290		mg/kg
WP-4	7614797.172	2100594.231	Soil	9/18/1997	0	0	Metal	Chromium, Hexavalent	1.1		mg/kg
WP-4	7614797.172	2100594.231	Soil	9/18/1997	0	0	Metal	Chromium, total	120		mg/kg
WP-5	7614796.366	2100583.123	Soil	9/18/1997	0	0	Metal	Chromium, Hexavalent	3.5		mg/kg
WP-5	7614796.366	2100583.123	Soil	9/18/1997	0	0	Metal	Chromium, total	511		mg/kg
WP-5	7614796.366	2100583.123	Soil	9/18/1997	1	1	Metal	Chromium, Hexavalent	6.7		mg/kg
WP-5	7614796.366	2100583.123	Soil	9/18/1997	1	1	Metal	Chromium, total	711		mg/kg
WP-6	7614794.348	2100570.794	Soil	9/18/1997	0	0	Metal	Chromium, Hexavalent	1.6		mg/kg
WP-6	7614794.348	2100570.794	Soil	9/18/1997	0	0	Metal	Chromium, total	712		mg/kg
WP-6	7614794.348	2100570.794	Soil	9/18/1997	1	1	Metal	Chromium, Hexavalent	9.5		mg/kg
WP-6	7614794.348	2100570.794	Soil	9/18/1997	1	1	Metal	Chromium, total	1030		mg/kg
WP-BANK 1	7614805.174	2100536.824	Soil	11/23/1998	0	0	Metal	Chromium, Hexavalent	5.5		mg/kg
WP-BANK 1	7614805.174	2100536.824	Soil	11/23/1998	0	0	Metal	Chromium, total	261		mg/kg
WP-BANK 2	7614805.888	2100526.785	Soil	11/23/1998	0	0	Metal	Chromium, Hexavalent	14		mg/kg
WP-BANK 2	7614805.888	2100526.785	Soil	11/23/1998	0	0	Metal	Chromium, total	909		mg/kg

Data Qualifiers:
J = estimated value
U = not detected at specified reporting limit

Acronyms and Abbreviations:
ft = foot or feet
HxCDD = hexachlorodibenzo-p-dioxin
HxCDF = hexachlorodibenzofuran
mg/kg = milligram(s) per kilogram
ng/kg = nanogram(s) per kilogram
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlorodibenzoparadioxin
TCDF = tetrachlorodibenzofuran

Table SSTPA-2
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for AOC 10

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Qualifier	Units
AOC10-1	7615911.461	2100648.96	Soil	10/2/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC10-1	7615911.461	2100648.96	Soil	10/2/2008	0	0.5	Metal	Chromium, total	6.6		mg/kg
AOC10-2	7616007.029	2100625.892	Soil	10/2/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC10-2	7616007.029	2100625.892	Soil	10/2/2008	0	0.5	Metal	Chromium, total	4.9		mg/kg
AOC10-3	7616222.525	2100714.094	Soil	9/19/2008	0	0.5	Metal	Chromium, Hexavalent	1.9		mg/kg
AOC10-3	7616222.525	2100714.094	Soil	9/19/2008	0	0.5	Metal	Chromium, total	64		mg/kg
AOC10-4	7616288.261	2100679.501	Soil	9/19/2008	0	0.5	Metal	Chromium, Hexavalent	0.55		mg/kg
AOC10-4	7616288.261	2100679.501	Soil	9/19/2008	0	0.5	Metal	Chromium, total	33		mg/kg
AOC10-5	7616410.538	2100966.969	Soil	9/19/2008	0	0.5	Metal	Chromium, Hexavalent	1		mg/kg
AOC10-5	7616410.538	2100966.969	Soil	9/19/2008	0	0.5	Metal	Chromium, total	39		mg/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	2.2	J	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1	UJ	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	4.5	J	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	1.4	UJ	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	3.4	J	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.75	UJ	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.26	UJ	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.34	UJ	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	17	UJ	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	2,3,4,7,8-PeCDF	1.9	J	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	2,3,7,8-TCDD	0.099	UJ	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Dioxins	2,3,7,8-TCDF	0.39	UJ	ng/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC10-6	7616416.542	2101013.345	Soil	9/20/2008	0	0.5	Metal	Chromium, total	24		mg/kg
AOC10-7	7616503.872	2100989.659	Soil	9/20/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
AOC10-7	7616503.872	2100989.659	Soil	9/20/2008	0	0.5	Metal	Chromium, total	22		mg/kg
AOC10-8	7616635.157	2101122.101	Soil	8/22/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC10-8	7616635.157	2101122.101	Soil	8/22/2008	0	0.5	Metal	Chromium, total	18		mg/kg
AOC10-9	7616362.432	2100997.725	Soil	12/7/2015	0	1	Metal	Chromium, Hexavalent	0.2	U	mg/kg
AOC10-9	7616362.432	2100997.725	Soil	12/7/2015	0	1	Metal	Chromium, total	19		mg/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	4.9	J	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	2.3	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	17		ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	3.9	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	13		ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	1.6	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	2.1	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	1	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	110	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	1	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	2,3,7,8-TCDD	0.23	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Dioxins	2,3,7,8-TCDF	0.13	U	ng/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Metal	Chromium, Hexavalent	0.45		mg/kg
AOC10-10	7615754.691	2100494.536	Soil	1/22/2016	0	1	Metal	Chromium, total	36		mg/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.93	U	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	5.5	J	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	0.74	J	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.33	U	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Metal	Chromium, Hexavalent	0.87		mg/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Metal	Chromium, total	31		mg/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	1.5	U	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.63	U	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	8.6	J	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.74	U	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	140	U	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	0.57	U	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	2,3,7,8-TCDD	0.077	U	ng/kg
AOC10-11	7616040.138	2100487.805	Soil	1/22/2016	0	1	Dioxins	2,3,7,8-TCDF	0.088	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	4.7	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	3.4	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	48		ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	32		ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	25		ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	3.9	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDD	3.3	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	1,2,3,7,8-PeCDF	2.1	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	380	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	2,3,4,7,8-PeCDF	2.1	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	2,3,7,8-TCDD	0.34	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Dioxins	2,3,7,8-TCDF	0.88	U	ng/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Metal	Chromium, Hexavalent	13		mg/kg
AOC10-12	7616079.415	2100505.772	Soil	1/22/2016	0	0.5	Metal	Chromium, total	460		mg/kg
AOC10-13	7615687.644	2100574.307	Soil	12/3/2015	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC10-13	7615687.644	2100574.307	Soil	12/3/2015	0	1	Metal	Chromium, total	16		mg/kg
AOC10-14	7615795.593	2100607.61	Soil	12/3/2015	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC10-14	7615795.593	2100607.61	Soil	12/3/2015	0	1	Metal	Chromium, total	11		mg/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDD	33		ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDD	210		ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDD	59		ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8-PeCDF	11	U	ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	2,3,4,7,8-PeCDF	16	U	ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	2,3,7,8-TCDD	4.1	J	ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Metal	Chromium, Hexavalent	2.6		mg/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDF	62		ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDF	17		ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDF	2.8	U	ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8-PeCDD	11	U	ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	2,3,4,6,7,8-HxCDF	2000	U	ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Dioxins	2,3,7,8-TCDF	8.2		ng/kg
AOC10-15	7616349.19	2100914.846	Soil	12/15/2015	0	1	Metal	Chromium, total	70		mg/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDD	1.6	J	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDF	1.3	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDD	2.3	J	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.66	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDD	0.76	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.83	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8-PeCDD	0.85	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8-PeCDF	1.4	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	2,3,4,6,7,8-HxCDF	1	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	2,3,4,7,8-PeCDF	0.48	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	2,3,7,8-TCDD	0.36	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Dioxins	2,3,7,8-TCDF	0.86	U	ng/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Metal	Chromium, Hexavalent	0.59		mg/kg
AOC10-16	7616058.27	2100641.691	Soil	12/15/2015	0	1	Metal	Chromium, total	21		mg/kg

Table SSTPA-2
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for AOC 10

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

Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Qualifier	Units
AOC10-17	7615940.952	2100623.728	Soil	12/3/2015	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
AOC10-17	7615940.952	2100623.728	Soil	12/3/2015	0	1	Metal	Chromium, total	9.7		mg/kg
AOC10-19	7616155.793	2100433.869	Soil	2/24/2016	0	1	Metal	Chromium, Hexavalent	0.2	U	mg/kg
AOC10-19	7616155.793	2100433.869	Soil	2/24/2016	0	1	Metal	Chromium, total	27		mg/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDD	6.5	J	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.26	U	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDD	17		ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	1,2,3,6,7,8-HxCDF	2.5	J	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDD	11	J	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	1,2,3,7,8,9-HxCDF	1	U	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	1,2,3,7,8-PeCDD	3.4	J	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	1,2,3,7,8-PeCDF	0.32	U	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	2,3,4,6,7,8-HxCDF	96	U	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	2,3,4,7,8-PeCDF	2.6	J	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	2,3,7,8-TCDD	0.41	U	ng/kg
AOC10-24	7616354.897	2100884.364	Soil	3/7/2016	0	1	Dioxins	2,3,7,8-TCDF	1.2	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	0.25	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	0.35	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	0.31	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	0.63	J	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.63	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	0.16	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.31	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.66	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.054	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Metal	Chromium, Hexavalent	0.2	U	mg/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	0.66	U	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	8	J	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Dioxins	2,3,7,8-TCDF	1.5	J	ng/kg
AOC10-25	7616333.001	2100949.04	Soil	1/8/2017	0	0.5	Metal	Chromium, total	18		mg/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	3	J	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	1.2	U	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	7.8	J	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	1.3	J	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	4.9	J	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	0.2	U	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.7	J	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.51	J	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	50	U	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	1.8	J	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.15	U	ng/kg
AOC10-26	7616382.14	2100854.29	Soil	2/21/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.39	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	3.4	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	6.3	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	12	J	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	5.5	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	7.9	J	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	7.2	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.1	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	1,2,3,7,8-PeCDF	2	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	6.5	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	2,3,4,7,8-PeCDF	7.7	J	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	2,3,7,8-TCDD	0.14	U	ng/kg
AOC10-27	7616410.589	2100967.963	Soil	1/4/2017	0	0.5	Dioxins	2,3,7,8-TCDF	0.71	U	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	5.8	J	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	2.2	UJ	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	20	J	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	4.1	UJ	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	12	J	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	2.5	UJ	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	1,2,3,7,8-PeCDD	2.7	J	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	1,2,3,7,8-PeCDF	0.59	UJ	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	100	UJ	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	2,3,4,7,8-PeCDF	0.59	UJ	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	2,3,7,8-TCDD	0.14	UJ	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Dioxins	2,3,7,8-TCDF	0.36	UJ	ng/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Metal	Chromium, Hexavalent	0.56		mg/kg
AOC10b-1	7615851.702	2100510.85	Soil	9/30/2008	0	0.5	Metal	Chromium, total	24		mg/kg
AOC10b-2	7615904.88	2100520.271	Soil	9/30/2008	0	0.5	Metal	Chromium, Hexavalent	0.43		mg/kg
AOC10b-2	7615904.88	2100520.271	Soil	9/30/2008	0	0.5	Metal	Chromium, total	29		mg/kg
AOC10b-3	7615986.13	2100478.663	Soil	9/30/2008	0	0.5	Metal	Chromium, Hexavalent	27.7		mg/kg
AOC10b-3	7615986.13	2100478.663	Soil	9/30/2008	0	0.5	Metal	Chromium, total	820		mg/kg
AOC10b-4	7615940.894	2100545.073	Soil	9/30/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC10b-4	7615940.894	2100545.073	Soil	9/30/2008	0	0.5	Metal	Chromium, total	12		mg/kg
AOC10c-1	7616077.795	2100554.03	Soil	10/1/2008	0	0.5	Metal	Chromium, Hexavalent	2		mg/kg
AOC10c-1	7616077.795	2100554.03	Soil	10/1/2008	0	0.5	Metal	Chromium, total	55		mg/kg
AOC10c-2	7616088.4	2100586.706	Soil	10/1/2008	0	0.5	Metal	Chromium, Hexavalent	1.3		mg/kg
AOC10c-2	7616088.4	2100586.706	Soil	10/1/2008	0	0.5	Metal	Chromium, total	51		mg/kg
AOC10c-3	7616126.054	2100636.709	Soil	10/2/2008	0	0.5	Metal	Chromium, Hexavalent	2.6		mg/kg
AOC10c-3	7616126.054	2100636.709	Soil	10/2/2008	0	0.5	Metal	Chromium, total	110		mg/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	1,2,3,4,7,8-HxCDD	73	J	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	1,2,3,4,7,8-HxCDF	100	UJ	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	1,2,3,6,7,8-HxCDD	330	J	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	1,2,3,6,7,8-HxCDF	92	UJ	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	1,2,3,7,8,9-HxCDD	150	J	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	1,2,3,7,8,9-HxCDF	120	UJ	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	1,2,3,7,8-PeCDD	1.7	UJ	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	1,2,3,7,8-PeCDF	3.6	UJ	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	2,3,4,6,7,8-HxCDF	2600	UJ	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	2,3,4,7,8-PeCDF	14	UJ	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	2,3,7,8-TCDD	2.4	J	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Dioxins	2,3,7,8-TCDF	6.9	J	ng/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Metal	Chromium, Hexavalent	2.7		mg/kg
AOC10c-4	7616145.573	2100603.772	Soil	10/1/2008	0	0.5	Metal	Chromium, total	120		mg/kg
AOC10c-5	7616083.691	2100633.778	Soil	10/1/2008	0	0.5	Metal	Chromium, Hexavalent	2.5		mg/kg
AOC10c-5	7616083.691	2100633.778	Soil	10/1/2008	0	0.5	Metal	Chromium, total	81		mg/kg
AOC10d-1	7616294.639	2100715.265	Soil	9/18/2008	0	0.5	Metal	Chromium, Hexavalent	0.64		mg/kg
AOC10d-1	7616294.639	2100715.265	Soil	9/18/2008	0	0.5	Metal	Chromium, total	49		mg/kg
AOC10d-2	7616313.959	2100854.45	Soil	9/17/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC10d-2	7616313.959	2100854.45	Soil	9/17/2008	0	0.5	Metal	Chromium, total	22		mg/kg
AOC10d-3	7616332.297	2100867.979	Soil	9/17/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
AOC10d-3	7616332.297	2100867.979	Soil	9/17/2008	0	0.5	Metal	Chromium, total	20		mg/kg
AOC10d-4	7616374.713	2100873.573	Soil	9/18/2008	0	0.5	Metal	Chromium, Hexavalent	0.92		mg/kg
AOC10d-4	7616374.713	2100873.573	Soil	9/18/2008	0	0.5	Metal	Chromium, total	29		mg/kg

Table SSTPA-2
Surface Soil Data for Indicator Chemicals Included in the Gradient Analyses for AOC 10

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

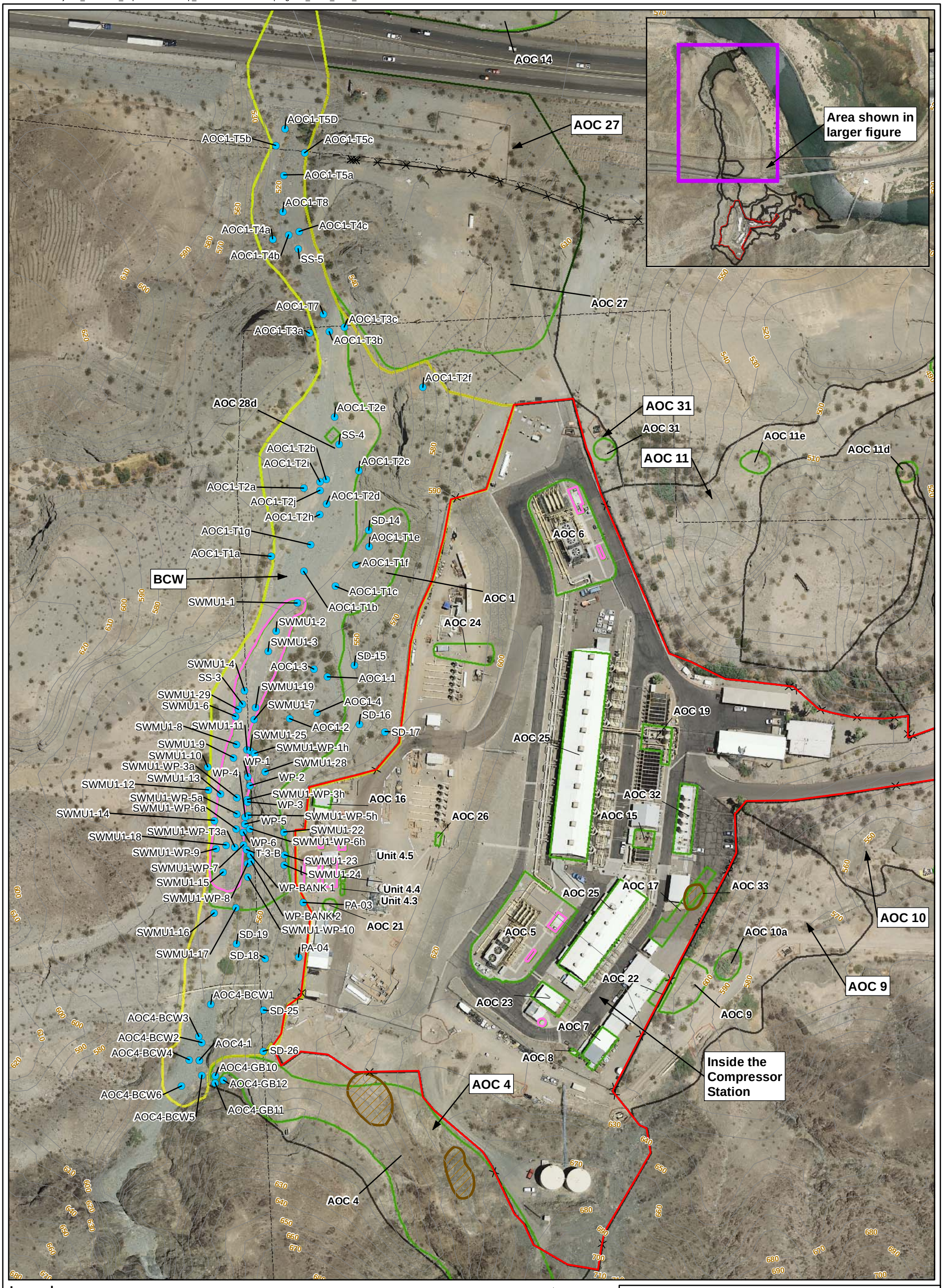
Location ID	X Coordinate	Y Coordinate	Matrix	Sample Date	Top Depth (ft)	Bottom Depth (ft)	Analytical Group	Analyte	Result	Qualifier	Units
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDD	0.88	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	1,2,3,4,7,8-HxCDF	0.22	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDD	1.4	J	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	1,2,3,6,7,8-HxCDF	0.4	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDD	1.4	J	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8,9-HxCDF	0.25	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8-PeCDD	0.13	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	1,2,3,7,8-PeCDF	0.31	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	2,3,4,6,7,8-HxCDF	2.7	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	2,3,4,7,8-PeCDF	0.32	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	2,3,7,8-TCDD	0.13	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Dioxins	2,3,7,8-TCDF	0.3	UJ	ng/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Metal	Chromium, Hexavalent	0.2	U	mg/kg
AOC10d-9	7616291.983	2100902.921	Soil	12/15/2015	0	1	Metal	Chromium, total	20		mg/kg
AOC10-XRF-01	7616528.603	2100550.93	Soil	8/25/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC10-XRF-01	7616528.603	2100550.93	Soil	8/25/2008	0	0.5	Metal	Chromium, total	9.2		mg/kg
AOC10-XRF-02	7616504.622	2100574.371	Soil	8/25/2008	0	0.5	Metal	Chromium, Hexavalent	0.4	U	mg/kg
AOC10-XRF-02	7616504.622	2100574.371	Soil	8/25/2008	0	0.5	Metal	Chromium, total	11		mg/kg
AOC10-XRF-03	7616128.84	2100442.732	Soil	8/25/2008	0	0.5	Metal	Chromium, Hexavalent	0.41	U	mg/kg
AOC10-XRF-03	7616128.84	2100442.732	Soil	8/25/2008	0	0.5	Metal	Chromium, total	10		mg/kg
Bank 1	7615812.473	2100627.034	Soil	3/7/2003	0	0	Metal	Chromium, Hexavalent	4	U	mg/kg
Bank 1	7615812.473	2100627.034	Soil	3/7/2003	0	0	Metal	Chromium, total	21.5		mg/kg
DTSC-AOC10d-1	7616284.58	2100771.287	WhitePowder	1/18/2008	0	0	Metal	Chromium, Hexavalent	31.5		mg/kg
DTSC-AOC10d-1	7616284.58	2100771.287	WhitePowder	1/18/2008	0	0	Metal	Chromium, total	652		mg/kg
DTSC-AOC10d-2	7616244.287	2100708.265	WhitePowder	1/18/2008	0	0	Metal	Chromium, Hexavalent	6		mg/kg
DTSC-AOC10d-2	7616244.287	2100708.265	WhitePowder	1/18/2008	0	0	Metal	Chromium, total	243		mg/kg
DTSC-AOC10d-3	7616232.234	2100707.576	WhitePowder	1/18/2008	0	0	Metal	Chromium, Hexavalent	4.4		mg/kg
DTSC-AOC10d-3	7616232.234	2100707.576	WhitePowder	1/18/2008	0	0	Metal	Chromium, total	224		mg/kg
L-1	7615900.08	2100536.32	Soil	2/20/2003	0	0	Metal	Chromium, Hexavalent	4.1	U	mg/kg
L-1	7615900.08	2100536.32	Soil	2/20/2003	0	0	Metal	Chromium, total	88.4		mg/kg
L-2	7616132.456	2100629.519	Soil	2/20/2003	0	0	Metal	Chromium, Hexavalent	4.7	U	mg/kg
L-2	7616132.456	2100629.519	Soil	2/20/2003	0	0	Metal	Chromium, total	86.8		mg/kg
L-3	7616326.931	2100870.594	Soil	2/20/2003	0	0	Metal	Chromium, Hexavalent	4.5	U	mg/kg
L-3	7616326.931	2100870.594	Soil	2/20/2003	0	0	Metal	Chromium, total	28.4		mg/kg
L-3	7616326.931	2100870.594	Soil	2/20/2003	1	1	Metal	Chromium, Hexavalent	1.2	J	mg/kg
L-3	7616326.931	2100870.594	Soil	2/20/2003	1	1	Metal	Chromium, total	379		mg/kg
L-3-2	7616311.398	2100857.546	Soil	3/5/2003	0.5	0.5	Metal	Chromium, Hexavalent	9.4		mg/kg
L-3-2	7616311.398	2100857.546	Soil	3/5/2003	0.5	0.5	Metal	Chromium, total	228		mg/kg
PS-21	7615741.572	2100526.873	Soil	4/13/1999	0	0	Metal	Chromium, Hexavalent	0.9		mg/kg
PS-21	7615741.572	2100526.873	Soil	4/13/1999	0	0	Metal	Chromium, total	16.5		mg/kg
SD-22	7615575.796	2100605.244	Soil	3/9/2016	0	1	Metal	Chromium, Hexavalent	0.21	U	mg/kg
SD-22	7615575.796	2100605.244	Soil	3/9/2016	0	1	Metal	Chromium, total	22		mg/kg
SD-05	7615627.734	2100577.035	Soil	11/10/2015	0	1	Metal	Chromium, Hexavalent	0.2	U	mg/kg
SD-05	7615627.734	2100577.035	Soil	11/10/2015	0	1	Metal	Chromium, total	19	J	mg/kg

Data Qualifiers:
J = estimated value
U = not detected at specified reporting limit

Acronyms and Abbreviations:
ft = foot or feet
HxCDD = hexachlorodibenzo-p-dioxin
HxCDF = hexachlorodibenzofuran
mg/kg = milligram(s) per kilogram
ng/kg = nanogram(s) per kilogram
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlorodibenzoparadioxin
TCDF = tetrachlorodibenzofuran

FIGURES

PATH: Z:\GISProjects_ENV\PGE_Topock\GIS\ArcMap_MXD\HHERA\SoilSamplingLocs_South_BCW_SSTPA-1a.mxd 8/14/2018 7:03:54 PM



Legend:

- Soil Sampling Location
- Area of Concern
- Bat Cave Wash (BCW) Exposure Area
- Exposure Area
- Inside the Topock Compressor Station boundary, as defined by current fenceline
- Solid Waste Management Unit
- Potential Burning Related Location
- Property Boundaries
- Contour Line (10 feet interval)
- Fence Line
- BCW — Label for Exposure Area
- AOC 1 — Label for Area of Concern

0 140

SCALE IN FEET

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

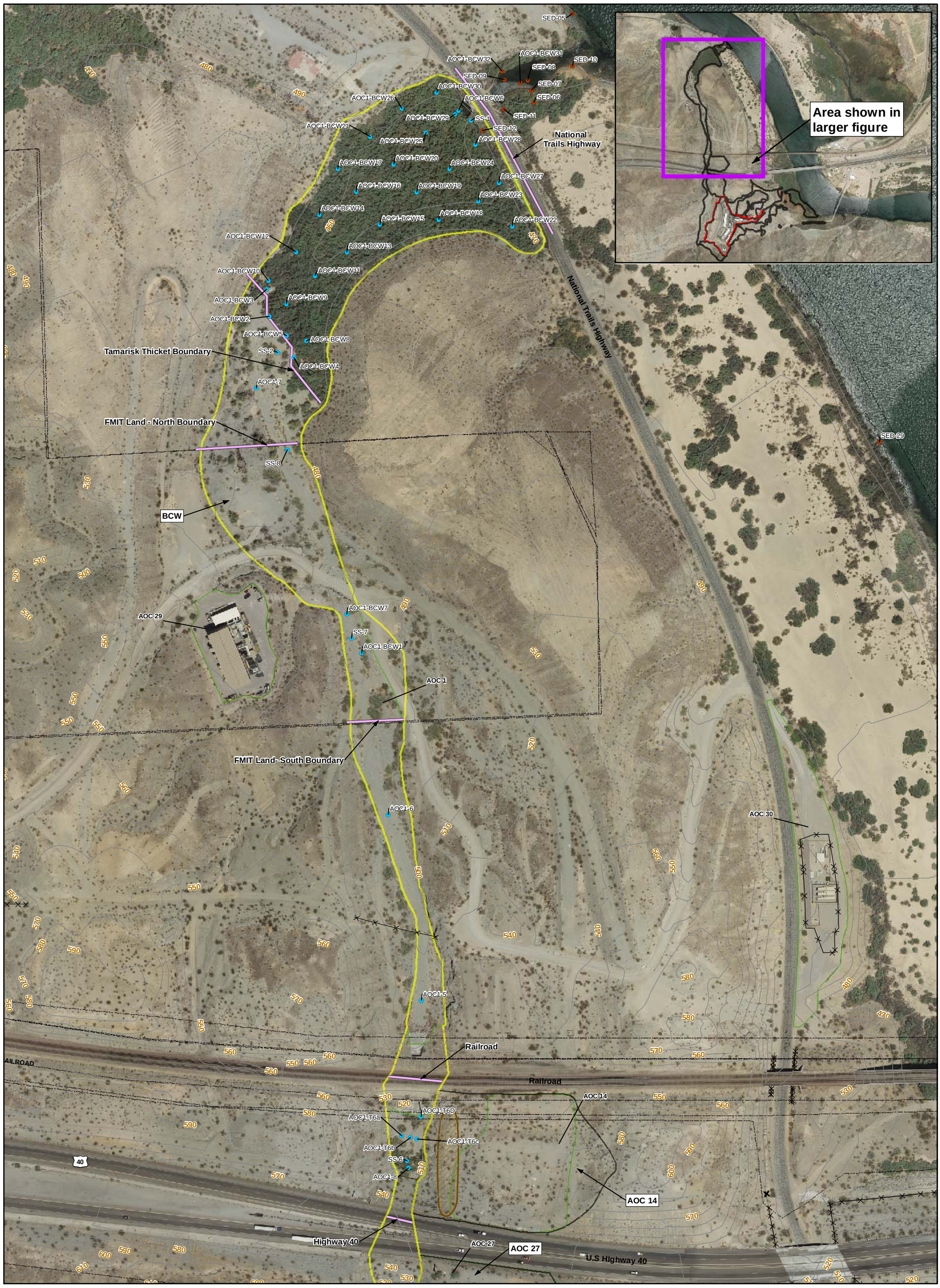
SURFACE SOIL SAMPLE LOCATIONS BAT CAVE WASH EXPOSURE AREA(SOUTH)

ARCADIS Design & Consultancy for natural and built assets

FIGURE

SSTPA-1a

PATH: Z:\GISProjects_ENV\PGE_Topock\GIS\ArcMap_MXD\HHERA\SoilSamplingLocs_north_BCW_SSTPA-1b.mxd 8/14/2018 5:36:02 PM



Legend:

- Soil Sampling Location
- Sediment Sampling Location
- Area of Concern
- Bat Cave Wash (BCW) Exposure Area
- Exposure Area
- Land Mark
- Potential Burning Related Location
- Property Boundaries
- Contour Line (10 feet interval)
- Fence Line
- BCW — Label for Exposure Area
- AOC 1 — Label for Area of Concern

0 220

SCALE IN FEET

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

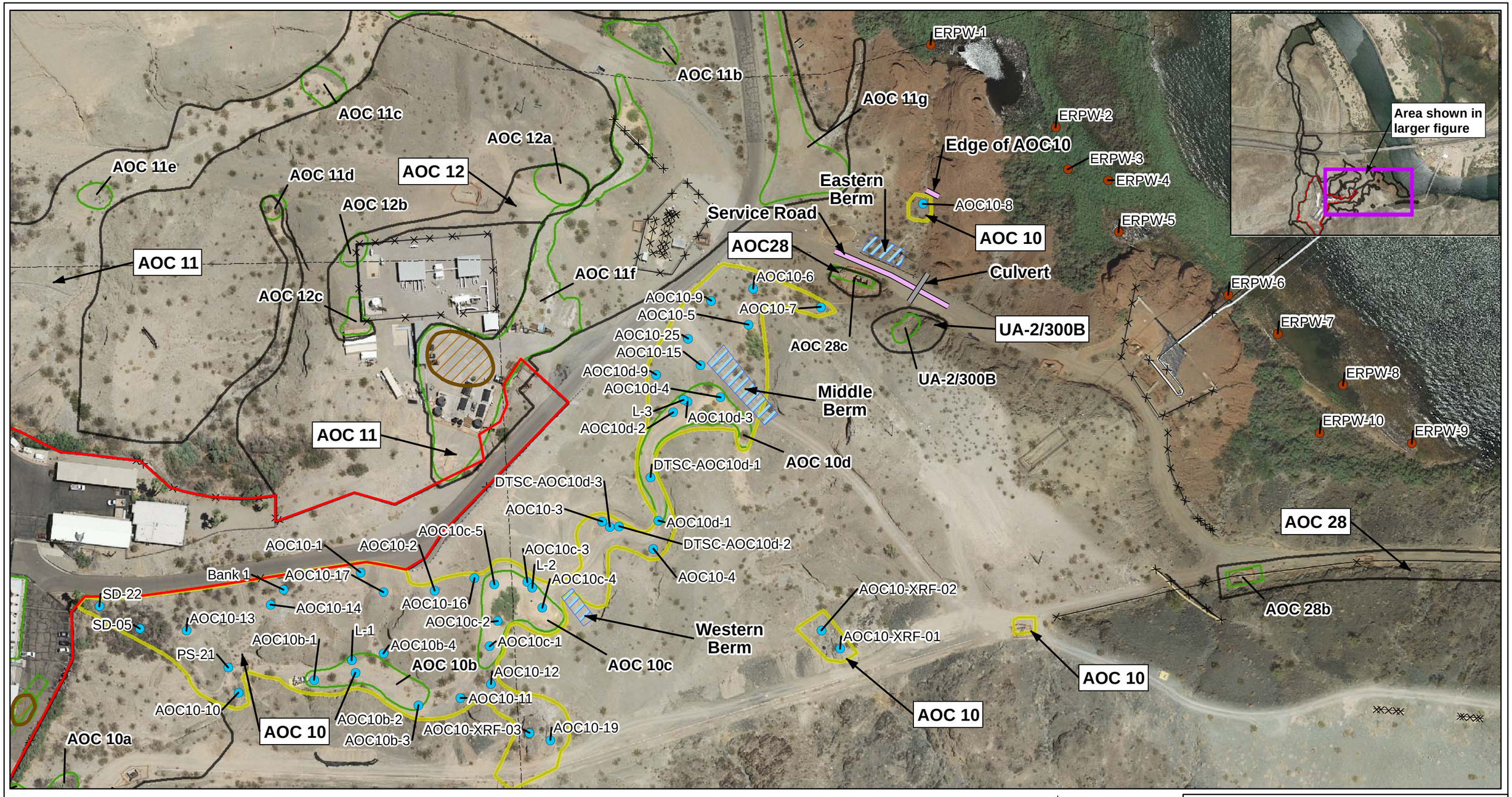
SURFACE SOIL SAMPLE LOCATIONS BAT CAVE WASH EXPOSURE AREA (NORTH)

ARCADIS Design & Consultancy for natural and built assets

FIGURE

SSTPA-1b

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Legend:

- Soil Sampling Location
- Sediment Sampling Location
- Area of Concern
- Exposure Area
- Inside the Topock Compressor Station boundary, as defined by current fenceline
- Potential Burning Related Location
- Property Boundaries
- Fence Line
- AOC 10 — Label for Exposure Area
- AOC 10a — Label for Area of Concern
- Berm
- Culvert
- Land Mark

0 120 240

SCALE IN FEET

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

SURFACE SOIL SAMPLE LOCATIONS AOC-10 EXPOSURE AREA

ARCADIS Design & Consultancy for natural and built assets

FIGURE
SSTPA-2

Figure SSTPA−3
Bat Cave Wash − Chromium, Hexavalent

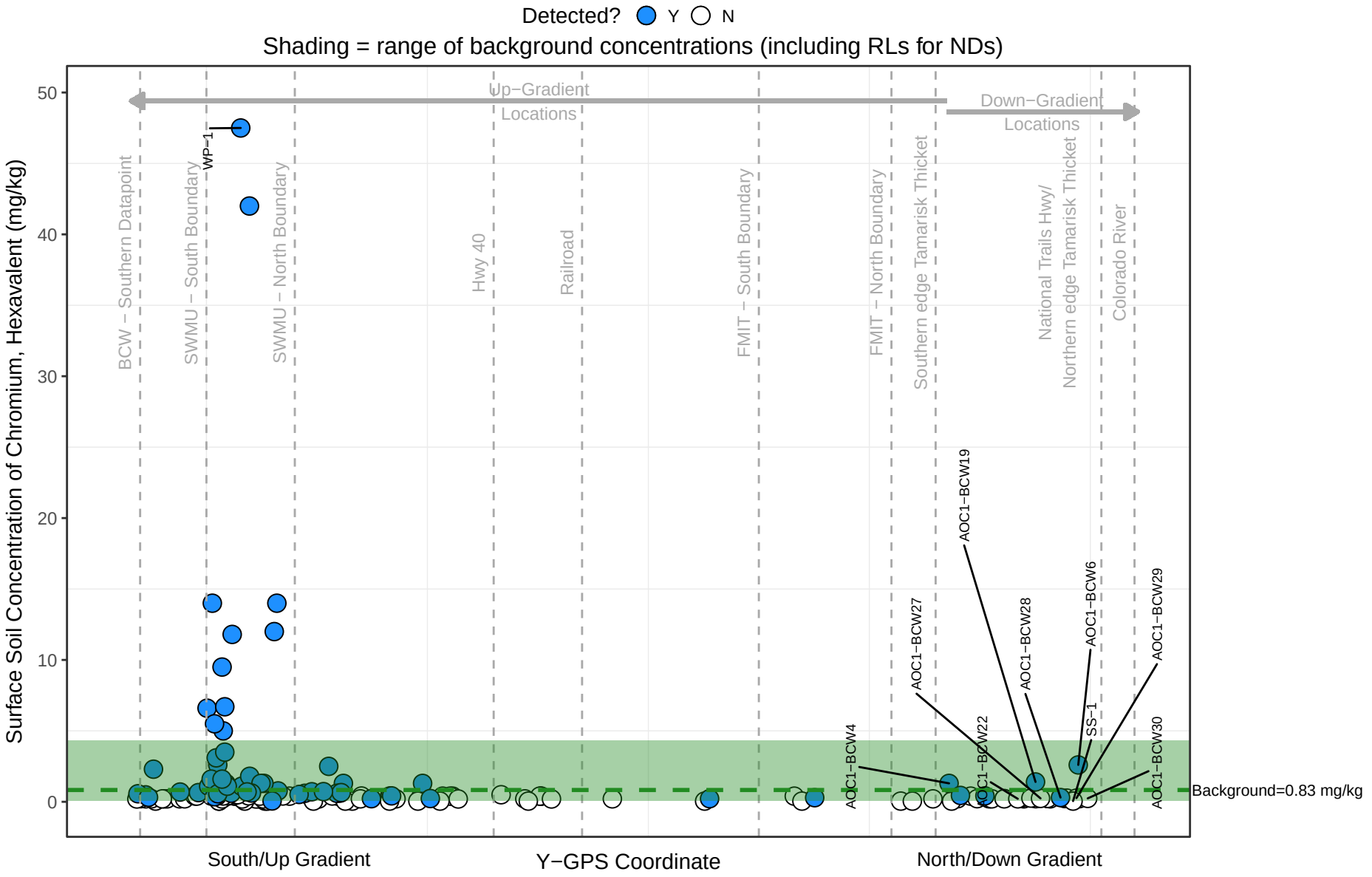


Figure SSTPA−3
Bat Cave Wash − Chromium, Hexavalent

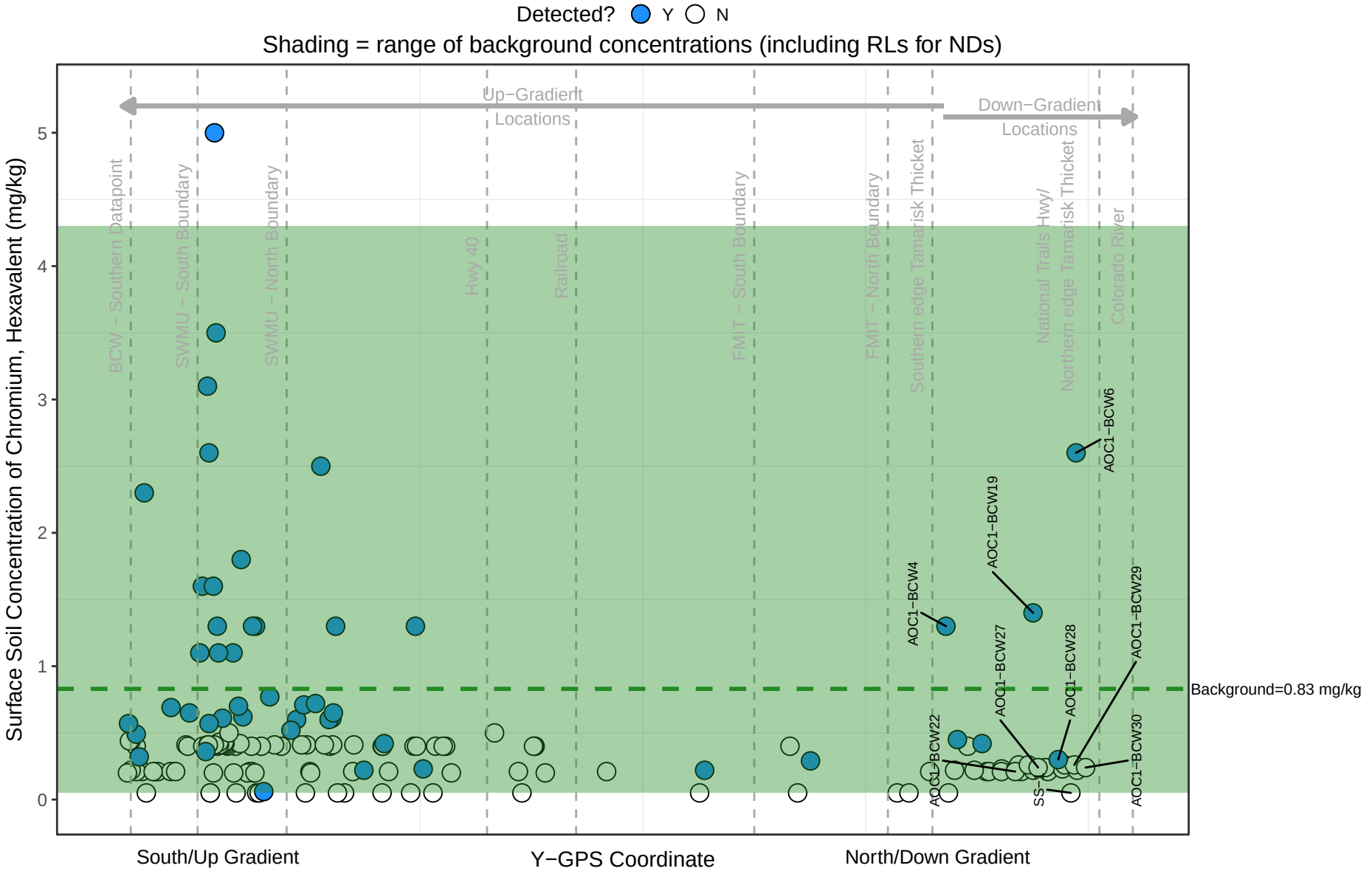


Figure SSTPA−4
Bat Cave Wash − Chromium, total

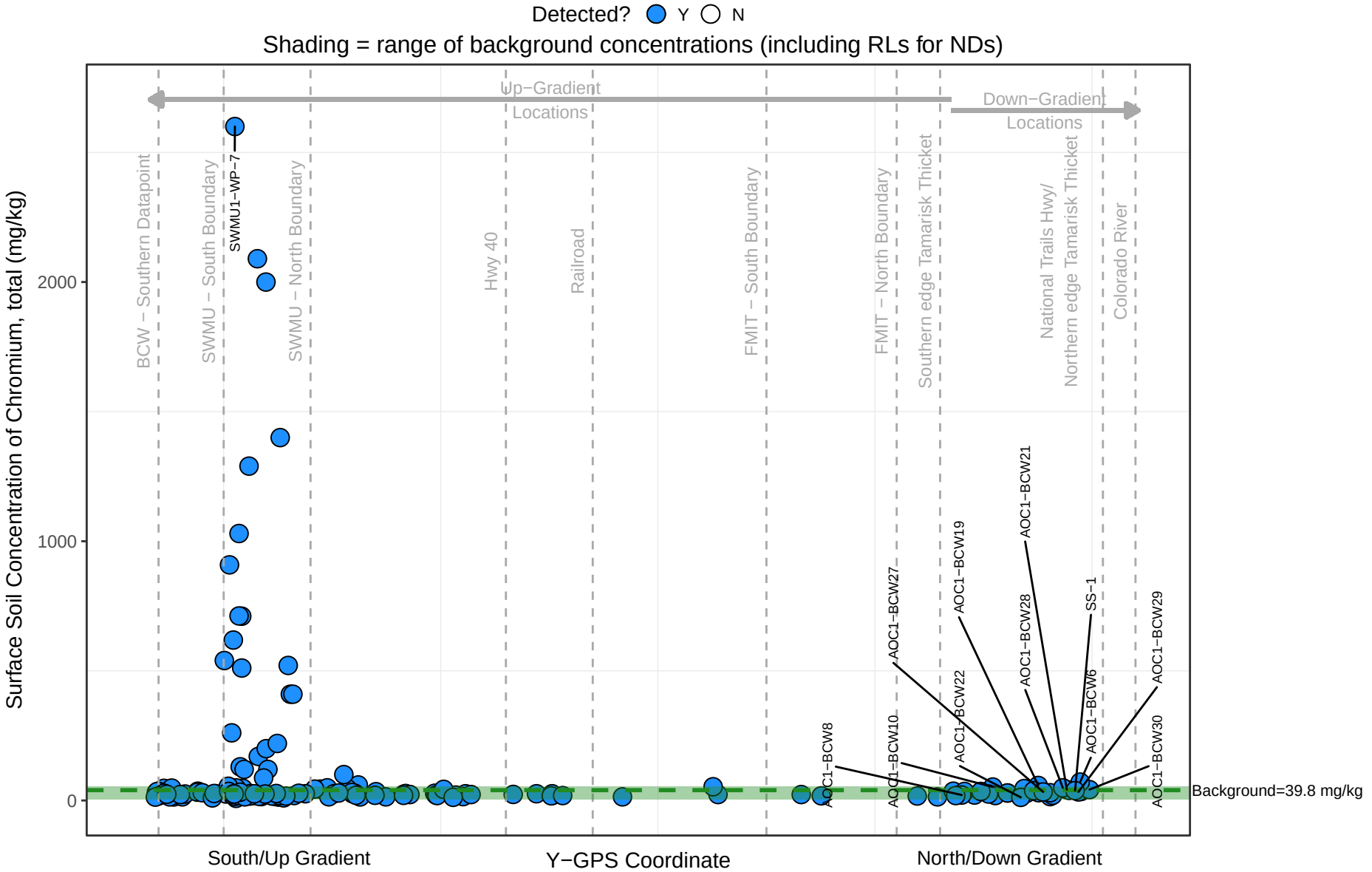


Figure SSTPA−4
Bat Cave Wash − Chromium, total

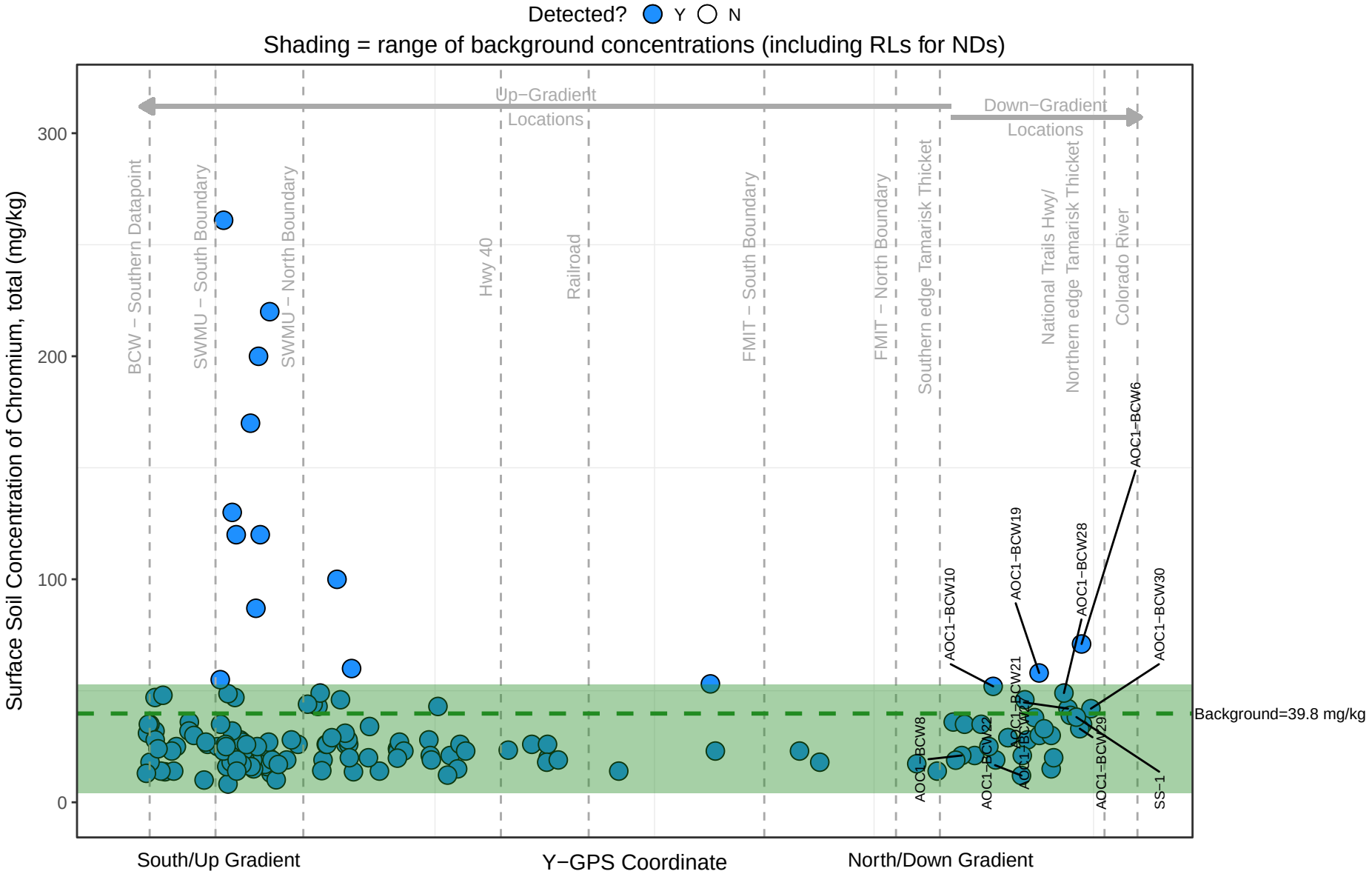


Figure SSTPA−5
Bat Cave Wash − 1,2,3,4,7,8−HxCDD

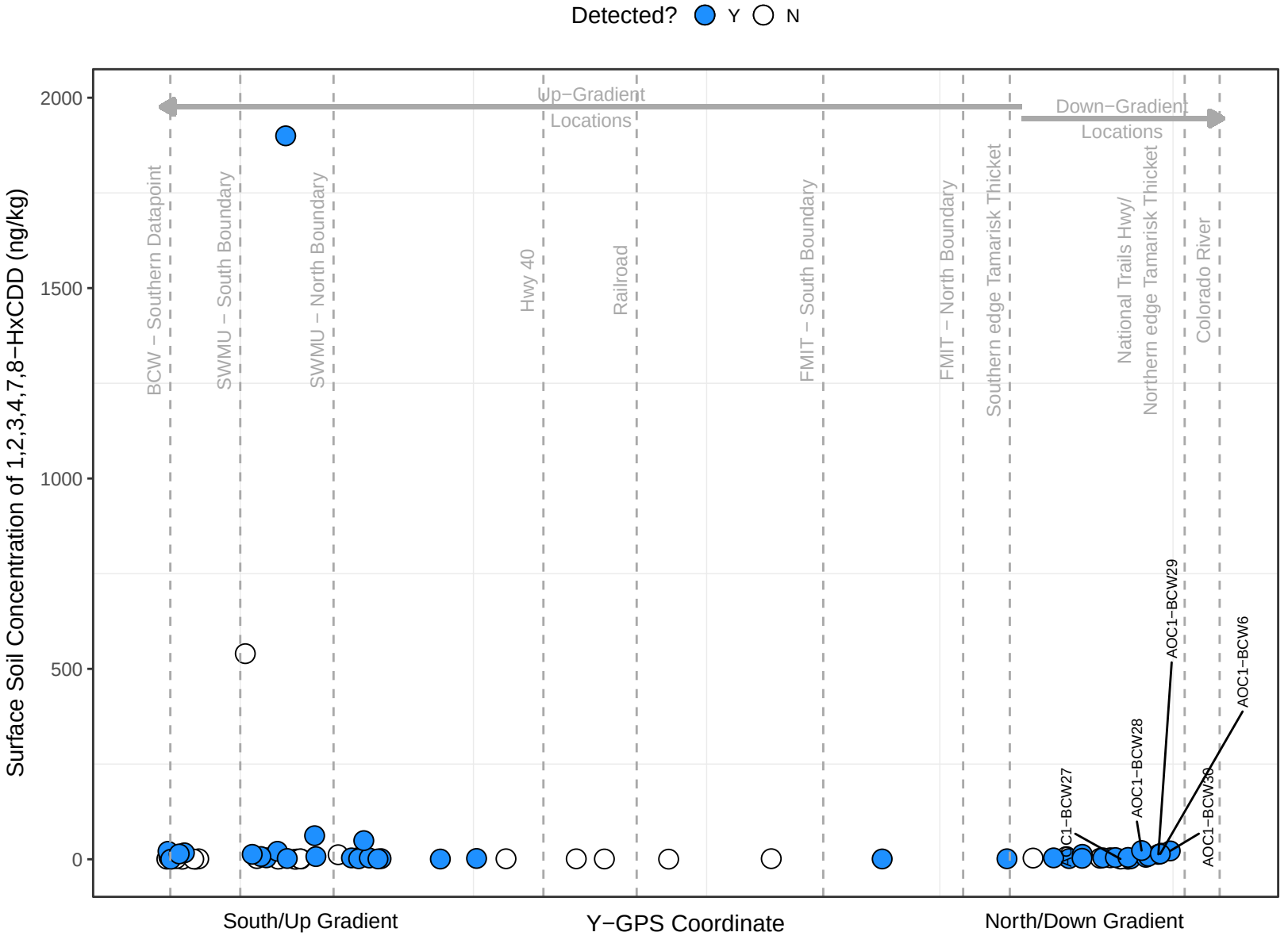


Figure SSTPA−9
Bat Cave Wash − 1,2,3,4,7,8−HxCDF

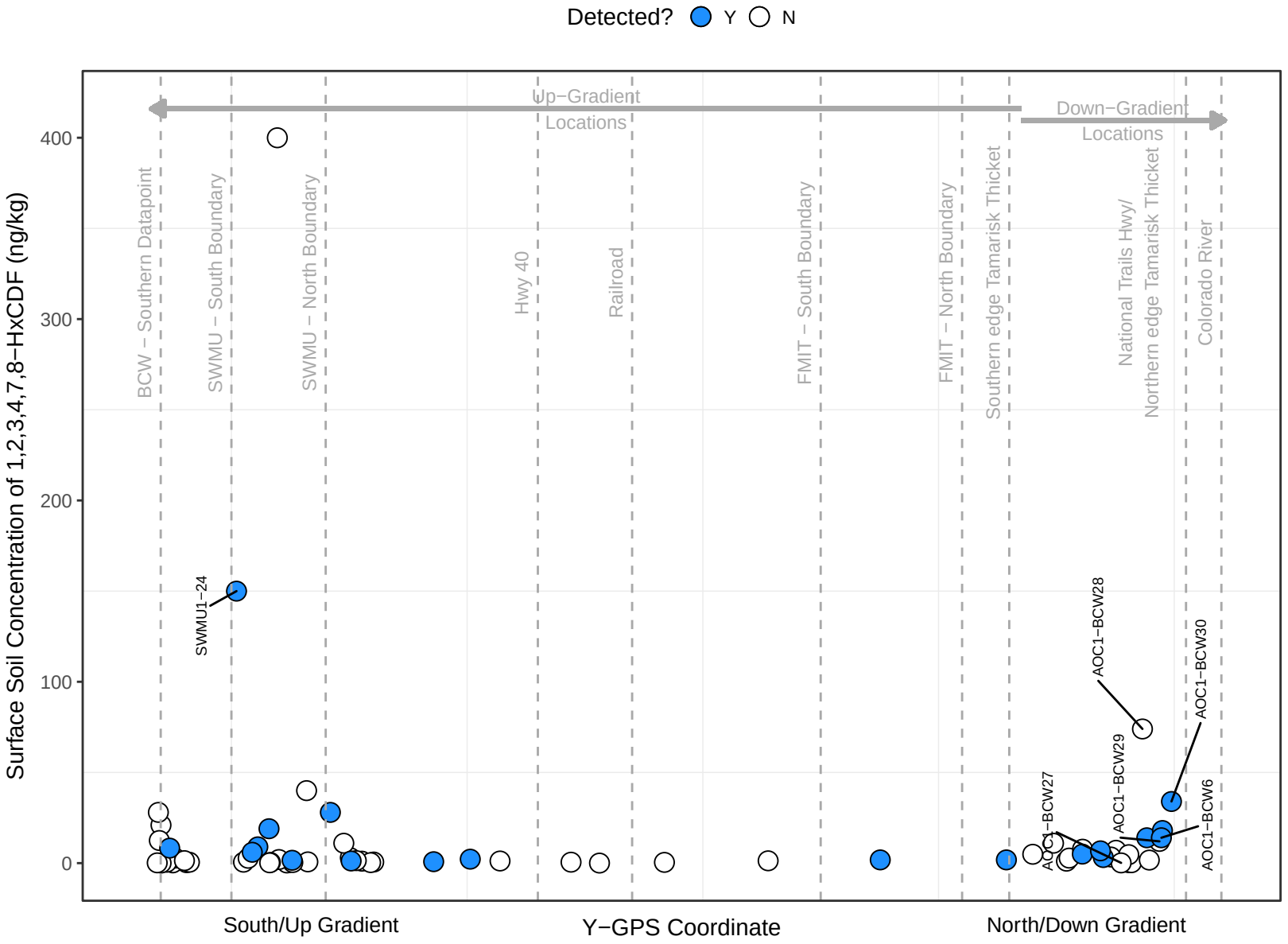


Figure SSTPA−6
Bat Cave Wash − 1,2,3,6,7,8−HxCDD

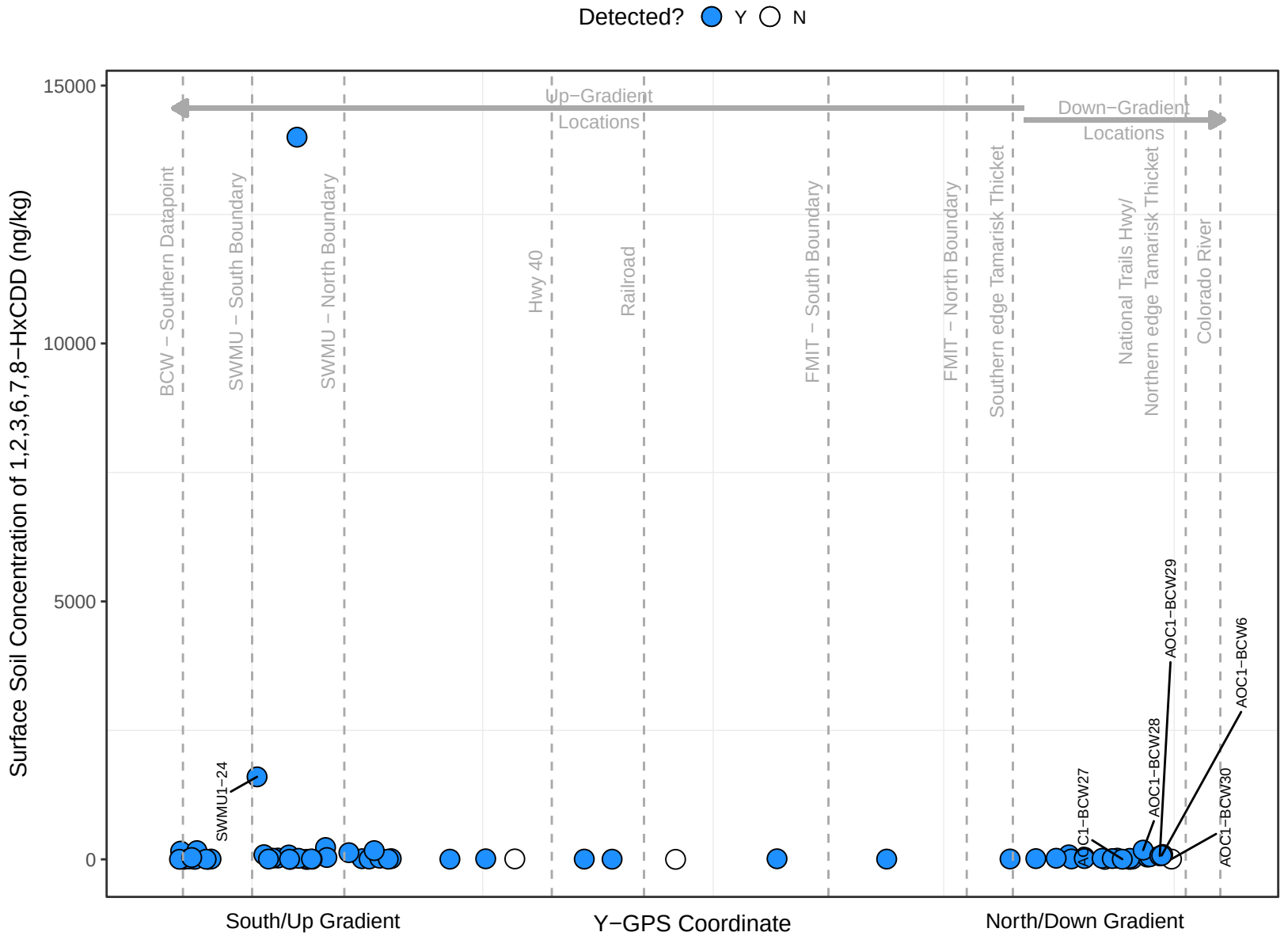


Figure SSTPA−8
Bat Cave Wash − 1,2,3,6,7,8−HxCDF

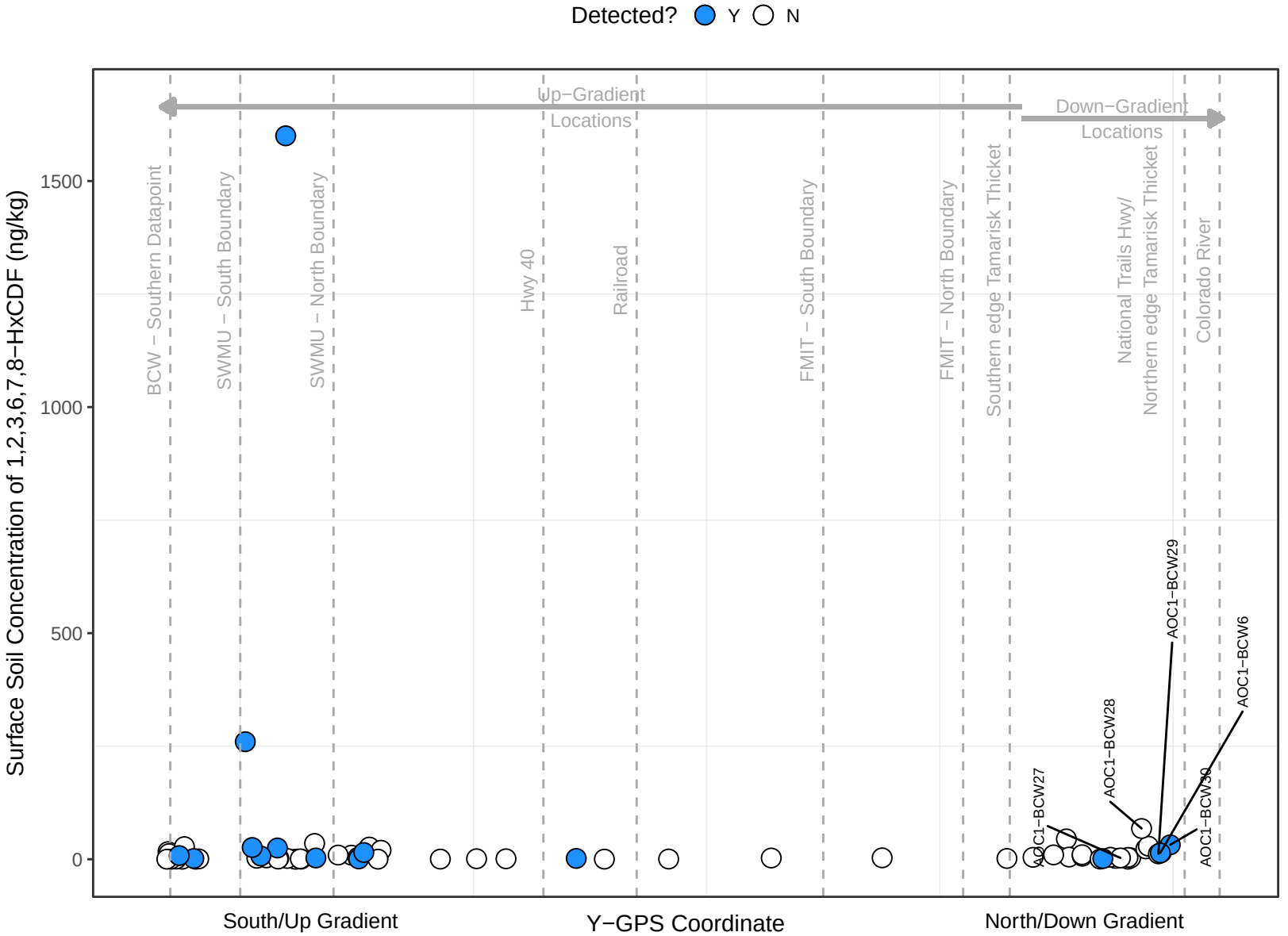


Figure SSTPA−7
Bat Cave Wash − 1,2,3,7,8,9−HxCDD

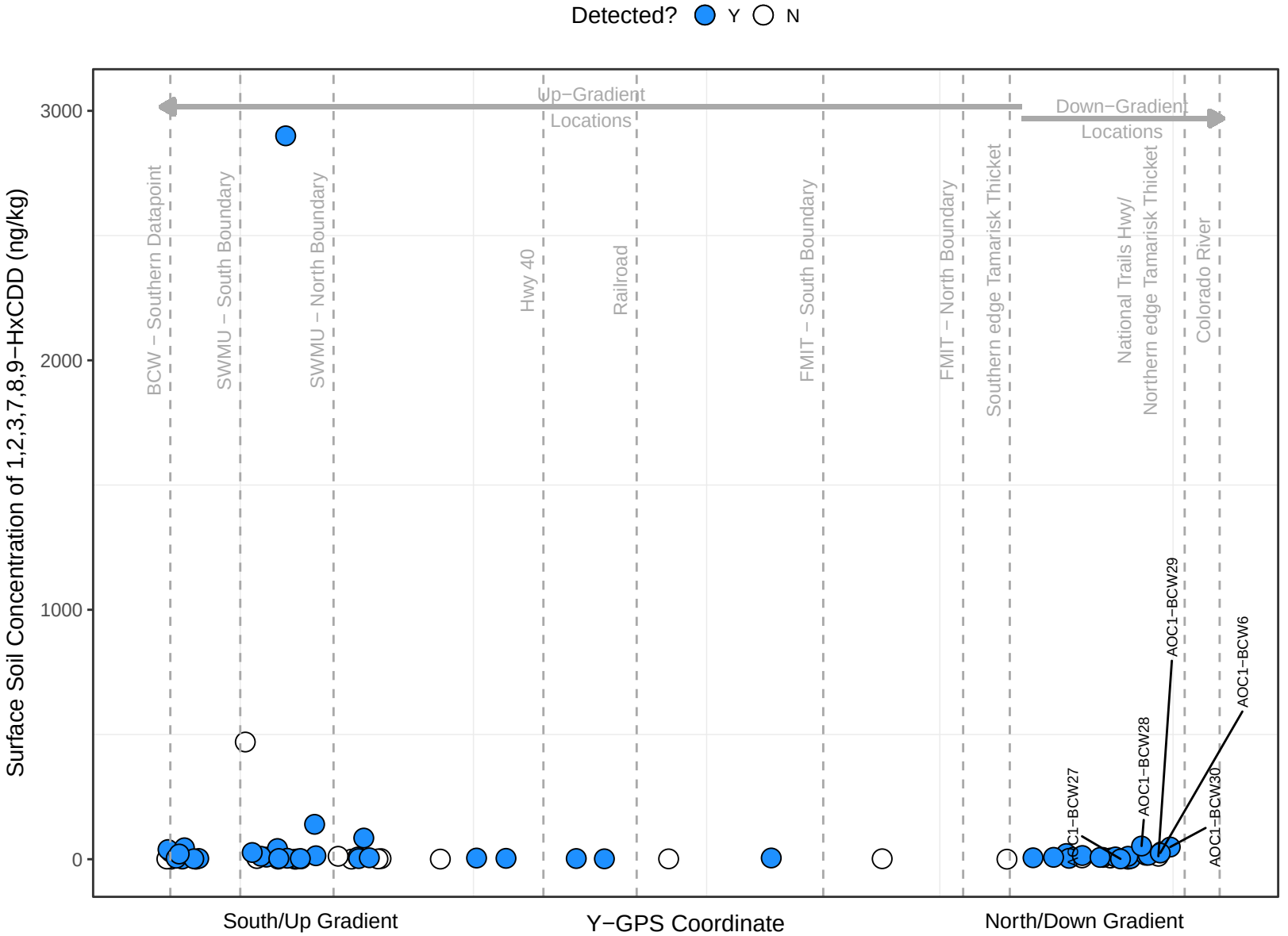


Figure SSTPA−10
Bat Cave Wash − 1,2,3,7,8,9−HxCDF

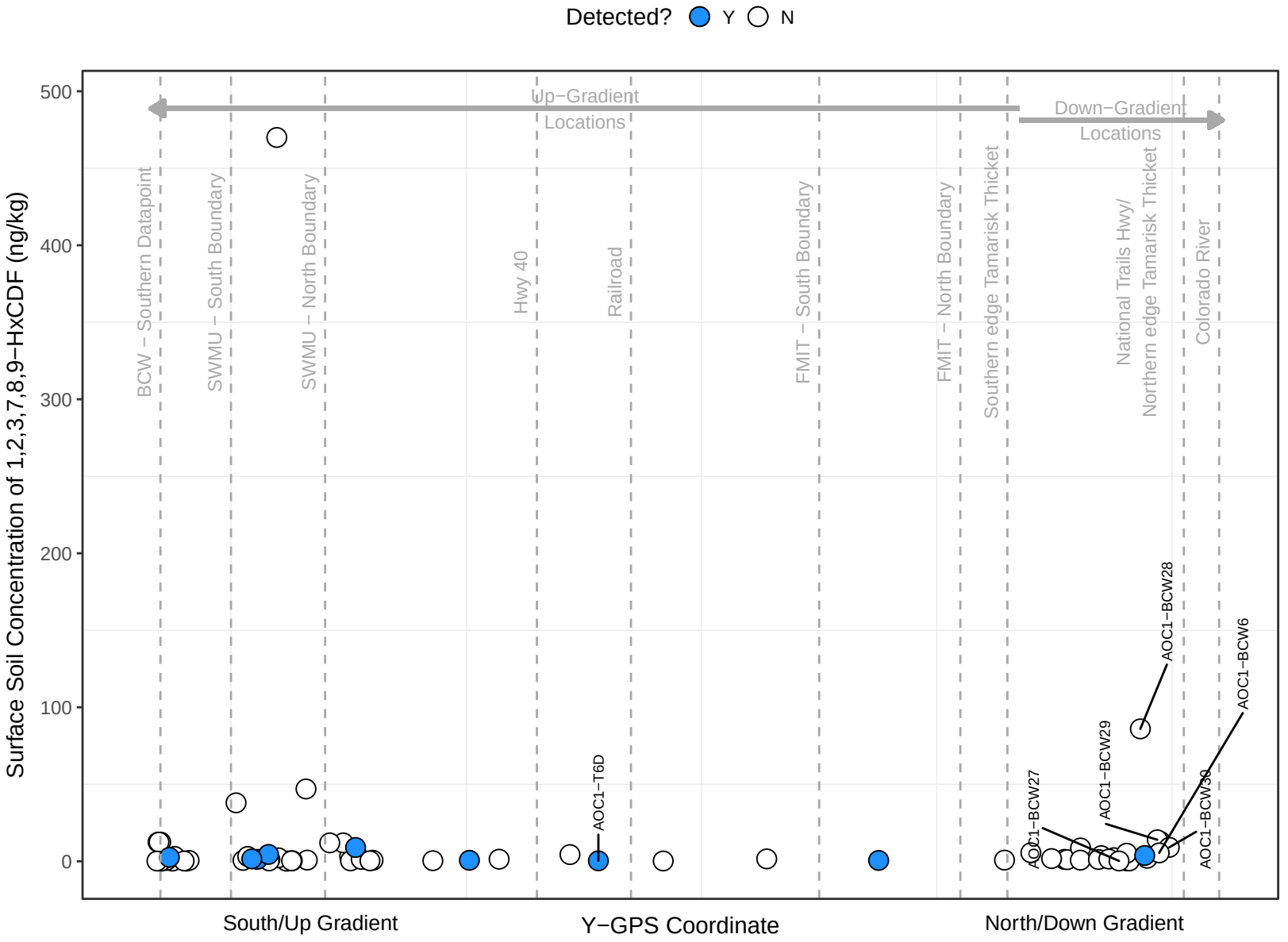


Figure SSTPA−12
Bat Cave Wash − 1,2,3,7,8−PeCDD

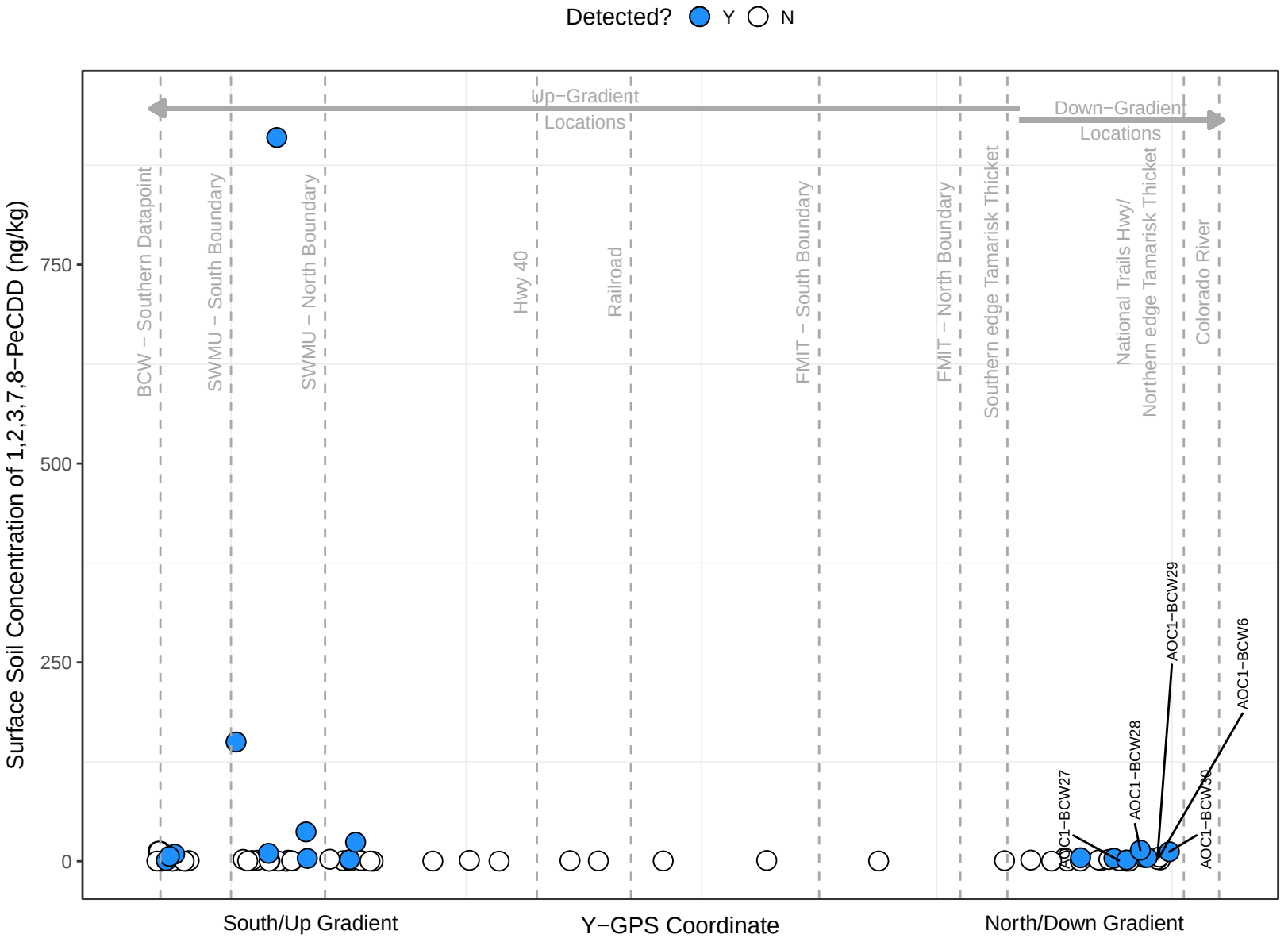


Figure SSTPA−13
Bat Cave Wash − 1,2,3,7,8−PeCDF

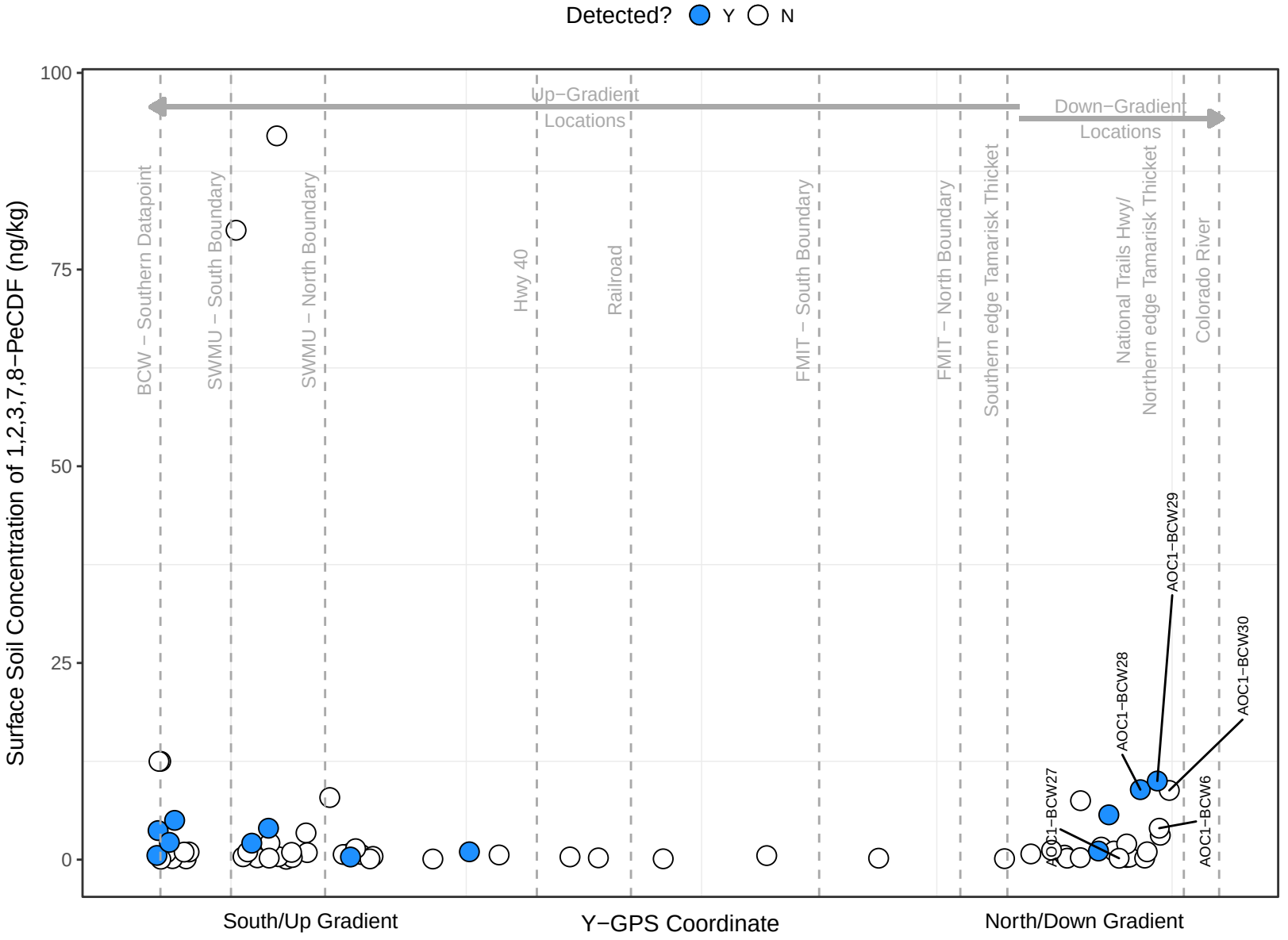


Figure SSTPA−11
Bat Cave Wash − 2,3,4,6,7,8−HxCDF

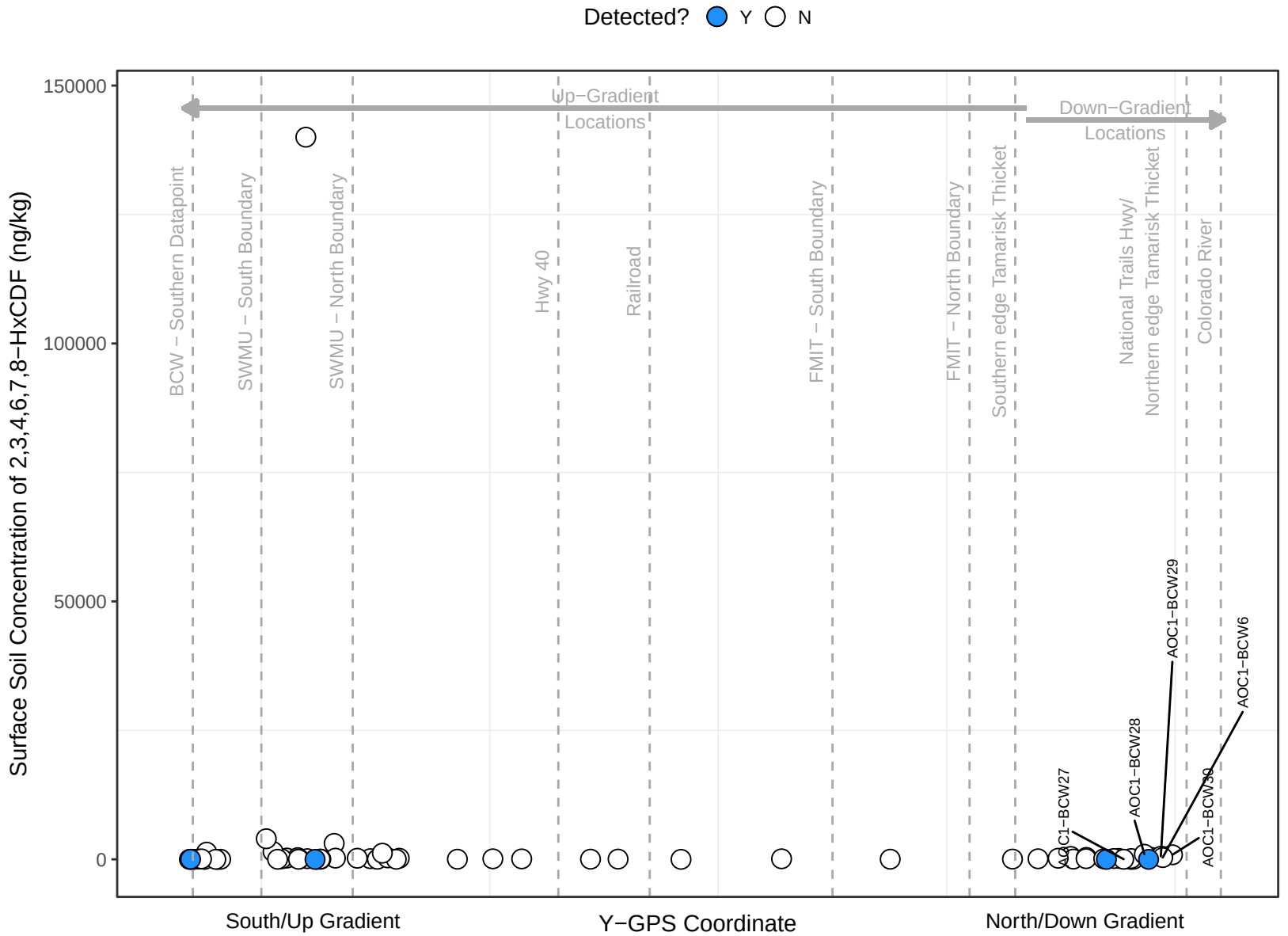


Figure SSTPA−14
Bat Cave Wash − 2,3,4,7,8−PeCDF

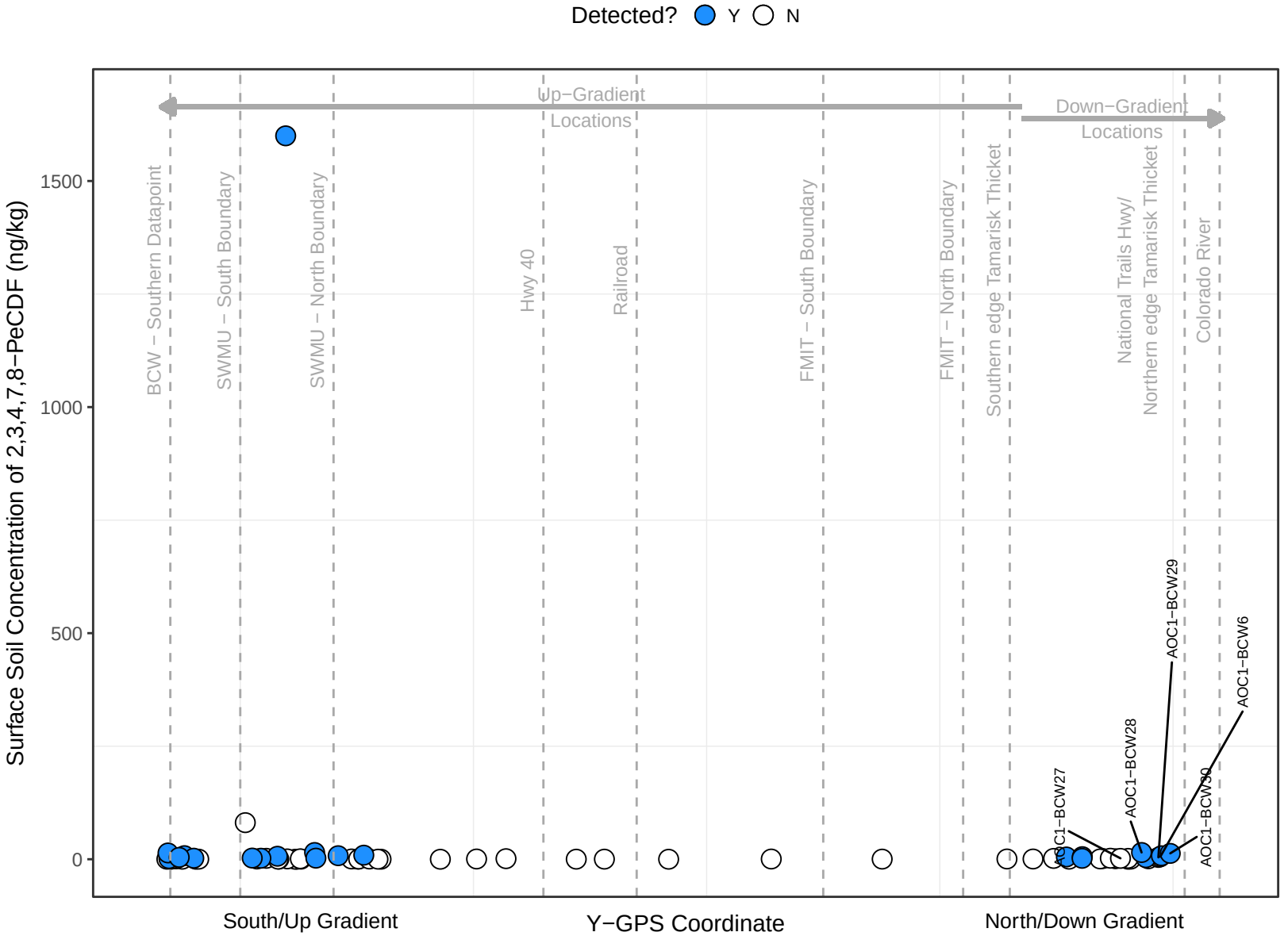


Figure SSTPA−15
Bat Cave Wash − 2,3,7,8−TCDD

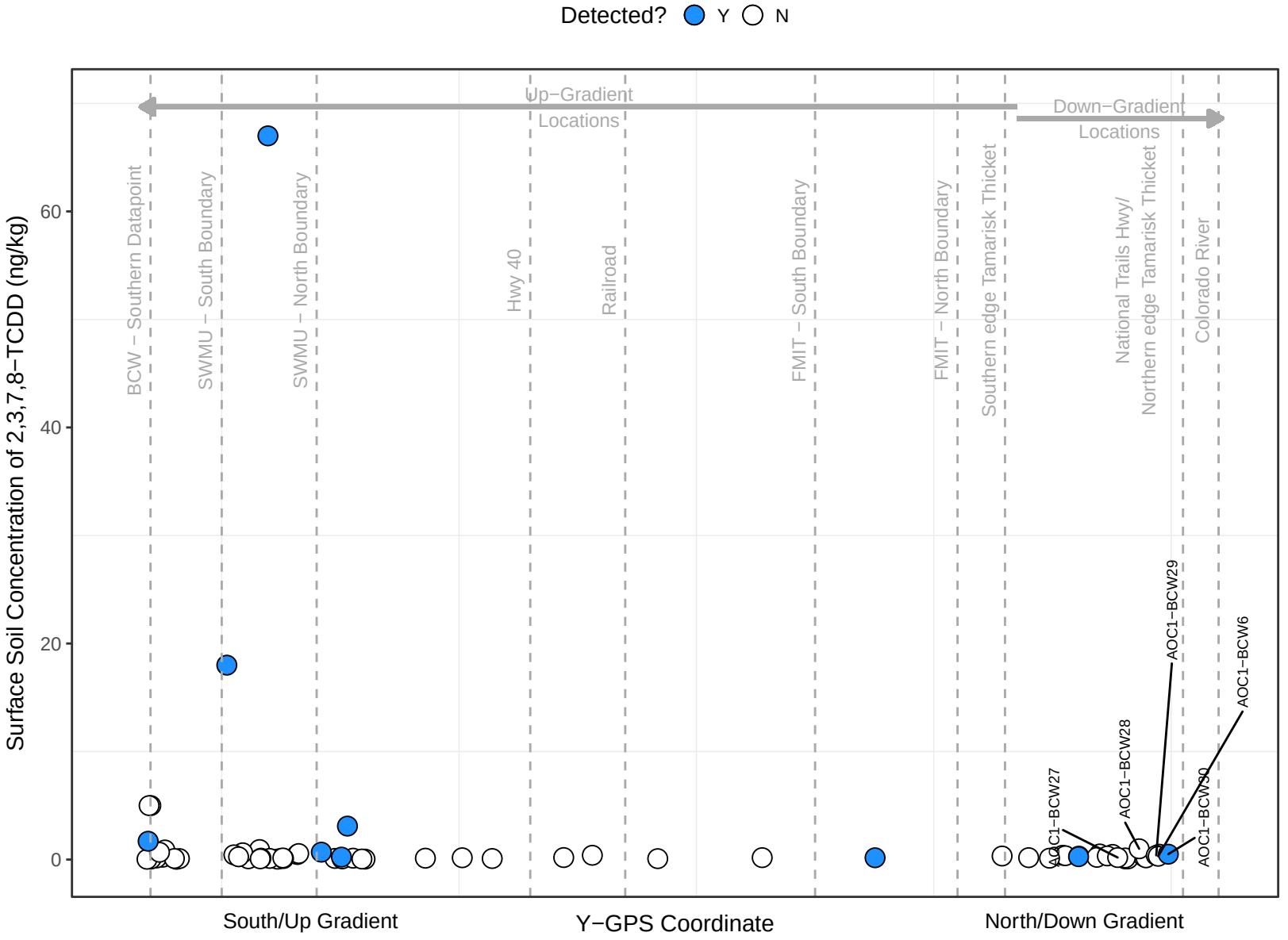


Figure SSTPA−16
Bat Cave Wash − 2,3,7,8−TCDF

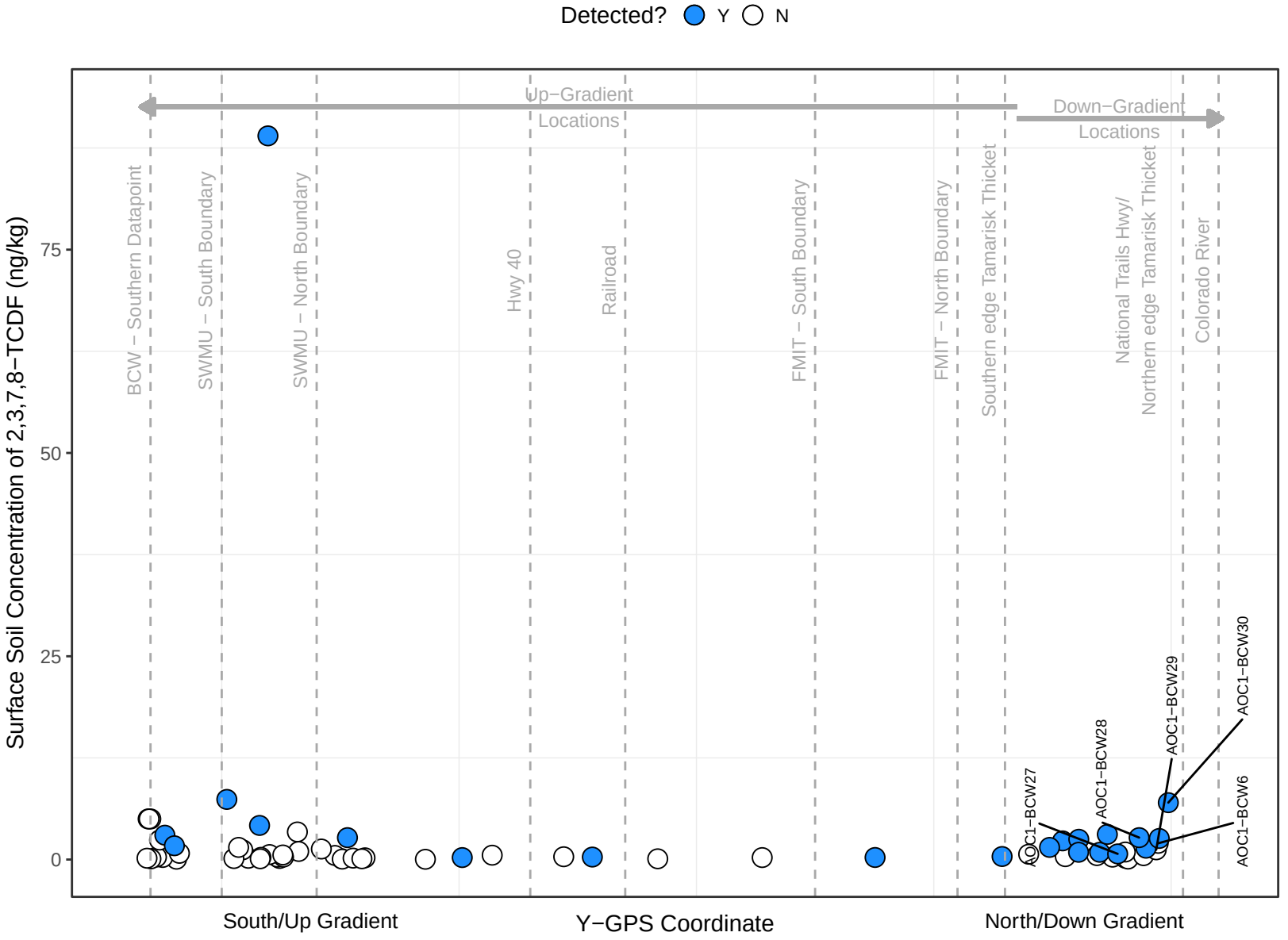


Figure SSTPA−17
AOC 10 − Chromium, Hexavalent

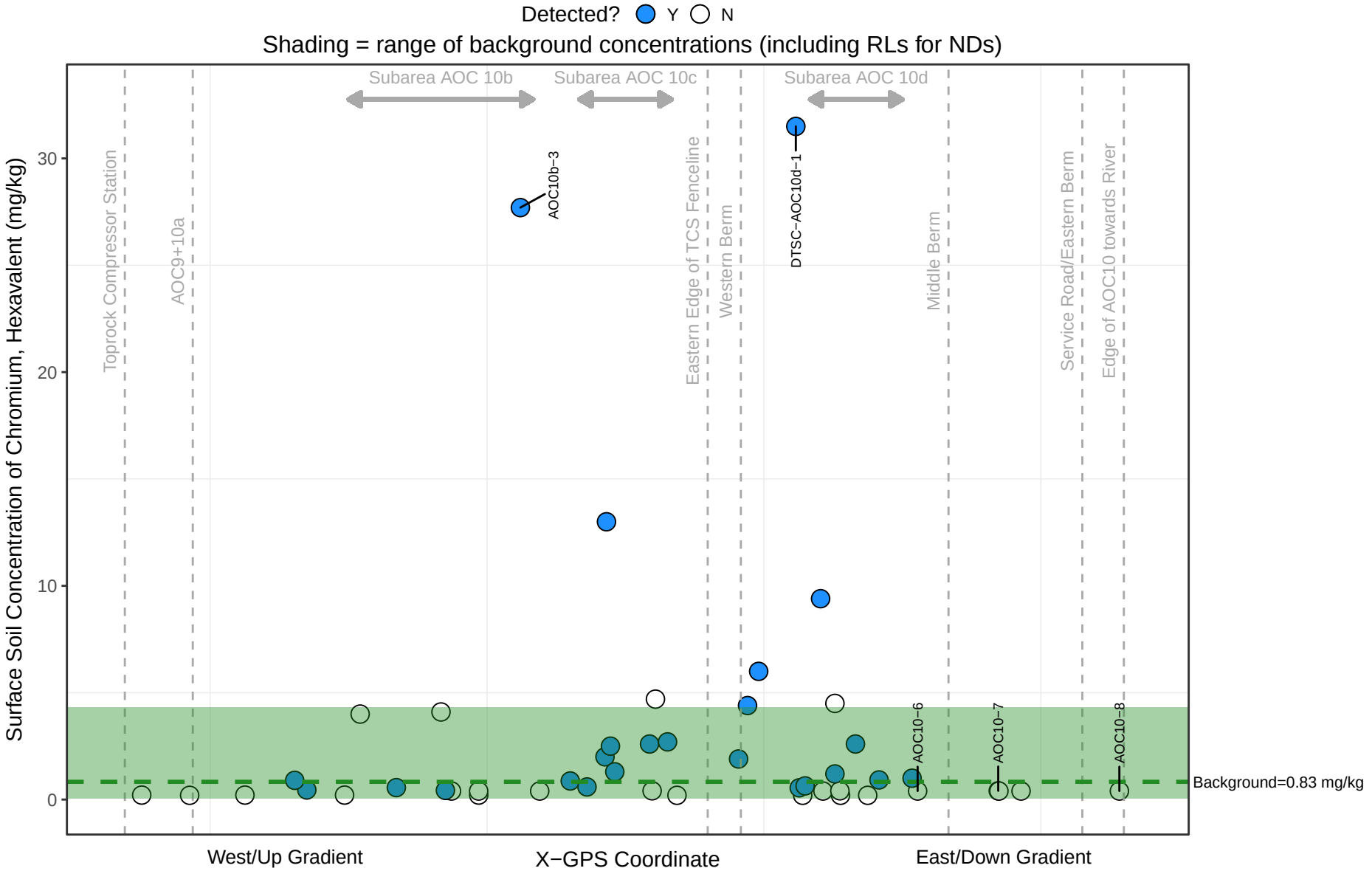


Figure SSTPA−18
AOC 10 − Chromium, total

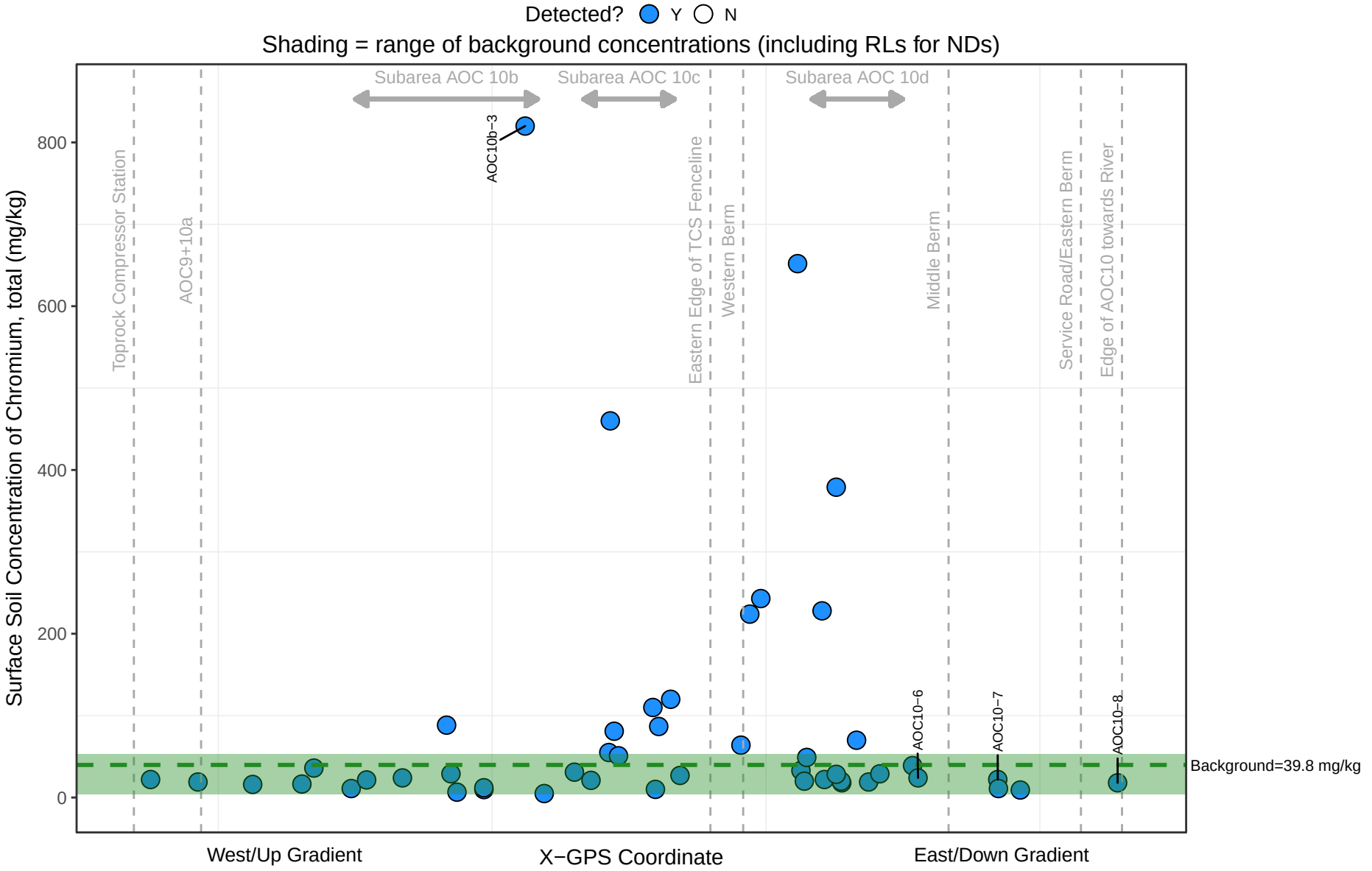


Figure SSTPA−19
AOC 10 − 1,2,3,4,7,8−HxCDD

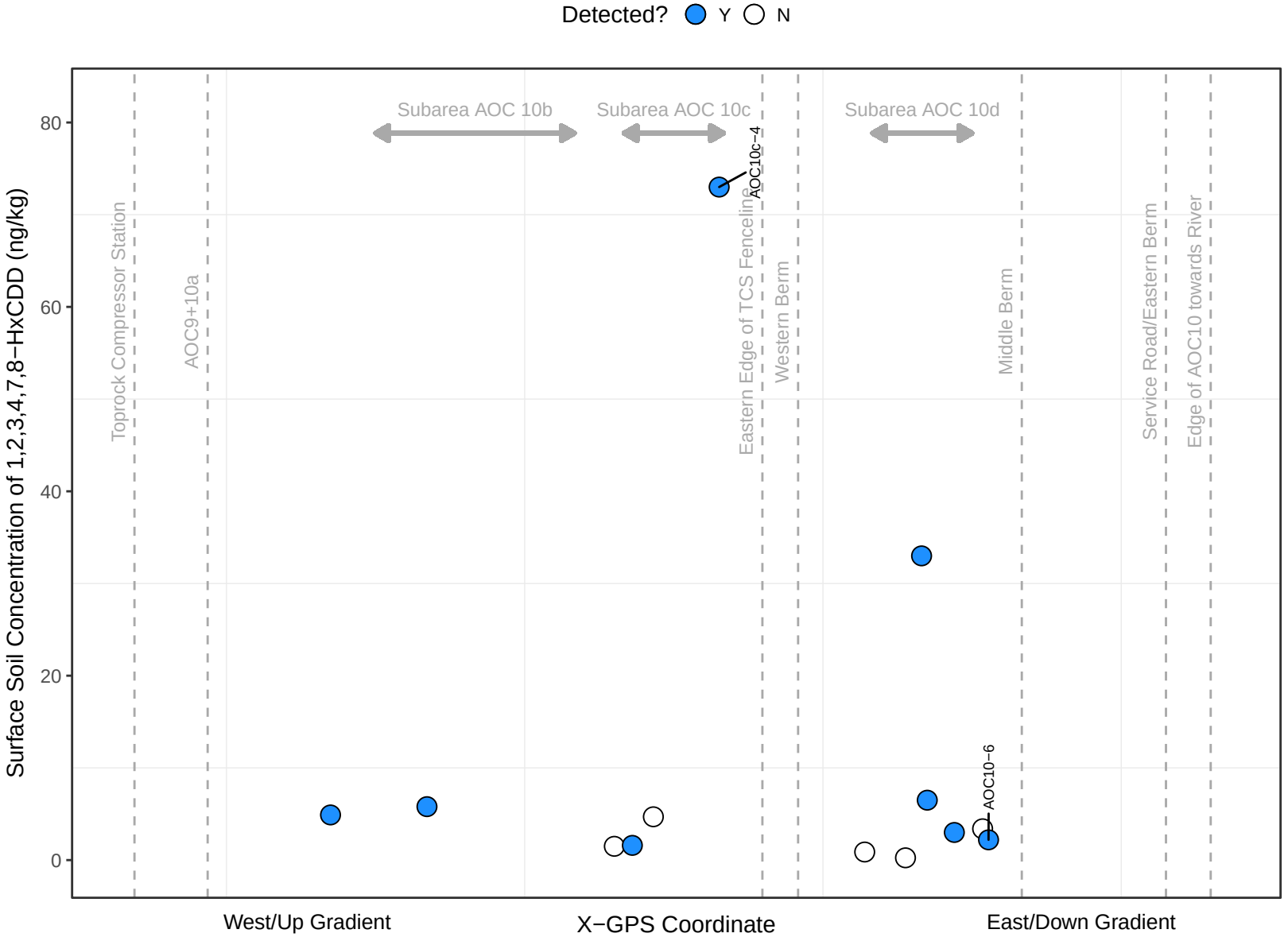


Figure SSTPA−22
AOC 10 − 1,2,3,4,7,8−HxCDF

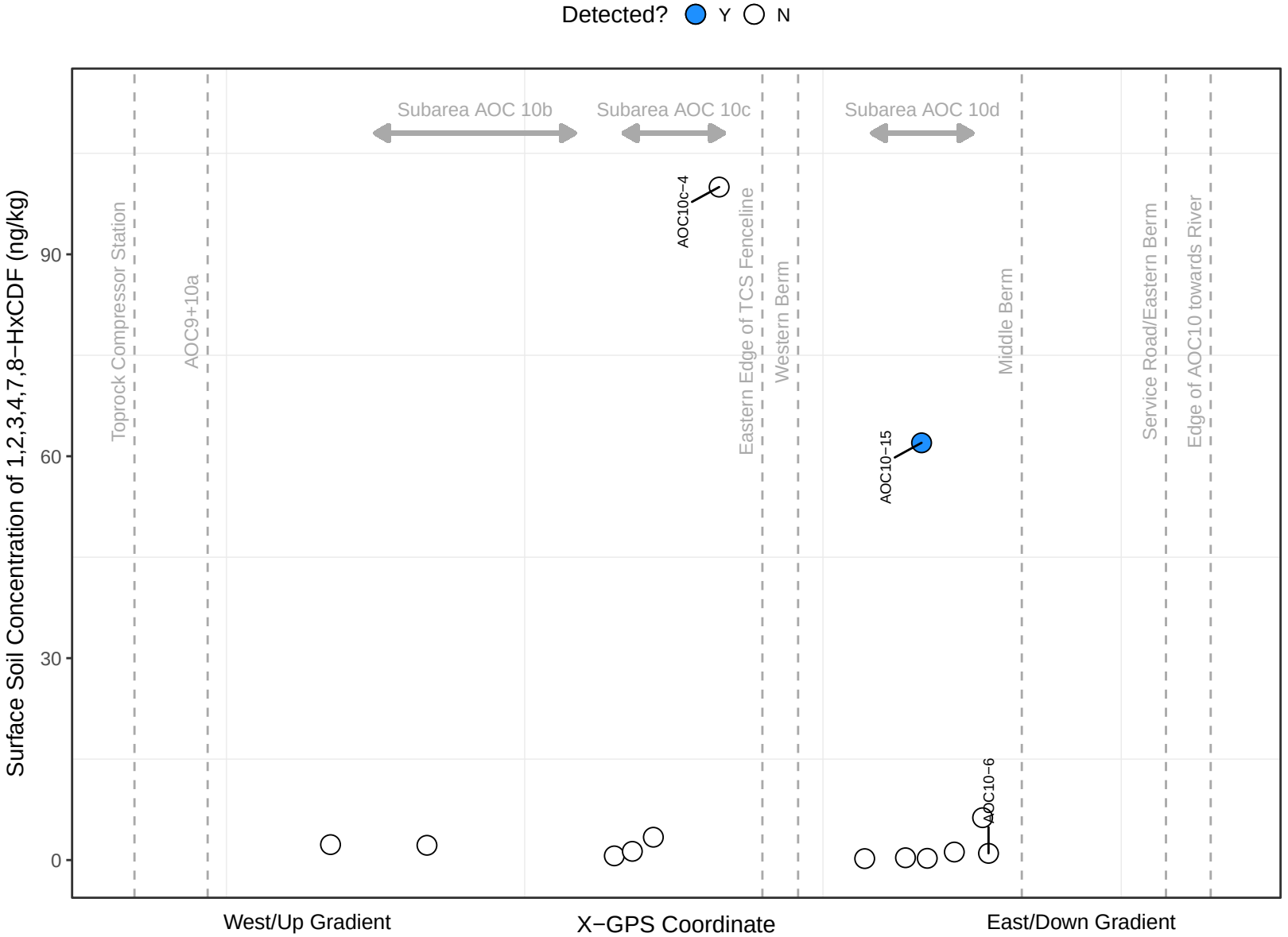


Figure SSTPA−20
AOC 10 − 1,2,3,6,7,8−HxCDD

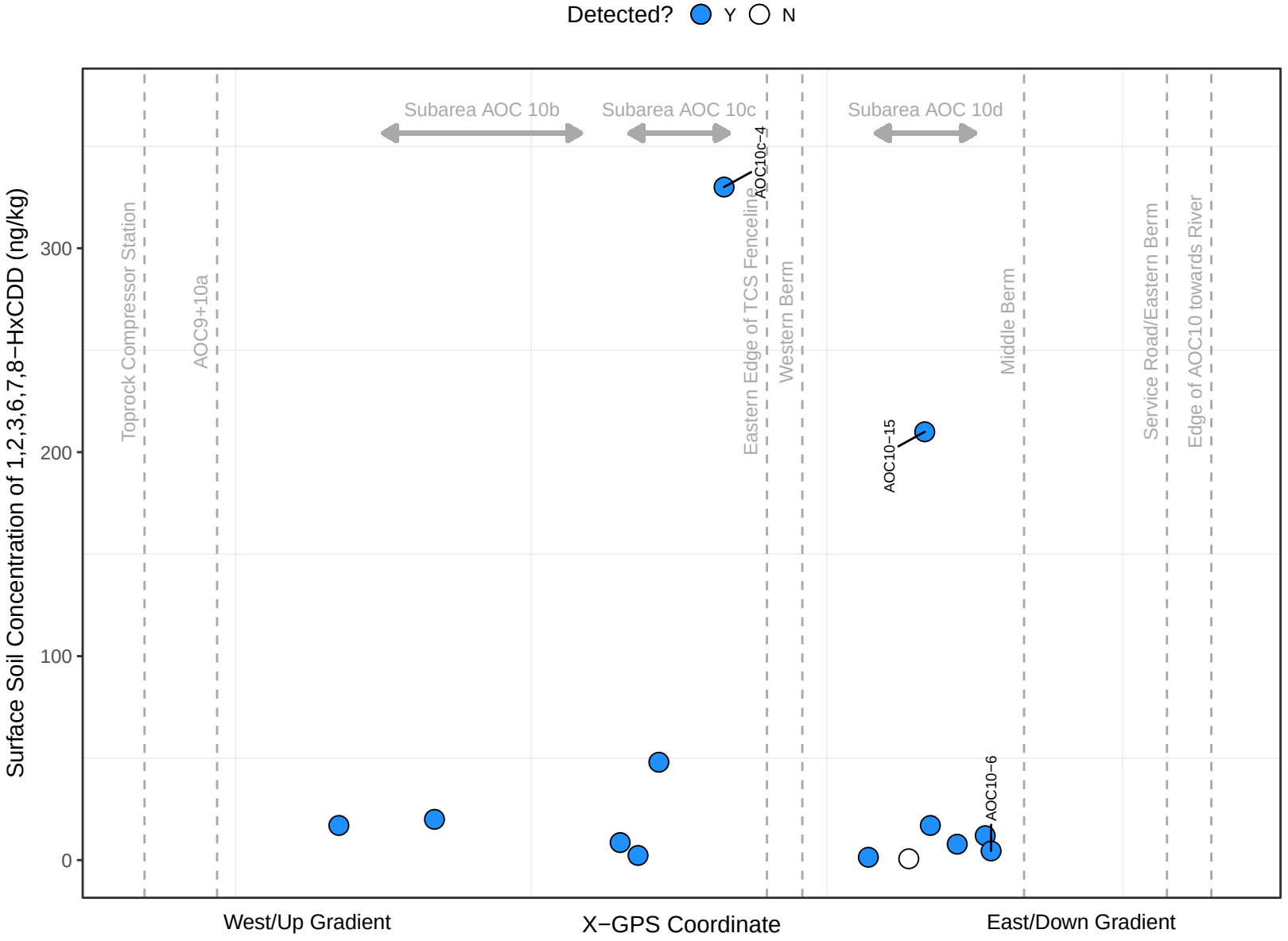


Figure SSTPA−23
AOC 10 − 1,2,3,6,7,8−HxCDF

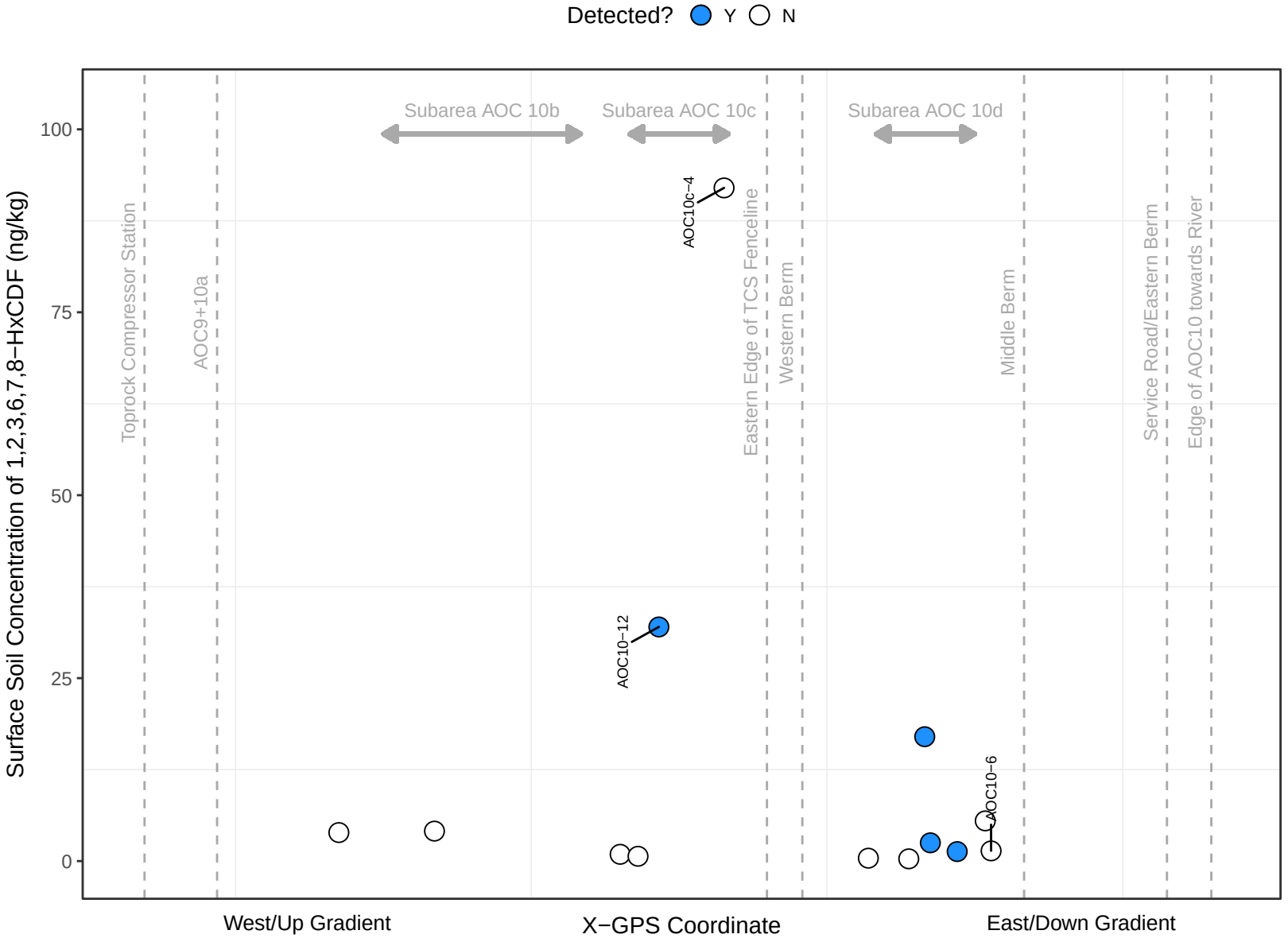


Figure SSTPA−21
AOC 10 − 1,2,3,7,8,9−HxCDD

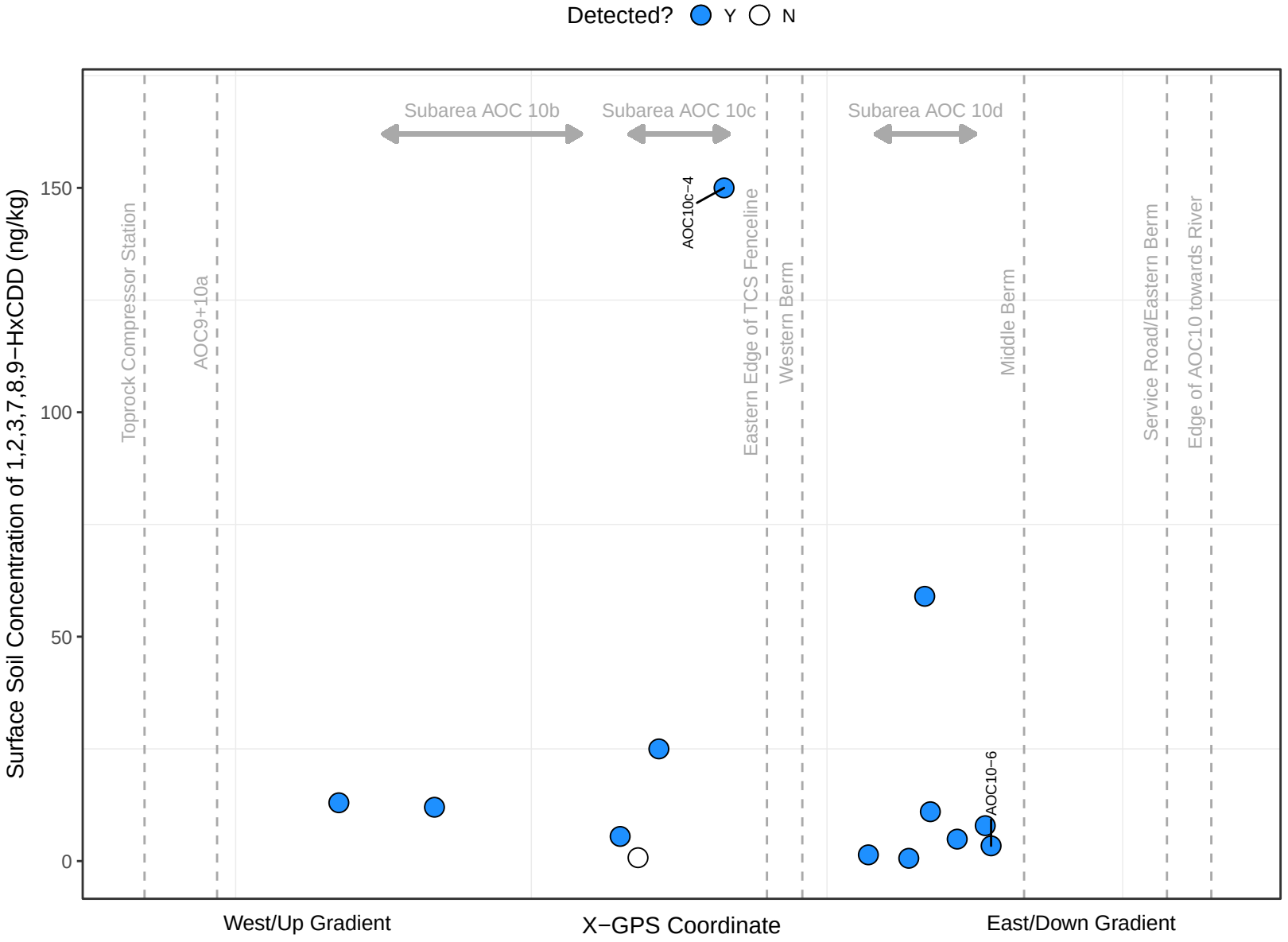


Figure SSTPA−24
AOC 10 − 1,2,3,7,8,9−HxCDF

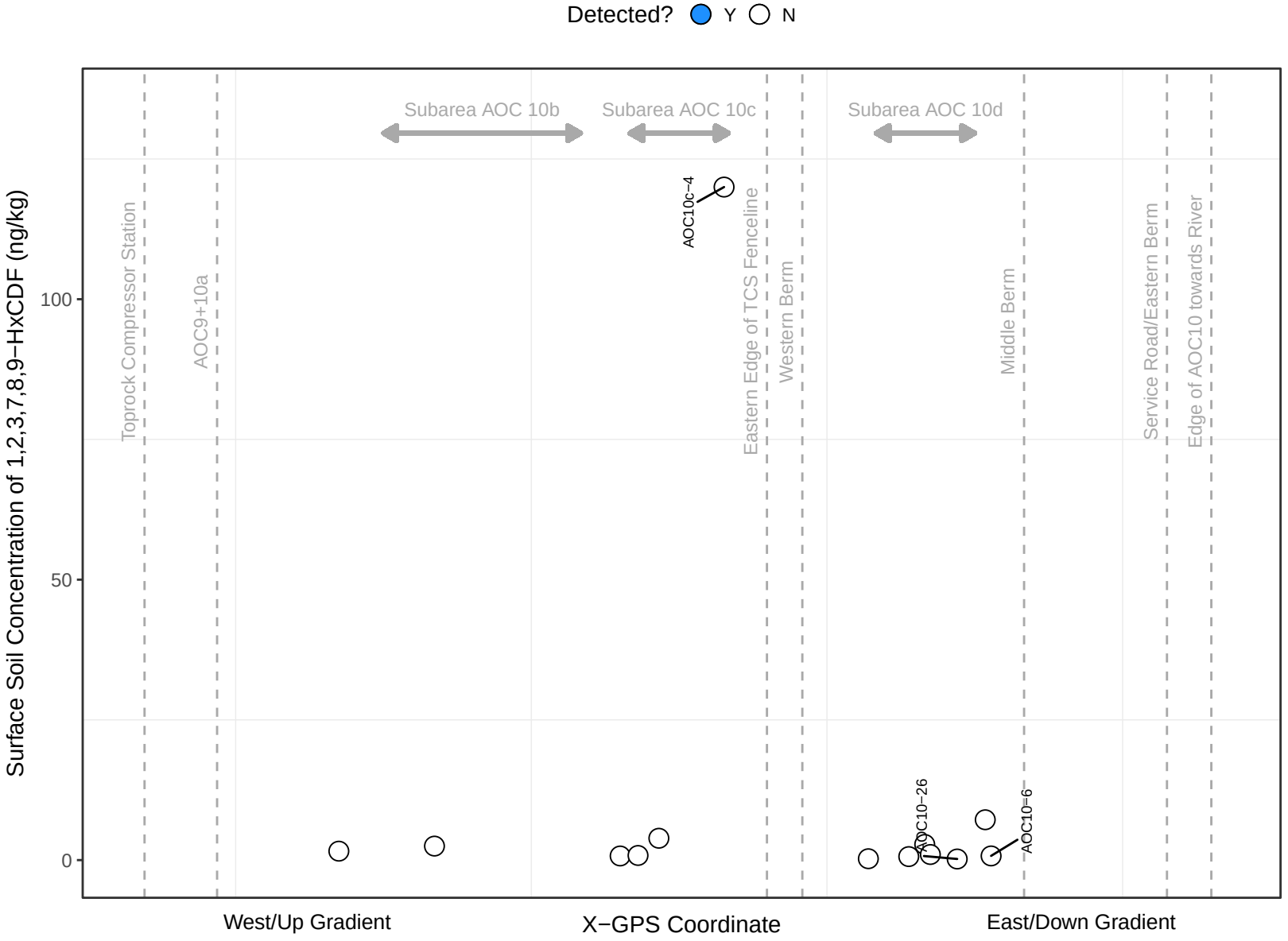


Figure SSTPA−26
AOC 10 − 1,2,3,7,8−PeCDD

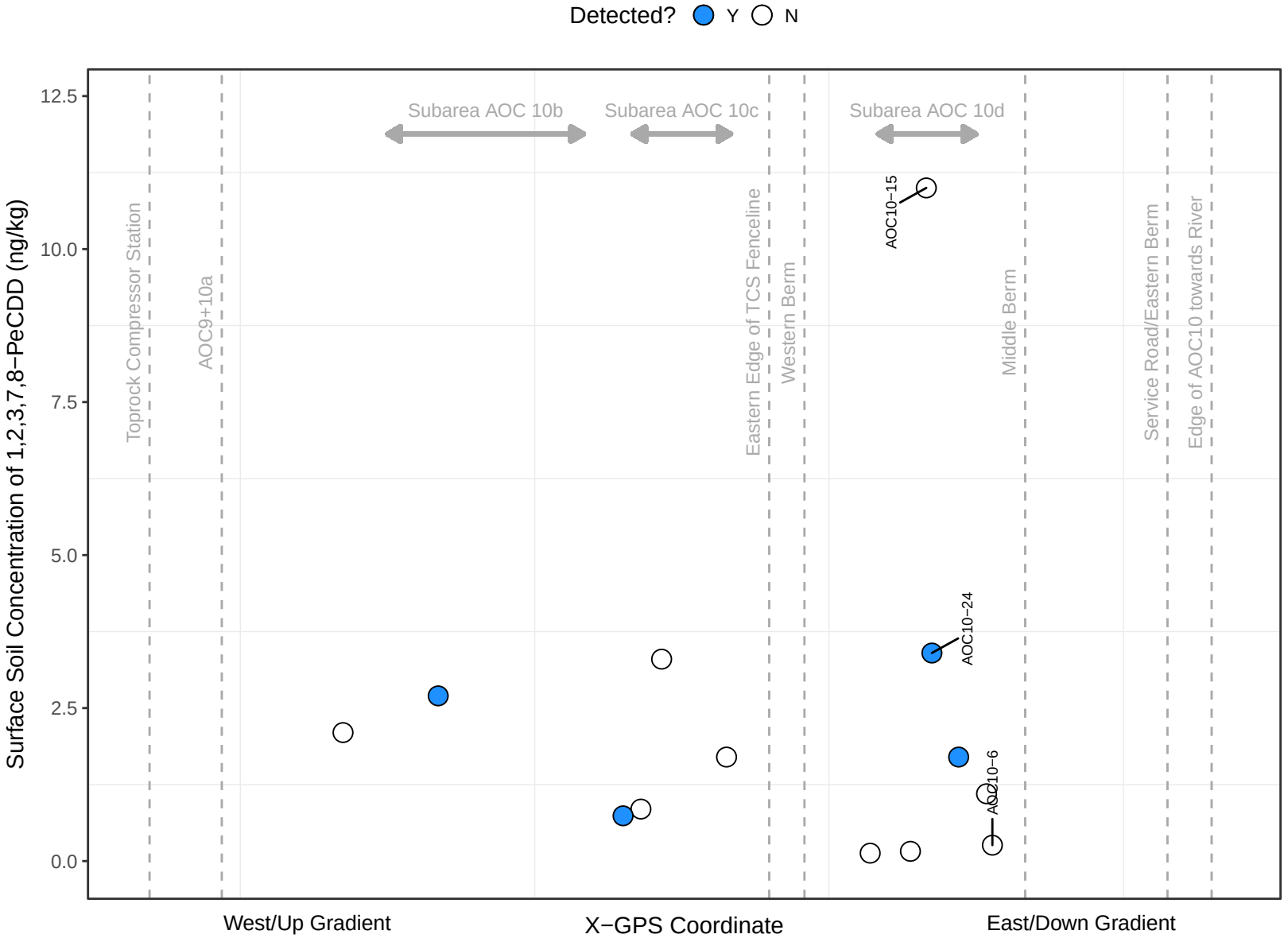


Figure SSTPA−27
AOC 10 − 1,2,3,7,8−PeCDF

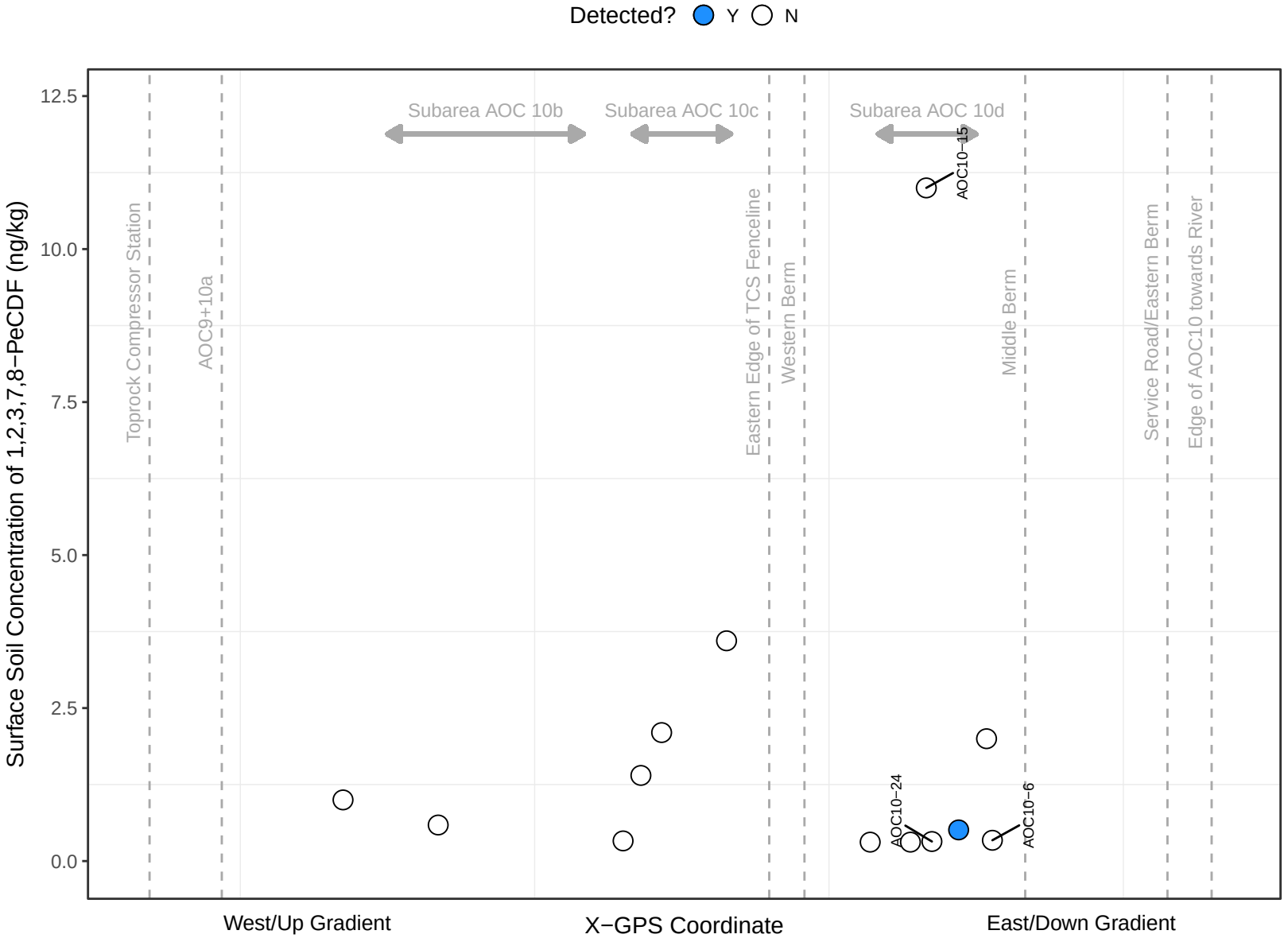


Figure SSTPA−25
AOC 10 − 2,3,4,6,7,8−HxCDF

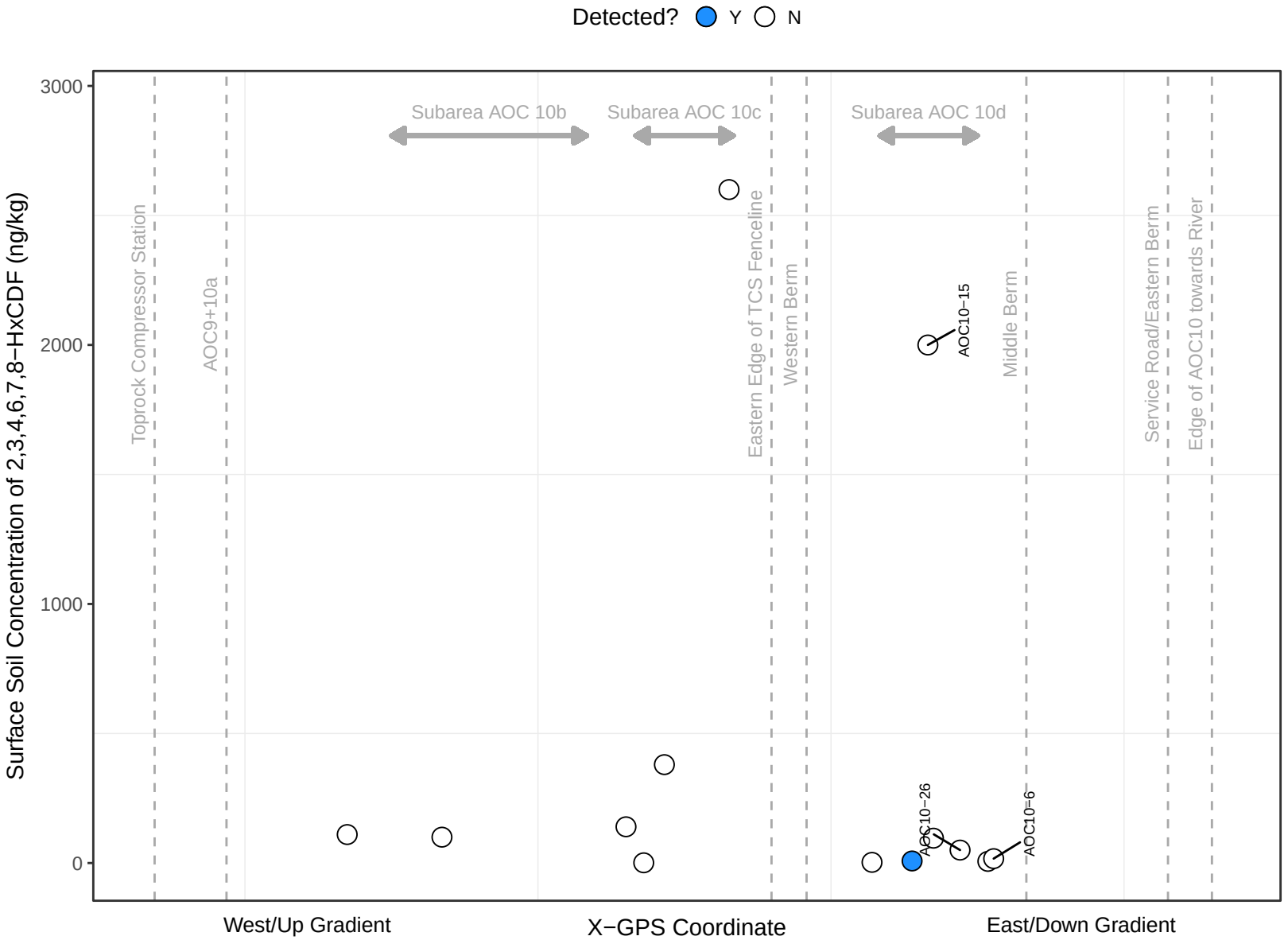


Figure SSTPA−28
AOC 10 − 2,3,4,7,8−PeCDF

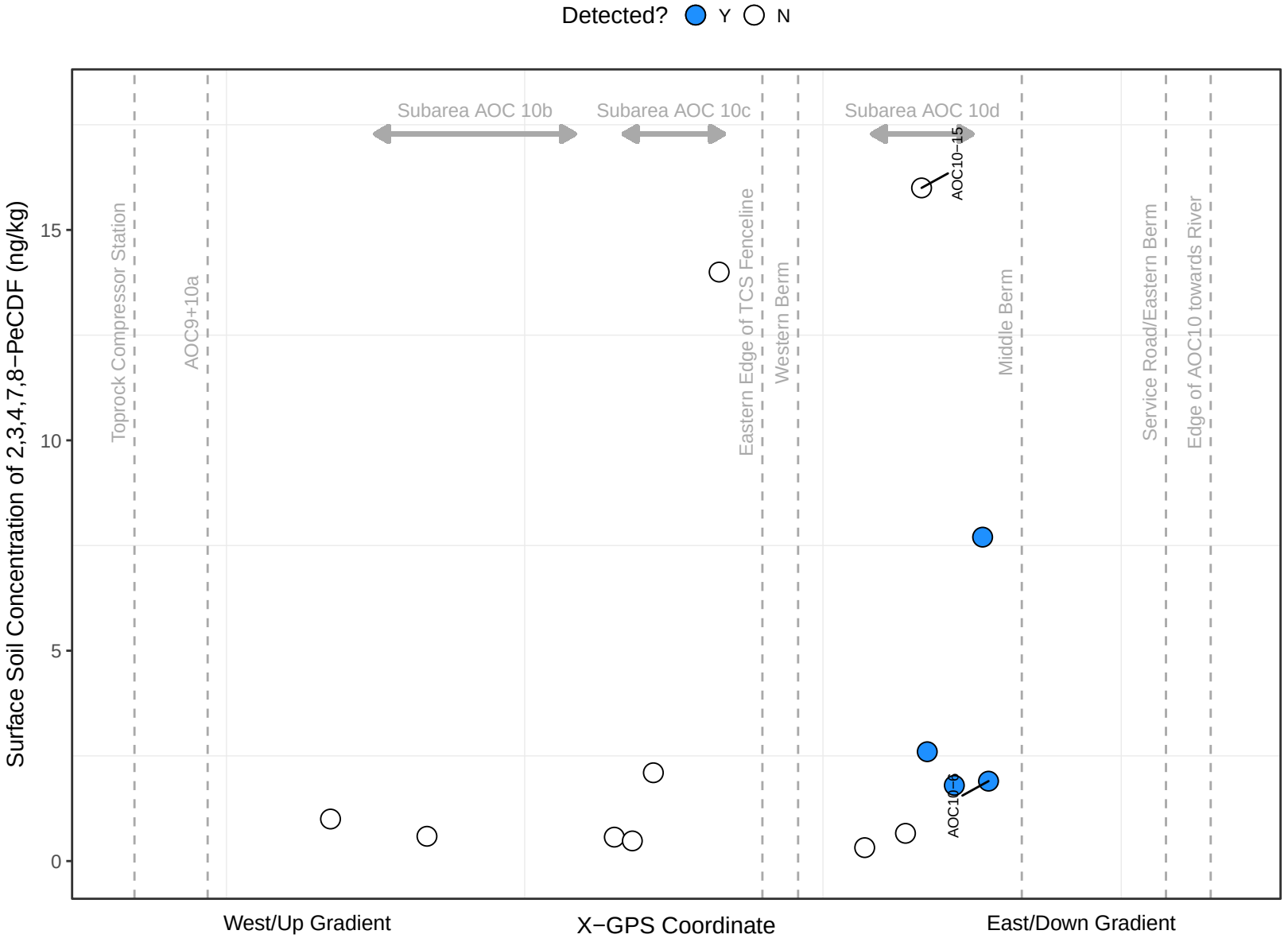


Figure SSTPA−29
AOC 10 − 2,3,7,8−TCDD

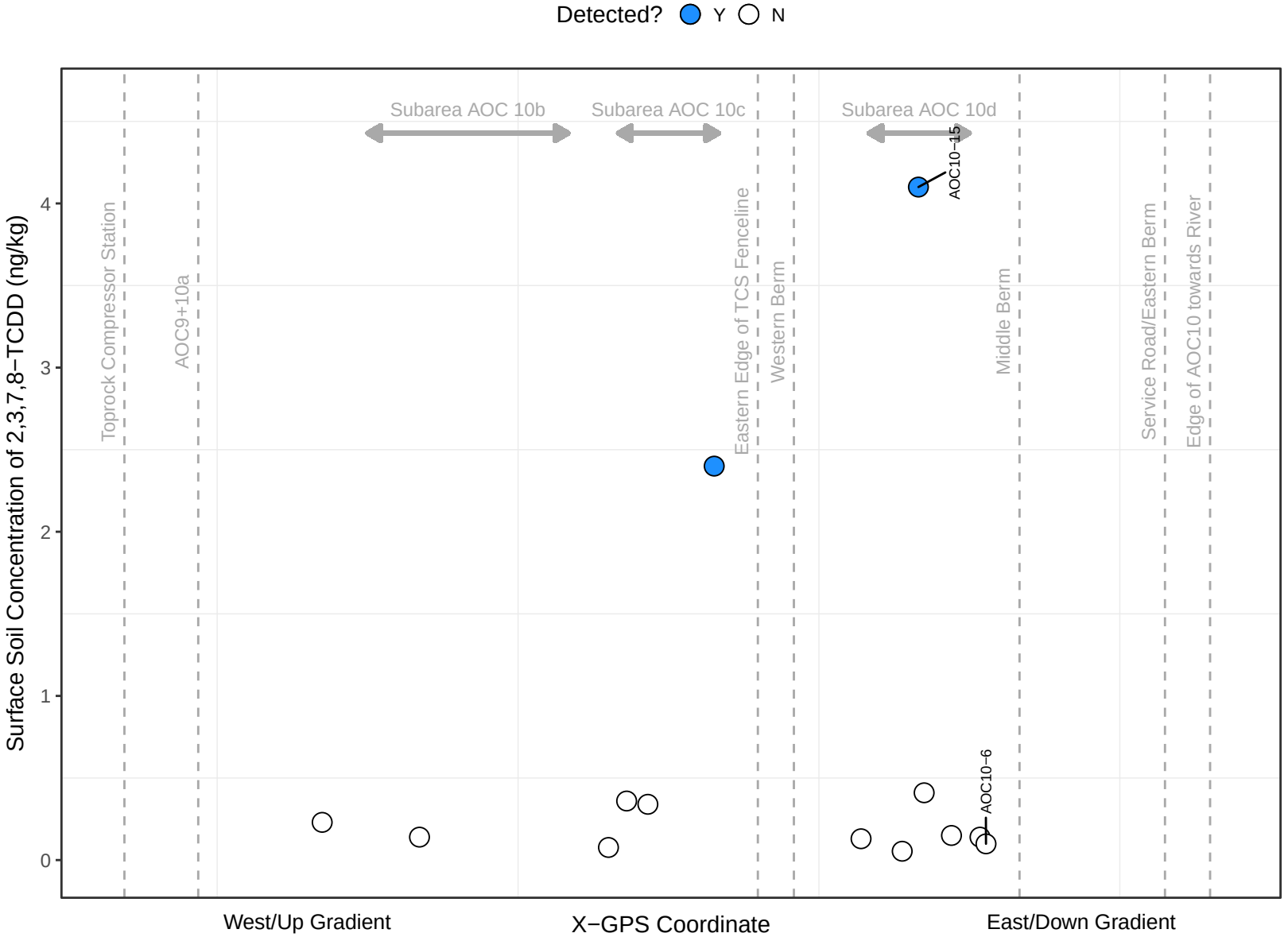
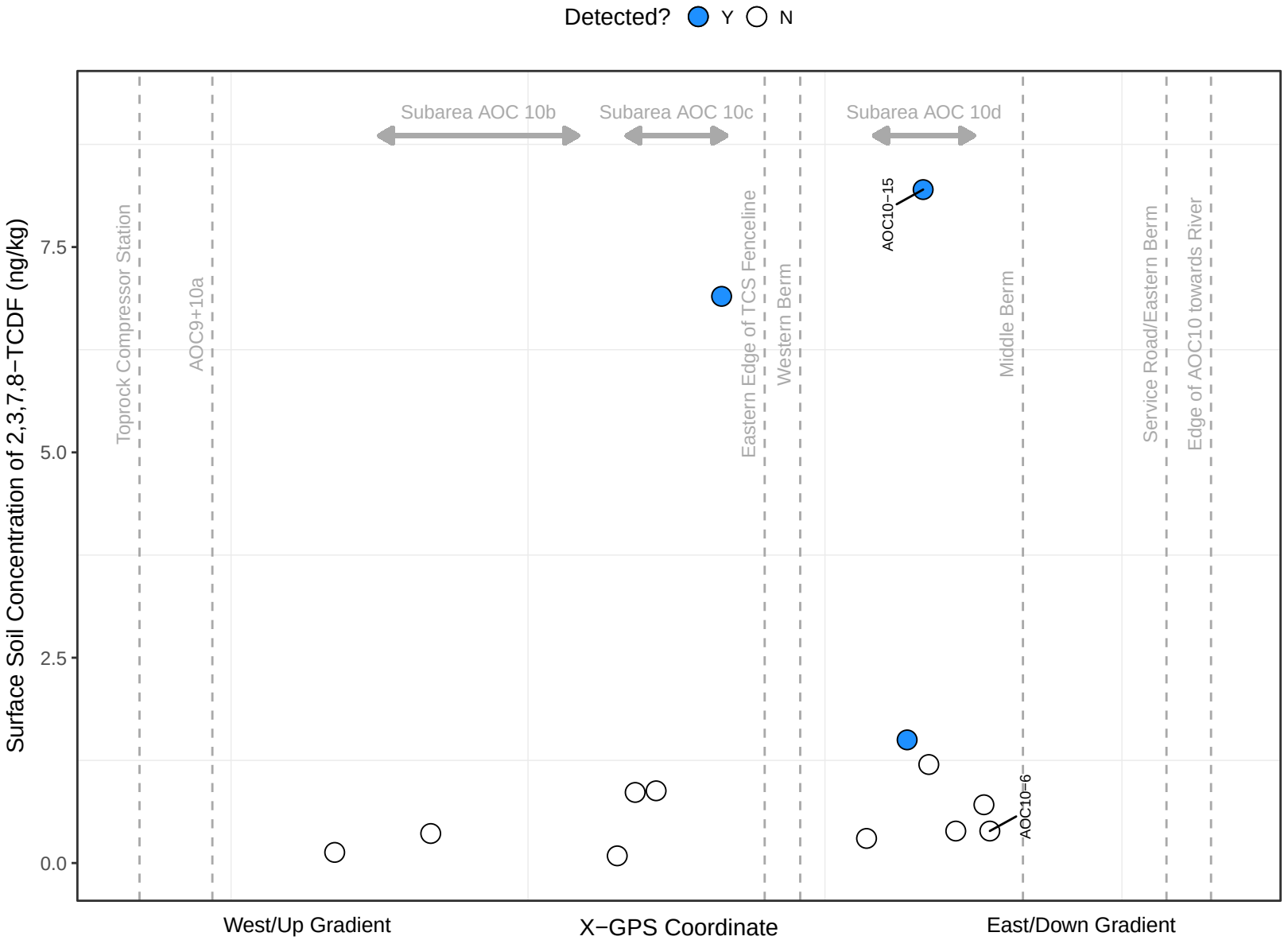


Figure SSTPA−30
AOC 10 − 2,3,7,8−TCDF

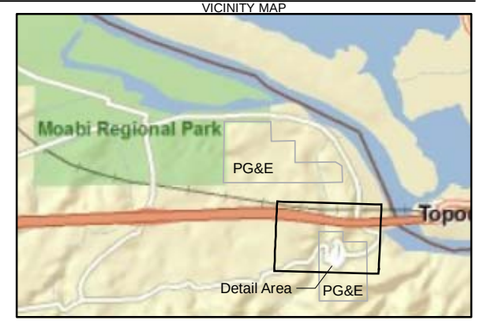


ATTACHMENT A

Figures from the *Final Soil RCRA Facility Investigation/Remedial Investigation Work Plan* (CH2M Hill 2013)



VICINITY MAP



LEGEND

- Soil Boring
- Property Boundary
- Caltrans Right Of Way
- SWMU1 Boundary
- AOC Boundary
- Potential New Investigation Area
- White Powder Area
- SWMU Area
- Transwestern Pipeline
- Mojave Pipeline
- PG&E Pipeline
- SoCal Gas Pipeline
- Historical Discharge Piping
- Potential Locations of Stormwater Piping Below Ground
- Potential Location of Stormwater Piping Above Ground

Potential Release Mechanisms

- Infrequent Surface Water Runoff
- Infiltration (Site-wide)
- Windblown Dispersion of Soil (Site-wide)
- Volatilization (Site-wide)
- Degradation by Heat/Light (Site-wide)
- Surface Soil Scouring & Redeposition (Possible Throughout the Wash)
- Downstream Movement During Flow Events
- Historic Waste Water Flow

Note:
Topographic contours shown are in 2 foot intervals.

N

0 50 100 200 300 400 500
Feet

FIGURE C2-3
Conceptual Site Model for AOC-1
Soil Investigation Part A
Phase 1 Data Gaps Evaluation Report
Pacific Gas and Electric Company Topock Compressor Station
Needles, California

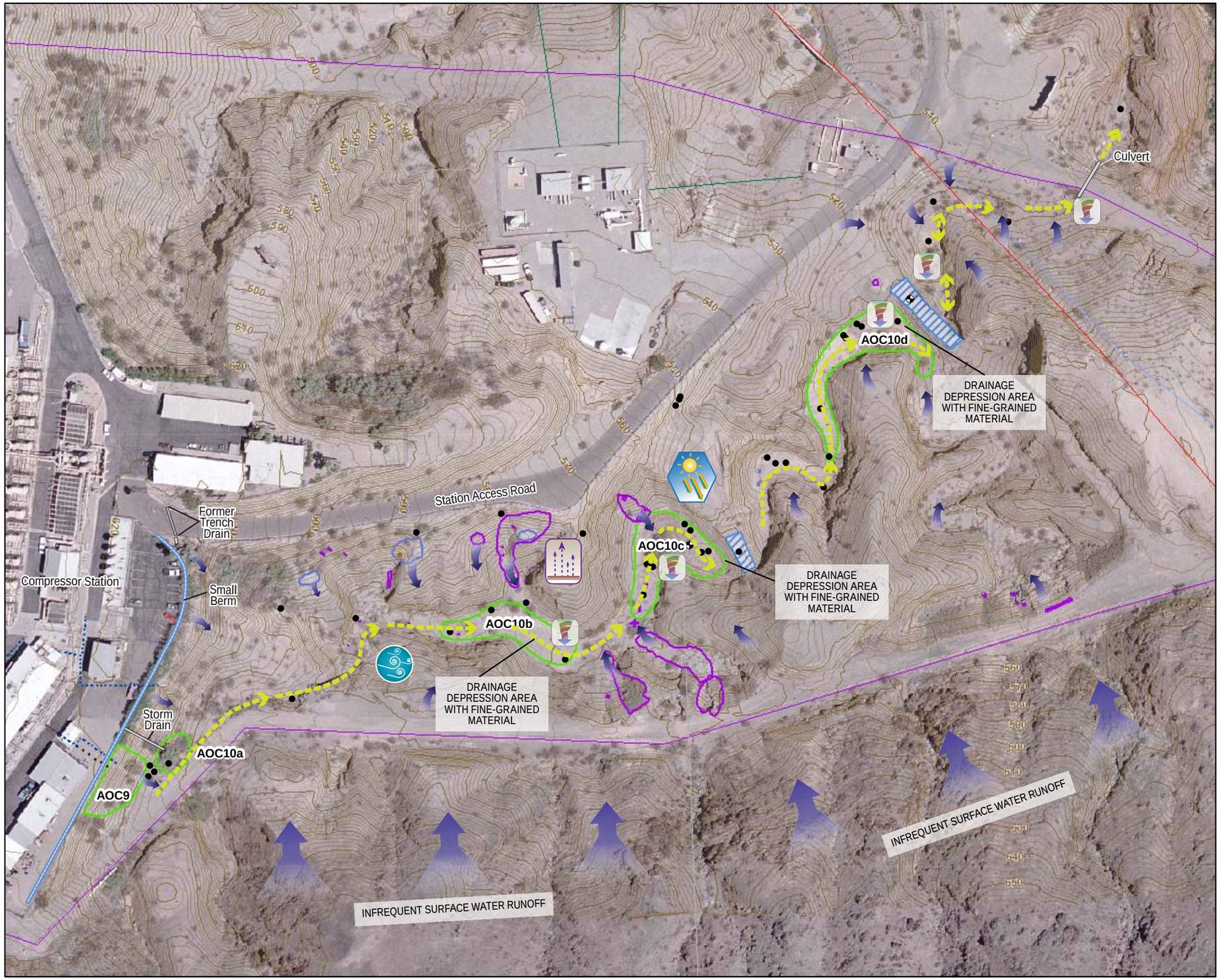
CH2MHILL



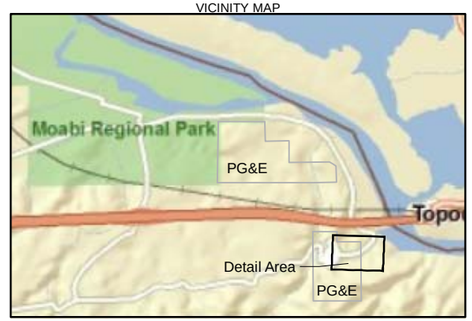
FIGURE C2-4
Conceptual Site Model for AOC-1 North
Soil Investigation Part A Phase 1 Data Summary Report
PG&E Topock Compressor Station
Needles, California

ES051410163258BAO AOC-1_North_conceptual_site_model_v2.ai 091312_lho

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VICINITY MAP



LEGEND

- Soil Boring
- Monitoring Well
- AOC Boundary
- Debris Feature
- Stained Soil
- White Powder
- Property Boundary
- 2 Foot Contour
- Transwestern Pipeline
- Mojave Pipeline
- PG&E Pipeline
- SoCal Gas Pipeline
- Stormwater Piping Alignment Below Ground (Approximate Location)
- Alternate Stormwater Piping Alignment Below Ground (Approximate Location)
- Berm

Potential Release Mechanisms

- Infrequent Surface Water Runoff
- Infiltration (Site-wide)
- Windblown Dispersion of Soil (Site-wide)
- Volatilization (Site-wide)
- Degradation by Heat/Light (Site-wide)
- Downstream Movement During Flow Events

Note:
Topographic contours shown are in 2 foot intervals.

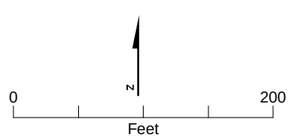
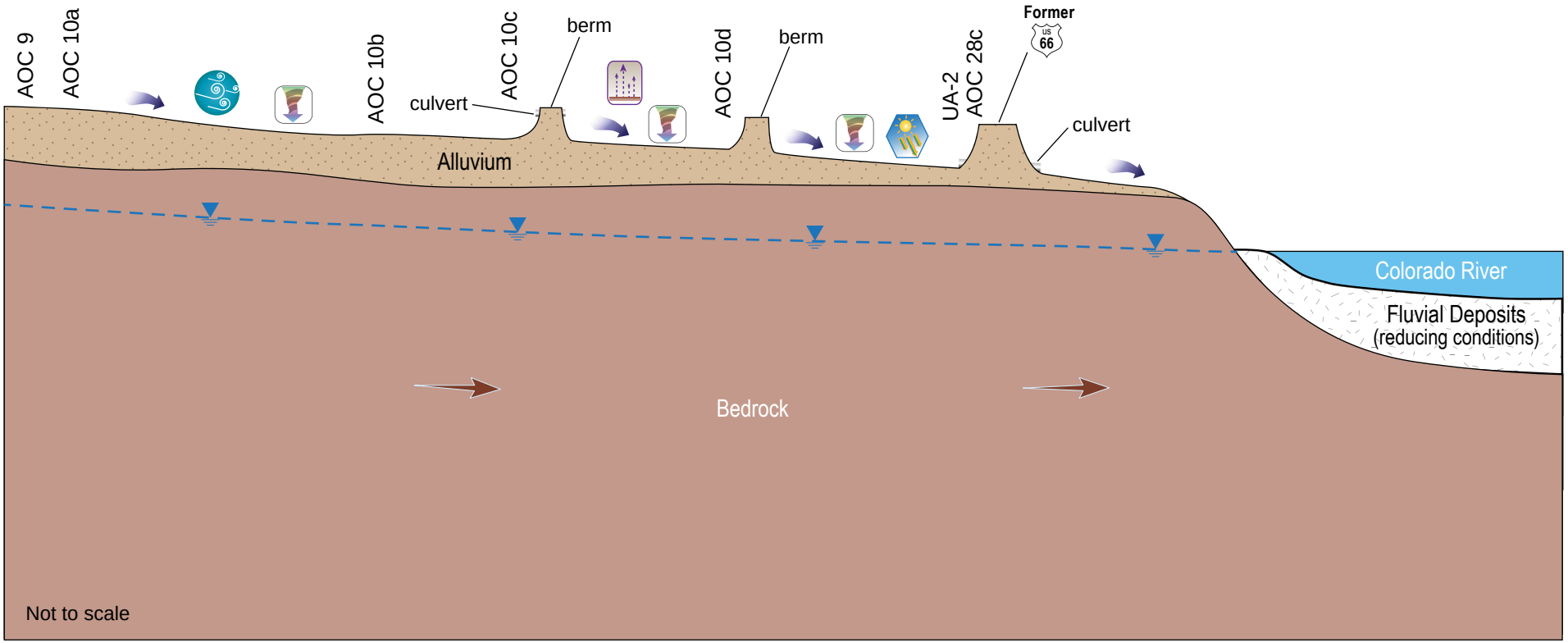


FIGURE C4-2
Conceptual Site Model for AOC-10
Soil Investigation Part A Phase 1 Data Summary Report
PG&E Topock Compressor Station
Needles, California



Potential Release Mechanisms

- Infrequent Surface Water Runoff
- Infiltration (Site-wide)
- Windblown Dispersion (Site-wide)
- Volatilization (Site-wide)
- Degradation by Heat/Light (Site-wide)
- Groundwater Flow in Bedrock
- Top of Groundwater Table

FIGURE 2
Conceptual Site Model Cross Section for East Ravine Sediment and Pore Water
East Ravine Sediment and Pore Water Sampling Work Plan
PG&E Topock Compressor Station
Needles, California

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Appendix BKG
Background Data and Information

Appendix BKG

Tables

Table BKG-1.1	Summary Statistics and 95 Percent Upper Confidence Limits for Soil Data in the Background Dataset

Attachment BKG-A

Attachment BKG-A	ProUCL Outputs for Background Data

Attachment BKG-B

Table BKG-B.1	95 Percent Upper Confidence Limits for Soil and Biota for Background
Table BKG-B.2	Ecological Risk Estimate Summary for 95 Percent Upper Confidence Limits (Plants and Soil Invertebrates; Wildlife SUF = 1, Selected TRVs and BTAG TRVs) for Background
Table BKG-B.3	Plants and Soil Invertebrates Risk Calculations for 95 Percent Upper Confidence Limits for Background
Table BKG-B.4	Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background
Table BKG-B.5	Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, BTAG TRVs) for Background
Table BKG-B Table Notes	Notes for Terrestrial Wildlife Risk Calculations

Attachment BKG-C

Table BKG-C.1	Background Threshold Values for Soil and Biota for Background
Table BKG-C.2	Ecological Risk Estimate Summary for Background Threshold Values (Plants and Soil Invertebrates; Wildlife SUF = 1, Selected TRVs and BTAG TRVs)
Table BKG-C.3	Plants and Soil Invertebrates Risk Calculations for Background Threshold Values
Table BKG-C.4	Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)
Table BKG-C.5	Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)
Table BKG-C Table Notes	Notes for Terrestrial Wildlife Risk Calculations

Attachment BKG-D

Attachment BKG-D	Ambient/Background Soil Sample Locations at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Attachment BKG-E

Attachment BKG-E	Ambient/Background Soil Analytical Data at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Attachment BKG-F

Attachment BKG-F	Background Screening Evaluation: ProUCL Outputs for Wilcoxon-Mann-Whitney, Tarone-Ware, Gehan, and Quantile Tests R Sample Programs and Outputs for Quantile Tests and Test of Proportions

Table BKG-1.1
Summary Statistics and 95 Percent Upper Confidence Limits for Soil Data in the Background Dataset

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

			Summary Statistics for Depth-Weighted Soil Datasets												Exposure Point Concentration[b]	
Constituent [a]	Units	Depth (ft bgs)	Detects / Total	FOD	Minimum Detect	Maximum Detect	Minimum Non-Detect	Maximum Non-Detect	Mean Detected	KM Mean	Median	Variance	Standard Deviation	95% UCL	Method
Soil Depth Interval: 0-10 ft bgs															
Inorganics															
Aluminum	mg/kg	0-10	55 / 55	100%	2600	18000	N/A	N/A	10445	10445	10000	8454377	2908	11102	95% Student's-t UCL
Antimony	mg/kg	0-10	0 / 55	0%	N/A	N/A	2	10	N/A	N/A	N/A	N/A	N/A	--	--
Arsenic	mg/kg	0-10	58 / 59	98%	0.884	12	1	1	4.006	3.953	3.5	5.555	2.357	4.501	95% GROS Approximate Gamma UCL
Barium	mg/kg	0-10	60 / 60	100%	48.4	660	N/A	N/A	164.6	164.6	135	12075	109.9	185.1	95% H-UCL
Beryllium	mg/kg	0-10	4 / 59	7%	0.459	0.672	1	5.4	0.57	0.57	0.574	0.0101	0.101	0.654	95% KM (t) UCL
Cadmium	mg/kg	0-10	1 / 55	2%	1.1	1.1	1	5	1.1	1.002	1.1	N/A	N/A	--	--
Calcium	mg/kg	0-10	55 / 55	100%	4100	67000	N/A	N/A	24293	24293	20000	176200000	13273	27527	95% Approximate Gamma UCL
Chromium, hexavalent	mg/kg	0-10	3 / 70	4%	0.504	0.83	0.05	4.3	0.68	0.0808	0.707	0.0271	0.165	--	--
Chromium, total	mg/kg	0-10	70 / 70	100%	4.2	53	N/A	N/A	22.35	22.35	21.9	77.68	8.814	24.1	95% Student's-t UCL
Cobalt	mg/kg	0-10	58 / 59	98%	2.3	14	5.1	5.1	7.854	7.788	7.605	5.367	2.317	8.302	95% KM (t) UCL
Copper	mg/kg	0-10	69 / 69	100%	2.1	18	N/A	N/A	10.32	10.32	10	10.59	3.255	10.97	95% Student's-t UCL
Iron	mg/kg	0-10	59 / 59	100%	5570	34000	N/A	N/A	18444	18444	18000	28890637	5375	19613	95% Student's-t UCL
Lead	mg/kg	0-10	59 / 60	98%	1.9	10	5.4	5.4	4.377	4.361	3.5	4.049	2.012	4.793	95% KM (t) UCL
Magnesium	mg/kg	0-10	55 / 55	100%	2500	13000	N/A	N/A	7945	7945	8100	4196970	2049	8408	95% Student's-t UCL
Manganese	mg/kg	0-10	57 / 57	100%	140	450	N/A	N/A	279.5	279.5	280	3784	61.51	293.2	95% Student's-t UCL
Mercury	mg/kg	0-10	0 / 55	0%	N/A	N/A	0.099	0.11	N/A	N/A	N/A	N/A	N/A	--	--
Molybdenum	mg/kg	0-10	11 / 60	18%	0.383	2.8	1	5.4	1.027	0.682	1	0.494	0.703	0.821	95% KM (t) UCL
Nickel	mg/kg	0-10	70 / 70	100%	2.6	31	N/A	N/A	15.42	15.42	15	35.7	5.975	16.61	95% Student's-t UCL
Potassium	mg/kg	0-10	54 / 54	100%	540	4300	N/A	N/A	2747	2747	2750	658040	811.2	2932	95% Student's-t UCL
Selenium	mg/kg	0-10	7 / 59	12%	0.738	2.7	0.911	5	1.566	0.898	1.6	0.46	0.678	1.015	95% KM (t) UCL
Silver	mg/kg	0-10	0 / 55	0%	N/A	N/A	1	5.4	N/A	N/A	N/A	N/A	N/A	--	--
Sodium	mg/kg	0-10	51 / 55	93%	170	4500	240	1100	636.9	610.9	280	554134	744.4	1038	95% KM (Chebyshev) UCL
Thallium	mg/kg	0-10	0 / 55	0%	N/A	N/A	2	11	N/A	N/A	N/A	N/A	N/A	--	--
Vanadium	mg/kg	0-10	60 / 60	100%	9.4	59	N/A	N/A	34.05	34.05	34.1	80.94	8.997	35.99	95% Student's-t UCL
Zinc	mg/kg	0-10	70 / 70	100%	8.4	66.1	N/A	N/A	36.82	36.82	35.5	102.8	10.14	38.84	95% Student's-t UCL
Polycyclic Aromatic Hydrocarbons															
PAH Low molecular weight	µg/kg	0-10	6 / 42	14%	6.9	37.6	0	0	18.9	2.7	12.6	202.8	14.24	5.044	95% KM (t) UCL
PAH High molecular weight	µg/kg	0-10	14 / 42	33%	5.1	267.4	0	0	86.74	28.91	46.9	6750	82.16	55.95	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)
1-Methyl naphthalene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
2-Methyl naphthalene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Acenaphthene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Acenaphthylene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Anthracene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Benzo (a) anthracene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Benzo (a) pyrene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Benzo (b) fluoranthene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Benzo (ghi) perylene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Benzo (k) fluoranthene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Chrysene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Dibenzo (a,h) anthracene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Fluoranthene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--

Table BKG-1.1
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PG&E Topock Compressor Station
Needles, California

			Summary Statistics for Depth-Weighted Soil Datasets												Exposure Point Concentration[b]	
Constituent [a]	Units	Depth (ft bgs)	Detects / Total	FOD	Minimum Detect	Maximum Detect	Minimum Non-Detect	Maximum Non-Detect	Mean Detected	KM Mean	Median	Variance	Standard Deviation	95% UCL	Method
Fluorene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Indeno (1,2,3-cd) pyrene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Naphthalene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Phenanthrene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
Pyrene	µg/kg	0-10	0 / 17	0%	N/A	N/A	5	5.3	N/A	N/A	N/A	N/A	N/A	--	--
B(a)P Equivalent	µg/kg	0-10	14 / 42	33%	6.1	55	5.8	6.1	13.75	8.45	8.7	168.7	12.99	11.19	95% KM Adjusted Gamma UCL
Pesticides															
4,4-DDE	µg/kg	0-10	0 / 17	0%	N/A	N/A	2	2.1	N/A	N/A	N/A	N/A	N/A	--	--
4,4-DDT	µg/kg	0-10	0 / 17	0%	N/A	N/A	2	2.1	N/A	N/A	N/A	N/A	N/A	--	--
Alpha-Chlordane	µg/kg	0-10	0 / 17	0%	N/A	N/A	1	1.1	N/A	N/A	N/A	N/A	N/A	--	--
Dieldrin	µg/kg	0-10	0 / 17	0%	N/A	N/A	2	2.1	N/A	N/A	N/A	N/A	N/A	--	--
Gamma-Chlordane	µg/kg	0-10	0 / 17	0%	N/A	N/A	1	1.1	N/A	N/A	N/A	N/A	N/A	--	--
Dioxins															
TEQ Human	ng/kg	0-10	33 / 35	94%	0.096	3.6	0.086	0.17	0.727	0.691	0.43	0.656	0.81	0.969	95% GROS Adjusted Gamma UCL
TEQ Avian	ng/kg	0-10	33 / 35	94%	0.13	3	0.12	0.27	0.693	0.662	0.37	0.543	0.737	0.901	KM H-UCL
TEQ Mammals	ng/kg	0-10	33 / 35	94%	0.19	4.4	0.17	0.34	1.066	1.017	0.64	1.08	1.039	1.398	95% GROS Adjusted Gamma UCL
Miscellaneous															
Orthophosphate	mg/kg	0-10	1 / 1	100%	139	139	N/A	N/A	139	N/A	139	N/A	N/A	--	--
pH	PHUNITS	0-10	12 / 12	100%	7.7	9.3	N/A	N/A	8.702	8.702	8.75	0.322	0.567	--	--
Sulfate	mg/kg	0-10	4 / 4	100%	17	150	N/A	N/A	66.5	66.5	49.5	3347	57.85	--	--
Sulfide	mg/kg	0-10	0 / 1	0%	N/A	N/A	0.4	0.4	N/A	N/A	N/A	N/A	N/A	--	--

Notes:
a. The constituent list is comprised of analytes detected at least once at the Topock Compressor Station site and measured in soil in this exposure area.
b. UCLs are presented for constituents with at least 8 total locations and 4 total detected concentrations, otherwise, the maximum depth-weighted concentration is presented.

Abbreviations:
AOC = area of concern
BCA = Bias-corrected accelerated bootstrap method
COPC = constituent of potential concern
DDE = Dichlorodiphenyldichloroethylene
DDT = Dichlorodiphenyltrichloroethane
EPC = exposure point concentration
ft bgs = feet below ground surface
KM = Kaplan-Meier
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
NA = not applicable
ND = not detected
ng/kg = nanograms per kilogram
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyls
TEQ = toxic equivalent
TPH = total petroleum hydrocarbon
UCL = upper confidence limit
X = COPC in the exposure depth interval

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 4:17:20 PM
From File	ProUCL_BkgdData_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Res (bkgd_aluminum)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	2600	Mean	10445
Maximum	18000	Median	10000
SD	2908	Std. Error of Mean	392.1
Coefficient of Variation	0.278	Skewness	0.126

Normal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.631	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.119	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	11102	95% Adjusted-CLT UCL (Chen-1995)	11097
		95% Modified-t UCL (Johnson-1978)	11103

Gamma GOF Test

A-D Test Statistic	0.824	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.115	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.12	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.34	k star (bias corrected MLE)	10.74
Theta hat (MLE)	920.8	Theta star (bias corrected MLE)	972.8
nu hat (MLE)	1248	nu star (bias corrected)	1181
MLE Mean (bias corrected)	10445	MLE Sd (bias corrected)	3188
		Approximate Chi Square Value (0.05)	1102

Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	1100

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	11192	95% Adjusted Gamma UCL (use when n<50)	11213

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	2.1234E-4	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.119	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	7.863	Mean of logged Data	9.209
Maximum of Logged Data	9.798	SD of logged Data	0.323

Assuming Lognormal Distribution

95% H-UCL	11345	90% Chebyshev (MVUE) UCL	11913
95% Chebyshev (MVUE) UCL	12548	97.5% Chebyshev (MVUE) UCL	13429
99% Chebyshev (MVUE) UCL	15159		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	11090	95% Jackknife UCL	11102
95% Standard Bootstrap UCL	11088	95% Bootstrap-t UCL	11129
95% Hall's Bootstrap UCL	11108	95% Percentile Bootstrap UCL	11049
95% BCA Bootstrap UCL	11100		
90% Chebyshev(Mean, Sd) UCL	11622	95% Chebyshev(Mean, Sd) UCL	12154
97.5% Chebyshev(Mean, Sd) UCL	12894	99% Chebyshev(Mean, Sd) UCL	14346

Suggested UCL to Use

95% Student's-t UCL	11102

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_arsenic)

General Statistics

Total Number of Observations	59	Number of Distinct Observations	44
Number of Detects	58	Number of Non-Detects	1
Number of Distinct Detects	43	Number of Distinct Non-Detects	1

Minimum Detect	0.884	Minimum Non-Detect	1
Maximum Detect	12	Maximum Non-Detect	1
Variance Detects	5.555	Percent Non-Detects	1.695%
Mean Detects	4.006	SD Detects	2.357
Median Detects	3.5	CV Detects	0.588
Skewness Detects	1.473	Kurtosis Detects	2.457
Mean of Logged Detects	1.235	SD of Logged Detects	0.559

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.872	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	1.7383E-6	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.953	KM Standard Error of Mean	0.309
KM SD	2.351	95% KM (BCA) UCL	4.454
95% KM (t) UCL	4.47	95% KM (Percentile Bootstrap) UCL	4.471
95% KM (z) UCL	4.461	95% KM Bootstrap t UCL	4.558
90% KM Chebyshev UCL	4.88	95% KM Chebyshev UCL	5.299
97.5% KM Chebyshev UCL	5.882	99% KM Chebyshev UCL	7.026

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.385	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0705	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.118	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.428	k star (bias corrected MLE)	3.262
Theta hat (MLE)	1.169	Theta star (bias corrected MLE)	1.228
nu hat (MLE)	397.6	nu star (bias corrected)	378.4
Mean (detects)	4.006		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.313	Mean	3.944
Maximum	12	Median	3.5
SD	2.385	CV	0.605
k hat (MLE)	2.969	k star (bias corrected MLE)	2.829

Theta hat (MLE)	1.328	Theta star (bias corrected MLE)	1.394
nu hat (MLE)	350.3	nu star (bias corrected)	333.8
Adjusted Level of Significance (β)	0.0459		
Approximate Chi Square Value (333.84, α)	292.5	Adjusted Chi Square Value (333.84, β)	291.5
95% Gamma Approximate UCL (use when n>=50)	4.501	95% Gamma Adjusted UCL (use when n<50)	4.516

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.953	SD (KM)	2.351
Variance (KM)	5.529	SE of Mean (KM)	0.309
k hat (KM)	2.827	k star (KM)	2.694
nu hat (KM)	333.6	nu star (KM)	317.9
theta hat (KM)	1.398	theta star (KM)	1.467
80% gamma percentile (KM)	5.712	90% gamma percentile (KM)	7.181
95% gamma percentile (KM)	8.56	99% gamma percentile (KM)	11.57

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (317.94, α)	277.6	Adjusted Chi Square Value (317.94, β)	276.7
95% Gamma Approximate KM-UCL (use when n>=50)	4.527	95% Gamma Adjusted KM-UCL (use when n<50)	4.543

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.984	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0533	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.954	Mean in Log Scale	1.213
SD in Original Scale	2.37	SD in Log Scale	0.579
95% t UCL (assumes normality of ROS data)	4.47	95% Percentile Bootstrap UCL	4.486
95% BCA Bootstrap UCL	4.508	95% Bootstrap t UCL	4.571
95% H-UCL (Log ROS)	4.611		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.212	KM Geo Mean	3.36
KM SD (logged)	0.576	95% Critical H Value (KM-Log)	1.942
KM Standard Error of Mean (logged)	0.0757	95% H-UCL (KM -Log)	4.595
KM SD (logged)	0.576	95% Critical H Value (KM-Log)	1.942
KM Standard Error of Mean (logged)	0.0757		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.947	Mean in Log Scale	1.202
SD in Original Scale	2.381	SD in Log Scale	0.608
95% t UCL (Assumes normality)	4.465	95% H-Stat UCL	4.684

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL	4.527	95% GROS Approximate Gamma UCL	4.501

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_b(a)p equivalent)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	15
Number of Detects	14	Number of Non-Detects	28
Number of Distinct Detects	12	Number of Distinct Non-Detects	4
Minimum Detect	6.1	Minimum Non-Detect	5.8
Maximum Detect	55	Maximum Non-Detect	6.1
Variance Detects	168.7	Percent Non-Detects	66.67%
Mean Detects	13.75	SD Detects	12.99
Median Detects	8.7	CV Detects	0.945
Skewness Detects	2.797	Kurtosis Detects	8.725
Mean of Logged Detects	2.375	SD of Logged Detects	0.652

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.629	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.278	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	8.45	KM Standard Error of Mean	1.304
KM SD	8.141	95% KM (BCA) UCL	10.74
95% KM (t) UCL	10.64	95% KM (Percentile Bootstrap) UCL	10.75
95% KM (z) UCL	10.59	95% KM Bootstrap t UCL	14.16
90% KM Chebyshev UCL	12.36	95% KM Chebyshev UCL	14.13
97.5% KM Chebyshev UCL	16.59	99% KM Chebyshev UCL	21.42

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.053	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.224	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.231	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.186	k star (bias corrected MLE)	1.765
Theta hat (MLE)	6.289	Theta star (bias corrected MLE)	7.789
nu hat (MLE)	61.21	nu star (bias corrected)	49.43
Mean (detects)	13.75		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	4.59
Maximum	55	Median	0.01
SD	9.822	CV	2.14
k hat (MLE)	0.194	k star (bias corrected MLE)	0.196
Theta hat (MLE)	23.61	Theta star (bias corrected MLE)	23.37
nu hat (MLE)	16.33	nu star (bias corrected)	16.5
Adjusted Level of Significance (β)	0.0443		
Approximate Chi Square Value (16.50, α)	8.314	Adjusted Chi Square Value (16.50, β)	8.106
95% Gamma Approximate UCL (use when n>=50)	9.108	95% Gamma Adjusted UCL (use when n<50)	9.341

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	8.45	SD (KM)	8.141
Variance (KM)	66.27	SE of Mean (KM)	1.304
k hat (KM)	1.077	k star (KM)	1.016
nu hat (KM)	90.51	nu star (KM)	85.38
theta hat (KM)	7.842	theta star (KM)	8.314
80% gamma percentile (KM)	13.58	90% gamma percentile (KM)	19.38
95% gamma percentile (KM)	25.17	99% gamma percentile (KM)	38.6

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (85.38, α)	65.08	Adjusted Chi Square Value (85.38, β)	64.45
95% Gamma Approximate KM-UCL (use when n>=50)	11.09	95% Gamma Adjusted KM-UCL (use when n<50)	11.19

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.217	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5.619	Mean in Log Scale	0.916

SD in Original Scale	9.384	SD in Log Scale	1.276
95% t UCL (assumes normality of ROS data)	8.056	95% Percentile Bootstrap UCL	8.148
95% BCA Bootstrap UCL	9.255	95% Bootstrap t UCL	10.21
95% H-UCL (Log ROS)	9.618		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.964	KM Geo Mean	7.125
KM SD (logged)	0.465	95% Critical H Value (KM-Log)	1.874
KM Standard Error of Mean (logged)	0.0745	95% H-UCL (KM -Log)	9.097
KM SD (logged)	0.465	95% Critical H Value (KM-Log)	1.874
KM Standard Error of Mean (logged)	0.0745		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	6.539	Mean in Log Scale	1.509
SD in Original Scale	8.951	SD in Log Scale	0.72
95% t UCL (Assumes normality)	8.864	95% H-Stat UCL	7.408

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	11.19	95% GROS Adjusted Gamma UCL	9.341

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_barium)

General Statistics

Total Number of Observations	60	Number of Distinct Observations	32
		Number of Missing Observations	0
Minimum	48.4	Mean	164.6
Maximum	660	Median	135
SD	109.9	Std. Error of Mean	14.19
Coefficient of Variation	0.668	Skewness	2.455

Normal GOF Test

Shapiro Wilk Test Statistic	0.752	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk P Value	3.298E-13	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.114	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	188.3	95% Adjusted-CLT UCL (Chen-1995)	192.7
		95% Modified-t UCL (Johnson-1978)	189

Gamma GOF Test

A-D Test Statistic	1.504	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.142	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.115	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.42	k star (bias corrected MLE)	3.26
Theta hat (MLE)	48.11	Theta star (bias corrected MLE)	50.47
nu hat (MLE)	410.4	nu star (bias corrected)	391.3
MLE Mean (bias corrected)	164.6	MLE Sd (bias corrected)	91.13
		Approximate Chi Square Value (0.05)	346.4
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	345.4

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	185.9	95% Adjusted Gamma UCL (use when n<50)	186.4

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.156	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.11	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.114	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.879	Mean of logged Data	4.95
Maximum of Logged Data	6.492	SD of logged Data	0.529

Assuming Lognormal Distribution

95% H-UCL	185.1	90% Chebyshev (MVUE) UCL	197
95% Chebyshev (MVUE) UCL	212.8	97.5% Chebyshev (MVUE) UCL	234.9
99% Chebyshev (MVUE) UCL	278.2		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	187.9	95% Jackknife UCL	188.3
95% Standard Bootstrap UCL	187.5	95% Bootstrap-t UCL	196.7
95% Hall's Bootstrap UCL	198.5	95% Percentile Bootstrap UCL	189.4
95% BCA Bootstrap UCL	192.8		
90% Chebyshev(Mean, Sd) UCL	207.1	95% Chebyshev(Mean, Sd) UCL	226.4
97.5% Chebyshev(Mean, Sd) UCL	253.1	99% Chebyshev(Mean, Sd) UCL	305.7

Suggested UCL to Use

95% H-UCL	185.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Res (bkgd_beryllium)

General Statistics

Total Number of Observations	59	Number of Distinct Observations	11
Number of Detects	4	Number of Non-Detects	55
Number of Distinct Detects	4	Number of Distinct Non-Detects	7
Minimum Detect	0.459	Minimum Non-Detect	1
Maximum Detect	0.672	Maximum Non-Detect	5.4
Variance Detects	0.0101	Percent Non-Detects	93.22%
Mean Detects	0.57	SD Detects	0.101
Median Detects	0.574	CV Detects	0.177
Skewness Detects	-0.125	Kurtosis Detects	-4.109
Mean of Logged Detects	-0.575	SD of Logged Detects	0.18

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.57	KM Standard Error of Mean	0.0504
KM SD	0.0872	95% KM (BCA) UCL	N/A

95% KM (t) UCL	0.654	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.653	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.721	95% KM Chebyshev UCL	0.789
97.5% KM Chebyshev UCL	0.884	99% KM Chebyshev UCL	1.071

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.344	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.281	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	41.87	k star (bias corrected MLE)	10.63
Theta hat (MLE)	0.0136	Theta star (bias corrected MLE)	0.0536
nu hat (MLE)	334.9	nu star (bias corrected)	85.07
Mean (detects)	0.57		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.35	Mean	0.572
Maximum	0.827	Median	0.567
SD	0.11	CV	0.192
k hat (MLE)	27.05	k star (bias corrected MLE)	25.68
Theta hat (MLE)	0.0211	Theta star (bias corrected MLE)	0.0223
nu hat (MLE)	3191	nu star (bias corrected)	3030
Adjusted Level of Significance (β)	0.0459		
Approximate Chi Square Value (N/A, α)	2903	Adjusted Chi Square Value (N/A, β)	2900
95% Gamma Approximate UCL (use when n>=50)	0.596	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.57	SD (KM)	0.0872
Variance (KM)	0.00761	SE of Mean (KM)	0.0504
k hat (KM)	42.65	k star (KM)	40.49
nu hat (KM)	5033	nu star (KM)	4778
theta hat (KM)	0.0134	theta star (KM)	0.0141
80% gamma percentile (KM)	0.643	90% gamma percentile (KM)	0.687
95% gamma percentile (KM)	0.725	99% gamma percentile (KM)	0.798

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	4618	Adjusted Chi Square Value (N/A, β)	4615
95% Gamma Approximate KM-UCL (use when n>=50)	0.589	95% Gamma Adjusted KM-UCL (use when n<50)	0.59

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.574	Mean in Log Scale	-0.575
SD in Original Scale	0.113	SD in Log Scale	0.196
95% t UCL (assumes normality of ROS data)	0.598	95% Percentile Bootstrap UCL	0.598
95% BCA Bootstrap UCL	0.598	95% Bootstrap t UCL	0.598
95% H-UCL (Log ROS)	0.6		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.575	KM Geo Mean	0.563
KM SD (logged)	0.156	95% Critical H Value (KM-Log)	1.717
KM Standard Error of Mean (logged)	0.0899	95% H-UCL (KM -Log)	0.59
KM SD (logged)	0.156	95% Critical H Value (KM-Log)	1.717
KM Standard Error of Mean (logged)	0.0899		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.059	Mean in Log Scale	-0.104
SD in Original Scale	0.681	SD in Log Scale	0.547
95% t UCL (Assumes normality)	1.207	95% H-Stat UCL	1.202

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.654

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_calcium)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	31
		Number of Missing Observations	0

Minimum	4100	Mean	24293
Maximum	67000	Median	20000
SD	13273	Std. Error of Mean	1790
Coefficient of Variation	0.546	Skewness	1.151

Normal GOF Test

Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	4.3268E-4	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.119	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	27288	95% Adjusted-CLT UCL (Chen-1995)	27533
		95% Modified-t UCL (Johnson-1978)	27334

Gamma GOF Test

A-D Test Statistic	0.363	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0968	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.121	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.563	k star (bias corrected MLE)	3.381
Theta hat (MLE)	6818	Theta star (bias corrected MLE)	7186
nu hat (MLE)	391.9	nu star (bias corrected)	371.9
MLE Mean (bias corrected)	24293	MLE Sd (bias corrected)	13212
		Approximate Chi Square Value (0.05)	328.2
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	327.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	27527	95% Adjusted Gamma UCL (use when n<50)	27619

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.543	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0901	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.119	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.319	Mean of logged Data	9.951
Maximum of Logged Data	11.11	SD of logged Data	0.566

Assuming Lognormal Distribution

95% H-UCL	28570	90% Chebyshev (MVUE) UCL	30530
95% Chebyshev (MVUE) UCL	33242	97.5% Chebyshev (MVUE) UCL	37007
99% Chebyshev (MVUE) UCL	44402		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	27237	95% Jackknife UCL	27288
95% Standard Bootstrap UCL	27253	95% Bootstrap-t UCL	27783
95% Hall's Bootstrap UCL	27840	95% Percentile Bootstrap UCL	27273
95% BCA Bootstrap UCL	27555		
90% Chebyshev(Mean, Sd) UCL	29662	95% Chebyshev(Mean, Sd) UCL	32094
97.5% Chebyshev(Mean, Sd) UCL	35470	99% Chebyshev(Mean, Sd) UCL	42101

Suggested UCL to Use

95% Approximate Gamma UCL	27527

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_chromium, total)

General Statistics

Total Number of Observations	70	Number of Distinct Observations	41
		Number of Missing Observations	0
Minimum	4.2	Mean	22.35
Maximum	53	Median	21.9
SD	8.814	Std. Error of Mean	1.053
Coefficient of Variation	0.394	Skewness	0.78

Normal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.14	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0844	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.106	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	24.1	95% Adjusted-CLT UCL (Chen-1995)	24.18
		95% Modified-t UCL (Johnson-1978)	24.12

Gamma GOF Test

A-D Test Statistic	0.389	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0761	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.107	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.155	k star (bias corrected MLE)	5.9
Theta hat (MLE)	3.631	Theta star (bias corrected MLE)	3.787
nu hat (MLE)	861.7	nu star (bias corrected)	826.1
MLE Mean (bias corrected)	22.35	MLE Sd (bias corrected)	9.199
		Approximate Chi Square Value (0.05)	760.4
Adjusted Level of Significance	0.0466	Adjusted Chi Square Value	759.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	24.28	95% Adjusted Gamma UCL (use when n<50)	24.32

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.0777	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.102	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.106	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.435	Mean of logged Data	3.023
Maximum of Logged Data	3.97	SD of logged Data	0.434

Assuming Lognormal Distribution

95% H-UCL	24.85	90% Chebyshev (MVUE) UCL	26.2
95% Chebyshev (MVUE) UCL	27.85	97.5% Chebyshev (MVUE) UCL	30.14
99% Chebyshev (MVUE) UCL	34.65		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	24.08	95% Jackknife UCL	24.1
95% Standard Bootstrap UCL	24.09	95% Bootstrap-t UCL	24.24
95% Hall's Bootstrap UCL	24.35	95% Percentile Bootstrap UCL	24.09
95% BCA Bootstrap UCL	24.2		
90% Chebyshev(Mean, Sd) UCL	25.51	95% Chebyshev(Mean, Sd) UCL	26.94
97.5% Chebyshev(Mean, Sd) UCL	28.92	99% Chebyshev(Mean, Sd) UCL	32.83

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

Suggested UCL to Use

95% Student's-t UCL	24.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_cobalt)

General Statistics

Total Number of Observations	59	Number of Distinct Observations	41
Number of Detects	58	Number of Non-Detects	1
Number of Distinct Detects	40	Number of Distinct Non-Detects	1
Minimum Detect	2.3	Minimum Non-Detect	5.1
Maximum Detect	14	Maximum Non-Detect	5.1
Variance Detects	5.367	Percent Non-Detects	1.695%
Mean Detects	7.854	SD Detects	2.317
Median Detects	7.605	CV Detects	0.295
Skewness Detects	0.221	Kurtosis Detects	0.38
Mean of Logged Detects	2.013	SD of Logged Detects	0.33

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.984	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0.849	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0864	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	7.788	KM Standard Error of Mean	0.307
KM SD	2.336	95% KM (BCA) UCL	8.263
95% KM (t) UCL	8.302	95% KM (Percentile Bootstrap) UCL	8.293
95% KM (z) UCL	8.293	95% KM Bootstrap t UCL	8.298
90% KM Chebyshev UCL	8.71	95% KM Chebyshev UCL	9.127
97.5% KM Chebyshev UCL	9.707	99% KM Chebyshev UCL	10.85

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.44	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0857	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.117	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	10.52	k star (bias corrected MLE)	9.984

Theta hat (MLE)	0.747	Theta star (bias corrected MLE)	0.787
nu hat (MLE)	1220	nu star (bias corrected)	1158
Mean (detects)	7.854		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.3	Mean	7.796
Maximum	14	Median	7.6
SD	2.34	CV	0.3
k hat (MLE)	10.21	k star (bias corrected MLE)	9.699
Theta hat (MLE)	0.764	Theta star (bias corrected MLE)	0.804
nu hat (MLE)	1204	nu star (bias corrected)	1144
Adjusted Level of Significance (β)	0.0459		
Approximate Chi Square Value (N/A, α)	1067	Adjusted Chi Square Value (N/A, β)	1065
95% Gamma Approximate UCL (use when n>=50)	8.363	95% Gamma Adjusted UCL (use when n<50)	8.377

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	7.788	SD (KM)	2.336
Variance (KM)	5.457	SE of Mean (KM)	0.307
k hat (KM)	11.12	k star (KM)	10.56
nu hat (KM)	1312	nu star (KM)	1246
theta hat (KM)	0.701	theta star (KM)	0.737
80% gamma percentile (KM)	9.701	90% gamma percentile (KM)	10.97
95% gamma percentile (KM)	12.1	99% gamma percentile (KM)	14.42

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1165	Adjusted Chi Square Value (N/A, β)	1163
95% Gamma Approximate KM-UCL (use when n>=50)	8.329	95% Gamma Adjusted KM-UCL (use when n<50)	8.343

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.943	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0155	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	7.796	Mean in Log Scale	2.004
SD in Original Scale	2.341	SD in Log Scale	0.334
95% t UCL (assumes normality of ROS data)	8.305	95% Percentile Bootstrap UCL	8.288
95% BCA Bootstrap UCL	8.304	95% Bootstrap t UCL	8.312
95% H-UCL (Log ROS)	8.454		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.001	KM Geo Mean	7.399
KM SD (logged)	0.337	95% Critical H Value (KM-Log)	1.718
KM Standard Error of Mean (logged)	0.0446	95% H-UCL (KM -Log)	8.452
KM SD (logged)	0.337	95% Critical H Value (KM-Log)	1.718
KM Standard Error of Mean (logged)	0.0446		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	7.765	Mean in Log Scale	1.995
SD in Original Scale	2.398	SD in Log Scale	0.356
95% t UCL (Assumes normality)	8.286	95% H-Stat UCL	8.491

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	8.302

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_copper)

General Statistics

Total Number of Observations	69	Number of Distinct Observations	43
		Number of Missing Observations	0
Minimum	2.1	Mean	10.32
Maximum	18	Median	10
SD	3.255	Std. Error of Mean	0.392
Coefficient of Variation	0.316	Skewness	-0.129

Normal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.506	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0851	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.107	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL	**95% UCLs (Adjusted for Skewness)**

95% Student's-t UCL	10.97	95% Adjusted-CLT UCL (Chen-1995)	10.95
		95% Modified-t UCL (Johnson-1978)	10.97

Gamma GOF Test

A-D Test Statistic	1.314	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.113	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.107	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.898	k star (bias corrected MLE)	7.564
Theta hat (MLE)	1.306	Theta star (bias corrected MLE)	1.364
nu hat (MLE)	1090	nu star (bias corrected)	1044
MLE Mean (bias corrected)	10.32	MLE Sd (bias corrected)	3.751
		Approximate Chi Square Value (0.05)	969.9
Adjusted Level of Significance	0.0465	Adjusted Chi Square Value	968.4

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	11.1	95% Adjusted Gamma UCL (use when n<50)	11.12

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.854	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	4.5337E-9	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.107	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.742	Mean of logged Data	2.269
Maximum of Logged Data	2.89	SD of logged Data	0.401

Assuming Lognormal Distribution

95% H-UCL	11.44	90% Chebyshev (MVUE) UCL	12.03
95% Chebyshev (MVUE) UCL	12.74	97.5% Chebyshev (MVUE) UCL	13.73
99% Chebyshev (MVUE) UCL	15.67		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	10.96	95% Jackknife UCL	10.97
95% Standard Bootstrap UCL	10.96	95% Bootstrap-t UCL	10.95
95% Hall's Bootstrap UCL	10.98	95% Percentile Bootstrap UCL	10.93
95% BCA Bootstrap UCL	10.93		
90% Chebyshev(Mean, Sd) UCL	11.49	95% Chebyshev(Mean, Sd) UCL	12.02

97.5% Chebyshev(Mean, Sd) UCL	12.76	99% Chebyshev(Mean, Sd) UCL	14.22

Suggested UCL to Use

95% Student's-t UCL 10.97

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Res (bkgd_iron)

General Statistics

Total Number of Observations	59	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	5570	Mean	18444
Maximum	34000	Median	18000
SD	5375	Std. Error of Mean	699.8
Coefficient of Variation	0.291	Skewness	0.194

Normal GOF Test

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.508	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0979	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.115	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	19613	95% Adjusted-CLT UCL (Chen-1995)	19613
		95% Modified-t UCL (Johnson-1978)	19616

Gamma GOF Test

A-D Test Statistic	0.89	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.116	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.116	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.41	k star (bias corrected MLE)	9.889
Theta hat (MLE)	1772	Theta star (bias corrected MLE)	1865

nu hat (MLE)	1228	nu star (bias corrected)	1167
MLE Mean (bias corrected)	18444	MLE Sd (bias corrected)	5865
		Approximate Chi Square Value (0.05)	1089
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	1087

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	19770	95% Adjusted Gamma UCL (use when n<50)	19805

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.1830E-4	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.115	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.625	Mean of logged Data	9.774
Maximum of Logged Data	10.43	SD of logged Data	0.336

Assuming Lognormal Distribution

95% H-UCL	20040	90% Chebyshev (MVUE) UCL	21054
95% Chebyshev (MVUE) UCL	22182	97.5% Chebyshev (MVUE) UCL	23748
99% Chebyshev (MVUE) UCL	26824		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	19595	95% Jackknife UCL	19613
95% Standard Bootstrap UCL	19610	95% Bootstrap-t UCL	19640
95% Hall's Bootstrap UCL	19691	95% Percentile Bootstrap UCL	19620
95% BCA Bootstrap UCL	19597		
90% Chebyshev(Mean, Sd) UCL	20543	95% Chebyshev(Mean, Sd) UCL	21494
97.5% Chebyshev(Mean, Sd) UCL	22814	99% Chebyshev(Mean, Sd) UCL	25406

Suggested UCL to Use

95% Student's-t UCL	19613

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_lead)

General Statistics

Total Number of Observations	60	Number of Distinct Observations	41
Number of Detects	59	Number of Non-Detects	1
Number of Distinct Detects	40	Number of Distinct Non-Detects	1
Minimum Detect	1.9	Minimum Non-Detect	5.4
Maximum Detect	10	Maximum Non-Detect	5.4
Variance Detects	4.049	Percent Non-Detects	1.667%
Mean Detects	4.377	SD Detects	2.012
Median Detects	3.5	CV Detects	0.46
Skewness Detects	1.061	Kurtosis Detects	0.145
Mean of Logged Detects	1.384	SD of Logged Detects	0.424

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.863	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	4.1521E-7	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.115	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.361	KM Standard Error of Mean	0.259
KM SD	1.986	95% KM (BCA) UCL	4.827
95% KM (t) UCL	4.793	95% KM (Percentile Bootstrap) UCL	4.775
95% KM (z) UCL	4.787	95% KM Bootstrap t UCL	4.849
90% KM Chebyshev UCL	5.138	95% KM Chebyshev UCL	5.489
97.5% KM Chebyshev UCL	5.978	99% KM Chebyshev UCL	6.937

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.738	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.152	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.116	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.569	k star (bias corrected MLE)	5.297
Theta hat (MLE)	0.786	Theta star (bias corrected MLE)	0.826
nu hat (MLE)	657.1	nu star (bias corrected)	625
Mean (detects)	4.377		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.9	Mean	4.363

Maximum	10	Median	3.516
SD	1.998	CV	0.458
k hat (MLE)	5.639	k star (bias corrected MLE)	5.369
Theta hat (MLE)	0.774	Theta star (bias corrected MLE)	0.813
nu hat (MLE)	676.7	nu star (bias corrected)	644.2
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (644.23, α)	586.3	Adjusted Chi Square Value (644.23, β)	585
95% Gamma Approximate UCL (use when n>=50)	4.794	95% Gamma Adjusted UCL (use when n<50)	4.805

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.361	SD (KM)	1.986
Variance (KM)	3.942	SE of Mean (KM)	0.259
k hat (KM)	4.823	k star (KM)	4.593
nu hat (KM)	578.8	nu star (KM)	551.2
theta hat (KM)	0.904	theta star (KM)	0.949
80% gamma percentile (KM)	5.918	90% gamma percentile (KM)	7.086
95% gamma percentile (KM)	8.155	99% gamma percentile (KM)	10.42

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (551.20, α)	497.7	Adjusted Chi Square Value (551.20, β)	496.5
95% Gamma Approximate KM-UCL (use when n>=50)	4.829	95% Gamma Adjusted KM-UCL (use when n<50)	4.841

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.936	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.00529	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.115	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.362	Mean in Log Scale	1.382
SD in Original Scale	1.998	SD in Log Scale	0.42
95% t UCL (assumes normality of ROS data)	4.794	95% Percentile Bootstrap UCL	4.792
95% BCA Bootstrap UCL	4.822	95% Bootstrap t UCL	4.815
95% H-UCL (Log ROS)	4.811		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.381	KM Geo Mean	3.978
KM SD (logged)	0.419	95% Critical H Value (KM-Log)	1.841
KM Standard Error of Mean (logged)	0.0547	95% H-UCL (KM -Log)	4.8
KM SD (logged)	0.419	95% Critical H Value (KM-Log)	1.841
KM Standard Error of Mean (logged)	0.0547		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.349	Mean in Log Scale	1.377

SD in Original Scale	2.007	SD in Log Scale	0.423
95% t UCL (Assumes normality)	4.782	95% H-Stat UCL	4.8

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	4.793	KM H-UCL	4.8
95% KM (BCA) UCL	4.827		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_magnesium)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	34
		Number of Missing Observations	0
Minimum	2500	Mean	7945
Maximum	13000	Median	8100
SD	2049	Std. Error of Mean	276.2
Coefficient of Variation	0.258	Skewness	-0.0407

Normal GOF Test

Shapiro Wilk Test Statistic	0.988	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.952	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0671	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.119	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8408	95% Adjusted-CLT UCL (Chen-1995)	8398
		95% Modified-t UCL (Johnson-1978)	8408

Gamma GOF Test

A-D Test Statistic	0.541	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0915	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.12	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	13.43	k star (bias corrected MLE)	12.7
Theta hat (MLE)	591.8	Theta star (bias corrected MLE)	625.4
nu hat (MLE)	1477	nu star (bias corrected)	1398
MLE Mean (bias corrected)	7945	MLE Sd (bias corrected)	2229
		Approximate Chi Square Value (0.05)	1312
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	1310

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	8465	95% Adjusted Gamma UCL (use when n<50)	8480

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.00414	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.105	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.119	Data appear Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	7.824	Mean of logged Data	8.943
Maximum of Logged Data	9.473	SD of logged Data	0.292

Assuming Lognormal Distribution

95% H-UCL	8545	90% Chebyshev (MVUE) UCL	8939
95% Chebyshev (MVUE) UCL	9373	97.5% Chebyshev (MVUE) UCL	9977
99% Chebyshev (MVUE) UCL	11162		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	8400	95% Jackknife UCL	8408
95% Standard Bootstrap UCL	8393	95% Bootstrap-t UCL	8408
95% Hall's Bootstrap UCL	8405	95% Percentile Bootstrap UCL	8420
95% BCA Bootstrap UCL	8402		
90% Chebyshev(Mean, Sd) UCL	8774	95% Chebyshev(Mean, Sd) UCL	9150
97.5% Chebyshev(Mean, Sd) UCL	9671	99% Chebyshev(Mean, Sd) UCL	10694

Suggested UCL to Use

95% Student's-t UCL	8408

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Res (bkgd_manganese)

General Statistics

Total Number of Observations	57	Number of Distinct Observations	26
		Number of Missing Observations	0
Minimum	140	Mean	279.5
Maximum	450	Median	280
SD	61.51	Std. Error of Mean	8.147
Coefficient of Variation	0.22	Skewness	0.244

Normal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.621	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0997	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.117	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	293.2	95% Adjusted-CLT UCL (Chen-1995)	293.2
		95% Modified-t UCL (Johnson-1978)	293.2

Gamma GOF Test

A-D Test Statistic	0.561	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.122	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.118	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	20.16	k star (bias corrected MLE)	19.11
Theta hat (MLE)	13.86	Theta star (bias corrected MLE)	14.63
nu hat (MLE)	2299	nu star (bias corrected)	2179
MLE Mean (bias corrected)	279.5	MLE Sd (bias corrected)	63.94
		Approximate Chi Square Value (0.05)	2072
Adjusted Level of Significance	0.0458	Adjusted Chi Square Value	2069

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	294	95% Adjusted Gamma UCL (use when n<50)	294.4

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**

5% Shapiro Wilk P Value	0.161	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.138	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.117	Data Not Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.942	Mean of logged Data	5.608
Maximum of Logged Data	6.109	SD of logged Data	0.23

Assuming Lognormal Distribution

95% H-UCL	295.2	90% Chebyshev (MVUE) UCL	305.7
95% Chebyshev (MVUE) UCL	317.5	97.5% Chebyshev (MVUE) UCL	333.8
99% Chebyshev (MVUE) UCL	365.8		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	292.9	95% Jackknife UCL	293.2
95% Standard Bootstrap UCL	292.3	95% Bootstrap-t UCL	294.3
95% Hall's Bootstrap UCL	293.7	95% Percentile Bootstrap UCL	292.2
95% BCA Bootstrap UCL	292.8		
90% Chebyshev(Mean, Sd) UCL	304	95% Chebyshev(Mean, Sd) UCL	315.1
97.5% Chebyshev(Mean, Sd) UCL	330.4	99% Chebyshev(Mean, Sd) UCL	360.6

Suggested UCL to Use

95% Student's-t UCL	293.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_molybdenum)

General Statistics

Total Number of Observations	60	Number of Distinct Observations	16
Number of Detects	11	Number of Non-Detects	49
Number of Distinct Detects	10	Number of Distinct Non-Detects	7
Minimum Detect	0.383	Minimum Non-Detect	1
Maximum Detect	2.8	Maximum Non-Detect	5.4
Variance Detects	0.494	Percent Non-Detects	81.67%
Mean Detects	1.027	SD Detects	0.703
Median Detects	1	CV Detects	0.684
Skewness Detects	1.695	Kurtosis Detects	3.655
Mean of Logged Detects	-0.157	SD of Logged Detects	0.623

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.682	KM Standard Error of Mean	0.0827
KM SD	0.433	95% KM (BCA) UCL	0.814
95% KM (t) UCL	0.821	95% KM (Percentile Bootstrap) UCL	0.815
95% KM (z) UCL	0.818	95% KM Bootstrap t UCL	0.866
90% KM Chebyshev UCL	0.93	95% KM Chebyshev UCL	1.043
97.5% KM Chebyshev UCL	1.199	99% KM Chebyshev UCL	1.505

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.546	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.235	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.257	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.883	k star (bias corrected MLE)	2.157
Theta hat (MLE)	0.356	Theta star (bias corrected MLE)	0.476
nu hat (MLE)	63.43	nu star (bias corrected)	47.46
Mean (detects)	1.027		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.658
Maximum	2.8	Median	0.566
SD	0.474	CV	0.72
k hat (MLE)	1.694	k star (bias corrected MLE)	1.621
Theta hat (MLE)	0.388	Theta star (bias corrected MLE)	0.406
nu hat (MLE)	203.3	nu star (bias corrected)	194.5
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (194.49, α)	163.2	Adjusted Chi Square Value (194.49, β)	162.5
95% Gamma Approximate UCL (use when n>=50)	0.784	95% Gamma Adjusted UCL (use when n<50)	0.787

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.682	SD (KM)	0.433
Variance (KM)	0.188	SE of Mean (KM)	0.0827
k hat (KM)	2.483	k star (KM)	2.37
nu hat (KM)	298	nu star (KM)	284.4
theta hat (KM)	0.275	theta star (KM)	0.288
80% gamma percentile (KM)	1.001	90% gamma percentile (KM)	1.276
95% gamma percentile (KM)	1.536	99% gamma percentile (KM)	2.106

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (284.40, α)	246.3	Adjusted Chi Square Value (284.40, β)	245.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.788	95% Gamma Adjusted KM-UCL (use when n<50)	0.791

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.222	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.694	Mean in Log Scale	-0.495
SD in Original Scale	0.411	SD in Log Scale	0.495
95% t UCL (assumes normality of ROS data)	0.782	95% Percentile Bootstrap UCL	0.786
95% BCA Bootstrap UCL	0.809	95% Bootstrap t UCL	0.816
95% H-UCL (Log ROS)	0.778		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.509	KM Geo Mean	0.601
KM SD (logged)	0.457	95% Critical H Value (KM-Log)	1.869
KM Standard Error of Mean (logged)	0.1	95% H-UCL (KM -Log)	0.745
KM SD (logged)	0.457	95% Critical H Value (KM-Log)	1.869
KM Standard Error of Mean (logged)	0.1		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.133	Mean in Log Scale	-0.035
SD in Original Scale	0.7	SD in Log Scale	0.556
95% t UCL (Assumes normality)	1.284	95% H-Stat UCL	1.296

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.821

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_nickel)

General Statistics

Total Number of Observations	70	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	2.6	Mean	15.42
Maximum	31	Median	15
SD	5.975	Std. Error of Mean	0.714
Coefficient of Variation	0.388	Skewness	0.348

Normal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.51	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.085	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.106	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	16.61	95% Adjusted-CLT UCL (Chen-1995)	16.62
		95% Modified-t UCL (Johnson-1978)	16.61

Gamma GOF Test

A-D Test Statistic	0.518	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0888	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.107	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.764	k star (bias corrected MLE)	5.526
Theta hat (MLE)	2.675	Theta star (bias corrected MLE)	2.79
nu hat (MLE)	806.9	nu star (bias corrected)	773.7
MLE Mean (bias corrected)	15.42	MLE Sd (bias corrected)	6.558
		Approximate Chi Square Value (0.05)	710.1
Adjusted Level of Significance	0.0466	Adjusted Chi Square Value	708.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	16.8	95% Adjusted Gamma UCL (use when n<50)	16.83

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	2.6062E-4	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.12	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.106	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.956	Mean of logged Data	2.646
Maximum of Logged Data	3.434	SD of logged Data	0.461

Assuming Lognormal Distribution

95% H-UCL	17.37	90% Chebyshev (MVUE) UCL	18.36
95% Chebyshev (MVUE) UCL	19.59	97.5% Chebyshev (MVUE) UCL	21.29
99% Chebyshev (MVUE) UCL	24.63		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	16.59	95% Jackknife UCL	16.61
95% Standard Bootstrap UCL	16.58	95% Bootstrap-t UCL	16.66
95% Hall's Bootstrap UCL	16.61	95% Percentile Bootstrap UCL	16.61
95% BCA Bootstrap UCL	16.63		
90% Chebyshev(Mean, Sd) UCL	17.56	95% Chebyshev(Mean, Sd) UCL	18.53
97.5% Chebyshev(Mean, Sd) UCL	19.88	99% Chebyshev(Mean, Sd) UCL	22.52

Suggested UCL to Use

95% Student's-t UCL	16.61

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_pah high molecular weight)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	15
Number of Detects	14	Number of Non-Detects	28
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	5.1	Minimum Non-Detect	0
Maximum Detect	267.4	Maximum Non-Detect	0

Variance Detects	6750	Percent Non-Detects	66.67%
Mean Detects	86.74	SD Detects	82.16
Median Detects	46.9	CV Detects	0.947
Skewness Detects	0.936	Kurtosis Detects	-0.037

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.226	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	28.91	KM Standard Error of Mean	9.821
KM SD	61.33	95% KM (BCA) UCL	45.55
95% KM (t) UCL	45.44	95% KM (Percentile Bootstrap) UCL	45.11
95% KM (z) UCL	45.07	95% KM Bootstrap t UCL	51.12
90% KM Chebyshev UCL	58.38	95% KM Chebyshev UCL	71.72
97.5% KM Chebyshev UCL	90.24	99% KM Chebyshev UCL	126.6

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.338	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.761	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.172	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.235	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.978	k star (bias corrected MLE)	0.816
Theta hat (MLE)	88.65	Theta star (bias corrected MLE)	106.2
nu hat (MLE)	27.4	nu star (bias corrected)	22.86
Mean (detects)	86.74		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	28.91	SD (KM)	61.33
Variance (KM)	3761	SE of Mean (KM)	9.821
k hat (KM)	0.222	k star (KM)	0.222
nu hat (KM)	18.67	nu star (KM)	18.67
theta hat (KM)	130.1	theta star (KM)	130.1
80% gamma percentile (KM)	40.08	90% gamma percentile (KM)	87.32
95% gamma percentile (KM)	144.8	99% gamma percentile (KM)	300.4

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0443
Approximate Chi Square Value (18.67, α)	9.877	Adjusted Chi Square Value (18.67, β)	9.649
95% Gamma Approximate KM-UCL (use when n>=50)	54.66	95% Gamma Adjusted KM-UCL (use when n<50)	55.95

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	N/A	KM Geo Mean	N/A
KM SD (logged)	N/A	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	N/A	95% H-UCL (KM -Log)	N/A
KM SD (logged)	N/A	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	N/A		

DL/2 Statistics

Mean in Original Scale	28.91	SD in Original Scale	62.07
95% t UCL (Assumes normality)	45.03		

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

ı Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	55.95

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_pah low molecular weight)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	36
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	6.9	Minimum Non-Detect	0
Maximum Detect	37.6	Maximum Non-Detect	0
Variance Detects	202.8	Percent Non-Detects	85.71%
Mean Detects	18.9	SD Detects	14.24
Median Detects	12.6	CV Detects	0.753
Skewness Detects	0.776	Kurtosis Detects	-1.941

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.789	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.7	KM Standard Error of Mean	1.393

KM SD	8.239	95% KM (BCA) UCL	5.293
95% KM (t) UCL	5.044	95% KM (Percentile Bootstrap) UCL	4.85
95% KM (z) UCL	4.991	95% KM Bootstrap t UCL	6.11
90% KM Chebyshev UCL	6.878	95% KM Chebyshev UCL	8.771
97.5% KM Chebyshev UCL	11.4	99% KM Chebyshev UCL	16.56

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.561	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.704	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.264	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.336	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.207	k star (bias corrected MLE)	1.215
Theta hat (MLE)	8.563	Theta star (bias corrected MLE)	15.56
nu hat (MLE)	26.49	nu star (bias corrected)	14.58
Mean (detects)	18.9		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.7	SD (KM)	8.239
Variance (KM)	67.88	SE of Mean (KM)	1.393
k hat (KM)	0.107	k star (KM)	0.116
nu hat (KM)	9.021	nu star (KM)	9.71
theta hat (KM)	25.14	theta star (KM)	23.36
80% gamma percentile (KM)	2.267	90% gamma percentile (KM)	7.568
95% gamma percentile (KM)	15.48	99% gamma percentile (KM)	39.85

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0443
Approximate Chi Square Value (9.71, α)	3.761	Adjusted Chi Square Value (9.71, β)	3.63
95% Gamma Approximate KM-UCL (use when n>=50)	6.97	95% Gamma Adjusted KM-UCL (use when n<50)	7.223

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	N/A	KM Geo Mean	N/A
KM SD (logged)	N/A	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	N/A	95% H-UCL (KM -Log)	N/A
KM SD (logged)	N/A	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	N/A		

DL/2 Statistics

Mean in Original Scale	2.7	SD in Original Scale	8.339
95% t UCL (Assumes normality)	4.865		

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	5.044

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_potassium)

General Statistics

Total Number of Observations	54	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	540	Mean	2747
Maximum	4300	Median	2750
SD	811.2	Std. Error of Mean	110.4
Coefficient of Variation	0.295	Skewness	-0.335

Normal GOF Test

Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.373	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.103	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.12	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2932	95% Adjusted-CLT UCL (Chen-1995)	2923
		95% Modified-t UCL (Johnson-1978)	2931

Gamma GOF Test

A-D Test Statistic	1.102	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.121	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.008	k star (bias corrected MLE)	8.52
Theta hat (MLE)	305	Theta star (bias corrected MLE)	322.4
nu hat (MLE)	972.9	nu star (bias corrected)	920.1
MLE Mean (bias corrected)	2747	MLE Sd (bias corrected)	941.1
		Approximate Chi Square Value (0.05)	850.7

Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	848.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	2971	95% Adjusted Gamma UCL (use when n<50)	2978

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.1698E-6	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.12	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	6.292	Mean of logged Data	7.862
Maximum of Logged Data	8.366	SD of logged Data	0.374

Assuming Lognormal Distribution

95% H-UCL	3050	90% Chebyshev (MVUE) UCL	3218
95% Chebyshev (MVUE) UCL	3416	97.5% Chebyshev (MVUE) UCL	3690
99% Chebyshev (MVUE) UCL	4230		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	2929	95% Jackknife UCL	2932
95% Standard Bootstrap UCL	2924	95% Bootstrap-t UCL	2922
95% Hall's Bootstrap UCL	2923	95% Percentile Bootstrap UCL	2928
95% BCA Bootstrap UCL	2922		
90% Chebyshev(Mean, Sd) UCL	3078	95% Chebyshev(Mean, Sd) UCL	3228
97.5% Chebyshev(Mean, Sd) UCL	3436	99% Chebyshev(Mean, Sd) UCL	3845

Suggested UCL to Use

95% Student's-t UCL	2932

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Res (bkgd_selenium)

General Statistics

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

Total Number of Observations	59	Number of Distinct Observations	12
Number of Detects	7	Number of Non-Detects	52
Number of Distinct Detects	7	Number of Distinct Non-Detects	6
Minimum Detect	0.738	Minimum Non-Detect	0.911
Maximum Detect	2.7	Maximum Non-Detect	5
Variance Detects	0.46	Percent Non-Detects	88.14%
Mean Detects	1.566	SD Detects	0.678
Median Detects	1.6	CV Detects	0.433
Skewness Detects	0.503	Kurtosis Detects	-0.22
Mean of Logged Detects	0.364	SD of Logged Detects	0.454

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.898	KM Standard Error of Mean	0.0703
KM SD	0.348	95% KM (BCA) UCL	1.087
95% KM (t) UCL	1.015	95% KM (Percentile Bootstrap) UCL	1.066
95% KM (z) UCL	1.013	95% KM Bootstrap t UCL	1.054
90% KM Chebyshev UCL	1.109	95% KM Chebyshev UCL	1.204
97.5% KM Chebyshev UCL	1.336	99% KM Chebyshev UCL	1.597

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.178	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.71	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.146	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	6.047	k star (bias corrected MLE)	3.551
Theta hat (MLE)	0.259	Theta star (bias corrected MLE)	0.441
nu hat (MLE)	84.66	nu star (bias corrected)	49.71
Mean (detects)	1.566		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.768

Maximum	2.7	Median	0.68
SD	0.507	CV	0.66
k hat (MLE)	1.709	k star (bias corrected MLE)	1.634
Theta hat (MLE)	0.449	Theta star (bias corrected MLE)	0.47
nu hat (MLE)	201.7	nu star (bias corrected)	192.8
Adjusted Level of Significance (β)	0.0459		
Approximate Chi Square Value (192.76, α)	161.6	Adjusted Chi Square Value (192.76, β)	160.9
95% Gamma Approximate UCL (use when n>=50)	0.916	95% Gamma Adjusted UCL (use when n<50)	0.92

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.898	SD (KM)	0.348
Variance (KM)	0.121	SE of Mean (KM)	0.0703
k hat (KM)	6.662	k star (KM)	6.334
nu hat (KM)	786.1	nu star (KM)	747.5
theta hat (KM)	0.135	theta star (KM)	0.142
80% gamma percentile (KM)	1.176	90% gamma percentile (KM)	1.374
95% gamma percentile (KM)	1.553	99% gamma percentile (KM)	1.928

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (747.47, α)	685	Adjusted Chi Square Value (747.47, β)	683.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.98	95% Gamma Adjusted KM-UCL (use when n<50)	0.982

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.881	Mean in Log Scale	-0.216
SD in Original Scale	0.415	SD in Log Scale	0.416
95% t UCL (assumes normality of ROS data)	0.971	95% Percentile Bootstrap UCL	0.979
95% BCA Bootstrap UCL	0.993	95% Bootstrap t UCL	0.99
95% H-UCL (Log ROS)	0.971		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.153	KM Geo Mean	0.858
KM SD (logged)	0.267	95% Critical H Value (KM-Log)	1.707
KM Standard Error of Mean (logged)	0.0707	95% H-UCL (KM -Log)	0.944
KM SD (logged)	0.267	95% Critical H Value (KM-Log)	1.707
KM Standard Error of Mean (logged)	0.0707		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.736	Mean in Log Scale	-0.455

SD in Original Scale	0.536	SD in Log Scale	0.479
95% t UCL (Assumes normality)	0.853	95% H-Stat UCL	0.801

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.015

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_sodium)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	32
Number of Detects	51	Number of Non-Detects	4
Number of Distinct Detects	31	Number of Distinct Non-Detects	4
Minimum Detect	170	Minimum Non-Detect	240
Maximum Detect	4500	Maximum Non-Detect	1100
Variance Detects	554134	Percent Non-Detects	7.273%
Mean Detects	636.9	SD Detects	744.4
Median Detects	280	CV Detects	1.169
Skewness Detects	3.18	Kurtosis Detects	13.87
Mean of Logged Detects	6.031	SD of Logged Detects	0.866

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.65	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	1.255E-14	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.265	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	610.9	KM Standard Error of Mean	97.89
KM SD	717.3	95% KM (BCA) UCL	784.7
95% KM (t) UCL	774.7	95% KM (Percentile Bootstrap) UCL	777
95% KM (z) UCL	771.9	95% KM Bootstrap t UCL	860.1
90% KM Chebyshev UCL	904.5	95% KM Chebyshev UCL	1038
97.5% KM Chebyshev UCL	1222	99% KM Chebyshev UCL	1585

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.388	**Anderson-Darling GOF Test**	

5% A-D Critical Value	0.772	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.246	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.127	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.317	k star (bias corrected MLE)	1.253
Theta hat (MLE)	483.4	Theta star (bias corrected MLE)	508.3
nu hat (MLE)	134.4	nu star (bias corrected)	127.8
Mean (detects)	636.9		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	73.63	Mean	605.8
Maximum	4500	Median	259.8
SD	725.3	CV	1.197
k hat (MLE)	1.294	k star (bias corrected MLE)	1.235
Theta hat (MLE)	468.3	Theta star (bias corrected MLE)	490.5
nu hat (MLE)	142.3	nu star (bias corrected)	135.9
Adjusted Level of Significance (β)	0.0456		
Approximate Chi Square Value (135.87, α)	109.9	Adjusted Chi Square Value (135.87, β)	109.3
95% Gamma Approximate UCL (use when n>=50)	748.7	95% Gamma Adjusted UCL (use when n<50)	753

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	610.9	SD (KM)	717.3
Variance (KM)	514582	SE of Mean (KM)	97.89
k hat (KM)	0.725	k star (KM)	0.698
nu hat (KM)	79.77	nu star (KM)	76.76
theta hat (KM)	842.4	theta star (KM)	875.5
80% gamma percentile (KM)	1004	90% gamma percentile (KM)	1535
95% gamma percentile (KM)	2082	99% gamma percentile (KM)	3388

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (76.76, α)	57.57	Adjusted Chi Square Value (76.76, β)	57.13
95% Gamma Approximate KM-UCL (use when n>=50)	814.4	95% Gamma Adjusted KM-UCL (use when n<50)	820.8

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.85	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	9.9339E-7	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.123	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	611.3	Mean in Log Scale	6.003
SD in Original Scale	722.3	SD in Log Scale	0.841
95% t UCL (assumes normality of ROS data)	774.3	95% Percentile Bootstrap UCL	781
95% BCA Bootstrap UCL	812.9	95% Bootstrap t UCL	860.2
95% H-UCL (Log ROS)	738.1		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	5.994	KM Geo Mean	400.9
KM SD (logged)	0.845	95% Critical H Value (KM-Log)	2.164
KM Standard Error of Mean (logged)	0.116	95% H-UCL (KM -Log)	734.8
KM SD (logged)	0.845	95% Critical H Value (KM-Log)	2.164
KM Standard Error of Mean (logged)	0.116		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	616.8	Mean in Log Scale	6.011
SD in Original Scale	721.2	SD in Log Scale	0.852
95% t UCL (Assumes normality)	779.6	95% H-Stat UCL	753.8

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	1038

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_teq avian)

General Statistics

Total Number of Observations	35	Number of Distinct Observations	30
Number of Detects	33	Number of Non-Detects	2
Number of Distinct Detects	29	Number of Distinct Non-Detects	2
Minimum Detect	0.13	Minimum Non-Detect	0.12
Maximum Detect	3	Maximum Non-Detect	0.27
Variance Detects	0.543	Percent Non-Detects	5.714%
Mean Detects	0.693	SD Detects	0.737
Median Detects	0.37	CV Detects	1.064
Skewness Detects	1.922	Kurtosis Detects	3.043
Mean of Logged Detects	-0.78	SD of Logged Detects	0.878

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.72	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.152	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.662	KM Standard Error of Mean	0.123
KM SD	0.716	95% KM (BCA) UCL	0.881
95% KM (t) UCL	0.87	95% KM (Percentile Bootstrap) UCL	0.874
95% KM (z) UCL	0.864	95% KM Bootstrap t UCL	0.963
90% KM Chebyshev UCL	1.031	95% KM Chebyshev UCL	1.198
97.5% KM Chebyshev UCL	1.43	99% KM Chebyshev UCL	1.885

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.384	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.768	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.177	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.157	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.354	k star (bias corrected MLE)	1.251
Theta hat (MLE)	0.512	Theta star (bias corrected MLE)	0.554
nu hat (MLE)	89.34	nu star (bias corrected)	82.55
Mean (detects)	0.693		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.654
Maximum	3	Median	0.34
SD	0.733	CV	1.121
k hat (MLE)	1.006	k star (bias corrected MLE)	0.939
Theta hat (MLE)	0.65	Theta star (bias corrected MLE)	0.697
nu hat (MLE)	70.41	nu star (bias corrected)	65.71
Adjusted Level of Significance (β)	0.0425		
Approximate Chi Square Value (65.71, α)	48.06	Adjusted Chi Square Value (65.71, β)	47.34
95% Gamma Approximate UCL (use when n>=50)	0.894	95% Gamma Adjusted UCL (use when n<50)	0.908

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.662	SD (KM)	0.716
Variance (KM)	0.513	SE of Mean (KM)	0.123
k hat (KM)	0.854	k star (KM)	0.8
nu hat (KM)	59.78	nu star (KM)	55.99
theta hat (KM)	0.775	theta star (KM)	0.827
80% gamma percentile (KM)	1.082	90% gamma percentile (KM)	1.609
95% gamma percentile (KM)	2.147	99% gamma percentile (KM)	3.417

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (55.99, α)	39.79	Adjusted Chi Square Value (55.99, β)	39.14
95% Gamma Approximate KM-UCL (use when n>=50)	0.931	95% Gamma Adjusted KM-UCL (use when n<50)	0.947

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.659	Mean in Log Scale	-0.873
SD in Original Scale	0.729	SD in Log Scale	0.945
95% t UCL (assumes normality of ROS data)	0.868	95% Percentile Bootstrap UCL	0.865
95% BCA Bootstrap UCL	0.917	95% Bootstrap t UCL	0.932
95% H-UCL (Log ROS)	0.961		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.846	KM Geo Mean	0.429
KM SD (logged)	0.884	95% Critical H Value (KM-Log)	2.32
KM Standard Error of Mean (logged)	0.152	95% H-UCL (KM -Log)	0.901
KM SD (logged)	0.884	95% Critical H Value (KM-Log)	2.32
KM Standard Error of Mean (logged)	0.152		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.659	Mean in Log Scale	-0.873
SD in Original Scale	0.729	SD in Log Scale	0.939
95% t UCL (Assumes normality)	0.867	95% H-Stat UCL	0.953

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	0.901

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_teq human)

General Statistics

Total Number of Observations	35	Number of Distinct Observations	30
Number of Detects	33	Number of Non-Detects	2
Number of Distinct Detects	28	Number of Distinct Non-Detects	2
Minimum Detect	0.096	Minimum Non-Detect	0.086
Maximum Detect	3.6	Maximum Non-Detect	0.17
Variance Detects	0.656	Percent Non-Detects	5.714%
Mean Detects	0.727	SD Detects	0.81
Median Detects	0.43	CV Detects	1.114
Skewness Detects	2.064	Kurtosis Detects	4.36
Mean of Logged Detects	-0.8	SD of Logged Detects	0.978

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.739	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.229	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.152	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.691	KM Standard Error of Mean	0.135
KM SD	0.788	95% KM (BCA) UCL	0.926
95% KM (t) UCL	0.92	95% KM (Percentile Bootstrap) UCL	0.919
95% KM (z) UCL	0.914	95% KM Bootstrap t UCL	1.001
90% KM Chebyshev UCL	1.097	95% KM Chebyshev UCL	1.281
97.5% KM Chebyshev UCL	1.536	99% KM Chebyshev UCL	2.037

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.866	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.772	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.134	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.157	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.178	k star (bias corrected MLE)	1.091
Theta hat (MLE)	0.617	Theta star (bias corrected MLE)	0.666
nu hat (MLE)	77.75	nu star (bias corrected)	72.01
Mean (detects)	0.727		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.686
Maximum	3.6	Median	0.35
SD	0.804	CV	1.172
k hat (MLE)	0.911	k star (bias corrected MLE)	0.852
Theta hat (MLE)	0.753	Theta star (bias corrected MLE)	0.805
nu hat (MLE)	63.79	nu star (bias corrected)	59.66
Adjusted Level of Significance (β)	0.0425		
Approximate Chi Square Value (59.66, α)	42.9	Adjusted Chi Square Value (59.66, β)	42.22
95% Gamma Approximate UCL (use when n>=50)	0.954	95% Gamma Adjusted UCL (use when n<50)	0.969

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.691	SD (KM)	0.788
Variance (KM)	0.621	SE of Mean (KM)	0.135
k hat (KM)	0.77	k star (KM)	0.723
nu hat (KM)	53.92	nu star (KM)	50.63
theta hat (KM)	0.898	theta star (KM)	0.956
80% gamma percentile (KM)	1.135	90% gamma percentile (KM)	1.722
95% gamma percentile (KM)	2.326	99% gamma percentile (KM)	3.762

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (50.63, α)	35.29	Adjusted Chi Square Value (50.63, β)	34.69
95% Gamma Approximate KM-UCL (use when n>=50)	0.992	95% Gamma Adjusted KM-UCL (use when n<50)	1.009

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0856	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.69	Mean in Log Scale	-0.91
SD in Original Scale	0.801	SD in Log Scale	1.061
95% t UCL (assumes normality of ROS data)	0.918	95% Percentile Bootstrap UCL	0.931
95% BCA Bootstrap UCL	1.006	95% Bootstrap t UCL	1.014
95% H-UCL (Log ROS)	1.119		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.884	KM Geo Mean	0.413

KM SD (logged)	0.998	95% Critical H Value (KM-Log)	2.452
KM Standard Error of Mean (logged)	0.171	95% H-UCL (KM -Log)	1.033
KM SD (logged)	0.998	95% Critical H Value (KM-Log)	2.452
KM Standard Error of Mean (logged)	0.171		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.689	Mean in Log Scale	-0.915
SD in Original Scale	0.801	SD in Log Scale	1.063
95% t UCL (Assumes normality)	0.918	95% H-Stat UCL	1.119

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	1.009	95% GROS Adjusted Gamma UCL	0.969

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_teqbird)

General Statistics

Total Number of Observations	35	Number of Distinct Observations	29
Number of Detects	33	Number of Non-Detects	2
Number of Distinct Detects	27	Number of Distinct Non-Detects	2
Minimum Detect	0.26	Minimum Non-Detect	0.24
Maximum Detect	4	Maximum Non-Detect	0.55
Variance Detects	0.99	Percent Non-Detects	5.714%
Mean Detects	1.107	SD Detects	0.995
Median Detects	0.68	CV Detects	0.899
Skewness Detects	1.562	Kurtosis Detects	1.529
Mean of Logged Detects	-0.221	SD of Logged Detects	0.786

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.77	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.061	KM Standard Error of Mean	0.166
KM SD	0.969	95% KM (BCA) UCL	1.358
95% KM (t) UCL	1.343	95% KM (Percentile Bootstrap) UCL	1.339
95% KM (z) UCL	1.335	95% KM Bootstrap t UCL	1.433
90% KM Chebyshev UCL	1.56	95% KM Chebyshev UCL	1.787
97.5% KM Chebyshev UCL	2.1	99% KM Chebyshev UCL	2.717

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.271	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.763	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.156	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.7	k star (bias corrected MLE)	1.565
Theta hat (MLE)	0.651	Theta star (bias corrected MLE)	0.707
nu hat (MLE)	112.2	nu star (bias corrected)	103.3
Mean (detects)	1.107		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.05
Maximum	4	Median	0.65
SD	0.993	CV	0.946
k hat (MLE)	1.3	k star (bias corrected MLE)	1.208
Theta hat (MLE)	0.808	Theta star (bias corrected MLE)	0.87
nu hat (MLE)	91	nu star (bias corrected)	84.53
Adjusted Level of Significance (β)	0.0425		
Approximate Chi Square Value (84.53, α)	64.34	Adjusted Chi Square Value (84.53, β)	63.5
95% Gamma Approximate UCL (use when n>=50)	1.38	95% Gamma Adjusted UCL (use when n<50)	1.398

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.061	SD (KM)	0.969
Variance (KM)	0.94	SE of Mean (KM)	0.166
k hat (KM)	1.199	k star (KM)	1.115
nu hat (KM)	83.9	nu star (KM)	78.04
theta hat (KM)	0.885	theta star (KM)	0.952
80% gamma percentile (KM)	1.692	90% gamma percentile (KM)	2.379
95% gamma percentile (KM)	3.06	99% gamma percentile (KM)	4.629

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (78.04, α)	58.69	Adjusted Chi Square Value (78.04, β)	57.9
95% Gamma Approximate KM-UCL (use when n>=50)	1.411	95% Gamma Adjusted KM-UCL (use when n<50)	1.431

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.057	Mean in Log Scale	-0.299
SD in Original Scale	0.987	SD in Log Scale	0.84
95% t UCL (assumes normality of ROS data)	1.339	95% Percentile Bootstrap UCL	1.339
95% BCA Bootstrap UCL	1.352	95% Bootstrap t UCL	1.41
95% H-UCL (Log ROS)	1.464		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.277	KM Geo Mean	0.758
KM SD (logged)	0.789	95% Critical H Value (KM-Log)	2.215
KM Standard Error of Mean (logged)	0.136	95% H-UCL (KM -Log)	1.396
KM SD (logged)	0.789	95% Critical H Value (KM-Log)	2.215
KM Standard Error of Mean (logged)	0.136		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.055	Mean in Log Scale	-0.306
SD in Original Scale	0.989	SD in Log Scale	0.845
95% t UCL (Assumes normality)	1.337	95% H-Stat UCL	1.464

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	1.396

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_teqmammals)

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

General Statistics

Total Number of Observations	35	Number of Distinct Observations	28
Number of Detects	33	Number of Non-Detects	2
Number of Distinct Detects	27	Number of Distinct Non-Detects	2
Minimum Detect	0.19	Minimum Non-Detect	0.17
Maximum Detect	4.4	Maximum Non-Detect	0.34
Variance Detects	1.08	Percent Non-Detects	5.714%
Mean Detects	1.066	SD Detects	1.039
Median Detects	0.64	CV Detects	0.975
Skewness Detects	1.688	Kurtosis Detects	2.435
Mean of Logged Detects	-0.327	SD of Logged Detects	0.882

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.779	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.152	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.017	KM Standard Error of Mean	0.174
KM SD	1.014	95% KM (BCA) UCL	1.282
95% KM (t) UCL	1.311	95% KM (Percentile Bootstrap) UCL	1.299
95% KM (z) UCL	1.303	95% KM Bootstrap t UCL	1.428
90% KM Chebyshev UCL	1.539	95% KM Chebyshev UCL	1.776
97.5% KM Chebyshev UCL	2.104	99% KM Chebyshev UCL	2.749

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.949	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.767	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.141	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.156	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.421	k star (bias corrected MLE)	1.312
Theta hat (MLE)	0.751	Theta star (bias corrected MLE)	0.813
nu hat (MLE)	93.77	nu star (bias corrected)	86.58
Mean (detects)	1.066		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.006
Maximum	4.4	Median	0.59
SD	1.039	CV	1.032
k hat (MLE)	0.999	k star (bias corrected MLE)	0.933
Theta hat (MLE)	1.007	Theta star (bias corrected MLE)	1.079
nu hat (MLE)	69.95	nu star (bias corrected)	65.29
Adjusted Level of Significance (β)	0.0425		
Approximate Chi Square Value (65.29, α)	47.7	Adjusted Chi Square Value (65.29, β)	46.98
95% Gamma Approximate UCL (use when n>=50)	1.377	95% Gamma Adjusted UCL (use when n<50)	1.398

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.017	SD (KM)	1.014
Variance (KM)	1.028	SE of Mean (KM)	0.174
k hat (KM)	1.006	k star (KM)	0.939
nu hat (KM)	70.45	nu star (KM)	65.74
theta hat (KM)	1.011	theta star (KM)	1.083
80% gamma percentile (KM)	1.645	90% gamma percentile (KM)	2.378
95% gamma percentile (KM)	3.116	99% gamma percentile (KM)	4.835

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (65.74, α)	48.08	Adjusted Chi Square Value (65.74, β)	47.37
95% Gamma Approximate KM-UCL (use when n>=50)	1.391	95% Gamma Adjusted KM-UCL (use when n<50)	1.412

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0829	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.014	Mean in Log Scale	-0.426
SD in Original Scale	1.032	SD in Log Scale	0.956
95% t UCL (assumes normality of ROS data)	1.309	95% Percentile Bootstrap UCL	1.312
95% BCA Bootstrap UCL	1.362	95% Bootstrap t UCL	1.4
95% H-UCL (Log ROS)	1.529		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.401	KM Geo Mean	0.67
KM SD (logged)	0.896	95% Critical H Value (KM-Log)	2.335
KM Standard Error of Mean (logged)	0.154	95% H-UCL (KM -Log)	1.433
KM SD (logged)	0.896	95% Critical H Value (KM-Log)	2.335
KM Standard Error of Mean (logged)	0.154		

DL/2 Statistics

DL/2 Normal **DL/2 Log-Transformed**

Mean in Original Scale	1.013	Mean in Log Scale	-0.43
SD in Original Scale	1.032	SD in Log Scale	0.958
95% t UCL (Assumes normality)	1.308	95% H-Stat UCL	1.529

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	1.412	95% GROS Adjusted Gamma UCL	1.398

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Res (bkgd_vanadium)

General Statistics

Total Number of Observations	60	Number of Distinct Observations	33
		Number of Missing Observations	0
Minimum	9.4	Mean	34.05
Maximum	59	Median	34.1
SD	8.997	Std. Error of Mean	1.161
Coefficient of Variation	0.264	Skewness	-0.152

Normal GOF Test

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.802	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.104	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.114	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	35.99	95% Adjusted-CLT UCL (Chen-1995)	35.93
		95% Modified-t UCL (Johnson-1978)	35.99

Gamma GOF Test

A-D Test Statistic	1.024	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.145	**Kolmogorov-Smirnov Gamma GOF Test**	

5% K-S Critical Value	0.115	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.06	k star (bias corrected MLE)	11.47
Theta hat (MLE)	2.824	Theta star (bias corrected MLE)	2.969
nu hat (MLE)	1447	nu star (bias corrected)	1376
MLE Mean (bias corrected)	34.05	MLE Sd (bias corrected)	10.06
		Approximate Chi Square Value (0.05)	1291
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	1289

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	36.29	95% Adjusted Gamma UCL (use when n<50)	36.35

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.886	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	6.3189E-6	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.114	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.241	Mean of logged Data	3.486
Maximum of Logged Data	4.078	SD of logged Data	0.315

Assuming Lognormal Distribution

95% H-UCL	36.77	90% Chebyshev (MVUE) UCL	38.54
95% Chebyshev (MVUE) UCL	40.47	97.5% Chebyshev (MVUE) UCL	43.15
99% Chebyshev (MVUE) UCL	48.42		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	35.96	95% Jackknife UCL	35.99
95% Standard Bootstrap UCL	35.91	95% Bootstrap-t UCL	36.1
95% Hall's Bootstrap UCL	35.98	95% Percentile Bootstrap UCL	35.88
95% BCA Bootstrap UCL	35.9		
90% Chebyshev(Mean, Sd) UCL	37.53	95% Chebyshev(Mean, Sd) UCL	39.11
97.5% Chebyshev(Mean, Sd) UCL	41.3	99% Chebyshev(Mean, Sd) UCL	45.6

Suggested UCL to Use

95% Student's-t UCL	35.99

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Res (bkgd_zinc)

General Statistics

Total Number of Observations	70	Number of Distinct Observations	42
		Number of Missing Observations	0
Minimum	8.4	Mean	36.82
Maximum	66.1	Median	35.5
SD	10.14	Std. Error of Mean	1.212
Coefficient of Variation	0.275	Skewness	-0.177

Normal GOF Test

Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.204	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.128	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.106	Data Not Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	38.84	95% Adjusted-CLT UCL (Chen-1995)	38.79
		95% Modified-t UCL (Johnson-1978)	38.84

Gamma GOF Test

A-D Test Statistic	2.028	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.177	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.106	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.63	k star (bias corrected MLE)	10.18
Theta hat (MLE)	3.464	Theta star (bias corrected MLE)	3.616
nu hat (MLE)	1488	nu star (bias corrected)	1426
MLE Mean (bias corrected)	36.82	MLE Sd (bias corrected)	11.54
		Approximate Chi Square Value (0.05)	1339
Adjusted Level of Significance	0.0466	Adjusted Chi Square Value	1337

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	39.21	95% Adjusted Gamma UCL (use when n<50)	39.26

Attachment BKG-A
ProUCL Outputs for Background Data

Soil Human Health and Ecological Risk Assessment
PG Topock Compressor Station
Needles, California

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	2.6954E-9	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.203	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.106	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.128	Mean of logged Data	3.558
Maximum of Logged Data	4.191	SD of logged Data	0.34

Assuming Lognormal Distribution

95% H-UCL	40.01	90% Chebyshev (MVUE) UCL	41.81
95% Chebyshev (MVUE) UCL	43.92	97.5% Chebyshev (MVUE) UCL	46.84
99% Chebyshev (MVUE) UCL	52.58		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	38.82	95% Jackknife UCL	38.84
95% Standard Bootstrap UCL	38.73	95% Bootstrap-t UCL	38.9
95% Hall's Bootstrap UCL	38.82	95% Percentile Bootstrap UCL	38.78
95% BCA Bootstrap UCL	38.74		
90% Chebyshev(Mean, Sd) UCL	40.46	95% Chebyshev(Mean, Sd) UCL	42.11
97.5% Chebyshev(Mean, Sd) UCL	44.39	99% Chebyshev(Mean, Sd) UCL	48.88

Suggested UCL to Use

95% Student's-t UCL	38.84

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Table BKG-B.1
95 Percent Upper Confidence Limits for Soil and Biota for Background

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

COPEC	Units	Exposure Point Concentrations[a,b]			
		Soil	Plants	Insects	Mammals
Inorganics					
Aluminum	mg/kg	1.11E+04	2.46E+02	1.11E+04	5.55E+02
Arsenic	mg/kg	4.50E+00	1.69E-01	6.98E-01	2.69E-02
Barium	mg/kg	1.85E+02	2.89E+01	1.68E+01	2.17E-01
Beryllium	mg/kg	6.54E-01	4.28E-01	2.94E-02	2.14E-02
Cadmium	mg/kg	1.10E+00 m	6.55E-01	8.93E+00	2.98E-01
Calcium	mg/kg	2.75E+04	--	--	--
Chromium, hexavalent	mg/kg	8.30E-01 m	3.40E-02	2.54E-01	2.03E-01
Chromium, total	mg/kg	2.41E+01	9.88E-01	7.37E+00	2.40E+00
Cobalt	mg/kg	8.30E+00	6.23E-02	1.01E+00	1.83E-01
Copper	mg/kg	1.10E+01	5.01E+00	5.65E+00	1.09E+01
Iron	mg/kg	1.96E+04	--	--	--
Lead	mg/kg	4.79E+00	6.38E-01	2.85E+00	2.16E+00
Magnesium	mg/kg	8.41E+03	--	--	--
Manganese	mg/kg	2.93E+02	2.32E+01	2.14E+01	6.01E+00
Molybdenum	mg/kg	8.21E-01	2.05E-01	4.52E-01	1.35E-01
Nickel	mg/kg	1.66E+01	8.86E-01	1.76E+01	2.89E+00
Potassium	mg/kg	2.93E+03	--	--	--
Selenium	mg/kg	1.02E+00	5.17E-01	9.38E-01	6.64E-01
Sodium	mg/kg	1.04E+03	--	--	--
Vanadium	mg/kg	3.60E+01	1.75E-01	1.51E+00	4.43E-01
Zinc	mg/kg	3.88E+01	3.67E+01	2.84E+02	1.02E+02
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	mg/kg	5.60E-02	7.20E-02	1.70E-01	0.00E+00
PAH High molecular weight	mg/kg	5.04E-03	1.22E-03	1.31E-02	0.00E+00
Dioxins					
TEQ Avian	ng/kg	9.01E-01	5.05E-03	2.45E+00	5.09E-01
TEQ Mammals	ng/kg	9.69E-01	5.43E-03	2.67E+00	5.51E-01

Notes:

[a] Biota calculated using soil EPC and uptake model. See Section 6 of the main report.

[b] Biota EPCs presented as 0.0 indicate no bioaccumulation from soil.

Abbreviations:

-- = soil EPC or uptake model not available, biota EPCs could not be estimated.
AOC = area of concern
BKG = background
EPC = exposure point concentration
ft bgs = feet below ground surface
m = maximum depth-weighted concentration
mg/kg = milligrams per kilogram
nd = not detected in this depth interval
ng/kg = nanograms per kilogram

Table BKG-B.2
Ecological Risk Estimate Summary for 95 Percent Upper Confidence Limits (Plants and Soil Invertebrates; Wildlife SUF = 1, Selected TRVs and BTAG TRVs) for Background

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

			HQs based on Selected TRVs														HQs based on BTAG TRVs													
	Plants	Soil Invertebrates	Gambel's Quail		Cactus Wren		Desert Shrew		Merriam's Kangaroo Rat		Red-Tailed Hawk		Desert Kit Fox		Nelson's Desert Bighorn Sheep		Gambel's Quail		Cactus Wren		Desert Shrew		Merriam's Kangaroo Rat		Red-Tailed Hawk		Desert Kit Fox		Nelson's Desert Bighorn Sheep	
			SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1	
COPEC	HQ	HQ	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Inorganics																														
Aluminum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	3E-01	8E-02	1E-02	7E-03	9E-02	6E-02	1E-01	7E-02	2E-02	1E-02	3E-03	2E-03	5E-03	3E-03	2E-02	1E-02	4E-03	1E-03	4E-02	9E-03	5E-01	3E-02	7E-02	5E-03	1E-03	3E-04	2E-02	1E-03	7E-02	4E-03
Barium	4E-01	6E-01	--	--	--	--	8E-02	5E-02	5E-02	3E-02	--	--	4E-03	2E-03	2E-02	1E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	7E-02	2E-02	--	--	--	--	2E-02	1E-02	7E-02	6E-02	--	--	3E-03	2E-03	2E-02	2E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	3E-02	8E-03	2E-02	5E-03	1E+00	3E-01	**2E+00**	2E-01	7E-02	7E-03	2E-02	4E-03	2E-02	2E-03	2E-02	2E-03	4E-02	3E-03	**2E+00**	2E-01	**3E+01**	7E-01	9E-01	2E-02	4E-02	2E-03	2E-01	4E-03	2E-01	5E-03
Calcium	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium, hexavalent	8E-01	**2E+00**	2E-03	2E-04	2E-02	2E-03	6E-03	1E-03	5E-04	1E-04	7E-03	7E-04	9E-04	2E-04	4E-04	1E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium, total	No SL	4E-01	5E-02	9E-03	7E-01	1E-01	7E-01	2E-01	5E-02	1E-02	8E-02	1E-02	5E-02	1E-02	5E-02	1E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	6E-01	No SL	5E-03	2E-03	4E-02	2E-02	3E-02	1E-02	3E-03	1E-03	3E-03	1E-03	2E-03	8E-04	5E-03	2E-03	--	--	--	--	2E-01	1E-02	2E-02	1E-03	--	--	1E-02	7E-04	3E-02	2E-03
Copper	2E-01	1E-01	6E-02	2E-02	3E-01	1E-01	1E-01	8E-02	5E-02	3E-02	2E-01	7E-02	7E-02	4E-02	2E-02	1E-02	1E-01	5E-03	5E-01	2E-02	4E-01	2E-03	2E-01	7E-04	4E-01	2E-02	1E-01	6E-04	4E-02	2E-04
Iron	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	4E-02	3E-03	3E-02	1E-02	4E-01	2E-01	1E-01	7E-02	1E-02	7E-03	1E-01	5E-02	2E-02	9E-03	8E-03	4E-03	**3E+00**	5E-03	**4E+01**	7E-02	6E-01	2E-03	6E-02	3E-04	**1E+01**	2E-02	8E-02	3E-04	3E-02	1E-04
Magnesium	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	1E+00	7E-01	1E-02	5E-03	5E-02	2E-02	1E-01	4E-02	5E-02	2E-02	4E-03	2E-03	1E-02	3E-03	3E-02	1E-02	3E-02	3E-03	1E-01	1E-02	4E-01	3E-02	2E-01	2E-02	1E-02	1E-03	4E-02	3E-03	1E-01	1E-02
Molybdenum	4E-01	No SL	3E-03	3E-04	3E-02	3E-03	4E-01	4E-02	7E-02	7E-03	3E-03	3E-04	2E-02	2E-03	4E-02	4E-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	4E-01	6E-02	1E-02	5E-03	5E-01	2E-01	**2E+00**	1E+00	6E-02	3E-02	4E-02	1E-02	7E-02	3E-02	8E-02	4E-02	7E-02	2E-03	**3E+00**	6E-02	**3E+01**	1E-01	8E-01	3E-03	2E-01	4E-03	9E-01	4E-03	6E-01	3E-03
Potassium	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	**2E+00**	2E-01	8E-02	4E-02	7E-01	3E-01	8E-01	6E-01	2E-01	1E-01	2E-01	9E-02	2E-01	1E-01	8E-02	5E-02	1E-01	3E-02	8E-01	2E-01	**4E+00**	2E-01	9E-01	4E-02	2E-01	6E-02	5E-01	2E-02	2E-01	9E-03
Sodium	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	**2E+01**	No SL	4E-01	2E-01	**3E+00**	1E+00	1E-01	5E-02	2E-02	1E-02	2E-01	1E-01	1E-02	6E-03	6E-02	3E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	2E-01	3E-01	2E-02	9E-03	8E-01	3E-01	8E-01	2E-01	4E-02	1E-02	1E-01	5E-02	5E-02	1E-02	9E-03	2E-03	9E-02	9E-03	**3E+00**	3E-01	**6E+00**	1E-01	3E-01	8E-03	5E-01	5E-02	4E-01	9E-03	7E-02	2E-03
Polycyclic Aromatic Hydrocarbons																														
PAH Low molecular weight	6E-03	2E-03	1E-04	1E-05	1E-03	1E-04	5E-04	1E-04	9E-05	2E-05	3E-06	3E-07	8E-07	2E-07	2E-05	4E-06	--	--	--	--	7E-04	2E-04	1E-04	4E-05	--	--	1E-06	4E-07	2E-05	8E-06
PAH High molecular weight	4E-03	3E-04	7E-06	7E-07	2E-04	2E-05	4E-03	9E-04	2E-04	4E-05	6E-07	6E-08	8E-06	2E-06	6E-05	1E-05	--	--	--	--	2E-03	8E-05	8E-05	3E-06	--	--	4E-06	2E-07	3E-05	1E-06
Dioxins																														
TEQ Avian	--	--	3E-04	3E-05	3E-02	3E-03	--	--	--	--	3E-03	3E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEQ Mammals	--	--	--	--	--	--	5E-01	5E-02	2E-03	2E-04	--	--	2E-02	2E-03	6E-03	6E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

	NOAEL HQ greater than 1
	HQ or LOAEL HQ greater than 1
	HQ or LOAEL HQ greater than 10
	HQ or LOAEL HQ greater than 100

Abbreviations:

-- = no toxicity value available, HQs could not be estimated
AOC = area of concern
BTAG = Biological Technical Assistance Group
HQ = hazard quotient
LOAEL = lowest observed adverse effect level
NOAEL = no-observed adverse effect level
PCBs = polychlorinated biphenyls
PAH = polycyclic aromatic hydrocarbons
SUF = site use factor
TRV = toxicity reference value

Table BKG-B.3
Plants and Soil Invertebrates Risk Calculations for 95 Percent Upper Confidence Limits for Background

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

COPEC	Terrestrial Plants			Terrestrial Invertebrates		
	Soil EPC (mg/kg)	Benchmark (mg/kg)	Hazard Quotient	Soil EPC (mg/kg)	Benchmark (mg/kg)	Hazard Quotient
Inorganics						
Aluminum	1.11E+04	pH<5.5	--	1.11E+04	pH<5.5	--
Arsenic	4.50E+00	18	3E-01	4.50E+00	60	8E-02
Barium	1.85E+02	500	4E-01	1.85E+02	330	6E-01
Beryllium	6.54E-01	10	7E-02	6.54E-01	40	2E-02
Cadmium	1.10E+00	32	3E-02	1.10E+00	140	8E-03
Calcium	2.75E+04	--	No SL	2.75E+04	--	No SL
Chromium, hexavalent	8.30E-01	1	8E-01	8.30E-01	0.4	**2E+00**
Chromium, total	2.41E+01	--	No SL	2.41E+01	57	4E-01
Cobalt	8.30E+00	13	6E-01	8.30E+00	--	No SL
Copper	1.10E+01	70	2E-01	1.10E+01	80	1E-01
Iron	1.96E+04	--	No SL	1.96E+04	--	No SL
Lead	4.79E+00	120	4E-02	4.79E+00	1700	3E-03
Magnesium	8.41E+03	--	No SL	8.41E+03	--	No SL
Manganese	2.93E+02	220	1E+00	2.93E+02	450	7E-01
Molybdenum	8.21E-01	2	4E-01	8.21E-01	--	No SL
Nickel	1.66E+01	38	4E-01	1.66E+01	280	6E-02
Potassium	2.93E+03	--	No SL	2.93E+03	--	No SL
Selenium	1.02E+00	0.52	**2E+00**	1.02E+00	4.1	2E-01
Sodium	1.04E+03	--	No SL	1.04E+03	--	No SL
Vanadium	3.60E+01	2	**2E+01**	3.60E+01	--	No SL
Zinc	3.88E+01	160	2E-01	3.88E+01	120	3E-01
Polycyclic Aromatic Hydrocarbons						
PAH Low molecular weight	5.60E-02	10	6E-03	5.60E-02	29	2E-03
PAH High molecular weight	5.04E-03	1.2	4E-03	5.04E-03	18	3E-04

Notes:

HQ greater than 1
HQ greater than 10
HQ greater than 100

Abbreviations:

AOC = area of concern
BKG = background
EPC = exposure point concentration
HQ = hazard quotient
LOAEL = lowest observed adverse effect level
mg/kg = milligrams per kilogram
ND = not detected in the applicable depth interval
ng/kg = nanograms per kilogram
no SL = no screening level available
NOAEL = no-observed adverse effect level
PCBs = polychlorinated biphenyls

Table BKG-B.4
Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Inorganics									
Aluminum	Gambel's Quail	1.1E+04	100% Plants	1.0E-01	2.5E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Arsenic	Gambel's Quail	4.5E+00	100% Plants	1.0E-01	1.7E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Barium	Gambel's Quail	1.9E+02	100% Plants	1.0E-01	2.9E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Beryllium	Gambel's Quail	6.5E-01	100% Plants	1.0E-01	4.3E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Cadmium	Gambel's Quail	1.1E+00 m	100% Plants	1.0E-01	6.6E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Calcium	Gambel's Quail	2.8E+04	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Chromium, hexavalent	Gambel's Quail	8.3E-01 m	100% Plants	1.0E-01	3.4E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Chromium, total	Gambel's Quail	2.4E+01	100% Plants	1.0E-01	9.9E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Cobalt	Gambel's Quail	8.3E+00	100% Plants	1.0E-01	6.2E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Copper	Gambel's Quail	1.1E+01	100% Plants	1.0E-01	5.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Iron	Gambel's Quail	2.0E+04	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Lead	Gambel's Quail	4.8E+00	100% Plants	1.0E-01	6.4E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Magnesium	Gambel's Quail	8.4E+03	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Manganese	Gambel's Quail	2.9E+02	100% Plants	1.0E-01	2.3E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Molybdenum	Gambel's Quail	8.2E-01	100% Plants	1.0E-01	2.1E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Nickel	Gambel's Quail	1.7E+01	100% Plants	1.0E-01	8.9E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Potassium	Gambel's Quail	2.9E+03	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Selenium	Gambel's Quail	1.0E+00	100% Plants	1.0E-01	5.2E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Sodium	Gambel's Quail	1.0E+03	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Vanadium	Gambel's Quail	3.6E+01	100% Plants	1.0E-01	1.7E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Zinc	Gambel's Quail	3.9E+01	100% Plants	1.0E-01	3.7E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Gambel's Quail	5.6E-02	100% Plants	1.0E-01	7.2E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
PAH High molecular weight	Gambel's Quail	5.0E-03	100% Plants	1.0E-01	1.2E-03	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Gambel's Quail	9.0E-01	100% Plants	1.0E-01	5.0E-03	1.7E-01	3.8E-02	4.0E-03	1.0E+00
TEQ Mammals	Gambel's Quail	9.7E-01	100% Plants	1.0E-01	5.4E-03	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Inorganics									
Aluminum	Cactus Wren	1.1E+04	100% Insects	9.3E-02	1.1E+04	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Arsenic	Cactus Wren	4.5E+00	100% Insects	9.3E-02	7.0E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Barium	Cactus Wren	1.9E+02	100% Insects	9.3E-02	1.7E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Beryllium	Cactus Wren	6.5E-01	100% Insects	9.3E-02	2.9E-02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Cadmium	Cactus Wren	1.1E+00 m	100% Insects	9.3E-02	8.9E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Calcium	Cactus Wren	2.8E+04	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Chromium, hexavalent	Cactus Wren	8.3E-01 m	100% Insects	9.3E-02	2.5E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Chromium, total	Cactus Wren	2.4E+01	100% Insects	9.3E-02	7.4E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Cobalt	Cactus Wren	8.3E+00	100% Insects	9.3E-02	1.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Copper	Cactus Wren	1.1E+01	100% Insects	9.3E-02	5.6E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Iron	Cactus Wren	2.0E+04	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Lead	Cactus Wren	4.8E+00	100% Insects	9.3E-02	2.8E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Magnesium	Cactus Wren	8.4E+03	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Manganese	Cactus Wren	2.9E+02	100% Insects	9.3E-02	2.1E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Molybdenum	Cactus Wren	8.2E-01	100% Insects	9.3E-02	4.5E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Nickel	Cactus Wren	1.7E+01	100% Insects	9.3E-02	1.8E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Potassium	Cactus Wren	2.9E+03	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Selenium	Cactus Wren	1.0E+00	100% Insects	9.3E-02	9.4E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Sodium	Cactus Wren	1.0E+03	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Vanadium	Cactus Wren	3.6E+01	100% Insects	9.3E-02	1.5E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Zinc	Cactus Wren	3.9E+01	100% Insects	9.3E-02	2.8E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Cactus Wren	5.6E-02	100% Insects	9.3E-02	1.7E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
PAH High molecular weight	Cactus Wren	5.0E-03	100% Insects	9.3E-02	1.3E-02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Cactus Wren	9.0E-01	100% Insects	9.3E-02	2.4E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
TEQ Mammals	Cactus Wren	9.7E-01	100% Insects	9.3E-02	2.7E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Inorganics									
Aluminum	Red-Tailed Hawk	1.1E+04	100% Mammals	1.4E-02	5.6E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Arsenic	Red-Tailed Hawk	4.5E+00	100% Mammals	1.4E-02	2.7E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Barium	Red-Tailed Hawk	1.9E+02	100% Mammals	1.4E-02	2.2E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Beryllium	Red-Tailed Hawk	6.5E-01	100% Mammals	1.4E-02	2.1E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00

Table BKG-B.4
Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Inorganics										
Aluminum	Gambel's Quail	9.4E+00	--	--	4.4E+01	5.4E+01	pH<5.5	pH<5.5	--	--
Arsenic	Gambel's Quail	6.5E-03	--	--	1.8E-02	2.4E-02	2.2E+00	3.6E+00	1E-02	7E-03
Barium	Gambel's Quail	1.1E+00	--	--	7.4E-01	1.8E+00	--	--	--	--
Beryllium	Gambel's Quail	1.6E-02	--	--	2.6E-03	1.9E-02	--	--	--	--
Cadmium	Gambel's Quail	2.5E-02	--	--	4.4E-03	2.9E-02	1.5E+00	6.4E+00	2E-02	5E-03
Calcium	Gambel's Quail	--	--	--	1.1E+02	1.1E+02	--	--	--	--
Chromium, hexavalent	Gambel's Quail	1.3E-03	--	--	3.3E-03	4.6E-03	2.5E+00	2.5E+01	2E-03	2E-04
Chromium, total	Gambel's Quail	3.8E-02	--	--	9.6E-02	1.3E-01	2.7E+00	1.6E+01	5E-02	9E-03
Cobalt	Gambel's Quail	2.4E-03	--	--	3.3E-02	3.5E-02	7.6E+00	1.8E+01	5E-03	2E-03
Copper	Gambel's Quail	1.9E-01	--	--	4.4E-02	2.4E-01	4.1E+00	1.2E+01	6E-02	2E-02
Iron	Gambel's Quail	--	--	--	7.8E+01	7.8E+01	--	--	--	--
Lead	Gambel's Quail	2.4E-02	--	--	1.9E-02	4.4E-02	1.6E+00	3.3E+00	3E-02	1E-02
Magnesium	Gambel's Quail	--	--	--	3.4E+01	3.4E+01	--	--	--	--
Manganese	Gambel's Quail	8.9E-01	--	--	1.2E+00	2.1E+00	1.8E+02	3.8E+02	1E-02	5E-03
Molybdenum	Gambel's Quail	7.9E-03	--	--	3.3E-03	1.1E-02	3.5E+00	3.5E+01	3E-03	3E-04
Nickel	Gambel's Quail	3.4E-02	--	--	6.6E-02	1.0E-01	6.7E+00	1.9E+01	1E-02	5E-03
Potassium	Gambel's Quail	--	--	--	1.2E+01	1.2E+01	--	--	--	--
Selenium	Gambel's Quail	2.0E-02	--	--	4.0E-03	2.4E-02	2.9E-01	5.8E-01	8E-02	4E-02
Sodium	Gambel's Quail	--	--	--	4.1E+00	4.1E+00	--	--	--	--
Vanadium	Gambel's Quail	6.7E-03	--	--	1.4E-01	1.5E-01	3.4E-01	6.9E-01	4E-01	2E-01
Zinc	Gambel's Quail	1.4E+00	--	--	1.5E-01	1.6E+00	6.6E+01	1.7E+02	2E-02	9E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Gambel's Quail	2.8E-03	--	--	2.2E-04	3.0E-03	2.3E+01	2.3E+02	1E-04	1E-05
PAH High molecular weight	Gambel's Quail	4.7E-05	--	--	2.0E-05	6.7E-05	1.0E+01	1.0E+02	7E-06	7E-07
Dioxins (presented in ng/kg)										
TEQ Avian	Gambel's Quail	1.9E-04	--	--	3.6E-03	3.8E-03	1.4E+01	1.4E+02	3E-04	3E-05
TEQ Mammals	Gambel's Quail	2.1E-04	--	--	3.9E-03	4.1E-03	--	--	--	--
Inorganics										
Aluminum	Cactus Wren	--	2.0E+03	--	1.9E+02	2.2E+03	pH<5.5	pH<5.5	--	--
Arsenic	Cactus Wren	--	1.3E-01	--	7.7E-02	2.0E-01	2.2E+00	3.6E+00	9E-02	6E-02
Barium	Cactus Wren	--	3.1E+00	--	3.2E+00	6.2E+00	--	--	--	--
Beryllium	Cactus Wren	--	5.4E-03	--	1.1E-02	1.7E-02	--	--	--	--
Cadmium	Cactus Wren	--	1.6E+00	--	1.9E-02	1.7E+00	1.5E+00	6.4E+00	1E+00	3E-01
Calcium	Cactus Wren	--	--	--	4.7E+02	4.7E+02	--	--	--	--
Chromium, hexavalent	Cactus Wren	--	4.7E-02	--	1.4E-02	6.1E-02	2.5E+00	2.5E+01	2E-02	2E-03
Chromium, total	Cactus Wren	--	1.4E+00	--	4.1E-01	1.8E+00	2.7E+00	1.6E+01	7E-01	1E-01
Cobalt	Cactus Wren	--	1.9E-01	--	1.4E-01	3.3E-01	7.6E+00	1.8E+01	4E-02	2E-02
Copper	Cactus Wren	--	1.0E+00	--	1.9E-01	1.2E+00	4.1E+00	1.2E+01	3E-01	1E-01
Iron	Cactus Wren	--	--	--	3.3E+02	3.3E+02	--	--	--	--
Lead	Cactus Wren	--	5.2E-01	--	8.2E-02	6.0E-01	1.6E+00	3.3E+00	4E-01	2E-01
Magnesium	Cactus Wren	--	--	--	1.4E+02	1.4E+02	--	--	--	--
Manganese	Cactus Wren	--	3.9E+00	--	5.0E+00	8.9E+00	1.8E+02	3.8E+02	5E-02	2E-02
Molybdenum	Cactus Wren	--	8.3E-02	--	1.4E-02	9.7E-02	3.5E+00	3.5E+01	3E-02	3E-03
Nickel	Cactus Wren	--	3.2E+00	--	2.8E-01	3.5E+00	6.7E+00	1.9E+01	5E-01	2E-01
Potassium	Cactus Wren	--	--	--	5.0E+01	5.0E+01	--	--	--	--
Selenium	Cactus Wren	--	1.7E-01	--	1.7E-02	1.9E-01	2.9E-01	5.8E-01	7E-01	3E-01
Sodium	Cactus Wren	--	--	--	1.8E+01	1.8E+01	--	--	--	--
Vanadium	Cactus Wren	--	2.8E-01	--	6.1E-01	8.9E-01	3.4E-01	6.9E-01	**3E+00**	1E+00
Zinc	Cactus Wren	--	5.2E+01	--	6.6E-01	5.3E+01	6.6E+01	1.7E+02	8E-01	3E-01
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Cactus Wren	--	3.1E-02	--	9.5E-04	3.2E-02	2.3E+01	2.3E+02	1E-03	1E-04
PAH High molecular weight	Cactus Wren	--	2.4E-03	--	8.6E-05	2.5E-03	1.0E+01	1.0E+02	2E-04	2E-05
Dioxins (presented in ng/kg)										
TEQ Avian	Cactus Wren	--	4.5E-01	--	1.5E-02	4.6E-01	1.4E+01	1.4E+02	3E-02	3E-03
TEQ Mammals	Cactus Wren	--	4.9E-01	--	1.7E-02	5.1E-01	--	--	--	--
Inorganics										
Aluminum	Red-Tailed Hawk	--	--	4.4E+01	1.2E+01	5.6E+01	pH<5.5	pH<5.5	--	--
Arsenic	Red-Tailed Hawk	--	--	2.1E-03	5.0E-03	7.1E-03	2.2E+00	3.6E+00	3E-03	2E-03
Barium	Red-Tailed Hawk	--	--	1.7E-02	2.1E-01	2.2E-01	--	--	--	--
Beryllium	Red-Tailed Hawk	--	--	1.7E-03	7.3E-04	2.4E-03	--	--	--	--

Table BKG-B.4
Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Cadmium	Red-Tailed Hawk	1.1E+00 m	100% Mammals	1.4E-02	3.0E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Calcium	Red-Tailed Hawk	2.8E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Chromium, hexavalent	Red-Tailed Hawk	8.3E-01 m	100% Mammals	1.4E-02	2.0E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Chromium, total	Red-Tailed Hawk	2.4E+01	100% Mammals	1.4E-02	2.4E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Cobalt	Red-Tailed Hawk	8.3E+00	100% Mammals	1.4E-02	1.8E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Copper	Red-Tailed Hawk	1.1E+01	100% Mammals	1.4E-02	1.1E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Iron	Red-Tailed Hawk	2.0E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Lead	Red-Tailed Hawk	4.8E+00	100% Mammals	1.4E-02	2.2E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Magnesium	Red-Tailed Hawk	8.4E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Manganese	Red-Tailed Hawk	2.9E+02	100% Mammals	1.4E-02	6.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Molybdenum	Red-Tailed Hawk	8.2E-01	100% Mammals	1.4E-02	1.4E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Nickel	Red-Tailed Hawk	1.7E+01	100% Mammals	1.4E-02	2.9E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Potassium	Red-Tailed Hawk	2.9E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Selenium	Red-Tailed Hawk	1.0E+00	100% Mammals	1.4E-02	6.6E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Sodium	Red-Tailed Hawk	1.0E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Vanadium	Red-Tailed Hawk	3.6E+01	100% Mammals	1.4E-02	4.4E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Zinc	Red-Tailed Hawk	3.9E+01	100% Mammals	1.4E-02	1.0E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Red-Tailed Hawk	5.6E-02	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
PAH High molecular weight	Red-Tailed Hawk	5.0E-03	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Red-Tailed Hawk	9.0E-01	100% Mammals	1.4E-02	5.1E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
TEQ Mammals	Red-Tailed Hawk	9.7E-01	100% Mammals	1.4E-02	5.5E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Inorganics									
Aluminum	Desert Shrew	1.1E+04	100% Insects	2.0E-02	1.1E+04	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Arsenic	Desert Shrew	4.5E+00	100% Insects	2.0E-02	7.0E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Barium	Desert Shrew	1.9E+02	100% Insects	2.0E-02	1.7E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Beryllium	Desert Shrew	6.5E-01	100% Insects	2.0E-02	2.9E-02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Cadmium	Desert Shrew	1.1E+00 m	100% Insects	2.0E-02	8.9E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Calcium	Desert Shrew	2.8E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Chromium, hexavalent	Desert Shrew	8.3E-01 m	100% Insects	2.0E-02	2.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Chromium, total	Desert Shrew	2.4E+01	100% Insects	2.0E-02	7.4E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Cobalt	Desert Shrew	8.3E+00	100% Insects	2.0E-02	1.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Copper	Desert Shrew	1.1E+01	100% Insects	2.0E-02	5.6E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Iron	Desert Shrew	2.0E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Lead	Desert Shrew	4.8E+00	100% Insects	2.0E-02	2.8E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Magnesium	Desert Shrew	8.4E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Manganese	Desert Shrew	2.9E+02	100% Insects	2.0E-02	2.1E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Molybdenum	Desert Shrew	8.2E-01	100% Insects	2.0E-02	4.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Nickel	Desert Shrew	1.7E+01	100% Insects	2.0E-02	1.8E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Potassium	Desert Shrew	2.9E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Selenium	Desert Shrew	1.0E+00	100% Insects	2.0E-02	9.4E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Sodium	Desert Shrew	1.0E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Vanadium	Desert Shrew	3.6E+01	100% Insects	2.0E-02	1.5E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Zinc	Desert Shrew	3.9E+01	100% Insects	2.0E-02	2.8E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Desert Shrew	5.6E-02	100% Insects	2.0E-02	1.7E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
PAH High molecular weight	Desert Shrew	5.0E-03	100% Insects	2.0E-02	1.3E-02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Desert Shrew	9.0E-01	100% Insects	2.0E-02	2.4E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
TEQ Mammals	Desert Shrew	9.7E-01	100% Insects	2.0E-02	2.7E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Inorganics									
Aluminum	Desert Kit Fox	1.1E+04	100% Mammals	2.8E-02	5.6E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Arsenic	Desert Kit Fox	4.5E+00	100% Mammals	2.8E-02	2.7E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Barium	Desert Kit Fox	1.9E+02	100% Mammals	2.8E-02	2.2E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Beryllium	Desert Kit Fox	6.5E-01	100% Mammals	2.8E-02	2.1E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Cadmium	Desert Kit Fox	1.1E+00 m	100% Mammals	2.8E-02	3.0E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Calcium	Desert Kit Fox	2.8E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Chromium, hexavalent	Desert Kit Fox	8.3E-01 m	100% Mammals	2.8E-02	2.0E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Chromium, total	Desert Kit Fox	2.4E+01	100% Mammals	2.8E-02	2.4E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Cobalt	Desert Kit Fox	8.3E+00	100% Mammals	2.8E-02	1.8E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00

Table BKG-B.4
Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Cadmium	Red-Tailed Hawk	--	--	2.4E-02	1.2E-03	2.5E-02	1.5E+00	6.4E+00	2E-02	4E-03
Calcium	Red-Tailed Hawk	--	--	--	3.1E+01	3.1E+01	--	--	--	--
Chromium, hexavalent	Red-Tailed Hawk	--	--	1.6E-02	9.2E-04	1.7E-02	2.5E+00	2.5E+01	7E-03	7E-04
Chromium, total	Red-Tailed Hawk	--	--	1.9E-01	2.7E-02	2.2E-01	2.7E+00	1.6E+01	8E-02	1E-02
Cobalt	Red-Tailed Hawk	--	--	1.4E-02	9.2E-03	2.4E-02	7.6E+00	1.8E+01	3E-03	1E-03
Copper	Red-Tailed Hawk	--	--	8.6E-01	1.2E-02	8.8E-01	4.1E+00	1.2E+01	2E-01	7E-02
Iron	Red-Tailed Hawk	--	--	--	2.2E+01	2.2E+01	--	--	--	--
Lead	Red-Tailed Hawk	--	--	1.7E-01	5.3E-03	1.8E-01	1.6E+00	3.3E+00	1E-01	5E-02
Magnesium	Red-Tailed Hawk	--	--	--	9.3E+00	9.3E+00	--	--	--	--
Manganese	Red-Tailed Hawk	--	--	4.8E-01	3.3E-01	8.0E-01	1.8E+02	3.8E+02	4E-03	2E-03
Molybdenum	Red-Tailed Hawk	--	--	1.1E-02	9.1E-04	1.2E-02	3.5E+00	3.5E+01	3E-03	3E-04
Nickel	Red-Tailed Hawk	--	--	2.3E-01	1.8E-02	2.5E-01	6.7E+00	1.9E+01	4E-02	1E-02
Potassium	Red-Tailed Hawk	--	--	--	3.3E+00	3.3E+00	--	--	--	--
Selenium	Red-Tailed Hawk	--	--	5.3E-02	1.1E-03	5.4E-02	2.9E-01	5.8E-01	2E-01	9E-02
Sodium	Red-Tailed Hawk	--	--	--	1.2E+00	1.2E+00	--	--	--	--
Vanadium	Red-Tailed Hawk	--	--	3.5E-02	4.0E-02	7.5E-02	3.4E-01	6.9E-01	2E-01	1E-01
Zinc	Red-Tailed Hawk	--	--	8.1E+00	4.3E-02	8.1E+00	6.6E+01	1.7E+02	1E-01	5E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Red-Tailed Hawk	--	--	0.0E+00	6.2E-05	6.2E-05	2.3E+01	2.3E+02	3E-06	3E-07
PAH High molecular weight	Red-Tailed Hawk	--	--	0.0E+00	5.6E-06	5.6E-06	1.0E+01	1.0E+02	6E-07	6E-08
Dioxins (presented in ng/kg)										
TEQ Avian	Red-Tailed Hawk	--	--	4.0E-02	1.0E-03	4.1E-02	1.4E+01	1.4E+02	3E-03	3E-04
TEQ Mammals	Red-Tailed Hawk	--	--	4.4E-02	1.1E-03	4.5E-02	--	--	--	--
Inorganics										
Aluminum	Desert Shrew	--	2.3E+03	--	4.5E+01	2.3E+03	pH<5.5	pH<5.5	--	--
Arsenic	Desert Shrew	--	1.4E-01	--	1.8E-02	1.6E-01	1.5E+00	2.4E+00	1E-01	7E-02
Barium	Desert Shrew	--	3.4E+00	--	7.5E-01	4.2E+00	5.2E+01	8.3E+01	8E-02	5E-02
Beryllium	Desert Shrew	--	6.0E-03	--	2.7E-03	8.6E-03	5.3E-01	6.3E-01	2E-02	1E-02
Cadmium	Desert Shrew	--	1.8E+00	--	4.5E-03	1.8E+00	7.7E-01	7.7E+00	**2E+00**	2E-01
Calcium	Desert Shrew	--	--	--	1.1E+02	1.1E+02	--	--	--	--
Chromium, hexavalent	Desert Shrew	--	5.2E-02	--	3.4E-03	5.5E-02	9.2E+00	3.8E+01	6E-03	1E-03
Chromium, total	Desert Shrew	--	1.5E+00	--	9.8E-02	1.6E+00	2.4E+00	9.6E+00	7E-01	2E-01
Cobalt	Desert Shrew	--	2.1E-01	--	3.4E-02	2.4E-01	7.3E+00	1.9E+01	3E-02	1E-02
Copper	Desert Shrew	--	1.1E+00	--	4.5E-02	1.2E+00	9.4E+00	1.6E+01	1E-01	8E-02
Iron	Desert Shrew	--	--	--	8.0E+01	8.0E+01	--	--	--	--
Lead	Desert Shrew	--	5.8E-01	--	1.9E-02	6.0E-01	4.7E+00	8.9E+00	1E-01	7E-02
Magnesium	Desert Shrew	--	--	--	3.4E+01	3.4E+01	--	--	--	--
Manganese	Desert Shrew	--	4.4E+00	--	1.2E+00	5.5E+00	5.2E+01	1.5E+02	1E-01	4E-02
Molybdenum	Desert Shrew	--	9.2E-02	--	3.3E-03	9.5E-02	2.6E-01	2.6E+00	4E-01	4E-02
Nickel	Desert Shrew	--	3.6E+00	--	6.7E-02	3.6E+00	1.7E+00	3.4E+00	**2E+00**	1E+00
Potassium	Desert Shrew	--	--	--	1.2E+01	1.2E+01	--	--	--	--
Selenium	Desert Shrew	--	1.9E-01	--	4.1E-03	1.9E-01	2.3E-01	3.5E-01	8E-01	6E-01
Sodium	Desert Shrew	--	--	--	4.2E+00	4.2E+00	--	--	--	--
Vanadium	Desert Shrew	--	3.1E-01	--	1.5E-01	4.5E-01	4.2E+00	8.3E+00	1E-01	5E-02
Zinc	Desert Shrew	--	5.8E+01	--	1.6E-01	5.8E+01	7.5E+01	3.0E+02	8E-01	2E-01
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Shrew	--	3.5E-02	--	2.3E-04	3.5E-02	6.6E+01	3.3E+02	5E-04	1E-04
PAH High molecular weight	Desert Shrew	--	2.7E-03	--	2.0E-05	2.7E-03	6.2E-01	3.1E+00	4E-03	9E-04
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Shrew	--	5.0E-01	--	3.7E-03	5.0E-01	--	--	--	--
TEQ Mammals	Desert Shrew	--	5.4E-01	--	3.9E-03	5.5E-01	1.0E+00	1.0E+01	5E-01	5E-02
Inorganics										
Aluminum	Desert Kit Fox	--	--	2.0E+01	1.1E+01	3.1E+01	pH<5.5	pH<5.5	--	--
Arsenic	Desert Kit Fox	--	--	9.5E-04	4.5E-03	5.4E-03	1.0E+00	1.7E+00	5E-03	3E-03
Barium	Desert Kit Fox	--	--	7.7E-03	1.8E-01	1.9E-01	5.2E+01	8.3E+01	4E-03	2E-03
Beryllium	Desert Kit Fox	--	--	7.6E-04	6.5E-04	1.4E-03	5.3E-01	6.3E-01	3E-03	2E-03
Cadmium	Desert Kit Fox	--	--	1.1E-02	1.1E-03	1.2E-02	7.7E-01	7.7E+00	2E-02	2E-03
Calcium	Desert Kit Fox	--	--	--	2.7E+01	2.7E+01	--	--	--	--
Chromium, hexavalent	Desert Kit Fox	--	--	7.2E-03	8.2E-04	8.0E-03	9.2E+00	3.8E+01	9E-04	2E-04
Chromium, total	Desert Kit Fox	--	--	8.5E-02	2.4E-02	1.1E-01	2.4E+00	9.6E+00	5E-02	1E-02
Cobalt	Desert Kit Fox	--	--	6.5E-03	8.2E-03	1.5E-02	7.3E+00	1.9E+01	2E-03	8E-04

Table BKG-B.4
Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)		Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
				Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Copper	Desert Kit Fox	1.1E+01		100% Mammals	2.8E-02	1.1E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Iron	Desert Kit Fox	2.0E+04		100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Lead	Desert Kit Fox	4.8E+00		100% Mammals	2.8E-02	2.2E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Magnesium	Desert Kit Fox	8.4E+03		100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Manganese	Desert Kit Fox	2.9E+02		100% Mammals	2.8E-02	6.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Molybdenum	Desert Kit Fox	8.2E-01		100% Mammals	2.8E-02	1.4E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Nickel	Desert Kit Fox	1.7E+01		100% Mammals	2.8E-02	2.9E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Potassium	Desert Kit Fox	2.9E+03		100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Selenium	Desert Kit Fox	1.0E+00		100% Mammals	2.8E-02	6.6E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Sodium	Desert Kit Fox	1.0E+03		100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Vanadium	Desert Kit Fox	3.6E+01		100% Mammals	2.8E-02	4.4E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Zinc	Desert Kit Fox	3.9E+01		100% Mammals	2.8E-02	1.0E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Kit Fox	5.6E-02		100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
PAH High molecular weight	Desert Kit Fox	5.0E-03		100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Kit Fox	9.0E-01		100% Mammals	2.8E-02	5.1E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
TEQ Mammals	Desert Kit Fox	9.7E-01		100% Mammals	2.8E-02	5.5E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Inorganics										
Aluminum	Merriam's Kangaroo Rat	1.1E+04		100% Plants	2.4E-02	2.5E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Arsenic	Merriam's Kangaroo Rat	4.5E+00		100% Plants	2.4E-02	1.7E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Barium	Merriam's Kangaroo Rat	1.9E+02		100% Plants	2.4E-02	2.9E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Beryllium	Merriam's Kangaroo Rat	6.5E-01		100% Plants	2.4E-02	4.3E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Cadmium	Merriam's Kangaroo Rat	1.1E+00	m	100% Plants	2.4E-02	6.6E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Calcium	Merriam's Kangaroo Rat	2.8E+04		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Chromium, hexavalent	Merriam's Kangaroo Rat	8.3E-01	m	100% Plants	2.4E-02	3.4E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Chromium, total	Merriam's Kangaroo Rat	2.4E+01		100% Plants	2.4E-02	9.9E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Cobalt	Merriam's Kangaroo Rat	8.3E+00		100% Plants	2.4E-02	6.2E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Copper	Merriam's Kangaroo Rat	1.1E+01		100% Plants	2.4E-02	5.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Iron	Merriam's Kangaroo Rat	2.0E+04		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Lead	Merriam's Kangaroo Rat	4.8E+00		100% Plants	2.4E-02	6.4E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Magnesium	Merriam's Kangaroo Rat	8.4E+03		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Manganese	Merriam's Kangaroo Rat	2.9E+02		100% Plants	2.4E-02	2.3E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Molybdenum	Merriam's Kangaroo Rat	8.2E-01		100% Plants	2.4E-02	2.1E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Nickel	Merriam's Kangaroo Rat	1.7E+01		100% Plants	2.4E-02	8.9E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Potassium	Merriam's Kangaroo Rat	2.9E+03		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Selenium	Merriam's Kangaroo Rat	1.0E+00		100% Plants	2.4E-02	5.2E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Sodium	Merriam's Kangaroo Rat	1.0E+03		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Vanadium	Merriam's Kangaroo Rat	3.6E+01		100% Plants	2.4E-02	1.7E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Zinc	Merriam's Kangaroo Rat	3.9E+01		100% Plants	2.4E-02	3.7E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Merriam's Kangaroo Rat	5.6E-02		100% Plants	2.4E-02	7.2E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
PAH High molecular weight	Merriam's Kangaroo Rat	5.0E-03		100% Plants	2.4E-02	1.2E-03	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Dioxins (presented in ng/kg)										
TEQ Avian	Merriam's Kangaroo Rat	9.0E-01		100% Plants	2.4E-02	5.0E-03	3.4E-02	8.2E-02	2.0E-03	1.0E+00
TEQ Mammals	Merriam's Kangaroo Rat	9.7E-01		100% Plants	2.4E-02	5.4E-03	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Inorganics										
Aluminum	Nelson's Desert Bighorn Sheep	1.1E+04		100% Plants	3.0E-01	2.5E+02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Arsenic	Nelson's Desert Bighorn Sheep	4.5E+00		100% Plants	3.0E-01	1.7E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Barium	Nelson's Desert Bighorn Sheep	1.9E+02		100% Plants	3.0E-01	2.9E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Beryllium	Nelson's Desert Bighorn Sheep	6.5E-01		100% Plants	3.0E-01	4.3E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Cadmium	Nelson's Desert Bighorn Sheep	1.1E+00	m	100% Plants	3.0E-01	6.6E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Calcium	Nelson's Desert Bighorn Sheep	2.8E+04		100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	8.3E-01	m	100% Plants	3.0E-01	3.4E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Chromium, total	Nelson's Desert Bighorn Sheep	2.4E+01		100% Plants	3.0E-01	9.9E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Cobalt	Nelson's Desert Bighorn Sheep	8.3E+00		100% Plants	3.0E-01	6.2E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Copper	Nelson's Desert Bighorn Sheep	1.1E+01		100% Plants	3.0E-01	5.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Iron	Nelson's Desert Bighorn Sheep	2.0E+04		100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Lead	Nelson's Desert Bighorn Sheep	4.8E+00		100% Plants	3.0E-01	6.4E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Magnesium	Nelson's Desert Bighorn Sheep	8.4E+03		100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Manganese	Nelson's Desert Bighorn Sheep	2.9E+02		100% Plants	3.0E-01	2.3E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00

Table BKG-B.4
Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Copper	Desert Kit Fox	--	--	3.9E-01	1.1E-02	4.0E-01	5.6E+00	9.3E+00	7E-02	4E-02
Iron	Desert Kit Fox	--	--	--	1.9E+01	1.9E+01	--	--	--	--
Lead	Desert Kit Fox	--	--	7.6E-02	4.7E-03	8.1E-02	4.7E+00	8.9E+00	2E-02	9E-03
Magnesium	Desert Kit Fox	--	--	--	8.3E+00	8.3E+00	--	--	--	--
Manganese	Desert Kit Fox	--	--	2.1E-01	2.9E-01	5.0E-01	5.2E+01	1.5E+02	1E-02	3E-03
Molybdenum	Desert Kit Fox	--	--	4.8E-03	8.1E-04	5.6E-03	2.6E-01	2.6E+00	2E-02	2E-03
Nickel	Desert Kit Fox	--	--	1.0E-01	1.6E-02	1.2E-01	1.7E+00	3.4E+00	7E-02	3E-02
Potassium	Desert Kit Fox	--	--	--	2.9E+00	2.9E+00	--	--	--	--
Selenium	Desert Kit Fox	--	--	2.3E-02	1.0E-03	2.4E-02	1.4E-01	2.2E-01	2E-01	1E-01
Sodium	Desert Kit Fox	--	--	--	1.0E+00	1.0E+00	--	--	--	--
Vanadium	Desert Kit Fox	--	--	1.6E-02	3.6E-02	5.1E-02	4.2E+00	8.3E+00	1E-02	6E-03
Zinc	Desert Kit Fox	--	--	3.6E+00	3.8E-02	3.6E+00	7.5E+01	3.0E+02	5E-02	1E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Kit Fox	--	--	0.0E+00	5.5E-05	5.5E-05	6.6E+01	3.3E+02	8E-07	2E-07
PAH High molecular weight	Desert Kit Fox	--	--	0.0E+00	5.0E-06	5.0E-06	6.2E-01	3.1E+00	8E-06	2E-06
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Kit Fox	--	--	1.8E-02	8.9E-04	1.9E-02	--	--	--	--
TEQ Mammals	Desert Kit Fox	--	--	2.0E-02	9.6E-04	2.0E-02	1.0E+00	1.0E+01	2E-02	2E-03
Inorganics										
Aluminum	Merriam's Kangaroo Rat	2.0E+01	--	--	2.2E+01	4.2E+01	pH<5.5	pH<5.5	--	--
Arsenic	Merriam's Kangaroo Rat	1.4E-02	--	--	8.9E-03	2.3E-02	1.5E+00	2.3E+00	2E-02	1E-02
Barium	Merriam's Kangaroo Rat	2.4E+00	--	--	3.7E-01	2.7E+00	5.2E+01	8.3E+01	5E-02	3E-02
Beryllium	Merriam's Kangaroo Rat	3.5E-02	--	--	1.3E-03	3.7E-02	5.3E-01	6.3E-01	7E-02	6E-02
Cadmium	Merriam's Kangaroo Rat	5.4E-02	--	--	2.2E-03	5.6E-02	7.7E-01	7.7E+00	7E-02	7E-03
Calcium	Merriam's Kangaroo Rat	--	--	--	5.4E+01	5.4E+01	--	--	--	--
Chromium, hexavalent	Merriam's Kangaroo Rat	2.8E-03	--	--	1.6E-03	4.4E-03	9.2E+00	3.8E+01	5E-04	1E-04
Chromium, total	Merriam's Kangaroo Rat	8.1E-02	--	--	4.8E-02	1.3E-01	2.4E+00	9.6E+00	5E-02	1E-02
Cobalt	Merriam's Kangaroo Rat	5.1E-03	--	--	1.6E-02	2.2E-02	7.3E+00	1.9E+01	3E-03	1E-03
Copper	Merriam's Kangaroo Rat	4.1E-01	--	--	2.2E-02	4.3E-01	9.0E+00	1.5E+01	5E-02	3E-02
Iron	Merriam's Kangaroo Rat	--	--	--	3.9E+01	3.9E+01	--	--	--	--
Lead	Merriam's Kangaroo Rat	5.2E-02	--	--	9.5E-03	6.2E-02	4.7E+00	8.9E+00	1E-02	7E-03
Magnesium	Merriam's Kangaroo Rat	--	--	--	1.7E+01	1.7E+01	--	--	--	--
Manganese	Merriam's Kangaroo Rat	1.9E+00	--	--	5.8E-01	2.5E+00	5.2E+01	1.5E+02	5E-02	2E-02
Molybdenum	Merriam's Kangaroo Rat	1.7E-02	--	--	1.6E-03	1.8E-02	2.6E-01	2.6E+00	7E-02	7E-03
Nickel	Merriam's Kangaroo Rat	7.3E-02	--	--	3.3E-02	1.1E-01	1.7E+00	3.4E+00	6E-02	3E-02
Potassium	Merriam's Kangaroo Rat	--	--	--	5.8E+00	5.8E+00	--	--	--	--
Selenium	Merriam's Kangaroo Rat	4.2E-02	--	--	2.0E-03	4.4E-02	2.1E-01	3.1E-01	2E-01	1E-01
Sodium	Merriam's Kangaroo Rat	--	--	--	2.0E+00	2.0E+00	--	--	--	--
Vanadium	Merriam's Kangaroo Rat	1.4E-02	--	--	7.1E-02	8.5E-02	4.2E+00	8.3E+00	2E-02	1E-02
Zinc	Merriam's Kangaroo Rat	3.0E+00	--	--	7.7E-02	3.1E+00	7.5E+01	3.0E+02	4E-02	1E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Merriam's Kangaroo Rat	5.9E-03	--	--	1.1E-04	6.0E-03	6.6E+01	3.3E+02	9E-05	2E-05
PAH High molecular weight	Merriam's Kangaroo Rat	1.0E-04	--	--	1.0E-05	1.1E-04	6.2E-01	3.1E+00	2E-04	4E-05
Dioxins (presented in ng/kg)										
TEQ Avian	Merriam's Kangaroo Rat	4.1E-04	--	--	1.8E-03	2.2E-03	--	--	--	--
TEQ Mammals	Merriam's Kangaroo Rat	4.5E-04	--	--	1.9E-03	2.4E-03	1.0E+00	1.0E+01	2E-03	2E-04
Inorganics										
Aluminum	Nelson's Desert Bighorn Sheep	3.4E+00	--	--	4.6E+01	4.9E+01	pH<5.5	pH<5.5	--	--
Arsenic	Nelson's Desert Bighorn Sheep	2.3E-03	--	--	1.9E-02	2.1E-02	1.0E+00	1.7E+00	2E-02	1E-02
Barium	Nelson's Desert Bighorn Sheep	4.0E-01	--	--	7.6E-01	1.2E+00	5.2E+01	8.3E+01	2E-02	1E-02
Beryllium	Nelson's Desert Bighorn Sheep	5.9E-03	--	--	2.7E-03	8.6E-03	4.0E-01	4.2E-01	2E-02	2E-02
Cadmium	Nelson's Desert Bighorn Sheep	9.0E-03	--	--	4.5E-03	1.4E-02	5.7E-01	5.7E+00	2E-02	2E-03
Calcium	Nelson's Desert Bighorn Sheep	--	--	--	1.1E+02	1.1E+02	--	--	--	--
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	4.7E-04	--	--	3.4E-03	3.9E-03	9.2E+00	3.8E+01	4E-04	1E-04
Chromium, total	Nelson's Desert Bighorn Sheep	1.4E-02	--	--	9.9E-02	1.1E-01	2.4E+00	9.6E+00	5E-02	1E-02
Cobalt	Nelson's Desert Bighorn Sheep	8.5E-04	--	--	3.4E-02	3.5E-02	7.3E+00	1.9E+01	5E-03	2E-03
Copper	Nelson's Desert Bighorn Sheep	6.9E-02	--	--	4.5E-02	1.1E-01	5.6E+00	9.3E+00	2E-02	1E-02
Iron	Nelson's Desert Bighorn Sheep	--	--	--	8.1E+01	8.1E+01	--	--	--	--
Lead	Nelson's Desert Bighorn Sheep	8.8E-03	--	--	2.0E-02	2.8E-02	3.4E+00	6.4E+00	8E-03	4E-03
Magnesium	Nelson's Desert Bighorn Sheep	--	--	--	3.5E+01	3.5E+01	--	--	--	--
Manganese	Nelson's Desert Bighorn Sheep	3.2E-01	--	--	1.2E+00	1.5E+00	5.2E+01	1.5E+02	3E-02	1E-02

Table BKG-B.4
Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Molybdenum	Nelson's Desert Bighorn Sheep	8.2E-01	100% Plants	3.0E-01	2.1E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Nickel	Nelson's Desert Bighorn Sheep	1.7E+01	100% Plants	3.0E-01	8.9E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Potassium	Nelson's Desert Bighorn Sheep	2.9E+03	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Selenium	Nelson's Desert Bighorn Sheep	1.0E+00	100% Plants	3.0E-01	5.2E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Sodium	Nelson's Desert Bighorn Sheep	1.0E+03	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Vanadium	Nelson's Desert Bighorn Sheep	3.6E+01	100% Plants	3.0E-01	1.7E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Zinc	Nelson's Desert Bighorn Sheep	3.9E+01	100% Plants	3.0E-01	3.7E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	5.6E-02	100% Plants	3.0E-01	7.2E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
PAH High molecular weight	Nelson's Desert Bighorn Sheep	5.0E-03	100% Plants	3.0E-01	1.2E-03	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Nelson's Desert Bighorn Sheep	9.0E-01	100% Plants	3.0E-01	5.0E-03	6.8E+01	1.4E-02	4.1E-03	1.0E+00
TEQ Mammals	Nelson's Desert Bighorn Sheep	9.7E-01	100% Plants	3.0E-01	5.4E-03	6.8E+01	1.4E-02	4.1E-03	1.0E+00

Table BKG-B.4
Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, Selected TRVs) for Background

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Molybdenum	Nelson's Desert Bighorn Sheep	2.8E-03	--	--	3.4E-03	6.2E-03	1.6E-01	1.6E+00	4E-02	4E-03
Nickel	Nelson's Desert Bighorn Sheep	1.2E-02	--	--	6.8E-02	8.1E-02	1.1E+00	2.1E+00	8E-02	4E-02
Potassium	Nelson's Desert Bighorn Sheep	--	--	--	1.2E+01	1.2E+01	--	--	--	--
Selenium	Nelson's Desert Bighorn Sheep	7.1E-03	--	--	4.2E-03	1.1E-02	1.4E-01	2.2E-01	8E-02	5E-02
Sodium	Nelson's Desert Bighorn Sheep	--	--	--	4.3E+00	4.3E+00	--	--	--	--
Vanadium	Nelson's Desert Bighorn Sheep	2.4E-03	--	--	1.5E-01	1.5E-01	2.7E+00	5.4E+00	6E-02	3E-02
Zinc	Nelson's Desert Bighorn Sheep	5.0E-01	--	--	1.6E-01	6.6E-01	7.5E+01	3.0E+02	9E-03	2E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	9.9E-04	--	--	2.3E-04	1.2E-03	6.6E+01	3.3E+02	2E-05	4E-06
PAH High molecular weight	Nelson's Desert Bighorn Sheep	1.7E-05	--	--	2.1E-05	3.7E-05	6.2E-01	3.1E+00	6E-05	1E-05
Dioxins (presented in ng/kg)										
TEQ Avian	Nelson's Desert Bighorn Sheep	6.9E-05	--	--	3.7E-03	3.8E-03	--	--	--	--
TEQ Mammals	Nelson's Desert Bighorn Sheep	7.4E-05	--	--	4.0E-03	4.1E-03	7.3E-01	7.3E+00	6E-03	6E-04

See Notes and Abbreviations following Table BKG-B.5.

Table BKG-B.5

Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, BTAG TRVs) for Background

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)		Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
				Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Inorganics										
Aluminum	Gambel's Quail	1.1E+04		100% Plants	1.0E-01	2.5E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Arsenic	Gambel's Quail	4.5E+00		100% Plants	1.0E-01	1.7E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Barium	Gambel's Quail	1.9E+02		100% Plants	1.0E-01	2.9E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Beryllium	Gambel's Quail	6.5E-01		100% Plants	1.0E-01	4.3E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Cadmium	Gambel's Quail	1.1E+00	m	100% Plants	1.0E-01	6.6E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Calcium	Gambel's Quail	2.8E+04		100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Chromium, hexavalent	Gambel's Quail	8.3E-01	m	100% Plants	1.0E-01	3.4E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Chromium, total	Gambel's Quail	2.4E+01		100% Plants	1.0E-01	9.9E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Cobalt	Gambel's Quail	8.3E+00		100% Plants	1.0E-01	6.2E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Copper	Gambel's Quail	1.1E+01		100% Plants	1.0E-01	5.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Iron	Gambel's Quail	2.0E+04		100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Lead	Gambel's Quail	4.8E+00		100% Plants	1.0E-01	6.4E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Magnesium	Gambel's Quail	8.4E+03		100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Manganese	Gambel's Quail	2.9E+02		100% Plants	1.0E-01	2.3E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Molybdenum	Gambel's Quail	8.2E-01		100% Plants	1.0E-01	2.1E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Nickel	Gambel's Quail	1.7E+01		100% Plants	1.0E-01	8.9E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Potassium	Gambel's Quail	2.9E+03		100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Selenium	Gambel's Quail	1.0E+00		100% Plants	1.0E-01	5.2E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Sodium	Gambel's Quail	1.0E+03		100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Vanadium	Gambel's Quail	3.6E+01		100% Plants	1.0E-01	1.7E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Zinc	Gambel's Quail	3.9E+01		100% Plants	1.0E-01	3.7E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Gambel's Quail	5.6E-02		100% Plants	1.0E-01	7.2E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
PAH High molecular weight	Gambel's Quail	5.0E-03		100% Plants	1.0E-01	1.2E-03	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Dioxins (presented in ng/kg)										
TEQ Avian	Gambel's Quail	9.0E-01		100% Plants	1.0E-01	5.0E-03	1.7E-01	3.8E-02	4.0E-03	1.0E+00
TEQ Mammals	Gambel's Quail	9.7E-01		100% Plants	1.0E-01	5.4E-03	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Inorganics										
Aluminum	Cactus Wren	1.1E+04		100% Insects	9.3E-02	1.1E+04	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Arsenic	Cactus Wren	4.5E+00		100% Insects	9.3E-02	7.0E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Barium	Cactus Wren	1.9E+02		100% Insects	9.3E-02	1.7E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Beryllium	Cactus Wren	6.5E-01		100% Insects	9.3E-02	2.9E-02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Cadmium	Cactus Wren	1.1E+00	m	100% Insects	9.3E-02	8.9E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Calcium	Cactus Wren	2.8E+04		100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Chromium, hexavalent	Cactus Wren	8.3E-01	m	100% Insects	9.3E-02	2.5E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Chromium, total	Cactus Wren	2.4E+01		100% Insects	9.3E-02	7.4E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Cobalt	Cactus Wren	8.3E+00		100% Insects	9.3E-02	1.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Copper	Cactus Wren	1.1E+01		100% Insects	9.3E-02	5.6E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Iron	Cactus Wren	2.0E+04		100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Lead	Cactus Wren	4.8E+00		100% Insects	9.3E-02	2.8E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Magnesium	Cactus Wren	8.4E+03		100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Manganese	Cactus Wren	2.9E+02		100% Insects	9.3E-02	2.1E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Molybdenum	Cactus Wren	8.2E-01		100% Insects	9.3E-02	4.5E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Nickel	Cactus Wren	1.7E+01		100% Insects	9.3E-02	1.8E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Potassium	Cactus Wren	2.9E+03		100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Selenium	Cactus Wren	1.0E+00		100% Insects	9.3E-02	9.4E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Sodium	Cactus Wren	1.0E+03		100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Vanadium	Cactus Wren	3.6E+01		100% Insects	9.3E-02	1.5E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Zinc	Cactus Wren	3.9E+01		100% Insects	9.3E-02	2.8E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Cactus Wren	5.6E-02		100% Insects	9.3E-02	1.7E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
PAH High molecular weight	Cactus Wren	5.0E-03		100% Insects	9.3E-02	1.3E-02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Dioxins (presented in ng/kg)										
TEQ Avian	Cactus Wren	9.0E-01		100% Insects	9.3E-02	2.4E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
TEQ Mammals	Cactus Wren	9.7E-01		100% Insects	9.3E-02	2.7E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Inorganics										
Aluminum	Red-Tailed Hawk	1.1E+04		100% Mammals	1.4E-02	5.6E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Arsenic	Red-Tailed Hawk	4.5E+00		100% Mammals	1.4E-02	2.7E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Barium	Red-Tailed Hawk	1.9E+02		100% Mammals	1.4E-02	2.2E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Beryllium	Red-Tailed Hawk	6.5E-01		100% Mammals	1.4E-02	2.1E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Cadmium	Red-Tailed Hawk	1.1E+00	m	100% Mammals	1.4E-02	3.0E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Calcium	Red-Tailed Hawk	2.8E+04		100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Chromium, hexavalent	Red-Tailed Hawk	8.3E-01	m	100% Mammals	1.4E-02	2.0E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Chromium, total	Red-Tailed Hawk	2.4E+01		100% Mammals	1.4E-02	2.4E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Cobalt	Red-Tailed Hawk	8.3E+00		100% Mammals	1.4E-02	1.8E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Copper	Red-Tailed Hawk	1.1E+01		100% Mammals	1.4E-02	1.1E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00

Table BKG-B.5

Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, BTAG TRVs) for Background

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Inorganics										
Aluminum	Gambel's Quail	9.4E+00	--	--	4.4E+01	5.4E+01	pH<5.5	pH<5.5	--	--
Arsenic	Gambel's Quail	6.5E-03	--	--	1.8E-02	2.4E-02	5.5E+00	2.2E+01	4E-03	1E-03
Barium	Gambel's Quail	1.1E+00	--	--	7.4E-01	1.8E+00	--	--	--	--
Beryllium	Gambel's Quail	1.6E-02	--	--	2.6E-03	1.9E-02	--	--	--	--
Cadmium	Gambel's Quail	2.5E-02	--	--	4.4E-03	2.9E-02	7.0E-01	1.0E+01	4E-02	3E-03
Calcium	Gambel's Quail	--	--	--	1.1E+02	1.1E+02	--	--	--	--
Chromium, hexavalent	Gambel's Quail	1.3E-03	--	--	3.3E-03	4.6E-03	--	--	--	--
Chromium, total	Gambel's Quail	3.8E-02	--	--	9.6E-02	1.3E-01	2.7E+00	1.6E+01	5E-02	9E-03
Cobalt	Gambel's Quail	2.4E-03	--	--	3.3E-02	3.5E-02	--	--	--	--
Copper	Gambel's Quail	1.9E-01	--	--	4.4E-02	2.4E-01	2.3E+00	5.2E+01	1E-01	5E-03
Iron	Gambel's Quail	--	--	--	7.8E+01	7.8E+01	--	--	--	--
Lead	Gambel's Quail	2.4E-02	--	--	1.9E-02	4.4E-02	1.4E-02	8.8E+00	**3E+00**	5E-03
Magnesium	Gambel's Quail	--	--	--	3.4E+01	3.4E+01	--	--	--	--
Manganese	Gambel's Quail	8.9E-01	--	--	1.2E+00	2.1E+00	7.8E+01	7.8E+02	3E-02	3E-03
Molybdenum	Gambel's Quail	7.9E-03	--	--	3.3E-03	1.1E-02	3.5E+00	3.5E+01	3E-03	3E-04
Nickel	Gambel's Quail	3.4E-02	--	--	6.6E-02	1.0E-01	1.4E+00	5.6E+01	7E-02	2E-03
Potassium	Gambel's Quail	--	--	--	1.2E+01	1.2E+01	--	--	--	--
Selenium	Gambel's Quail	2.0E-02	--	--	4.0E-03	2.4E-02	2.3E-01	9.3E-01	1E-01	3E-02
Sodium	Gambel's Quail	--	--	--	4.1E+00	4.1E+00	--	--	--	--
Vanadium	Gambel's Quail	6.7E-03	--	--	1.4E-01	1.5E-01	3.4E-01	6.9E-01	4E-01	2E-01
Zinc	Gambel's Quail	1.4E+00	--	--	1.5E-01	1.6E+00	1.7E+01	1.7E+02	9E-02	9E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Gambel's Quail	2.8E-03	--	--	2.2E-04	3.0E-03	2.3E+01	2.3E+02	1E-04	1E-05
PAH High molecular weight	Gambel's Quail	4.7E-05	--	--	2.0E-05	6.7E-05	1.0E+01	1.0E+02	7E-06	7E-07
Dioxins (presented in ng/kg)										
TEQ Avian	Gambel's Quail	1.9E-04	--	--	3.6E-03	3.8E-03	1.4E+01	1.4E+02	3E-04	3E-05
TEQ Mammals	Gambel's Quail	2.1E-04	--	--	3.9E-03	4.1E-03	--	--	--	--
Inorganics										
Aluminum	Cactus Wren	--	2.0E+03	--	1.9E+02	2.2E+03	pH<5.5	pH<5.5	--	--
Arsenic	Cactus Wren	--	1.3E-01	--	7.7E-02	2.0E-01	5.5E+00	2.2E+01	4E-02	9E-03
Barium	Cactus Wren	--	3.1E+00	--	3.2E+00	6.2E+00	--	--	--	--
Beryllium	Cactus Wren	--	5.4E-03	--	1.1E-02	1.7E-02	--	--	--	--
Cadmium	Cactus Wren	--	1.6E+00	--	1.9E-02	1.7E+00	7.0E-01	1.0E+01	**2E+00**	2E-01
Calcium	Cactus Wren	--	--	--	4.7E+02	4.7E+02	--	--	--	--
Chromium, hexavalent	Cactus Wren	--	4.7E-02	--	1.4E-02	6.1E-02	--	--	--	--
Chromium, total	Cactus Wren	--	1.4E+00	--	4.1E-01	1.8E+00	2.7E+00	1.6E+01	7E-01	1E-01
Cobalt	Cactus Wren	--	1.9E-01	--	1.4E-01	3.3E-01	--	--	--	--
Copper	Cactus Wren	--	1.0E+00	--	1.9E-01	1.2E+00	2.3E+00	5.2E+01	5E-01	2E-02
Iron	Cactus Wren	--	--	--	3.3E+02	3.3E+02	--	--	--	--
Lead	Cactus Wren	--	5.2E-01	--	8.2E-02	6.0E-01	1.4E-02	8.8E+00	**4E+01**	7E-02
Magnesium	Cactus Wren	--	--	--	1.4E+02	1.4E+02	--	--	--	--
Manganese	Cactus Wren	--	3.9E+00	--	5.0E+00	8.9E+00	7.8E+01	7.8E+02	1E-01	1E-02
Molybdenum	Cactus Wren	--	8.3E-02	--	1.4E-02	9.7E-02	3.5E+00	3.5E+01	3E-02	3E-03
Nickel	Cactus Wren	--	3.2E+00	--	2.8E-01	3.5E+00	1.4E+00	5.6E+01	**3E+00**	6E-02
Potassium	Cactus Wren	--	--	--	5.0E+01	5.0E+01	--	--	--	--
Selenium	Cactus Wren	--	1.7E-01	--	1.7E-02	1.9E-01	2.3E-01	9.3E-01	8E-01	2E-01
Sodium	Cactus Wren	--	--	--	1.8E+01	1.8E+01	--	--	--	--
Vanadium	Cactus Wren	--	2.8E-01	--	6.1E-01	8.9E-01	3.4E-01	6.9E-01	**3E+00**	1E+00
Zinc	Cactus Wren	--	5.2E+01	--	6.6E-01	5.3E+01	1.7E+01	1.7E+02	**3E+00**	3E-01
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Cactus Wren	--	3.1E-02	--	9.5E-04	3.2E-02	2.3E+01	2.3E+02	1E-03	1E-04
PAH High molecular weight	Cactus Wren	--	2.4E-03	--	8.6E-05	2.5E-03	1.0E+01	1.0E+02	2E-04	2E-05
Dioxins (presented in ng/kg)										
TEQ Avian	Cactus Wren	--	4.5E-01	--	1.5E-02	4.6E-01	1.4E+01	1.4E+02	3E-02	3E-03
TEQ Mammals	Cactus Wren	--	4.9E-01	--	1.7E-02	5.1E-01	--	--	--	--
Inorganics										
Aluminum	Red-Tailed Hawk	--	--	4.4E+01	1.2E+01	5.6E+01	pH<5.5	pH<5.5	--	--
Arsenic	Red-Tailed Hawk	--	--	2.1E-03	5.0E-03	7.1E-03	5.5E+00	2.2E+01	1E-03	3E-04
Barium	Red-Tailed Hawk	--	--	1.7E-02	2.1E-01	2.2E-01	--	--	--	--
Beryllium	Red-Tailed Hawk	--	--	1.7E-03	7.3E-04	2.4E-03	--	--	--	--
Cadmium	Red-Tailed Hawk	--	--	2.4E-02	1.2E-03	2.5E-02	7.0E-01	1.0E+01	4E-02	2E-03
Calcium	Red-Tailed Hawk	--	--	--	3.1E+01	3.1E+01	--	--	--	--
Chromium, hexavalent	Red-Tailed Hawk	--	--	1.6E-02	9.2E-04	1.7E-02	--	--	--	--
Chromium, total	Red-Tailed Hawk	--	--	1.9E-01	2.7E-02	2.2E-01	2.7E+00	1.6E+01	8E-02	1E-02
Cobalt	Red-Tailed Hawk	--	--	1.4E-02	9.2E-03	2.4E-02	--	--	--	--
Copper	Red-Tailed Hawk	--	--	8.6E-01	1.2E-02	8.8E-01	2.3E+00	5.2E+01	4E-01	2E-02

Table BKG-B.5

Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, BTAG TRVs) for Background

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Iron	Red-Tailed Hawk	2.0E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Lead	Red-Tailed Hawk	4.8E+00	100% Mammals	1.4E-02	2.2E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Magnesium	Red-Tailed Hawk	8.4E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Manganese	Red-Tailed Hawk	2.9E+02	100% Mammals	1.4E-02	6.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Molybdenum	Red-Tailed Hawk	8.2E-01	100% Mammals	1.4E-02	1.4E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Nickel	Red-Tailed Hawk	1.7E+01	100% Mammals	1.4E-02	2.9E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Potassium	Red-Tailed Hawk	2.9E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Selenium	Red-Tailed Hawk	1.0E+00	100% Mammals	1.4E-02	6.6E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Sodium	Red-Tailed Hawk	1.0E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Vanadium	Red-Tailed Hawk	3.6E+01	100% Mammals	1.4E-02	4.4E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Zinc	Red-Tailed Hawk	3.9E+01	100% Mammals	1.4E-02	1.0E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Red-Tailed Hawk	5.6E-02	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
PAH High molecular weight	Red-Tailed Hawk	5.0E-03	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Red-Tailed Hawk	9.0E-01	100% Mammals	1.4E-02	5.1E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
TEQ Mammals	Red-Tailed Hawk	9.7E-01	100% Mammals	1.4E-02	5.5E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Inorganics									
Aluminum	Desert Shrew	1.1E+04	100% Insects	2.0E-02	1.1E+04	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Arsenic	Desert Shrew	4.5E+00	100% Insects	2.0E-02	7.0E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Barium	Desert Shrew	1.9E+02	100% Insects	2.0E-02	1.7E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Beryllium	Desert Shrew	6.5E-01	100% Insects	2.0E-02	2.9E-02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Cadmium	Desert Shrew	1.1E+00 m	100% Insects	2.0E-02	8.9E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Calcium	Desert Shrew	2.8E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Chromium, hexavalent	Desert Shrew	8.3E-01 m	100% Insects	2.0E-02	2.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Chromium, total	Desert Shrew	2.4E+01	100% Insects	2.0E-02	7.4E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Cobalt	Desert Shrew	8.3E+00	100% Insects	2.0E-02	1.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Copper	Desert Shrew	1.1E+01	100% Insects	2.0E-02	5.6E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Iron	Desert Shrew	2.0E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Lead	Desert Shrew	4.8E+00	100% Insects	2.0E-02	2.8E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Magnesium	Desert Shrew	8.4E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Manganese	Desert Shrew	2.9E+02	100% Insects	2.0E-02	2.1E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Molybdenum	Desert Shrew	8.2E-01	100% Insects	2.0E-02	4.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Nickel	Desert Shrew	1.7E+01	100% Insects	2.0E-02	1.8E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Potassium	Desert Shrew	2.9E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Selenium	Desert Shrew	1.0E+00	100% Insects	2.0E-02	9.4E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Sodium	Desert Shrew	1.0E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Vanadium	Desert Shrew	3.6E+01	100% Insects	2.0E-02	1.5E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Zinc	Desert Shrew	3.9E+01	100% Insects	2.0E-02	2.8E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Desert Shrew	5.6E-02	100% Insects	2.0E-02	1.7E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
PAH High molecular weight	Desert Shrew	5.0E-03	100% Insects	2.0E-02	1.3E-02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Desert Shrew	9.0E-01	100% Insects	2.0E-02	2.4E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
TEQ Mammals	Desert Shrew	9.7E-01	100% Insects	2.0E-02	2.7E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Inorganics									
Aluminum	Desert Kit Fox	1.1E+04	100% Mammals	2.8E-02	5.6E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Arsenic	Desert Kit Fox	4.5E+00	100% Mammals	2.8E-02	2.7E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Barium	Desert Kit Fox	1.9E+02	100% Mammals	2.8E-02	2.2E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Beryllium	Desert Kit Fox	6.5E-01	100% Mammals	2.8E-02	2.1E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Cadmium	Desert Kit Fox	1.1E+00 m	100% Mammals	2.8E-02	3.0E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Calcium	Desert Kit Fox	2.8E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Chromium, hexavalent	Desert Kit Fox	8.3E-01 m	100% Mammals	2.8E-02	2.0E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Chromium, total	Desert Kit Fox	2.4E+01	100% Mammals	2.8E-02	2.4E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Cobalt	Desert Kit Fox	8.3E+00	100% Mammals	2.8E-02	1.8E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Copper	Desert Kit Fox	1.1E+01	100% Mammals	2.8E-02	1.1E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Iron	Desert Kit Fox	2.0E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Lead	Desert Kit Fox	4.8E+00	100% Mammals	2.8E-02	2.2E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Magnesium	Desert Kit Fox	8.4E+03	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Manganese	Desert Kit Fox	2.9E+02	100% Mammals	2.8E-02	6.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Molybdenum	Desert Kit Fox	8.2E-01	100% Mammals	2.8E-02	1.4E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Nickel	Desert Kit Fox	1.7E+01	100% Mammals	2.8E-02	2.9E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Potassium	Desert Kit Fox	2.9E+03	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Selenium	Desert Kit Fox	1.0E+00	100% Mammals	2.8E-02	6.6E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Sodium	Desert Kit Fox	1.0E+03	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Vanadium	Desert Kit Fox	3.6E+01	100% Mammals	2.8E-02	4.4E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Zinc	Desert Kit Fox	3.9E+01	100% Mammals	2.8E-02	1.0E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00

Table BKG-B.5

Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, BTAG TRVs) for Background

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Iron	Red-Tailed Hawk	--	--	--	2.2E+01	2.2E+01	--	--	--	--
Lead	Red-Tailed Hawk	--	--	1.7E-01	5.3E-03	1.8E-01	1.4E-02	8.8E+00	**1E+01**	2E-02
Magnesium	Red-Tailed Hawk	--	--	--	9.3E+00	9.3E+00	--	--	--	--
Manganese	Red-Tailed Hawk	--	--	4.8E-01	3.3E-01	8.0E-01	7.8E+01	7.8E+02	1E-02	1E-03
Molybdenum	Red-Tailed Hawk	--	--	1.1E-02	9.1E-04	1.2E-02	3.5E+00	3.5E+01	3E-03	3E-04
Nickel	Red-Tailed Hawk	--	--	2.3E-01	1.8E-02	2.5E-01	1.4E+00	5.6E+01	2E-01	4E-03
Potassium	Red-Tailed Hawk	--	--	--	3.3E+00	3.3E+00	--	--	--	--
Selenium	Red-Tailed Hawk	--	--	5.3E-02	1.1E-03	5.4E-02	2.3E-01	9.3E-01	2E-01	6E-02
Sodium	Red-Tailed Hawk	--	--	--	1.2E+00	1.2E+00	--	--	--	--
Vanadium	Red-Tailed Hawk	--	--	3.5E-02	4.0E-02	7.5E-02	3.4E-01	6.9E-01	2E-01	1E-01
Zinc	Red-Tailed Hawk	--	--	8.1E+00	4.3E-02	8.1E+00	1.7E+01	1.7E+02	5E-01	5E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Red-Tailed Hawk	--	--	0.0E+00	6.2E-05	6.2E-05	2.3E+01	2.3E+02	3E-06	3E-07
PAH High molecular weight	Red-Tailed Hawk	--	--	0.0E+00	5.6E-06	5.6E-06	1.0E+01	1.0E+02	6E-07	6E-08
Dioxins (presented in ng/kg)										
TEQ Avian	Red-Tailed Hawk	--	--	4.0E-02	1.0E-03	4.1E-02	1.4E+01	1.4E+02	3E-03	3E-04
TEQ Mammals	Red-Tailed Hawk	--	--	4.4E-02	1.1E-03	4.5E-02	--	--	--	--
Inorganics										
Aluminum	Desert Shrew	--	2.3E+03	--	4.5E+01	2.3E+03	pH<5.5	pH<5.5	--	--
Arsenic	Desert Shrew	--	1.4E-01	--	1.8E-02	1.6E-01	3.2E-01	4.7E+00	5E-01	3E-02
Barium	Desert Shrew	--	3.4E+00	--	7.5E-01	4.2E+00	5.2E+01	8.3E+01	8E-02	5E-02
Beryllium	Desert Shrew	--	6.0E-03	--	2.7E-03	8.6E-03	5.3E-01	6.3E-01	2E-02	1E-02
Cadmium	Desert Shrew	--	1.8E+00	--	4.5E-03	1.8E+00	6.0E-02	2.6E+00	**3E+01**	7E-01
Calcium	Desert Shrew	--	--	--	1.1E+02	1.1E+02	--	--	--	--
Chromium, hexavalent	Desert Shrew	--	5.2E-02	--	3.4E-03	5.5E-02	9.2E+00	3.8E+01	6E-03	1E-03
Chromium, total	Desert Shrew	--	1.5E+00	--	9.8E-02	1.6E+00	2.4E+00	9.6E+00	7E-01	2E-01
Cobalt	Desert Shrew	--	2.1E-01	--	3.4E-02	2.4E-01	1.2E+00	2.0E+01	2E-01	1E-02
Copper	Desert Shrew	--	1.1E+00	--	4.5E-02	1.2E+00	2.7E+00	6.3E+02	4E-01	2E-03
Iron	Desert Shrew	--	--	--	8.0E+01	8.0E+01	--	--	--	--
Lead	Desert Shrew	--	5.8E-01	--	1.9E-02	6.0E-01	1.0E+00	2.4E+02	6E-01	2E-03
Magnesium	Desert Shrew	--	--	--	3.4E+01	3.4E+01	--	--	--	--
Manganese	Desert Shrew	--	4.4E+00	--	1.2E+00	5.5E+00	1.4E+01	1.6E+02	4E-01	3E-02
Molybdenum	Desert Shrew	--	9.2E-02	--	3.3E-03	9.5E-02	2.6E-01	2.6E+00	4E-01	4E-02
Nickel	Desert Shrew	--	3.6E+00	--	6.7E-02	3.6E+00	1.3E-01	3.2E+01	**3E+01**	1E-01
Potassium	Desert Shrew	--	--	--	1.2E+01	1.2E+01	--	--	--	--
Selenium	Desert Shrew	--	1.9E-01	--	4.1E-03	1.9E-01	5.0E-02	1.2E+00	**4E+00**	2E-01
Sodium	Desert Shrew	--	--	--	4.2E+00	4.2E+00	--	--	--	--
Vanadium	Desert Shrew	--	3.1E-01	--	1.5E-01	4.5E-01	4.2E+00	8.3E+00	1E-01	5E-02
Zinc	Desert Shrew	--	5.8E+01	--	1.6E-01	5.8E+01	9.6E+00	4.1E+02	**6E+00**	1E-01
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Shrew	--	3.5E-02	--	2.3E-04	3.5E-02	5.0E+01	1.5E+02	7E-04	2E-04
PAH High molecular weight	Desert Shrew	--	2.7E-03	--	2.0E-05	2.7E-03	1.3E+00	3.3E+01	2E-03	8E-05
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Shrew	--	5.0E-01	--	3.7E-03	5.0E-01	--	--	--	--
TEQ Mammals	Desert Shrew	--	5.4E-01	--	3.9E-03	5.5E-01	1.0E+00	1.0E+01	5E-01	5E-02
Inorganics										
Aluminum	Desert Kit Fox	--	--	2.0E+01	1.1E+01	3.1E+01	pH<5.5	pH<5.5	--	--
Arsenic	Desert Kit Fox	--	--	9.5E-04	4.5E-03	5.4E-03	3.2E-01	4.7E+00	2E-02	1E-03
Barium	Desert Kit Fox	--	--	7.7E-03	1.8E-01	1.9E-01	5.2E+01	8.3E+01	4E-03	2E-03
Beryllium	Desert Kit Fox	--	--	7.6E-04	6.5E-04	1.4E-03	5.3E-01	6.3E-01	3E-03	2E-03
Cadmium	Desert Kit Fox	--	--	1.1E-02	1.1E-03	1.2E-02	6.0E-02	2.6E+00	2E-01	4E-03
Calcium	Desert Kit Fox	--	--	--	2.7E+01	2.7E+01	--	--	--	--
Chromium, hexavalent	Desert Kit Fox	--	--	7.2E-03	8.2E-04	8.0E-03	9.2E+00	3.8E+01	9E-04	2E-04
Chromium, total	Desert Kit Fox	--	--	8.5E-02	2.4E-02	1.1E-01	2.4E+00	9.6E+00	5E-02	1E-02
Cobalt	Desert Kit Fox	--	--	6.5E-03	8.2E-03	1.5E-02	1.2E+00	2.0E+01	1E-02	7E-04
Copper	Desert Kit Fox	--	--	3.9E-01	1.1E-02	4.0E-01	2.7E+00	6.3E+02	1E-01	6E-04
Iron	Desert Kit Fox	--	--	--	1.9E+01	1.9E+01	--	--	--	--
Lead	Desert Kit Fox	--	--	7.6E-02	4.7E-03	8.1E-02	1.0E+00	2.4E+02	8E-02	3E-04
Magnesium	Desert Kit Fox	--	--	--	8.3E+00	8.3E+00	--	--	--	--
Manganese	Desert Kit Fox	--	--	2.1E-01	2.9E-01	5.0E-01	1.4E+01	1.6E+02	4E-02	3E-03
Molybdenum	Desert Kit Fox	--	--	4.8E-03	8.1E-04	5.6E-03	2.6E-01	2.6E+00	2E-02	2E-03
Nickel	Desert Kit Fox	--	--	1.0E-01	1.6E-02	1.2E-01	1.3E-01	3.2E+01	9E-01	4E-03
Potassium	Desert Kit Fox	--	--	--	2.9E+00	2.9E+00	--	--	--	--
Selenium	Desert Kit Fox	--	--	2.3E-02	1.0E-03	2.4E-02	5.0E-02	1.2E+00	5E-01	2E-02
Sodium	Desert Kit Fox	--	--	--	1.0E+00	1.0E+00	--	--	--	--
Vanadium	Desert Kit Fox	--	--	1.6E-02	3.6E-02	5.1E-02	4.2E+00	8.3E+00	1E-02	6E-03
Zinc	Desert Kit Fox	--	--	3.6E+00	3.8E-02	3.6E+00	9.6E+00	4.1E+02	4E-01	9E-03

Table BKG-B.5

Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, BTAG TRVs) for Background

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)		Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
				Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Kit Fox	5.6E-02		100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
PAH High molecular weight	Desert Kit Fox	5.0E-03		100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Kit Fox	9.0E-01		100% Mammals	2.8E-02	5.1E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
TEQ Mammals	Desert Kit Fox	9.7E-01		100% Mammals	2.8E-02	5.5E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Inorganics										
Aluminum	Merriam's Kangaroo Rat	1.1E+04		100% Plants	2.4E-02	2.5E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Arsenic	Merriam's Kangaroo Rat	4.5E+00		100% Plants	2.4E-02	1.7E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Barium	Merriam's Kangaroo Rat	1.9E+02		100% Plants	2.4E-02	2.9E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Beryllium	Merriam's Kangaroo Rat	6.5E-01		100% Plants	2.4E-02	4.3E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Cadmium	Merriam's Kangaroo Rat	1.1E+00	m	100% Plants	2.4E-02	6.6E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Calcium	Merriam's Kangaroo Rat	2.8E+04		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Chromium, hexavalent	Merriam's Kangaroo Rat	8.3E-01	m	100% Plants	2.4E-02	3.4E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Chromium, total	Merriam's Kangaroo Rat	2.4E+01		100% Plants	2.4E-02	9.9E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Cobalt	Merriam's Kangaroo Rat	8.3E+00		100% Plants	2.4E-02	6.2E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Copper	Merriam's Kangaroo Rat	1.1E+01		100% Plants	2.4E-02	5.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Iron	Merriam's Kangaroo Rat	2.0E+04		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Lead	Merriam's Kangaroo Rat	4.8E+00		100% Plants	2.4E-02	6.4E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Magnesium	Merriam's Kangaroo Rat	8.4E+03		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Manganese	Merriam's Kangaroo Rat	2.9E+02		100% Plants	2.4E-02	2.3E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Molybdenum	Merriam's Kangaroo Rat	8.2E-01		100% Plants	2.4E-02	2.1E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Nickel	Merriam's Kangaroo Rat	1.7E+01		100% Plants	2.4E-02	8.9E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Potassium	Merriam's Kangaroo Rat	2.9E+03		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Selenium	Merriam's Kangaroo Rat	1.0E+00		100% Plants	2.4E-02	5.2E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Sodium	Merriam's Kangaroo Rat	1.0E+03		100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Vanadium	Merriam's Kangaroo Rat	3.6E+01		100% Plants	2.4E-02	1.7E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Zinc	Merriam's Kangaroo Rat	3.9E+01		100% Plants	2.4E-02	3.7E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Merriam's Kangaroo Rat	5.6E-02		100% Plants	2.4E-02	7.2E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
PAH High molecular weight	Merriam's Kangaroo Rat	5.0E-03		100% Plants	2.4E-02	1.2E-03	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Dioxins (presented in ng/kg)										
TEQ Avian	Merriam's Kangaroo Rat	9.0E-01		100% Plants	2.4E-02	5.0E-03	3.4E-02	8.2E-02	2.0E-03	1.0E+00
TEQ Mammals	Merriam's Kangaroo Rat	9.7E-01		100% Plants	2.4E-02	5.4E-03	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Inorganics										
Aluminum	Nelson's Desert Bighorn Sheep	1.1E+04		100% Plants	3.0E-01	2.5E+02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Arsenic	Nelson's Desert Bighorn Sheep	4.5E+00		100% Plants	3.0E-01	1.7E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Barium	Nelson's Desert Bighorn Sheep	1.9E+02		100% Plants	3.0E-01	2.9E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Beryllium	Nelson's Desert Bighorn Sheep	6.5E-01		100% Plants	3.0E-01	4.3E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Cadmium	Nelson's Desert Bighorn Sheep	1.1E+00	m	100% Plants	3.0E-01	6.6E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Calcium	Nelson's Desert Bighorn Sheep	2.8E+04		100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	8.3E-01	m	100% Plants	3.0E-01	3.4E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Chromium, total	Nelson's Desert Bighorn Sheep	2.4E+01		100% Plants	3.0E-01	9.9E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Cobalt	Nelson's Desert Bighorn Sheep	8.3E+00		100% Plants	3.0E-01	6.2E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Copper	Nelson's Desert Bighorn Sheep	1.1E+01		100% Plants	3.0E-01	5.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Iron	Nelson's Desert Bighorn Sheep	2.0E+04		100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Lead	Nelson's Desert Bighorn Sheep	4.8E+00		100% Plants	3.0E-01	6.4E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Magnesium	Nelson's Desert Bighorn Sheep	8.4E+03		100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Manganese	Nelson's Desert Bighorn Sheep	2.9E+02		100% Plants	3.0E-01	2.3E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Molybdenum	Nelson's Desert Bighorn Sheep	8.2E-01		100% Plants	3.0E-01	2.1E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Nickel	Nelson's Desert Bighorn Sheep	1.7E+01		100% Plants	3.0E-01	8.9E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Potassium	Nelson's Desert Bighorn Sheep	2.9E+03		100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Selenium	Nelson's Desert Bighorn Sheep	1.0E+00		100% Plants	3.0E-01	5.2E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Sodium	Nelson's Desert Bighorn Sheep	1.0E+03		100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Vanadium	Nelson's Desert Bighorn Sheep	3.6E+01		100% Plants	3.0E-01	1.7E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Zinc	Nelson's Desert Bighorn Sheep	3.9E+01		100% Plants	3.0E-01	3.7E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	5.6E-02		100% Plants	3.0E-01	7.2E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
PAH High molecular weight	Nelson's Desert Bighorn Sheep	5.0E-03		100% Plants	3.0E-01	1.2E-03	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Dioxins (presented in ng/kg)										
TEQ Avian	Nelson's Desert Bighorn Sheep	9.0E-01		100% Plants	3.0E-01	5.0E-03	6.8E+01	1.4E-02	4.1E-03	1.0E+00
TEQ Mammals	Nelson's Desert Bighorn Sheep	9.7E-01		100% Plants	3.0E-01	5.4E-03	6.8E+01	1.4E-02	4.1E-03	1.0E+00

Table BKG-B.5

Terrestrial Wildlife Risk Calculations for 95 Percent Upper Confidence Limits (SUF = 1, BTAG TRVs) for Background

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Kit Fox	--	--	0.0E+00	5.5E-05	5.5E-05	5.0E+01	1.5E+02	1E-06	4E-07
PAH High molecular weight	Desert Kit Fox	--	--	0.0E+00	5.0E-06	5.0E-06	1.3E+00	3.3E+01	4E-06	2E-07
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Kit Fox	--	--	1.8E-02	8.9E-04	1.9E-02	--	--	--	--
TEQ Mammals	Desert Kit Fox	--	--	2.0E-02	9.6E-04	2.0E-02	1.0E+00	1.0E+01	2E-02	2E-03
Inorganics										
Aluminum	Merriam's Kangaroo Rat	2.0E+01	--	--	2.2E+01	4.2E+01	pH<5.5	pH<5.5	--	--
Arsenic	Merriam's Kangaroo Rat	1.4E-02	--	--	8.9E-03	2.3E-02	3.2E-01	4.7E+00	7E-02	5E-03
Barium	Merriam's Kangaroo Rat	2.4E+00	--	--	3.7E-01	2.7E+00	5.2E+01	8.3E+01	5E-02	3E-02
Beryllium	Merriam's Kangaroo Rat	3.5E-02	--	--	1.3E-03	3.7E-02	5.3E-01	6.3E-01	7E-02	6E-02
Cadmium	Merriam's Kangaroo Rat	5.4E-02	--	--	2.2E-03	5.6E-02	6.0E-02	2.6E+00	9E-01	2E-02
Calcium	Merriam's Kangaroo Rat	--	--	--	5.4E+01	5.4E+01	--	--	--	--
Chromium, hexavalent	Merriam's Kangaroo Rat	2.8E-03	--	--	1.6E-03	4.4E-03	9.2E+00	3.8E+01	5E-04	1E-04
Chromium, total	Merriam's Kangaroo Rat	8.1E-02	--	--	4.8E-02	1.3E-01	2.4E+00	9.6E+00	5E-02	1E-02
Cobalt	Merriam's Kangaroo Rat	5.1E-03	--	--	1.6E-02	2.2E-02	1.2E+00	2.0E+01	2E-02	1E-03
Copper	Merriam's Kangaroo Rat	4.1E-01	--	--	2.2E-02	4.3E-01	2.7E+00	6.3E+02	2E-01	7E-04
Iron	Merriam's Kangaroo Rat	--	--	--	3.9E+01	3.9E+01	--	--	--	--
Lead	Merriam's Kangaroo Rat	5.2E-02	--	--	9.5E-03	6.2E-02	1.0E+00	2.4E+02	6E-02	3E-04
Magnesium	Merriam's Kangaroo Rat	--	--	--	1.7E+01	1.7E+01	--	--	--	--
Manganese	Merriam's Kangaroo Rat	1.9E+00	--	--	5.8E-01	2.5E+00	1.4E+01	1.6E+02	2E-01	2E-02
Molybdenum	Merriam's Kangaroo Rat	1.7E-02	--	--	1.6E-03	1.8E-02	2.6E-01	2.6E+00	7E-02	7E-03
Nickel	Merriam's Kangaroo Rat	7.3E-02	--	--	3.3E-02	1.1E-01	1.3E-01	3.2E+01	8E-01	3E-03
Potassium	Merriam's Kangaroo Rat	--	--	--	5.8E+00	5.8E+00	--	--	--	--
Selenium	Merriam's Kangaroo Rat	4.2E-02	--	--	2.0E-03	4.4E-02	5.0E-02	1.2E+00	9E-01	4E-02
Sodium	Merriam's Kangaroo Rat	--	--	--	2.0E+00	2.0E+00	--	--	--	--
Vanadium	Merriam's Kangaroo Rat	1.4E-02	--	--	7.1E-02	8.5E-02	4.2E+00	8.3E+00	2E-02	1E-02
Zinc	Merriam's Kangaroo Rat	3.0E+00	--	--	7.7E-02	3.1E+00	9.6E+00	4.1E+02	3E-01	8E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Merriam's Kangaroo Rat	5.9E-03	--	--	1.1E-04	6.0E-03	5.0E+01	1.5E+02	1E-04	4E-05
PAH High molecular weight	Merriam's Kangaroo Rat	1.0E-04	--	--	1.0E-05	1.1E-04	1.3E+00	3.3E+01	8E-05	3E-06
Dioxins (presented in ng/kg)										
TEQ Avian	Merriam's Kangaroo Rat	4.1E-04	--	--	1.8E-03	2.2E-03	--	--	--	--
TEQ Mammals	Merriam's Kangaroo Rat	4.5E-04	--	--	1.9E-03	2.4E-03	1.0E+00	1.0E+01	2E-03	2E-04
Inorganics										
Aluminum	Nelson's Desert Bighorn Sheep	3.4E+00	--	--	4.6E+01	4.9E+01	pH<5.5	pH<5.5	--	--
Arsenic	Nelson's Desert Bighorn Sheep	2.3E-03	--	--	1.9E-02	2.1E-02	3.2E-01	4.7E+00	7E-02	4E-03
Barium	Nelson's Desert Bighorn Sheep	4.0E-01	--	--	7.6E-01	1.2E+00	5.2E+01	8.3E+01	2E-02	1E-02
Beryllium	Nelson's Desert Bighorn Sheep	5.9E-03	--	--	2.7E-03	8.6E-03	5.3E-01	6.3E-01	2E-02	1E-02
Cadmium	Nelson's Desert Bighorn Sheep	9.0E-03	--	--	4.5E-03	1.4E-02	6.0E-02	2.6E+00	2E-01	5E-03
Calcium	Nelson's Desert Bighorn Sheep	--	--	--	1.1E+02	1.1E+02	--	--	--	--
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	4.7E-04	--	--	3.4E-03	3.9E-03	9.2E+00	3.8E+01	4E-04	1E-04
Chromium, total	Nelson's Desert Bighorn Sheep	1.4E-02	--	--	9.9E-02	1.1E-01	2.4E+00	9.6E+00	5E-02	1E-02
Cobalt	Nelson's Desert Bighorn Sheep	8.5E-04	--	--	3.4E-02	3.5E-02	1.2E+00	2.0E+01	3E-02	2E-03
Copper	Nelson's Desert Bighorn Sheep	6.9E-02	--	--	4.5E-02	1.1E-01	2.7E+00	6.3E+02	4E-02	2E-04
Iron	Nelson's Desert Bighorn Sheep	--	--	--	8.1E+01	8.1E+01	--	--	--	--
Lead	Nelson's Desert Bighorn Sheep	8.8E-03	--	--	2.0E-02	2.8E-02	1.0E+00	2.4E+02	3E-02	1E-04
Magnesium	Nelson's Desert Bighorn Sheep	--	--	--	3.5E+01	3.5E+01	--	--	--	--
Manganese	Nelson's Desert Bighorn Sheep	3.2E-01	--	--	1.2E+00	1.5E+00	1.4E+01	1.6E+02	1E-01	1E-02
Molybdenum	Nelson's Desert Bighorn Sheep	2.8E-03	--	--	3.4E-03	6.2E-03	2.6E-01	2.6E+00	2E-02	2E-03
Nickel	Nelson's Desert Bighorn Sheep	1.2E-02	--	--	6.8E-02	8.1E-02	1.3E-01	3.2E+01	6E-01	3E-03
Potassium	Nelson's Desert Bighorn Sheep	--	--	--	1.2E+01	1.2E+01	--	--	--	--
Selenium	Nelson's Desert Bighorn Sheep	7.1E-03	--	--	4.2E-03	1.1E-02	5.0E-02	1.2E+00	2E-01	9E-03
Sodium	Nelson's Desert Bighorn Sheep	--	--	--	4.3E+00	4.3E+00	--	--	--	--
Vanadium	Nelson's Desert Bighorn Sheep	2.4E-03	--	--	1.5E-01	1.5E-01	4.2E+00	8.3E+00	4E-02	2E-02
Zinc	Nelson's Desert Bighorn Sheep	5.0E-01	--	--	1.6E-01	6.6E-01	9.6E+00	4.1E+02	7E-02	2E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	9.9E-04	--	--	2.3E-04	1.2E-03	5.0E+01	1.5E+02	2E-05	8E-06
PAH High molecular weight	Nelson's Desert Bighorn Sheep	1.7E-05	--	--	2.1E-05	3.7E-05	1.3E+00	3.3E+01	3E-05	1E-06
Dioxins (presented in ng/kg)										
TEQ Avian	Nelson's Desert Bighorn Sheep	6.9E-05	--	--	3.7E-03	3.8E-03	--	--	--	--
TEQ Mammals	Nelson's Desert Bighorn Sheep	7.4E-05	--	--	4.0E-03	4.1E-03	1.0E+00	1.0E+01	4E-03	4E-04

See Notes and Abbreviations following Table BKG-B.5.

Table BKG-B Table Notes
Notes for Terrestrial Wildlife Risk Calculations

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

Notes:

[a] Dioxin presented in ng/kg.

[b] Total dose equation is presented below:

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

[c] HQ = Total Dose / TRV

Abbreviations:

AOC = area of concern
BTAG = Biological Technical Assistance Group
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)
m = maximum detected concentration
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)
SIR = soil ingestion rate (kg dw/kg bw-day)
SUF = site use factor (fraction)
TRV = toxicity reference value (mg/kg-day)

Table BKG-C.1
Background Threshold Values for Soil and Biota for Background

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

COPEC	Units	Exposure Point Concentrations[a,b]			
		Soil	Plants	Insects	Mammals
Inorganics					
Aluminum	mg/kg	1.64E+04	3.54E+02	1.64E+04	8.20E+02
Arsenic	mg/kg	1.10E+01	4.13E-01	1.31E+00	5.59E-02
Barium	mg/kg	4.10E+02	6.40E+01	3.73E+01	4.80E-01
Beryllium	mg/kg	6.72E-01	4.37E-01	3.02E-02	2.18E-02
Cadmium	mg/kg	1.10E+00	6.55E-01	8.93E+00	2.98E-01
Calcium	mg/kg	6.65E+04	--	--	--
Chromium, hexavalent	mg/kg	8.30E-01	3.40E-02	2.54E-01	2.03E-01
Chromium, total	mg/kg	3.98E+01	1.63E+00	1.22E+01	3.47E+00
Cobalt	mg/kg	1.27E+01	9.53E-02	1.55E+00	3.18E-01
Copper	mg/kg	1.68E+01	5.93E+00	8.65E+00	1.16E+01
Iron	mg/kg	2.93E+04	--	--	--
Lead	mg/kg	8.39E+00	8.74E-01	4.48E+00	2.76E+00
Magnesium	mg/kg	1.21E+04	--	--	--
Manganese	mg/kg	4.02E+02	3.18E+01	2.66E+01	8.24E+00
Molybdenum	mg/kg	1.37E+00	3.43E-01	7.54E-01	2.26E-01
Nickel	mg/kg	2.73E+01	1.28E+00	2.89E+01	3.65E+00
Potassium	mg/kg	4.40E+03	--	--	--
Selenium	mg/kg	1.47E+00	7.78E-01	1.23E+00	7.63E-01
Sodium	mg/kg	2.07E+03	--	--	--
Vanadium	mg/kg	5.22E+01	2.53E-01	2.19E+00	6.42E-01
Zinc	mg/kg	5.80E+01	4.58E+01	3.24E+02	1.05E+02
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	mg/kg	2.67E+02	3.38E+00	8.13E+02	0.00E+00
PAH High molecular weight	mg/kg	3.76E+01	5.65E+00	9.78E+01	0.00E+00
Dioxins					
TEQ Avian	ng/kg	5.98E+00	3.35E-02	2.29E+01	4.08E+00
TEQ Mammals	ng/kg	5.58E+00	3.12E-02	2.11E+01	3.78E+00
2,3,7,8-TCDD	ng/kg	--	--	--	--

Notes:

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

[b] Biota EPCs presented as 0.0 indicate no bioaccumulation from soil.

Abbreviations:

-- = soil EPC or uptake model not available, biota EPCs could not be estimated.
AOC = area of concern
BKG = background
EPC = exposure point concentration
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram

Table BKG-C.2
Ecological Risk Estimate Summary for Background Threshold Values (Plants and Soil Invertebrates; Wildlife SUF = 1, Selected TRVs and BTAG TRVs)

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

			HQs based on Selected TRVs														HQs based on BTAG TRVs													
	Plants	Soil Invertebrates	Gambel's Quail		Cactus Wren		Desert Shrew		Merriam's Kangaroo Rat		Red-Tailed Hawk		Desert Kit Fox		Nelson's Desert Bighorn Sheep		Gambel's Quail		Cactus Wren		Desert Shrew		Merriam's Kangaroo Rat		Red-Tailed Hawk		Desert Kit Fox		Nelson's Desert Bighorn Sheep	
			SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1	
COPEC	HQ	HQ	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Inorganics																														
Aluminum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	6E-01	2E-01	3E-02	2E-02	2E-01	1E-01	2E-01	1E-01	4E-02	2E-02	7E-03	5E-03	1E-02	8E-03	5E-02	3E-02	1E-02	3E-03	8E-02	2E-02	1E+00	7E-02	2E-01	1E-02	3E-03	8E-04	4E-02	3E-03	2E-01	1E-02
Barium	8E-01	1E+00	--	--	--	--	2E-01	1E-01	1E-01	7E-02	--	--	8E-03	5E-03	5E-02	3E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	7E-02	2E-02	--	--	--	--	2E-02	1E-02	7E-02	6E-02	--	--	3E-03	2E-03	2E-02	2E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	3E-02	8E-03	2E-02	5E-03	1E+00	3E-01	**2E+00**	2E-01	7E-02	7E-03	2E-02	4E-03	2E-02	2E-03	2E-02	2E-03	4E-02	3E-03	**2E+00**	2E-01	**3E+01**	7E-01	9E-01	2E-02	4E-02	2E-03	2E-01	4E-03	2E-01	5E-03
Calcium	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium, hexavalent	8E-01	**2E+00**	2E-03	2E-04	2E-02	2E-03	6E-03	1E-03	5E-04	1E-04	7E-03	7E-04	9E-04	2E-04	4E-04	1E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium, total	No SL	7E-01	8E-02	1E-02	1E+00	2E-01	1E+00	3E-01	9E-02	2E-02	1E-01	2E-02	7E-02	2E-02	8E-02	2E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	1E+00	No SL	7E-03	3E-03	7E-02	3E-02	5E-02	2E-02	4E-03	2E-03	5E-03	2E-03	3E-03	1E-03	7E-03	3E-03	--	--	--	--	3E-01	2E-02	3E-02	2E-03	--	--	2E-02	1E-03	4E-02	3E-03
Copper	2E-01	2E-01	7E-02	2E-02	5E-01	2E-01	2E-01	1E-01	6E-02	3E-02	2E-01	8E-02	8E-02	5E-02	3E-02	2E-02	1E-01	6E-03	8E-01	4E-02	7E-01	3E-03	2E-01	8E-04	4E-01	2E-02	2E-01	7E-04	6E-02	2E-04
Iron	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	7E-02	5E-03	4E-02	2E-02	6E-01	3E-01	2E-01	1E-01	2E-02	1E-02	1E-01	7E-02	2E-02	1E-02	1E-02	7E-03	**5E+00**	8E-03	**7E+01**	1E-01	9E-01	4E-03	9E-02	4E-04	**2E+01**	3E-02	1E-01	4E-04	5E-02	2E-04
Magnesium	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	**2E+00**	9E-01	2E-02	7E-03	7E-02	3E-02	1E-01	5E-02	7E-02	2E-02	6E-03	3E-03	1E-02	5E-03	4E-02	1E-02	4E-02	4E-03	2E-01	2E-02	5E-01	4E-02	2E-01	2E-02	1E-02	1E-03	5E-02	4E-03	2E-01	1E-02
Molybdenum	7E-01	No SL	5E-03	5E-04	5E-02	5E-03	6E-01	6E-02	1E-01	1E-02	6E-03	6E-04	4E-02	4E-03	6E-02	6E-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	7E-01	1E-01	2E-02	8E-03	9E-01	3E-01	**4E+00**	**2E+00**	9E-02	5E-02	5E-02	2E-02	9E-02	5E-02	1E-01	6E-02	1E-01	3E-03	**4E+00**	1E-01	**4E+01**	2E-01	1E+00	5E-03	2E-01	6E-03	1E+00	5E-03	1E+00	4E-03
Potassium	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	**3E+00**	4E-01	1E-01	6E-02	9E-01	4E-01	1E+00	7E-01	3E-01	2E-01	2E-01	1E-01	2E-01	1E-01	1E-01	8E-02	2E-01	4E-02	1E+00	3E-01	**5E+00**	2E-01	1E+00	6E-02	3E-01	7E-02	6E-01	2E-02	3E-01	1E-02
Sodium	No SL	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	**3E+01**	No SL	6E-01	3E-01	**4E+00**	**2E+00**	2E-01	8E-02	3E-02	1E-02	3E-01	2E-01	2E-02	9E-03	8E-02	4E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	4E-01	5E-01	3E-02	1E-02	9E-01	4E-01	9E-01	2E-01	5E-02	1E-02	1E-01	5E-02	5E-02	1E-02	1E-02	3E-03	1E-01	1E-02	**4E+00**	4E-01	**7E+00**	2E-01	4E-01	9E-03	5E-01	5E-02	4E-01	9E-03	9E-02	2E-03
Polycyclic Aromatic Hydrocarbons																														
PAH Low molecular weight	**3E+01**	**9E+00**	5E-02	5E-03	**7E+00**	7E-01	**3E+00**	5E-01	1E-02	2E-03	1E-02	1E-03	4E-03	8E-04	2E-02	3E-03	--	--	--	--	**3E+00**	1E+00	2E-02	5E-03	--	--	5E-03	2E-03	2E-02	8E-03
PAH High molecular weight	**3E+01**	**2E+00**	4E-02	4E-03	**2E+00**	2E-01	**3E+01**	**7E+00**	9E-01	2E-01	4E-03	4E-04	6E-02	1E-02	4E-01	8E-02	--	--	--	--	**2E+01**	6E-01	4E-01	2E-02	--	--	3E-02	1E-03	2E-01	7E-03
Dioxins																														
2,3,7,8-TCDD	No SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEQ Avian	--	--	2E-03	2E-04	3E-01	3E-02	--	--	--	--	2E-02	2E-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEQ Mammals	--	--	--	--	--	--	**4E+00**	4E-01	1E-02	1E-03	--	--	1E-01	1E-02	3E-02	3E-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

NOAEL HQ greater than 1
HQ or LOAEL HQ greater than 1
HQ or LOAEL HQ greater than 10
HQ or LOAEL HQ greater than 100

Abbreviations:

-- = no toxicity value available, HQs could not be estimated
AOC = area of concern
BTAG = Biological Technical Assistance Group
HQ = hazard quotient
LOAEL = lowest observed adverse effect level
NOAEL = no-observed adverse effect level
PCBs = polychlorinated biphenyls
PAH = polycyclic aromatic hydrocarbons
SUF = site use factor
TRV = toxicity reference value

Table BKG-C.3
Plants and Soil Invertebrates Risk Calculations for Background Threshold Values

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

COPEC	Terrestrial Plants			Terrestrial Invertebrates		
	Soil EPC (mg/kg)	Benchmark (mg/kg)	Hazard Quotient	Soil EPC (mg/kg)	Benchmark (mg/kg)	Hazard Quotient
Inorganics						
Aluminum	1.64E+04	pH<5.5	--	1.64E+04	pH<5.5	--
Arsenic	1.10E+01	18	6E-01	1.10E+01	60	2E-01
Barium	4.10E+02	500	8E-01	4.10E+02	330	1E+00
Beryllium	6.72E-01	10	7E-02	6.72E-01	40	2E-02
Cadmium	1.10E+00	32	3E-02	1.10E+00	140	8E-03
Calcium	6.65E+04	--	No SL	6.65E+04	--	No SL
Chromium, hexavalent	8.30E-01	1	8E-01	8.30E-01	0.4	**2E+00**
Chromium, total	3.98E+01	--	No SL	3.98E+01	57	7E-01
Cobalt	1.27E+01	13	1E+00	1.27E+01	--	No SL
Copper	1.68E+01	70	2E-01	1.68E+01	80	2E-01
Iron	2.93E+04	--	No SL	2.93E+04	--	No SL
Lead	8.39E+00	120	7E-02	8.39E+00	1700	5E-03
Magnesium	1.21E+04	--	No SL	1.21E+04	--	No SL
Manganese	4.02E+02	220	**2E+00**	4.02E+02	450	9E-01
Molybdenum	1.37E+00	2	7E-01	1.37E+00	--	No SL
Nickel	2.73E+01	38	7E-01	2.73E+01	280	1E-01
Potassium	4.40E+03	--	No SL	4.40E+03	--	No SL
Selenium	1.47E+00	0.52	**3E+00**	1.47E+00	4.1	4E-01
Sodium	2.07E+03	--	No SL	2.07E+03	--	No SL
Vanadium	5.22E+01	2	**3E+01**	5.22E+01	--	No SL
Zinc	5.80E+01	160	4E-01	5.80E+01	120	5E-01
Polycyclic Aromatic Hydrocarbons						
PAH Low molecular weight	2.67E+02	10	**3E+01**	2.67E+02	29	**9E+00**
PAH High molecular weight	3.76E+01	1.2	**3E+01**	3.76E+01	18	**2E+00**
Dioxins (presented in ng/kg)						
2,3,7,8-TCDD	--	--	No SL	--	8800	--

Notes:

HQ greater than 1
HQ greater than 10
HQ greater than 100

Abbreviations:

AOC = area of concern
BKG = background
EPC = exposure point concentration
HQ = hazard quotient
LOAEL = lowest observed adverse effect level
mg/kg = milligrams per kilogram
ND = not detected in the applicable depth interval
ng/kg = nanograms per kilogram
no SL = no screening level available
NOAEL = no-observed adverse effect level
PAH = polycyclic aromatic hydrocarbons

Table BKG-C.4

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Inorganics									
Aluminum	Gambel's Quail	1.6E+04	100% Plants	1.0E-01	3.5E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Arsenic	Gambel's Quail	1.1E+01	100% Plants	1.0E-01	4.1E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Barium	Gambel's Quail	4.1E+02	100% Plants	1.0E-01	6.4E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Beryllium	Gambel's Quail	6.7E-01	100% Plants	1.0E-01	4.4E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Cadmium	Gambel's Quail	1.1E+00	100% Plants	1.0E-01	6.6E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Calcium	Gambel's Quail	6.7E+04	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Chromium, hexavalent	Gambel's Quail	8.3E-01	100% Plants	1.0E-01	3.4E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Chromium, total	Gambel's Quail	4.0E+01	100% Plants	1.0E-01	1.6E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Cobalt	Gambel's Quail	1.3E+01	100% Plants	1.0E-01	9.5E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Copper	Gambel's Quail	1.7E+01	100% Plants	1.0E-01	5.9E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Iron	Gambel's Quail	2.9E+04	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Lead	Gambel's Quail	8.4E+00	100% Plants	1.0E-01	8.7E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Magnesium	Gambel's Quail	1.2E+04	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Manganese	Gambel's Quail	4.0E+02	100% Plants	1.0E-01	3.2E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Molybdenum	Gambel's Quail	1.4E+00	100% Plants	1.0E-01	3.4E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Nickel	Gambel's Quail	2.7E+01	100% Plants	1.0E-01	1.3E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Potassium	Gambel's Quail	4.4E+03	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Selenium	Gambel's Quail	1.5E+00	100% Plants	1.0E-01	7.8E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Sodium	Gambel's Quail	2.1E+03	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Vanadium	Gambel's Quail	5.2E+01	100% Plants	1.0E-01	2.5E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Zinc	Gambel's Quail	5.8E+01	100% Plants	1.0E-01	4.6E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Gambel's Quail	2.7E+02	100% Plants	1.0E-01	3.4E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
PAH High molecular weight	Gambel's Quail	3.8E+01	100% Plants	1.0E-01	5.7E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Gambel's Quail	6.0E+00	100% Plants	1.0E-01	3.3E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
TEQ Mammals	Gambel's Quail	5.6E+00	100% Plants	1.0E-01	3.1E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Inorganics									
Aluminum	Cactus Wren	1.6E+04	100% Insects	9.3E-02	1.6E+04	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Arsenic	Cactus Wren	1.1E+01	100% Insects	9.3E-02	1.3E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Barium	Cactus Wren	4.1E+02	100% Insects	9.3E-02	3.7E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Beryllium	Cactus Wren	6.7E-01	100% Insects	9.3E-02	3.0E-02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Cadmium	Cactus Wren	1.1E+00	100% Insects	9.3E-02	8.9E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Calcium	Cactus Wren	6.7E+04	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Chromium, hexavalent	Cactus Wren	8.3E-01	100% Insects	9.3E-02	2.5E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Chromium, total	Cactus Wren	4.0E+01	100% Insects	9.3E-02	1.2E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Cobalt	Cactus Wren	1.3E+01	100% Insects	9.3E-02	1.5E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Copper	Cactus Wren	1.7E+01	100% Insects	9.3E-02	8.7E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Iron	Cactus Wren	2.9E+04	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Lead	Cactus Wren	8.4E+00	100% Insects	9.3E-02	4.5E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Magnesium	Cactus Wren	1.2E+04	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Manganese	Cactus Wren	4.0E+02	100% Insects	9.3E-02	2.7E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Molybdenum	Cactus Wren	1.4E+00	100% Insects	9.3E-02	7.5E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Nickel	Cactus Wren	2.7E+01	100% Insects	9.3E-02	2.9E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Potassium	Cactus Wren	4.4E+03	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Selenium	Cactus Wren	1.5E+00	100% Insects	9.3E-02	1.2E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Sodium	Cactus Wren	2.1E+03	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Vanadium	Cactus Wren	5.2E+01	100% Insects	9.3E-02	2.2E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Zinc	Cactus Wren	5.8E+01	100% Insects	9.3E-02	3.2E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Cactus Wren	2.7E+02	100% Insects	9.3E-02	8.1E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
PAH High molecular weight	Cactus Wren	3.8E+01	100% Insects	9.3E-02	9.8E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Cactus Wren	6.0E+00	100% Insects	9.3E-02	2.3E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
TEQ Mammals	Cactus Wren	5.6E+00	100% Insects	9.3E-02	2.1E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Inorganics									
Aluminum	Red-Tailed Hawk	1.6E+04	100% Mammals	1.4E-02	8.2E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Arsenic	Red-Tailed Hawk	1.1E+01	100% Mammals	1.4E-02	5.6E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Barium	Red-Tailed Hawk	4.1E+02	100% Mammals	1.4E-02	4.8E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Beryllium	Red-Tailed Hawk	6.7E-01	100% Mammals	1.4E-02	2.2E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00

Table BKG-C.4

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Inorganics										
Aluminum	Gambel's Quail	1.4E+01	--	--	6.5E+01	7.9E+01	pH<5.5	pH<5.5	--	--
Arsenic	Gambel's Quail	1.6E-02	--	--	4.4E-02	6.0E-02	2.2E+00	3.6E+00	3E-02	2E-02
Barium	Gambel's Quail	2.5E+00	--	--	1.6E+00	4.1E+00	--	--	--	--
Beryllium	Gambel's Quail	1.7E-02	--	--	2.7E-03	1.9E-02	--	--	--	--
Cadmium	Gambel's Quail	2.5E-02	--	--	4.4E-03	2.9E-02	1.5E+00	6.4E+00	2E-02	5E-03
Calcium	Gambel's Quail	--	--	--	2.7E+02	2.7E+02	--	--	--	--
Chromium, hexavalent	Gambel's Quail	1.3E-03	--	--	3.3E-03	4.6E-03	2.5E+00	2.5E+01	2E-03	2E-04
Chromium, total	Gambel's Quail	6.3E-02	--	--	1.6E-01	2.2E-01	2.7E+00	1.6E+01	8E-02	1E-02
Cobalt	Gambel's Quail	3.7E-03	--	--	5.1E-02	5.4E-02	7.6E+00	1.8E+01	7E-03	3E-03
Copper	Gambel's Quail	2.3E-01	--	--	6.7E-02	2.9E-01	4.1E+00	1.2E+01	7E-02	2E-02
Iron	Gambel's Quail	--	--	--	1.2E+02	1.2E+02	--	--	--	--
Lead	Gambel's Quail	3.4E-02	--	--	3.3E-02	6.7E-02	1.6E+00	3.3E+00	4E-02	2E-02
Magnesium	Gambel's Quail	--	--	--	4.8E+01	4.8E+01	--	--	--	--
Manganese	Gambel's Quail	1.2E+00	--	--	1.6E+00	2.8E+00	1.8E+02	3.8E+02	2E-02	7E-03
Molybdenum	Gambel's Quail	1.3E-02	--	--	5.5E-03	1.9E-02	3.5E+00	3.5E+01	5E-03	5E-04
Nickel	Gambel's Quail	4.9E-02	--	--	1.1E-01	1.6E-01	6.7E+00	1.9E+01	2E-02	8E-03
Potassium	Gambel's Quail	--	--	--	1.8E+01	1.8E+01	--	--	--	--
Selenium	Gambel's Quail	3.0E-02	--	--	5.9E-03	3.6E-02	2.9E-01	5.8E-01	1E-01	6E-02
Sodium	Gambel's Quail	--	--	--	8.3E+00	8.3E+00	--	--	--	--
Vanadium	Gambel's Quail	9.7E-03	--	--	2.1E-01	2.2E-01	3.4E-01	6.9E-01	6E-01	3E-01
Zinc	Gambel's Quail	1.8E+00	--	--	2.3E-01	2.0E+00	6.6E+01	1.7E+02	3E-02	1E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Gambel's Quail	1.3E-01	--	--	1.1E+00	1.2E+00	2.3E+01	2.3E+02	5E-02	5E-03
PAH High molecular weight	Gambel's Quail	2.2E-01	--	--	1.5E-01	3.7E-01	1.0E+01	1.0E+02	4E-02	4E-03
Dioxins (presented in ng/kg)										
TEQ Avian	Gambel's Quail	1.3E-03	--	--	2.4E-02	2.5E-02	1.4E+01	1.4E+02	2E-03	2E-04
TEQ Mammals	Gambel's Quail	1.2E-03	--	--	2.2E-02	2.3E-02	--	--	--	--
Inorganics										
Aluminum	Cactus Wren	--	3.0E+03	--	2.8E+02	3.3E+03	pH<5.5	pH<5.5	--	--
Arsenic	Cactus Wren	--	2.4E-01	--	1.9E-01	4.3E-01	2.2E+00	3.6E+00	2E-01	1E-01
Barium	Cactus Wren	--	6.8E+00	--	7.0E+00	1.4E+01	--	--	--	--
Beryllium	Cactus Wren	--	5.5E-03	--	1.1E-02	1.7E-02	--	--	--	--
Cadmium	Cactus Wren	--	1.6E+00	--	1.9E-02	1.7E+00	1.5E+00	6.4E+00	1E+00	3E-01
Calcium	Cactus Wren	--	--	--	1.1E+03	1.1E+03	--	--	--	--
Chromium, hexavalent	Cactus Wren	--	4.7E-02	--	1.4E-02	6.1E-02	2.5E+00	2.5E+01	2E-02	2E-03
Chromium, total	Cactus Wren	--	2.2E+00	--	6.8E-01	2.9E+00	2.7E+00	1.6E+01	1E+00	2E-01
Cobalt	Cactus Wren	--	2.8E-01	--	2.2E-01	5.0E-01	7.6E+00	1.8E+01	7E-02	3E-02
Copper	Cactus Wren	--	1.6E+00	--	2.9E-01	1.9E+00	4.1E+00	1.2E+01	5E-01	2E-01
Iron	Cactus Wren	--	--	--	5.0E+02	5.0E+02	--	--	--	--
Lead	Cactus Wren	--	8.2E-01	--	1.4E-01	9.6E-01	1.6E+00	3.3E+00	6E-01	3E-01
Magnesium	Cactus Wren	--	--	--	2.1E+02	2.1E+02	--	--	--	--
Manganese	Cactus Wren	--	4.9E+00	--	6.9E+00	1.2E+01	1.8E+02	3.8E+02	7E-02	3E-02
Molybdenum	Cactus Wren	--	1.4E-01	--	2.3E-02	1.6E-01	3.5E+00	3.5E+01	5E-02	5E-03
Nickel	Cactus Wren	--	5.3E+00	--	4.7E-01	5.8E+00	6.7E+00	1.9E+01	9E-01	3E-01
Potassium	Cactus Wren	--	--	--	7.5E+01	7.5E+01	--	--	--	--
Selenium	Cactus Wren	--	2.3E-01	--	2.5E-02	2.5E-01	2.9E-01	5.8E-01	9E-01	4E-01
Sodium	Cactus Wren	--	--	--	3.5E+01	3.5E+01	--	--	--	--
Vanadium	Cactus Wren	--	4.0E-01	--	8.9E-01	1.3E+00	3.4E-01	6.9E-01	**4E+00**	**2E+00**
Zinc	Cactus Wren	--	5.9E+01	--	9.9E-01	6.0E+01	6.6E+01	1.7E+02	9E-01	4E-01
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Cactus Wren	--	1.5E+02	--	4.6E+00	1.5E+02	2.3E+01	2.3E+02	**7E+00**	7E-01
PAH High molecular weight	Cactus Wren	--	1.8E+01	--	6.4E-01	1.9E+01	1.0E+01	1.0E+02	**2E+00**	2E-01
Dioxins (presented in ng/kg)										
TEQ Avian	Cactus Wren	--	4.2E+00	--	1.0E-01	4.3E+00	1.4E+01	1.4E+02	3E-01	3E-02
TEQ Mammals	Cactus Wren	--	3.9E+00	--	9.5E-02	4.0E+00	--	--	--	--
Inorganics										
Aluminum	Red-Tailed Hawk	--	--	6.5E+01	1.8E+01	8.3E+01	pH<5.5	pH<5.5	--	--
Arsenic	Red-Tailed Hawk	--	--	4.4E-03	1.2E-02	1.7E-02	2.2E+00	3.6E+00	7E-03	5E-03
Barium	Red-Tailed Hawk	--	--	3.8E-02	4.6E-01	4.9E-01	--	--	--	--
Beryllium	Red-Tailed Hawk	--	--	1.7E-03	7.5E-04	2.5E-03	--	--	--	--

Table BKG-C.4

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Cadmium	Red-Tailed Hawk	1.1E+00	100% Mammals	1.4E-02	3.0E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Calcium	Red-Tailed Hawk	6.7E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Chromium, hexavalent	Red-Tailed Hawk	8.3E-01	100% Mammals	1.4E-02	2.0E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Chromium, total	Red-Tailed Hawk	4.0E+01	100% Mammals	1.4E-02	3.5E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Cobalt	Red-Tailed Hawk	1.3E+01	100% Mammals	1.4E-02	3.2E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Copper	Red-Tailed Hawk	1.7E+01	100% Mammals	1.4E-02	1.2E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Iron	Red-Tailed Hawk	2.9E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Lead	Red-Tailed Hawk	8.4E+00	100% Mammals	1.4E-02	2.8E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Magnesium	Red-Tailed Hawk	1.2E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Manganese	Red-Tailed Hawk	4.0E+02	100% Mammals	1.4E-02	8.2E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Molybdenum	Red-Tailed Hawk	1.4E+00	100% Mammals	1.4E-02	2.3E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Nickel	Red-Tailed Hawk	2.7E+01	100% Mammals	1.4E-02	3.6E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Potassium	Red-Tailed Hawk	4.4E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Selenium	Red-Tailed Hawk	1.5E+00	100% Mammals	1.4E-02	7.6E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Sodium	Red-Tailed Hawk	2.1E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Vanadium	Red-Tailed Hawk	5.2E+01	100% Mammals	1.4E-02	6.4E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Zinc	Red-Tailed Hawk	5.8E+01	100% Mammals	1.4E-02	1.0E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Red-Tailed Hawk	2.7E+02	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
PAH High molecular weight	Red-Tailed Hawk	3.8E+01	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Red-Tailed Hawk	6.0E+00	100% Mammals	1.4E-02	4.1E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
TEQ Mammals	Red-Tailed Hawk	5.6E+00	100% Mammals	1.4E-02	3.8E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Inorganics									
Aluminum	Desert Shrew	1.6E+04	100% Insects	2.0E-02	1.6E+04	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Arsenic	Desert Shrew	1.1E+01	100% Insects	2.0E-02	1.3E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Barium	Desert Shrew	4.1E+02	100% Insects	2.0E-02	3.7E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Beryllium	Desert Shrew	6.7E-01	100% Insects	2.0E-02	3.0E-02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Cadmium	Desert Shrew	1.1E+00	100% Insects	2.0E-02	8.9E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Calcium	Desert Shrew	6.7E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Chromium, hexavalent	Desert Shrew	8.3E-01	100% Insects	2.0E-02	2.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Chromium, total	Desert Shrew	4.0E+01	100% Insects	2.0E-02	1.2E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Cobalt	Desert Shrew	1.3E+01	100% Insects	2.0E-02	1.5E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Copper	Desert Shrew	1.7E+01	100% Insects	2.0E-02	8.7E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Iron	Desert Shrew	2.9E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Lead	Desert Shrew	8.4E+00	100% Insects	2.0E-02	4.5E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Magnesium	Desert Shrew	1.2E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Manganese	Desert Shrew	4.0E+02	100% Insects	2.0E-02	2.7E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Molybdenum	Desert Shrew	1.4E+00	100% Insects	2.0E-02	7.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Nickel	Desert Shrew	2.7E+01	100% Insects	2.0E-02	2.9E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Potassium	Desert Shrew	4.4E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Selenium	Desert Shrew	1.5E+00	100% Insects	2.0E-02	1.2E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Sodium	Desert Shrew	2.1E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Vanadium	Desert Shrew	5.2E+01	100% Insects	2.0E-02	2.2E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Zinc	Desert Shrew	5.8E+01	100% Insects	2.0E-02	3.2E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Desert Shrew	2.7E+02	100% Insects	2.0E-02	8.1E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
PAH High molecular weight	Desert Shrew	3.8E+01	100% Insects	2.0E-02	9.8E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Desert Shrew	6.0E+00	100% Insects	2.0E-02	2.3E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
TEQ Mammals	Desert Shrew	5.6E+00	100% Insects	2.0E-02	2.1E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Inorganics									
Aluminum	Desert Kit Fox	1.6E+04	100% Mammals	2.8E-02	8.2E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Arsenic	Desert Kit Fox	1.1E+01	100% Mammals	2.8E-02	5.6E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Barium	Desert Kit Fox	4.1E+02	100% Mammals	2.8E-02	4.8E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Beryllium	Desert Kit Fox	6.7E-01	100% Mammals	2.8E-02	2.2E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Cadmium	Desert Kit Fox	1.1E+00	100% Mammals	2.8E-02	3.0E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Calcium	Desert Kit Fox	6.7E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Chromium, hexavalent	Desert Kit Fox	8.3E-01	100% Mammals	2.8E-02	2.0E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Chromium, total	Desert Kit Fox	4.0E+01	100% Mammals	2.8E-02	3.5E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Cobalt	Desert Kit Fox	1.3E+01	100% Mammals	2.8E-02	3.2E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00

Table BKG-C.4

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Cadmium	Red-Tailed Hawk	--	--	2.4E-02	1.2E-03	2.5E-02	1.5E+00	6.4E+00	2E-02	4E-03
Calcium	Red-Tailed Hawk	--	--	--	7.4E+01	7.4E+01	--	--	--	--
Chromium, hexavalent	Red-Tailed Hawk	--	--	1.6E-02	9.2E-04	1.7E-02	2.5E+00	2.5E+01	7E-03	7E-04
Chromium, total	Red-Tailed Hawk	--	--	2.7E-01	4.4E-02	3.2E-01	2.7E+00	1.6E+01	1E-01	2E-02
Cobalt	Red-Tailed Hawk	--	--	2.5E-02	1.4E-02	3.9E-02	7.6E+00	1.8E+01	5E-03	2E-03
Copper	Red-Tailed Hawk	--	--	9.2E-01	1.9E-02	9.4E-01	4.1E+00	1.2E+01	2E-01	8E-02
Iron	Red-Tailed Hawk	--	--	--	3.3E+01	3.3E+01	--	--	--	--
Lead	Red-Tailed Hawk	--	--	2.2E-01	9.3E-03	2.3E-01	1.6E+00	3.3E+00	1E-01	7E-02
Magnesium	Red-Tailed Hawk	--	--	--	1.3E+01	1.3E+01	--	--	--	--
Manganese	Red-Tailed Hawk	--	--	6.5E-01	4.5E-01	1.1E+00	1.8E+02	3.8E+02	6E-03	3E-03
Molybdenum	Red-Tailed Hawk	--	--	1.8E-02	1.5E-03	1.9E-02	3.5E+00	3.5E+01	6E-03	6E-04
Nickel	Red-Tailed Hawk	--	--	2.9E-01	3.0E-02	3.2E-01	6.7E+00	1.9E+01	5E-02	2E-02
Potassium	Red-Tailed Hawk	--	--	--	4.9E+00	4.9E+00	--	--	--	--
Selenium	Red-Tailed Hawk	--	--	6.0E-02	1.6E-03	6.2E-02	2.9E-01	5.8E-01	2E-01	1E-01
Sodium	Red-Tailed Hawk	--	--	--	2.3E+00	2.3E+00	--	--	--	--
Vanadium	Red-Tailed Hawk	--	--	5.1E-02	5.8E-02	1.1E-01	3.4E-01	6.9E-01	3E-01	2E-01
Zinc	Red-Tailed Hawk	--	--	8.3E+00	6.4E-02	8.4E+00	6.6E+01	1.7E+02	1E-01	5E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Red-Tailed Hawk	--	--	0.0E+00	3.0E-01	3.0E-01	2.3E+01	2.3E+02	1E-02	1E-03
PAH High molecular weight	Red-Tailed Hawk	--	--	0.0E+00	4.2E-02	4.2E-02	1.0E+01	1.0E+02	4E-03	4E-04
Dioxins (presented in ng/kg)										
TEQ Avian	Red-Tailed Hawk	--	--	3.2E-01	6.6E-03	3.3E-01	1.4E+01	1.4E+02	2E-02	2E-03
TEQ Mammals	Red-Tailed Hawk	--	--	3.0E-01	6.2E-03	3.1E-01	--	--	--	--
Inorganics										
Aluminum	Desert Shrew	--	3.3E+03	--	6.7E+01	3.4E+03	pH<5.5	pH<5.5	--	--
Arsenic	Desert Shrew	--	2.7E-01	--	4.5E-02	3.1E-01	1.5E+00	2.4E+00	2E-01	1E-01
Barium	Desert Shrew	--	7.6E+00	--	1.7E+00	9.2E+00	5.2E+01	8.3E+01	2E-01	1E-01
Beryllium	Desert Shrew	--	6.1E-03	--	2.7E-03	8.9E-03	5.3E-01	6.3E-01	2E-02	1E-02
Cadmium	Desert Shrew	--	1.8E+00	--	4.5E-03	1.8E+00	7.7E-01	7.7E+00	**2E+00**	2E-01
Calcium	Desert Shrew	--	--	--	2.7E+02	2.7E+02	--	--	--	--
Chromium, hexavalent	Desert Shrew	--	5.2E-02	--	3.4E-03	5.5E-02	9.2E+00	3.8E+01	6E-03	1E-03
Chromium, total	Desert Shrew	--	2.5E+00	--	1.6E-01	2.6E+00	2.4E+00	9.6E+00	1E+00	3E-01
Cobalt	Desert Shrew	--	3.1E-01	--	5.2E-02	3.7E-01	7.3E+00	1.9E+01	5E-02	2E-02
Copper	Desert Shrew	--	1.8E+00	--	6.8E-02	1.8E+00	9.4E+00	1.6E+01	2E-01	1E-01
Iron	Desert Shrew	--	--	--	1.2E+02	1.2E+02	--	--	--	--
Lead	Desert Shrew	--	9.1E-01	--	3.4E-02	9.4E-01	4.7E+00	8.9E+00	2E-01	1E-01
Magnesium	Desert Shrew	--	--	--	4.9E+01	4.9E+01	--	--	--	--
Manganese	Desert Shrew	--	5.4E+00	--	1.6E+00	7.0E+00	5.2E+01	1.5E+02	1E-01	5E-02
Molybdenum	Desert Shrew	--	1.5E-01	--	5.6E-03	1.6E-01	2.6E-01	2.6E+00	6E-01	6E-02
Nickel	Desert Shrew	--	5.9E+00	--	1.1E-01	6.0E+00	1.7E+00	3.4E+00	**4E+00**	**2E+00**
Potassium	Desert Shrew	--	--	--	1.8E+01	1.8E+01	--	--	--	--
Selenium	Desert Shrew	--	2.5E-01	--	6.0E-03	2.6E-01	2.3E-01	3.5E-01	1E+00	7E-01
Sodium	Desert Shrew	--	--	--	8.4E+00	8.4E+00	--	--	--	--
Vanadium	Desert Shrew	--	4.5E-01	--	2.1E-01	6.6E-01	4.2E+00	8.3E+00	2E-01	8E-02
Zinc	Desert Shrew	--	6.6E+01	--	2.4E-01	6.6E+01	7.5E+01	3.0E+02	9E-01	2E-01
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Shrew	--	1.7E+02	--	1.1E+00	1.7E+02	6.6E+01	3.3E+02	**3E+00**	5E-01
PAH High molecular weight	Desert Shrew	--	2.0E+01	--	1.5E-01	2.0E+01	6.2E-01	3.1E+00	**3E+01**	**7E+00**
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Shrew	--	4.7E+00	--	2.4E-02	4.7E+00	--	--	--	--
TEQ Mammals	Desert Shrew	--	4.3E+00	--	2.3E-02	4.3E+00	1.0E+00	1.0E+01	**4E+00**	4E-01
Inorganics										
Aluminum	Desert Kit Fox	--	--	2.9E+01	1.6E+01	4.5E+01	pH<5.5	pH<5.5	--	--
Arsenic	Desert Kit Fox	--	--	2.0E-03	1.1E-02	1.3E-02	1.0E+00	1.7E+00	1E-02	8E-03
Barium	Desert Kit Fox	--	--	1.7E-02	4.1E-01	4.2E-01	5.2E+01	8.3E+01	8E-03	5E-03
Beryllium	Desert Kit Fox	--	--	7.7E-04	6.7E-04	1.4E-03	5.3E-01	6.3E-01	3E-03	2E-03
Cadmium	Desert Kit Fox	--	--	1.1E-02	1.1E-03	1.2E-02	7.7E-01	7.7E+00	2E-02	2E-03
Calcium	Desert Kit Fox	--	--	--	6.6E+01	6.6E+01	--	--	--	--
Chromium, hexavalent	Desert Kit Fox	--	--	7.2E-03	8.2E-04	8.0E-03	9.2E+00	3.8E+01	9E-04	2E-04
Chromium, total	Desert Kit Fox	--	--	1.2E-01	3.9E-02	1.6E-01	2.4E+00	9.6E+00	7E-02	2E-02
Cobalt	Desert Kit Fox	--	--	1.1E-02	1.3E-02	2.4E-02	7.3E+00	1.9E+01	3E-03	1E-03

Table BKG-C.4

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Copper	Desert Kit Fox	1.7E+01	100% Mammals	2.8E-02	1.2E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Iron	Desert Kit Fox	2.9E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Lead	Desert Kit Fox	8.4E+00	100% Mammals	2.8E-02	2.8E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Magnesium	Desert Kit Fox	1.2E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Manganese	Desert Kit Fox	4.0E+02	100% Mammals	2.8E-02	8.2E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Molybdenum	Desert Kit Fox	1.4E+00	100% Mammals	2.8E-02	2.3E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Nickel	Desert Kit Fox	2.7E+01	100% Mammals	2.8E-02	3.6E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Potassium	Desert Kit Fox	4.4E+03	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Selenium	Desert Kit Fox	1.5E+00	100% Mammals	2.8E-02	7.6E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Sodium	Desert Kit Fox	2.1E+03	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Vanadium	Desert Kit Fox	5.2E+01	100% Mammals	2.8E-02	6.4E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Zinc	Desert Kit Fox	5.8E+01	100% Mammals	2.8E-02	1.0E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Desert Kit Fox	2.7E+02	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
PAH High molecular weight	Desert Kit Fox	3.8E+01	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Desert Kit Fox	6.0E+00	100% Mammals	2.8E-02	4.1E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
TEQ Mammals	Desert Kit Fox	5.6E+00	100% Mammals	2.8E-02	3.8E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Inorganics									
Aluminum	Merriam's Kangaroo Rat	1.6E+04	100% Plants	2.4E-02	3.5E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Arsenic	Merriam's Kangaroo Rat	1.1E+01	100% Plants	2.4E-02	4.1E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Barium	Merriam's Kangaroo Rat	4.1E+02	100% Plants	2.4E-02	6.4E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Beryllium	Merriam's Kangaroo Rat	6.7E-01	100% Plants	2.4E-02	4.4E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Cadmium	Merriam's Kangaroo Rat	1.1E+00	100% Plants	2.4E-02	6.6E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Calcium	Merriam's Kangaroo Rat	6.7E+04	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Chromium, hexavalent	Merriam's Kangaroo Rat	8.3E-01	100% Plants	2.4E-02	3.4E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Chromium, total	Merriam's Kangaroo Rat	4.0E+01	100% Plants	2.4E-02	1.6E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Cobalt	Merriam's Kangaroo Rat	1.3E+01	100% Plants	2.4E-02	9.5E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Copper	Merriam's Kangaroo Rat	1.7E+01	100% Plants	2.4E-02	5.9E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Iron	Merriam's Kangaroo Rat	2.9E+04	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Lead	Merriam's Kangaroo Rat	8.4E+00	100% Plants	2.4E-02	8.7E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Magnesium	Merriam's Kangaroo Rat	1.2E+04	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Manganese	Merriam's Kangaroo Rat	4.0E+02	100% Plants	2.4E-02	3.2E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Molybdenum	Merriam's Kangaroo Rat	1.4E+00	100% Plants	2.4E-02	3.4E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Nickel	Merriam's Kangaroo Rat	2.7E+01	100% Plants	2.4E-02	1.3E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Potassium	Merriam's Kangaroo Rat	4.4E+03	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Selenium	Merriam's Kangaroo Rat	1.5E+00	100% Plants	2.4E-02	7.8E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Sodium	Merriam's Kangaroo Rat	2.1E+03	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Vanadium	Merriam's Kangaroo Rat	5.2E+01	100% Plants	2.4E-02	2.5E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Zinc	Merriam's Kangaroo Rat	5.8E+01	100% Plants	2.4E-02	4.6E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Merriam's Kangaroo Rat	2.7E+02	100% Plants	2.4E-02	3.4E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
PAH High molecular weight	Merriam's Kangaroo Rat	3.8E+01	100% Plants	2.4E-02	5.7E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Merriam's Kangaroo Rat	6.0E+00	100% Plants	2.4E-02	3.3E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
TEQ Mammals	Merriam's Kangaroo Rat	5.6E+00	100% Plants	2.4E-02	3.1E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Inorganics									
Aluminum	Nelson's Desert Bighorn Sheep	1.6E+04	100% Plants	3.0E-01	3.5E+02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Arsenic	Nelson's Desert Bighorn Sheep	1.1E+01	100% Plants	3.0E-01	4.1E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Barium	Nelson's Desert Bighorn Sheep	4.1E+02	100% Plants	3.0E-01	6.4E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Beryllium	Nelson's Desert Bighorn Sheep	6.7E-01	100% Plants	3.0E-01	4.4E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Cadmium	Nelson's Desert Bighorn Sheep	1.1E+00	100% Plants	3.0E-01	6.6E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Calcium	Nelson's Desert Bighorn Sheep	6.7E+04	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	8.3E-01	100% Plants	3.0E-01	3.4E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Chromium, total	Nelson's Desert Bighorn Sheep	4.0E+01	100% Plants	3.0E-01	1.6E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Cobalt	Nelson's Desert Bighorn Sheep	1.3E+01	100% Plants	3.0E-01	9.5E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Copper	Nelson's Desert Bighorn Sheep	1.7E+01	100% Plants	3.0E-01	5.9E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Iron	Nelson's Desert Bighorn Sheep	2.9E+04	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Lead	Nelson's Desert Bighorn Sheep	8.4E+00	100% Plants	3.0E-01	8.7E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Magnesium	Nelson's Desert Bighorn Sheep	1.2E+04	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Manganese	Nelson's Desert Bighorn Sheep	4.0E+02	100% Plants	3.0E-01	3.2E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00

Table BKG-C.4

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Copper	Desert Kit Fox	--	--	4.1E-01	1.7E-02	4.3E-01	5.6E+00	9.3E+00	8E-02	5E-02
Iron	Desert Kit Fox	--	--	--	2.9E+01	2.9E+01	--	--	--	--
Lead	Desert Kit Fox	--	--	9.8E-02	8.3E-03	1.1E-01	4.7E+00	8.9E+00	2E-02	1E-02
Magnesium	Desert Kit Fox	--	--	--	1.2E+01	1.2E+01	--	--	--	--
Manganese	Desert Kit Fox	--	--	2.9E-01	4.0E-01	6.9E-01	5.2E+01	1.5E+02	1E-02	5E-03
Molybdenum	Desert Kit Fox	--	--	8.0E-03	1.4E-03	9.4E-03	2.6E-01	2.6E+00	4E-02	4E-03
Nickel	Desert Kit Fox	--	--	1.3E-01	2.7E-02	1.6E-01	1.7E+00	3.4E+00	9E-02	5E-02
Potassium	Desert Kit Fox	--	--	--	4.4E+00	4.4E+00	--	--	--	--
Selenium	Desert Kit Fox	--	--	2.7E-02	1.5E-03	2.8E-02	1.4E-01	2.2E-01	2E-01	1E-01
Sodium	Desert Kit Fox	--	--	--	2.0E+00	2.0E+00	--	--	--	--
Vanadium	Desert Kit Fox	--	--	2.3E-02	5.2E-02	7.4E-02	4.2E+00	8.3E+00	2E-02	9E-03
Zinc	Desert Kit Fox	--	--	3.7E+00	5.7E-02	3.8E+00	7.5E+01	3.0E+02	5E-02	1E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Kit Fox	--	--	0.0E+00	2.6E-01	2.6E-01	6.6E+01	3.3E+02	4E-03	8E-04
PAH High molecular weight	Desert Kit Fox	--	--	0.0E+00	3.7E-02	3.7E-02	6.2E-01	3.1E+00	6E-02	1E-02
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Kit Fox	--	--	1.4E-01	5.9E-03	1.5E-01	--	--	--	--
TEQ Mammals	Desert Kit Fox	--	--	1.3E-01	5.5E-03	1.4E-01	1.0E+00	1.0E+01	1E-01	1E-02
Inorganics										
Aluminum	Merriam's Kangaroo Rat	2.9E+01	--	--	3.2E+01	6.1E+01	pH<5.5	pH<5.5	--	--
Arsenic	Merriam's Kangaroo Rat	3.4E-02	--	--	2.2E-02	5.6E-02	1.5E+00	2.3E+00	4E-02	2E-02
Barium	Merriam's Kangaroo Rat	5.3E+00	--	--	8.1E-01	6.1E+00	5.2E+01	8.3E+01	1E-01	7E-02
Beryllium	Merriam's Kangaroo Rat	3.6E-02	--	--	1.3E-03	3.7E-02	5.3E-01	6.3E-01	7E-02	6E-02
Cadmium	Merriam's Kangaroo Rat	5.4E-02	--	--	2.2E-03	5.6E-02	7.7E-01	7.7E+00	7E-02	7E-03
Calcium	Merriam's Kangaroo Rat	--	--	--	1.3E+02	1.3E+02	--	--	--	--
Chromium, hexavalent	Merriam's Kangaroo Rat	2.8E-03	--	--	1.6E-03	4.4E-03	9.2E+00	3.8E+01	5E-04	1E-04
Chromium, total	Merriam's Kangaroo Rat	1.3E-01	--	--	7.9E-02	2.1E-01	2.4E+00	9.6E+00	9E-02	2E-02
Cobalt	Merriam's Kangaroo Rat	7.8E-03	--	--	2.5E-02	3.3E-02	7.3E+00	1.9E+01	4E-03	2E-03
Copper	Merriam's Kangaroo Rat	4.9E-01	--	--	3.3E-02	5.2E-01	9.0E+00	1.5E+01	6E-02	3E-02
Iron	Merriam's Kangaroo Rat	--	--	--	5.8E+01	5.8E+01	--	--	--	--
Lead	Merriam's Kangaroo Rat	7.2E-02	--	--	1.7E-02	8.8E-02	4.7E+00	8.9E+00	2E-02	1E-02
Magnesium	Merriam's Kangaroo Rat	--	--	--	2.4E+01	2.4E+01	--	--	--	--
Manganese	Merriam's Kangaroo Rat	2.6E+00	--	--	7.9E-01	3.4E+00	5.2E+01	1.5E+02	7E-02	2E-02
Molybdenum	Merriam's Kangaroo Rat	2.8E-02	--	--	2.7E-03	3.1E-02	2.6E-01	2.6E+00	1E-01	1E-02
Nickel	Merriam's Kangaroo Rat	1.1E-01	--	--	5.4E-02	1.6E-01	1.7E+00	3.4E+00	9E-02	5E-02
Potassium	Merriam's Kangaroo Rat	--	--	--	8.7E+00	8.7E+00	--	--	--	--
Selenium	Merriam's Kangaroo Rat	6.4E-02	--	--	2.9E-03	6.7E-02	2.1E-01	3.1E-01	3E-01	2E-01
Sodium	Merriam's Kangaroo Rat	--	--	--	4.1E+00	4.1E+00	--	--	--	--
Vanadium	Merriam's Kangaroo Rat	2.1E-02	--	--	1.0E-01	1.2E-01	4.2E+00	8.3E+00	3E-02	1E-02
Zinc	Merriam's Kangaroo Rat	3.8E+00	--	--	1.1E-01	3.9E+00	7.5E+01	3.0E+02	5E-02	1E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Merriam's Kangaroo Rat	2.8E-01	--	--	5.3E-01	8.1E-01	6.6E+01	3.3E+02	1E-02	2E-03
PAH High molecular weight	Merriam's Kangaroo Rat	4.6E-01	--	--	7.4E-02	5.4E-01	6.2E-01	3.1E+00	9E-01	2E-01
Dioxins (presented in ng/kg)										
TEQ Avian	Merriam's Kangaroo Rat	2.8E-03	--	--	1.2E-02	1.5E-02	--	--	--	--
TEQ Mammals	Merriam's Kangaroo Rat	2.6E-03	--	--	1.1E-02	1.4E-02	1.0E+00	1.0E+01	1E-02	1E-03
Inorganics										
Aluminum	Nelson's Desert Bighorn Sheep	4.9E+00	--	--	6.8E+01	7.2E+01	pH<5.5	pH<5.5	--	--
Arsenic	Nelson's Desert Bighorn Sheep	5.7E-03	--	--	4.5E-02	5.1E-02	1.0E+00	1.7E+00	5E-02	3E-02
Barium	Nelson's Desert Bighorn Sheep	8.8E-01	--	--	1.7E+00	2.6E+00	5.2E+01	8.3E+01	5E-02	3E-02
Beryllium	Nelson's Desert Bighorn Sheep	6.0E-03	--	--	2.8E-03	8.8E-03	4.0E-01	4.2E-01	2E-02	2E-02
Cadmium	Nelson's Desert Bighorn Sheep	9.0E-03	--	--	4.5E-03	1.4E-02	5.7E-01	5.7E+00	2E-02	2E-03
Calcium	Nelson's Desert Bighorn Sheep	--	--	--	2.7E+02	2.7E+02	--	--	--	--
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	4.7E-04	--	--	3.4E-03	3.9E-03	9.2E+00	3.8E+01	4E-04	1E-04
Chromium, total	Nelson's Desert Bighorn Sheep	2.2E-02	--	--	1.6E-01	1.9E-01	2.4E+00	9.6E+00	8E-02	2E-02
Cobalt	Nelson's Desert Bighorn Sheep	1.3E-03	--	--	5.2E-02	5.4E-02	7.3E+00	1.9E+01	7E-03	3E-03
Copper	Nelson's Desert Bighorn Sheep	8.1E-02	--	--	6.9E-02	1.5E-01	5.6E+00	9.3E+00	3E-02	2E-02
Iron	Nelson's Desert Bighorn Sheep	--	--	--	1.2E+02	1.2E+02	--	--	--	--
Lead	Nelson's Desert Bighorn Sheep	1.2E-02	--	--	3.5E-02	4.7E-02	3.4E+00	6.4E+00	1E-02	7E-03
Magnesium	Nelson's Desert Bighorn Sheep	--	--	--	5.0E+01	5.0E+01	--	--	--	--
Manganese	Nelson's Desert Bighorn Sheep	4.4E-01	--	--	1.7E+00	2.1E+00	5.2E+01	1.5E+02	4E-02	1E-02

Table BKG-C.4

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Molybdenum	Nelson's Desert Bighorn Sheep	1.4E+00	100% Plants	3.0E-01	3.4E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Nickel	Nelson's Desert Bighorn Sheep	2.7E+01	100% Plants	3.0E-01	1.3E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Potassium	Nelson's Desert Bighorn Sheep	4.4E+03	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Selenium	Nelson's Desert Bighorn Sheep	1.5E+00	100% Plants	3.0E-01	7.8E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Sodium	Nelson's Desert Bighorn Sheep	2.1E+03	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Vanadium	Nelson's Desert Bighorn Sheep	5.2E+01	100% Plants	3.0E-01	2.5E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Zinc	Nelson's Desert Bighorn Sheep	5.8E+01	100% Plants	3.0E-01	4.6E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	2.7E+02	100% Plants	3.0E-01	3.4E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
PAH High molecular weight	Nelson's Desert Bighorn Sheep	3.8E+01	100% Plants	3.0E-01	5.7E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Nelson's Desert Bighorn Sheep	6.0E+00	100% Plants	3.0E-01	3.3E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
TEQ Mammals	Nelson's Desert Bighorn Sheep	5.6E+00	100% Plants	3.0E-01	3.1E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00

Table BKG-C.4

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, Selected TRVs)

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Molybdenum	Nelson's Desert Bighorn Sheep	4.7E-03	--	--	5.6E-03	1.0E-02	1.6E-01	1.6E+00	6E-02	6E-03
Nickel	Nelson's Desert Bighorn Sheep	1.8E-02	--	--	1.1E-01	1.3E-01	1.1E+00	2.1E+00	1E-01	6E-02
Potassium	Nelson's Desert Bighorn Sheep	--	--	--	1.8E+01	1.8E+01	--	--	--	--
Selenium	Nelson's Desert Bighorn Sheep	1.1E-02	--	--	6.1E-03	1.7E-02	1.4E-01	2.2E-01	1E-01	8E-02
Sodium	Nelson's Desert Bighorn Sheep	--	--	--	8.5E+00	8.5E+00	--	--	--	--
Vanadium	Nelson's Desert Bighorn Sheep	3.5E-03	--	--	2.1E-01	2.2E-01	2.7E+00	5.4E+00	8E-02	4E-02
Zinc	Nelson's Desert Bighorn Sheep	6.3E-01	--	--	2.4E-01	8.7E-01	7.5E+01	3.0E+02	1E-02	3E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	4.6E-02	--	--	1.1E+00	1.1E+00	6.6E+01	3.3E+02	2E-02	3E-03
PAH High molecular weight	Nelson's Desert Bighorn Sheep	7.8E-02	--	--	1.5E-01	2.3E-01	6.2E-01	3.1E+00	4E-01	8E-02
Dioxins (presented in ng/kg)										
TEQ Avian	Nelson's Desert Bighorn Sheep	4.6E-04	--	--	2.5E-02	2.5E-02	--	--	--	--
TEQ Mammals	Nelson's Desert Bighorn Sheep	4.3E-04	--	--	2.3E-02	2.3E-02	7.3E-01	7.3E+00	3E-02	3E-03

See Notes and Abbreviations following Table BKG-C.5.

Table BKG-C.5

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Inorganics									
Aluminum	Gambel's Quail	1.6E+04	100% Plants	1.0E-01	3.5E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Arsenic	Gambel's Quail	1.1E+01	100% Plants	1.0E-01	4.1E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Barium	Gambel's Quail	4.1E+02	100% Plants	1.0E-01	6.4E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Beryllium	Gambel's Quail	6.7E-01	100% Plants	1.0E-01	4.4E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Cadmium	Gambel's Quail	1.1E+00	100% Plants	1.0E-01	6.6E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Calcium	Gambel's Quail	6.7E+04	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Chromium, hexavalent	Gambel's Quail	8.3E-01	100% Plants	1.0E-01	3.4E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Chromium, total	Gambel's Quail	4.0E+01	100% Plants	1.0E-01	1.6E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Cobalt	Gambel's Quail	1.3E+01	100% Plants	1.0E-01	9.5E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Copper	Gambel's Quail	1.7E+01	100% Plants	1.0E-01	5.9E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Iron	Gambel's Quail	2.9E+04	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Lead	Gambel's Quail	8.4E+00	100% Plants	1.0E-01	8.7E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Magnesium	Gambel's Quail	1.2E+04	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Manganese	Gambel's Quail	4.0E+02	100% Plants	1.0E-01	3.2E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Molybdenum	Gambel's Quail	1.4E+00	100% Plants	1.0E-01	3.4E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Nickel	Gambel's Quail	2.7E+01	100% Plants	1.0E-01	1.3E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Potassium	Gambel's Quail	4.4E+03	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Selenium	Gambel's Quail	1.5E+00	100% Plants	1.0E-01	7.8E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Sodium	Gambel's Quail	2.1E+03	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Vanadium	Gambel's Quail	5.2E+01	100% Plants	1.0E-01	2.5E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Zinc	Gambel's Quail	5.8E+01	100% Plants	1.0E-01	4.6E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Gambel's Quail	2.7E+02	100% Plants	1.0E-01	3.4E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
PAH High molecular weight	Gambel's Quail	3.8E+01	100% Plants	1.0E-01	5.7E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Gambel's Quail	6.0E+00	100% Plants	1.0E-01	3.3E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
TEQ Mammals	Gambel's Quail	5.6E+00	100% Plants	1.0E-01	3.1E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00
Inorganics									
Aluminum	Cactus Wren	1.6E+04	100% Insects	9.3E-02	1.6E+04	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Arsenic	Cactus Wren	1.1E+01	100% Insects	9.3E-02	1.3E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Barium	Cactus Wren	4.1E+02	100% Insects	9.3E-02	3.7E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Beryllium	Cactus Wren	6.7E-01	100% Insects	9.3E-02	3.0E-02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Cadmium	Cactus Wren	1.1E+00	100% Insects	9.3E-02	8.9E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Calcium	Cactus Wren	6.7E+04	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Chromium, hexavalent	Cactus Wren	8.3E-01	100% Insects	9.3E-02	2.5E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Chromium, total	Cactus Wren	4.0E+01	100% Insects	9.3E-02	1.2E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Cobalt	Cactus Wren	1.3E+01	100% Insects	9.3E-02	1.5E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Copper	Cactus Wren	1.7E+01	100% Insects	9.3E-02	8.7E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Iron	Cactus Wren	2.9E+04	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Lead	Cactus Wren	8.4E+00	100% Insects	9.3E-02	4.5E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Magnesium	Cactus Wren	1.2E+04	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Manganese	Cactus Wren	4.0E+02	100% Insects	9.3E-02	2.7E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Molybdenum	Cactus Wren	1.4E+00	100% Insects	9.3E-02	7.5E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Nickel	Cactus Wren	2.7E+01	100% Insects	9.3E-02	2.9E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Potassium	Cactus Wren	4.4E+03	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Selenium	Cactus Wren	1.5E+00	100% Insects	9.3E-02	1.2E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Sodium	Cactus Wren	2.1E+03	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Vanadium	Cactus Wren	5.2E+01	100% Insects	9.3E-02	2.2E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Zinc	Cactus Wren	5.8E+01	100% Insects	9.3E-02	3.2E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Cactus Wren	2.7E+02	100% Insects	9.3E-02	8.1E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00
PAH High molecular weight	Cactus Wren	3.8E+01	100% Insects	9.3E-02	9.8E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Cactus Wren	6.0E+00	100% Insects	9.3E-02	2.3E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
TEQ Mammals	Cactus Wren	5.6E+00	100% Insects	9.3E-02	2.1E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00
Inorganics									
Aluminum	Red-Tailed Hawk	1.6E+04	100% Mammals	1.4E-02	8.2E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Arsenic	Red-Tailed Hawk	1.1E+01	100% Mammals	1.4E-02	5.6E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Barium	Red-Tailed Hawk	4.1E+02	100% Mammals	1.4E-02	4.8E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Beryllium	Red-Tailed Hawk	6.7E-01	100% Mammals	1.4E-02	2.2E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00

Table BKG-C.5

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Inorganics										
Aluminum	Gambel's Quail	1.4E+01	--	--	6.5E+01	7.9E+01	pH<5.5	pH<5.5	--	--
Arsenic	Gambel's Quail	1.6E-02	--	--	4.4E-02	6.0E-02	5.5E+00	2.2E+01	1E-02	3E-03
Barium	Gambel's Quail	2.5E+00	--	--	1.6E+00	4.1E+00	--	--	--	--
Beryllium	Gambel's Quail	1.7E-02	--	--	2.7E-03	1.9E-02	--	--	--	--
Cadmium	Gambel's Quail	2.5E-02	--	--	4.4E-03	2.9E-02	7.0E-01	1.0E+01	4E-02	3E-03
Calcium	Gambel's Quail	--	--	--	2.7E+02	2.7E+02	--	--	--	--
Chromium, hexavalent	Gambel's Quail	1.3E-03	--	--	3.3E-03	4.6E-03	--	--	--	--
Chromium, total	Gambel's Quail	6.3E-02	--	--	1.6E-01	2.2E-01	2.7E+00	1.6E+01	8E-02	1E-02
Cobalt	Gambel's Quail	3.7E-03	--	--	5.1E-02	5.4E-02	--	--	--	--
Copper	Gambel's Quail	2.3E-01	--	--	6.7E-02	2.9E-01	2.3E+00	5.2E+01	1E-01	6E-03
Iron	Gambel's Quail	--	--	--	1.2E+02	1.2E+02	--	--	--	--
Lead	Gambel's Quail	3.4E-02	--	--	3.3E-02	6.7E-02	1.4E-02	8.8E+00	**5E+00**	8E-03
Magnesium	Gambel's Quail	--	--	--	4.8E+01	4.8E+01	--	--	--	--
Manganese	Gambel's Quail	1.2E+00	--	--	1.6E+00	2.8E+00	7.8E+01	7.8E+02	4E-02	4E-03
Molybdenum	Gambel's Quail	1.3E-02	--	--	5.5E-03	1.9E-02	3.5E+00	3.5E+01	5E-03	5E-04
Nickel	Gambel's Quail	4.9E-02	--	--	1.1E-01	1.6E-01	1.4E+00	5.6E+01	1E-01	3E-03
Potassium	Gambel's Quail	--	--	--	1.8E+01	1.8E+01	--	--	--	--
Selenium	Gambel's Quail	3.0E-02	--	--	5.9E-03	3.6E-02	2.3E-01	9.3E-01	2E-01	4E-02
Sodium	Gambel's Quail	--	--	--	8.3E+00	8.3E+00	--	--	--	--
Vanadium	Gambel's Quail	9.7E-03	--	--	2.1E-01	2.2E-01	3.4E-01	6.9E-01	6E-01	3E-01
Zinc	Gambel's Quail	1.8E+00	--	--	2.3E-01	2.0E+00	1.7E+01	1.7E+02	1E-01	1E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Gambel's Quail	1.3E-01	--	--	1.1E+00	1.2E+00	2.3E+01	2.3E+02	5E-02	5E-03
PAH High molecular weight	Gambel's Quail	2.2E-01	--	--	1.5E-01	3.7E-01	1.0E+01	1.0E+02	4E-02	4E-03
Dioxins (presented in ng/kg)										
TEQ Avian	Gambel's Quail	1.3E-03	--	--	2.4E-02	2.5E-02	1.4E+01	1.4E+02	2E-03	2E-04
TEQ Mammals	Gambel's Quail	1.2E-03	--	--	2.2E-02	2.3E-02	--	--	--	--
Inorganics										
Aluminum	Cactus Wren	--	3.0E+03	--	2.8E+02	3.3E+03	pH<5.5	pH<5.5	--	--
Arsenic	Cactus Wren	--	2.4E-01	--	1.9E-01	4.3E-01	5.5E+00	2.2E+01	8E-02	2E-02
Barium	Cactus Wren	--	6.8E+00	--	7.0E+00	1.4E+01	--	--	--	--
Beryllium	Cactus Wren	--	5.5E-03	--	1.1E-02	1.7E-02	--	--	--	--
Cadmium	Cactus Wren	--	1.6E+00	--	1.9E-02	1.7E+00	7.0E-01	1.0E+01	**2E+00**	2E-01
Calcium	Cactus Wren	--	--	--	1.1E+03	1.1E+03	--	--	--	--
Chromium, hexavalent	Cactus Wren	--	4.7E-02	--	1.4E-02	6.1E-02	--	--	--	--
Chromium, total	Cactus Wren	--	2.2E+00	--	6.8E-01	2.9E+00	2.7E+00	1.6E+01	1E+00	2E-01
Cobalt	Cactus Wren	--	2.8E-01	--	2.2E-01	5.0E-01	--	--	--	--
Copper	Cactus Wren	--	1.6E+00	--	2.9E-01	1.9E+00	2.3E+00	5.2E+01	8E-01	4E-02
Iron	Cactus Wren	--	--	--	5.0E+02	5.0E+02	--	--	--	--
Lead	Cactus Wren	--	8.2E-01	--	1.4E-01	9.6E-01	1.4E-02	8.8E+00	**7E+01**	1E-01
Magnesium	Cactus Wren	--	--	--	2.1E+02	2.1E+02	--	--	--	--
Manganese	Cactus Wren	--	4.9E+00	--	6.9E+00	1.2E+01	7.8E+01	7.8E+02	2E-01	2E-02
Molybdenum	Cactus Wren	--	1.4E-01	--	2.3E-02	1.6E-01	3.5E+00	3.5E+01	5E-02	5E-03
Nickel	Cactus Wren	--	5.3E+00	--	4.7E-01	5.8E+00	1.4E+00	5.6E+01	**4E+00**	1E-01
Potassium	Cactus Wren	--	--	--	7.5E+01	7.5E+01	--	--	--	--
Selenium	Cactus Wren	--	2.3E-01	--	2.5E-02	2.5E-01	2.3E-01	9.3E-01	1E+00	3E-01
Sodium	Cactus Wren	--	--	--	3.5E+01	3.5E+01	--	--	--	--
Vanadium	Cactus Wren	--	4.0E-01	--	8.9E-01	1.3E+00	3.4E-01	6.9E-01	**4E+00**	**2E+00**
Zinc	Cactus Wren	--	5.9E+01	--	9.9E-01	6.0E+01	1.7E+01	1.7E+02	**4E+00**	4E-01
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Cactus Wren	--	1.5E+02	--	4.6E+00	1.5E+02	2.3E+01	2.3E+02	**7E+00**	7E-01
PAH High molecular weight	Cactus Wren	--	1.8E+01	--	6.4E-01	1.9E+01	1.0E+01	1.0E+02	**2E+00**	2E-01
Dioxins (presented in ng/kg)										
TEQ Avian	Cactus Wren	--	4.2E+00	--	1.0E-01	4.3E+00	1.4E+01	1.4E+02	3E-01	3E-02
TEQ Mammals	Cactus Wren	--	3.9E+00	--	9.5E-02	4.0E+00	--	--	--	--
Inorganics										
Aluminum	Red-Tailed Hawk	--	--	6.5E+01	1.8E+01	8.3E+01	pH<5.5	pH<5.5	--	--
Arsenic	Red-Tailed Hawk	--	--	4.4E-03	1.2E-02	1.7E-02	5.5E+00	2.2E+01	3E-03	8E-04
Barium	Red-Tailed Hawk	--	--	3.8E-02	4.6E-01	4.9E-01	--	--	--	--
Beryllium	Red-Tailed Hawk	--	--	1.7E-03	7.5E-04	2.5E-03	--	--	--	--

Table BKG-C.5

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Cadmium	Red-Tailed Hawk	1.1E+00	100% Mammals	1.4E-02	3.0E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Calcium	Red-Tailed Hawk	6.7E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Chromium, hexavalent	Red-Tailed Hawk	8.3E-01	100% Mammals	1.4E-02	2.0E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Chromium, total	Red-Tailed Hawk	4.0E+01	100% Mammals	1.4E-02	3.5E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Cobalt	Red-Tailed Hawk	1.3E+01	100% Mammals	1.4E-02	3.2E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Copper	Red-Tailed Hawk	1.7E+01	100% Mammals	1.4E-02	1.2E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Iron	Red-Tailed Hawk	2.9E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Lead	Red-Tailed Hawk	8.4E+00	100% Mammals	1.4E-02	2.8E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Magnesium	Red-Tailed Hawk	1.2E+04	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Manganese	Red-Tailed Hawk	4.0E+02	100% Mammals	1.4E-02	8.2E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Molybdenum	Red-Tailed Hawk	1.4E+00	100% Mammals	1.4E-02	2.3E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Nickel	Red-Tailed Hawk	2.7E+01	100% Mammals	1.4E-02	3.6E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Potassium	Red-Tailed Hawk	4.4E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Selenium	Red-Tailed Hawk	1.5E+00	100% Mammals	1.4E-02	7.6E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Sodium	Red-Tailed Hawk	2.1E+03	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Vanadium	Red-Tailed Hawk	5.2E+01	100% Mammals	1.4E-02	6.4E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Zinc	Red-Tailed Hawk	5.8E+01	100% Mammals	1.4E-02	1.0E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Red-Tailed Hawk	2.7E+02	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
PAH High molecular weight	Red-Tailed Hawk	3.8E+01	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Red-Tailed Hawk	6.0E+00	100% Mammals	1.4E-02	4.1E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
TEQ Mammals	Red-Tailed Hawk	5.6E+00	100% Mammals	1.4E-02	3.8E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00
Inorganics									
Aluminum	Desert Shrew	1.6E+04	100% Insects	2.0E-02	1.6E+04	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Arsenic	Desert Shrew	1.1E+01	100% Insects	2.0E-02	1.3E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Barium	Desert Shrew	4.1E+02	100% Insects	2.0E-02	3.7E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Beryllium	Desert Shrew	6.7E-01	100% Insects	2.0E-02	3.0E-02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Cadmium	Desert Shrew	1.1E+00	100% Insects	2.0E-02	8.9E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Calcium	Desert Shrew	6.7E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Chromium, hexavalent	Desert Shrew	8.3E-01	100% Insects	2.0E-02	2.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Chromium, total	Desert Shrew	4.0E+01	100% Insects	2.0E-02	1.2E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Cobalt	Desert Shrew	1.3E+01	100% Insects	2.0E-02	1.5E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Copper	Desert Shrew	1.7E+01	100% Insects	2.0E-02	8.7E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Iron	Desert Shrew	2.9E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Lead	Desert Shrew	8.4E+00	100% Insects	2.0E-02	4.5E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Magnesium	Desert Shrew	1.2E+04	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Manganese	Desert Shrew	4.0E+02	100% Insects	2.0E-02	2.7E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Molybdenum	Desert Shrew	1.4E+00	100% Insects	2.0E-02	7.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Nickel	Desert Shrew	2.7E+01	100% Insects	2.0E-02	2.9E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Potassium	Desert Shrew	4.4E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Selenium	Desert Shrew	1.5E+00	100% Insects	2.0E-02	1.2E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Sodium	Desert Shrew	2.1E+03	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Vanadium	Desert Shrew	5.2E+01	100% Insects	2.0E-02	2.2E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Zinc	Desert Shrew	5.8E+01	100% Insects	2.0E-02	3.2E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Desert Shrew	2.7E+02	100% Insects	2.0E-02	8.1E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00
PAH High molecular weight	Desert Shrew	3.8E+01	100% Insects	2.0E-02	9.8E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Desert Shrew	6.0E+00	100% Insects	2.0E-02	2.3E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
TEQ Mammals	Desert Shrew	5.6E+00	100% Insects	2.0E-02	2.1E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00
Inorganics									
Aluminum	Desert Kit Fox	1.6E+04	100% Mammals	2.8E-02	8.2E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Arsenic	Desert Kit Fox	1.1E+01	100% Mammals	2.8E-02	5.6E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Barium	Desert Kit Fox	4.1E+02	100% Mammals	2.8E-02	4.8E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Beryllium	Desert Kit Fox	6.7E-01	100% Mammals	2.8E-02	2.2E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Cadmium	Desert Kit Fox	1.1E+00	100% Mammals	2.8E-02	3.0E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Calcium	Desert Kit Fox	6.7E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Chromium, hexavalent	Desert Kit Fox	8.3E-01	100% Mammals	2.8E-02	2.0E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Chromium, total	Desert Kit Fox	4.0E+01	100% Mammals	2.8E-02	3.5E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Cobalt	Desert Kit Fox	1.3E+01	100% Mammals	2.8E-02	3.2E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00

Table BKG-C.5

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Cadmium	Red-Tailed Hawk	--	--	2.4E-02	1.2E-03	2.5E-02	7.0E-01	1.0E+01	4E-02	2E-03
Calcium	Red-Tailed Hawk	--	--	--	7.4E+01	7.4E+01	--	--	--	--
Chromium, hexavalent	Red-Tailed Hawk	--	--	1.6E-02	9.2E-04	1.7E-02	--	--	--	--
Chromium, total	Red-Tailed Hawk	--	--	2.7E-01	4.4E-02	3.2E-01	2.7E+00	1.6E+01	1E-01	2E-02
Cobalt	Red-Tailed Hawk	--	--	2.5E-02	1.4E-02	3.9E-02	--	--	--	--
Copper	Red-Tailed Hawk	--	--	9.2E-01	1.9E-02	9.4E-01	2.3E+00	5.2E+01	4E-01	2E-02
Iron	Red-Tailed Hawk	--	--	--	3.3E+01	3.3E+01	--	--	--	--
Lead	Red-Tailed Hawk	--	--	2.2E-01	9.3E-03	2.3E-01	1.4E-02	8.8E+00	**2E+01**	3E-02
Magnesium	Red-Tailed Hawk	--	--	--	1.3E+01	1.3E+01	--	--	--	--
Manganese	Red-Tailed Hawk	--	--	6.5E-01	4.5E-01	1.1E+00	7.8E+01	7.8E+02	1E-02	1E-03
Molybdenum	Red-Tailed Hawk	--	--	1.8E-02	1.5E-03	1.9E-02	3.5E+00	3.5E+01	6E-03	6E-04
Nickel	Red-Tailed Hawk	--	--	2.9E-01	3.0E-02	3.2E-01	1.4E+00	5.6E+01	2E-01	6E-03
Potassium	Red-Tailed Hawk	--	--	--	4.9E+00	4.9E+00	--	--	--	--
Selenium	Red-Tailed Hawk	--	--	6.0E-02	1.6E-03	6.2E-02	2.3E-01	9.3E-01	3E-01	7E-02
Sodium	Red-Tailed Hawk	--	--	--	2.3E+00	2.3E+00	--	--	--	--
Vanadium	Red-Tailed Hawk	--	--	5.1E-02	5.8E-02	1.1E-01	3.4E-01	6.9E-01	3E-01	2E-01
Zinc	Red-Tailed Hawk	--	--	8.3E+00	6.4E-02	8.4E+00	1.7E+01	1.7E+02	5E-01	5E-02
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Red-Tailed Hawk	--	--	0.0E+00	3.0E-01	3.0E-01	2.3E+01	2.3E+02	1E-02	1E-03
PAH High molecular weight	Red-Tailed Hawk	--	--	0.0E+00	4.2E-02	4.2E-02	1.0E+01	1.0E+02	4E-03	4E-04
Dioxins (presented in ng/kg)										
TEQ Avian	Red-Tailed Hawk	--	--	3.2E-01	6.6E-03	3.3E-01	1.4E+01	1.4E+02	2E-02	2E-03
TEQ Mammals	Red-Tailed Hawk	--	--	3.0E-01	6.2E-03	3.1E-01	--	--	--	--
Inorganics										
Aluminum	Desert Shrew	--	3.3E+03	--	6.7E+01	3.4E+03	pH<5.5	pH<5.5	--	--
Arsenic	Desert Shrew	--	2.7E-01	--	4.5E-02	3.1E-01	3.2E-01	4.7E+00	1E+00	7E-02
Barium	Desert Shrew	--	7.6E+00	--	1.7E+00	9.2E+00	5.2E+01	8.3E+01	2E-01	1E-01
Beryllium	Desert Shrew	--	6.1E-03	--	2.7E-03	8.9E-03	5.3E-01	6.3E-01	2E-02	1E-02
Cadmium	Desert Shrew	--	1.8E+00	--	4.5E-03	1.8E+00	6.0E-02	2.6E+00	**3E+01**	7E-01
Calcium	Desert Shrew	--	--	--	2.7E+02	2.7E+02	--	--	--	--
Chromium, hexavalent	Desert Shrew	--	5.2E-02	--	3.4E-03	5.5E-02	9.2E+00	3.8E+01	6E-03	1E-03
Chromium, total	Desert Shrew	--	2.5E+00	--	1.6E-01	2.6E+00	2.4E+00	9.6E+00	1E+00	3E-01
Cobalt	Desert Shrew	--	3.1E-01	--	5.2E-02	3.7E-01	1.2E+00	2.0E+01	3E-01	2E-02
Copper	Desert Shrew	--	1.8E+00	--	6.8E-02	1.8E+00	2.7E+00	6.3E+02	7E-01	3E-03
Iron	Desert Shrew	--	--	--	1.2E+02	1.2E+02	--	--	--	--
Lead	Desert Shrew	--	9.1E-01	--	3.4E-02	9.4E-01	1.0E+00	2.4E+02	9E-01	4E-03
Magnesium	Desert Shrew	--	--	--	4.9E+01	4.9E+01	--	--	--	--
Manganese	Desert Shrew	--	5.4E+00	--	1.6E+00	7.0E+00	1.4E+01	1.6E+02	5E-01	4E-02
Molybdenum	Desert Shrew	--	1.5E-01	--	5.6E-03	1.6E-01	2.6E-01	2.6E+00	6E-01	6E-02
Nickel	Desert Shrew	--	5.9E+00	--	1.1E-01	6.0E+00	1.3E-01	3.2E+01	**4E+01**	2E-01
Potassium	Desert Shrew	--	--	--	1.8E+01	1.8E+01	--	--	--	--
Selenium	Desert Shrew	--	2.5E-01	--	6.0E-03	2.6E-01	5.0E-02	1.2E+00	**5E+00**	2E-01
Sodium	Desert Shrew	--	--	--	8.4E+00	8.4E+00	--	--	--	--
Vanadium	Desert Shrew	--	4.5E-01	--	2.1E-01	6.6E-01	4.2E+00	8.3E+00	2E-01	8E-02
Zinc	Desert Shrew	--	6.6E+01	--	2.4E-01	6.6E+01	9.6E+00	4.1E+02	**7E+00**	2E-01
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Shrew	--	1.7E+02	--	1.1E+00	1.7E+02	5.0E+01	1.5E+02	**3E+00**	1E+00
PAH High molecular weight	Desert Shrew	--	2.0E+01	--	1.5E-01	2.0E+01	1.3E+00	3.3E+01	**2E+01**	6E-01
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Shrew	--	4.7E+00	--	2.4E-02	4.7E+00	--	--	--	--
TEQ Mammals	Desert Shrew	--	4.3E+00	--	2.3E-02	4.3E+00	1.0E+00	1.0E+01	**4E+00**	4E-01
Inorganics										
Aluminum	Desert Kit Fox	--	--	2.9E+01	1.6E+01	4.5E+01	pH<5.5	pH<5.5	--	--
Arsenic	Desert Kit Fox	--	--	2.0E-03	1.1E-02	1.3E-02	3.2E-01	4.7E+00	4E-02	3E-03
Barium	Desert Kit Fox	--	--	1.7E-02	4.1E-01	4.2E-01	5.2E+01	8.3E+01	8E-03	5E-03
Beryllium	Desert Kit Fox	--	--	7.7E-04	6.7E-04	1.4E-03	5.3E-01	6.3E-01	3E-03	2E-03
Cadmium	Desert Kit Fox	--	--	1.1E-02	1.1E-03	1.2E-02	6.0E-02	2.6E+00	2E-01	4E-03
Calcium	Desert Kit Fox	--	--	--	6.6E+01	6.6E+01	--	--	--	--
Chromium, hexavalent	Desert Kit Fox	--	--	7.2E-03	8.2E-04	8.0E-03	9.2E+00	3.8E+01	9E-04	2E-04
Chromium, total	Desert Kit Fox	--	--	1.2E-01	3.9E-02	1.6E-01	2.4E+00	9.6E+00	7E-02	2E-02
Cobalt	Desert Kit Fox	--	--	1.1E-02	1.3E-02	2.4E-02	1.2E+00	2.0E+01	2E-02	1E-03

Table BKG-C.5

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Copper	Desert Kit Fox	1.7E+01	100% Mammals	2.8E-02	1.2E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Iron	Desert Kit Fox	2.9E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Lead	Desert Kit Fox	8.4E+00	100% Mammals	2.8E-02	2.8E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Magnesium	Desert Kit Fox	1.2E+04	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Manganese	Desert Kit Fox	4.0E+02	100% Mammals	2.8E-02	8.2E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Molybdenum	Desert Kit Fox	1.4E+00	100% Mammals	2.8E-02	2.3E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Nickel	Desert Kit Fox	2.7E+01	100% Mammals	2.8E-02	3.6E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Potassium	Desert Kit Fox	4.4E+03	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Selenium	Desert Kit Fox	1.5E+00	100% Mammals	2.8E-02	7.6E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Sodium	Desert Kit Fox	2.1E+03	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Vanadium	Desert Kit Fox	5.2E+01	100% Mammals	2.8E-02	6.4E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Zinc	Desert Kit Fox	5.8E+01	100% Mammals	2.8E-02	1.0E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Desert Kit Fox	2.7E+02	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
PAH High molecular weight	Desert Kit Fox	3.8E+01	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Desert Kit Fox	6.0E+00	100% Mammals	2.8E-02	4.1E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
TEQ Mammals	Desert Kit Fox	5.6E+00	100% Mammals	2.8E-02	3.8E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00
Inorganics									
Aluminum	Merriam's Kangaroo Rat	1.6E+04	100% Plants	2.4E-02	3.5E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Arsenic	Merriam's Kangaroo Rat	1.1E+01	100% Plants	2.4E-02	4.1E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Barium	Merriam's Kangaroo Rat	4.1E+02	100% Plants	2.4E-02	6.4E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Beryllium	Merriam's Kangaroo Rat	6.7E-01	100% Plants	2.4E-02	4.4E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Cadmium	Merriam's Kangaroo Rat	1.1E+00	100% Plants	2.4E-02	6.6E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Calcium	Merriam's Kangaroo Rat	6.7E+04	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Chromium, hexavalent	Merriam's Kangaroo Rat	8.3E-01	100% Plants	2.4E-02	3.4E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Chromium, total	Merriam's Kangaroo Rat	4.0E+01	100% Plants	2.4E-02	1.6E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Cobalt	Merriam's Kangaroo Rat	1.3E+01	100% Plants	2.4E-02	9.5E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Copper	Merriam's Kangaroo Rat	1.7E+01	100% Plants	2.4E-02	5.9E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Iron	Merriam's Kangaroo Rat	2.9E+04	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Lead	Merriam's Kangaroo Rat	8.4E+00	100% Plants	2.4E-02	8.7E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Magnesium	Merriam's Kangaroo Rat	1.2E+04	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Manganese	Merriam's Kangaroo Rat	4.0E+02	100% Plants	2.4E-02	3.2E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Molybdenum	Merriam's Kangaroo Rat	1.4E+00	100% Plants	2.4E-02	3.4E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Nickel	Merriam's Kangaroo Rat	2.7E+01	100% Plants	2.4E-02	1.3E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Potassium	Merriam's Kangaroo Rat	4.4E+03	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Selenium	Merriam's Kangaroo Rat	1.5E+00	100% Plants	2.4E-02	7.8E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Sodium	Merriam's Kangaroo Rat	2.1E+03	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Vanadium	Merriam's Kangaroo Rat	5.2E+01	100% Plants	2.4E-02	2.5E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Zinc	Merriam's Kangaroo Rat	5.8E+01	100% Plants	2.4E-02	4.6E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Merriam's Kangaroo Rat	2.7E+02	100% Plants	2.4E-02	3.4E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
PAH High molecular weight	Merriam's Kangaroo Rat	3.8E+01	100% Plants	2.4E-02	5.7E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Merriam's Kangaroo Rat	6.0E+00	100% Plants	2.4E-02	3.3E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
TEQ Mammals	Merriam's Kangaroo Rat	5.6E+00	100% Plants	2.4E-02	3.1E-02	3.4E-02	8.2E-02	2.0E-03	1.0E+00
Inorganics									
Aluminum	Nelson's Desert Bighorn Sheep	1.6E+04	100% Plants	3.0E-01	3.5E+02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Arsenic	Nelson's Desert Bighorn Sheep	1.1E+01	100% Plants	3.0E-01	4.1E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Barium	Nelson's Desert Bighorn Sheep	4.1E+02	100% Plants	3.0E-01	6.4E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Beryllium	Nelson's Desert Bighorn Sheep	6.7E-01	100% Plants	3.0E-01	4.4E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Cadmium	Nelson's Desert Bighorn Sheep	1.1E+00	100% Plants	3.0E-01	6.6E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Calcium	Nelson's Desert Bighorn Sheep	6.7E+04	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	8.3E-01	100% Plants	3.0E-01	3.4E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Chromium, total	Nelson's Desert Bighorn Sheep	4.0E+01	100% Plants	3.0E-01	1.6E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Cobalt	Nelson's Desert Bighorn Sheep	1.3E+01	100% Plants	3.0E-01	9.5E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Copper	Nelson's Desert Bighorn Sheep	1.7E+01	100% Plants	3.0E-01	5.9E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Iron	Nelson's Desert Bighorn Sheep	2.9E+04	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Lead	Nelson's Desert Bighorn Sheep	8.4E+00	100% Plants	3.0E-01	8.7E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Magnesium	Nelson's Desert Bighorn Sheep	1.2E+04	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Manganese	Nelson's Desert Bighorn Sheep	4.0E+02	100% Plants	3.0E-01	3.2E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00

Table BKG-C.5

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Copper	Desert Kit Fox	--	--	4.1E-01	1.7E-02	4.3E-01	2.7E+00	6.3E+02	2E-01	7E-04
Iron	Desert Kit Fox	--	--	--	2.9E+01	2.9E+01	--	--	--	--
Lead	Desert Kit Fox	--	--	9.8E-02	8.3E-03	1.1E-01	1.0E+00	2.4E+02	1E-01	4E-04
Magnesium	Desert Kit Fox	--	--	--	1.2E+01	1.2E+01	--	--	--	--
Manganese	Desert Kit Fox	--	--	2.9E-01	4.0E-01	6.9E-01	1.4E+01	1.6E+02	5E-02	4E-03
Molybdenum	Desert Kit Fox	--	--	8.0E-03	1.4E-03	9.4E-03	2.6E-01	2.6E+00	4E-02	4E-03
Nickel	Desert Kit Fox	--	--	1.3E-01	2.7E-02	1.6E-01	1.3E-01	3.2E+01	1E+00	5E-03
Potassium	Desert Kit Fox	--	--	--	4.4E+00	4.4E+00	--	--	--	--
Selenium	Desert Kit Fox	--	--	2.7E-02	1.5E-03	2.8E-02	5.0E-02	1.2E+00	6E-01	2E-02
Sodium	Desert Kit Fox	--	--	--	2.0E+00	2.0E+00	--	--	--	--
Vanadium	Desert Kit Fox	--	--	2.3E-02	5.2E-02	7.4E-02	4.2E+00	8.3E+00	2E-02	9E-03
Zinc	Desert Kit Fox	--	--	3.7E+00	5.7E-02	3.8E+00	9.6E+00	4.1E+02	4E-01	9E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Desert Kit Fox	--	--	0.0E+00	2.6E-01	2.6E-01	5.0E+01	1.5E+02	5E-03	2E-03
PAH High molecular weight	Desert Kit Fox	--	--	0.0E+00	3.7E-02	3.7E-02	1.3E+00	3.3E+01	3E-02	1E-03
Dioxins (presented in ng/kg)										
TEQ Avian	Desert Kit Fox	--	--	1.4E-01	5.9E-03	1.5E-01	--	--	--	--
TEQ Mammals	Desert Kit Fox	--	--	1.3E-01	5.5E-03	1.4E-01	1.0E+00	1.0E+01	1E-01	1E-02
Inorganics										
Aluminum	Merriam's Kangaroo Rat	2.9E+01	--	--	3.2E+01	6.1E+01	pH<5.5	pH<5.5	--	--
Arsenic	Merriam's Kangaroo Rat	3.4E-02	--	--	2.2E-02	5.6E-02	3.2E-01	4.7E+00	2E-01	1E-02
Barium	Merriam's Kangaroo Rat	5.3E+00	--	--	8.1E-01	6.1E+00	5.2E+01	8.3E+01	1E-01	7E-02
Beryllium	Merriam's Kangaroo Rat	3.6E-02	--	--	1.3E-03	3.7E-02	5.3E-01	6.3E-01	7E-02	6E-02
Cadmium	Merriam's Kangaroo Rat	5.4E-02	--	--	2.2E-03	5.6E-02	6.0E-02	2.6E+00	9E-01	2E-02
Calcium	Merriam's Kangaroo Rat	--	--	--	1.3E+02	1.3E+02	--	--	--	--
Chromium, hexavalent	Merriam's Kangaroo Rat	2.8E-03	--	--	1.6E-03	4.4E-03	9.2E+00	3.8E+01	5E-04	1E-04
Chromium, total	Merriam's Kangaroo Rat	1.3E-01	--	--	7.9E-02	2.1E-01	2.4E+00	9.6E+00	9E-02	2E-02
Cobalt	Merriam's Kangaroo Rat	7.8E-03	--	--	2.5E-02	3.3E-02	1.2E+00	2.0E+01	3E-02	2E-03
Copper	Merriam's Kangaroo Rat	4.9E-01	--	--	3.3E-02	5.2E-01	2.7E+00	6.3E+02	2E-01	8E-04
Iron	Merriam's Kangaroo Rat	--	--	--	5.8E+01	5.8E+01	--	--	--	--
Lead	Merriam's Kangaroo Rat	7.2E-02	--	--	1.7E-02	8.8E-02	1.0E+00	2.4E+02	9E-02	4E-04
Magnesium	Merriam's Kangaroo Rat	--	--	--	2.4E+01	2.4E+01	--	--	--	--
Manganese	Merriam's Kangaroo Rat	2.6E+00	--	--	7.9E-01	3.4E+00	1.4E+01	1.6E+02	2E-01	2E-02
Molybdenum	Merriam's Kangaroo Rat	2.8E-02	--	--	2.7E-03	3.1E-02	2.6E-01	2.6E+00	1E-01	1E-02
Nickel	Merriam's Kangaroo Rat	1.1E-01	--	--	5.4E-02	1.6E-01	1.3E-01	3.2E+01	1E+00	5E-03
Potassium	Merriam's Kangaroo Rat	--	--	--	8.7E+00	8.7E+00	--	--	--	--
Selenium	Merriam's Kangaroo Rat	6.4E-02	--	--	2.9E-03	6.7E-02	5.0E-02	1.2E+00	1E+00	6E-02
Sodium	Merriam's Kangaroo Rat	--	--	--	4.1E+00	4.1E+00	--	--	--	--
Vanadium	Merriam's Kangaroo Rat	2.1E-02	--	--	1.0E-01	1.2E-01	4.2E+00	8.3E+00	3E-02	1E-02
Zinc	Merriam's Kangaroo Rat	3.8E+00	--	--	1.1E-01	3.9E+00	9.6E+00	4.1E+02	4E-01	9E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Merriam's Kangaroo Rat	2.8E-01	--	--	5.3E-01	8.1E-01	5.0E+01	1.5E+02	2E-02	5E-03
PAH High molecular weight	Merriam's Kangaroo Rat	4.6E-01	--	--	7.4E-02	5.4E-01	1.3E+00	3.3E+01	4E-01	2E-02
Dioxins (presented in ng/kg)										
TEQ Avian	Merriam's Kangaroo Rat	2.8E-03	--	--	1.2E-02	1.5E-02	--	--	--	--
TEQ Mammals	Merriam's Kangaroo Rat	2.6E-03	--	--	1.1E-02	1.4E-02	1.0E+00	1.0E+01	1E-02	1E-03
Inorganics										
Aluminum	Nelson's Desert Bighorn Sheep	4.9E+00	--	--	6.8E+01	7.2E+01	pH<5.5	pH<5.5	--	--
Arsenic	Nelson's Desert Bighorn Sheep	5.7E-03	--	--	4.5E-02	5.1E-02	3.2E-01	4.7E+00	2E-01	1E-02
Barium	Nelson's Desert Bighorn Sheep	8.8E-01	--	--	1.7E+00	2.6E+00	5.2E+01	8.3E+01	5E-02	3E-02
Beryllium	Nelson's Desert Bighorn Sheep	6.0E-03	--	--	2.8E-03	8.8E-03	5.3E-01	6.3E-01	2E-02	1E-02
Cadmium	Nelson's Desert Bighorn Sheep	9.0E-03	--	--	4.5E-03	1.4E-02	6.0E-02	2.6E+00	2E-01	5E-03
Calcium	Nelson's Desert Bighorn Sheep	--	--	--	2.7E+02	2.7E+02	--	--	--	--
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	4.7E-04	--	--	3.4E-03	3.9E-03	9.2E+00	3.8E+01	4E-04	1E-04
Chromium, total	Nelson's Desert Bighorn Sheep	2.2E-02	--	--	1.6E-01	1.9E-01	2.4E+00	9.6E+00	8E-02	2E-02
Cobalt	Nelson's Desert Bighorn Sheep	1.3E-03	--	--	5.2E-02	5.4E-02	1.2E+00	2.0E+01	4E-02	3E-03
Copper	Nelson's Desert Bighorn Sheep	8.1E-02	--	--	6.9E-02	1.5E-01	2.7E+00	6.3E+02	6E-02	2E-04
Iron	Nelson's Desert Bighorn Sheep	--	--	--	1.2E+02	1.2E+02	--	--	--	--
Lead	Nelson's Desert Bighorn Sheep	1.2E-02	--	--	3.5E-02	4.7E-02	1.0E+00	2.4E+02	5E-02	2E-04
Magnesium	Nelson's Desert Bighorn Sheep	--	--	--	5.0E+01	5.0E+01	--	--	--	--
Manganese	Nelson's Desert Bighorn Sheep	4.4E-01	--	--	1.7E+00	2.1E+00	1.4E+01	1.6E+02	2E-01	1E-02

Table BKG-C.5

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)

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

COPEC	Terrestrial Receptors	Soil EPC (mg/kg)	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)
			Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate	
Molybdenum	Nelson's Desert Bighorn Sheep	1.4E+00	100% Plants	3.0E-01	3.4E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Nickel	Nelson's Desert Bighorn Sheep	2.7E+01	100% Plants	3.0E-01	1.3E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Potassium	Nelson's Desert Bighorn Sheep	4.4E+03	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Selenium	Nelson's Desert Bighorn Sheep	1.5E+00	100% Plants	3.0E-01	7.8E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Sodium	Nelson's Desert Bighorn Sheep	2.1E+03	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Vanadium	Nelson's Desert Bighorn Sheep	5.2E+01	100% Plants	3.0E-01	2.5E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Zinc	Nelson's Desert Bighorn Sheep	5.8E+01	100% Plants	3.0E-01	4.6E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Polycyclic Aromatic Hydrocarbons									
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	2.7E+02	100% Plants	3.0E-01	3.4E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
PAH High molecular weight	Nelson's Desert Bighorn Sheep	3.8E+01	100% Plants	3.0E-01	5.7E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00
Dioxins (presented in ng/kg)									
TEQ Avian	Nelson's Desert Bighorn Sheep	6.0E+00	100% Plants	3.0E-01	3.3E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00
TEQ Mammals	Nelson's Desert Bighorn Sheep	5.6E+00	100% Plants	3.0E-01	3.1E-02	6.8E+01	1.4E-02	4.1E-03	1.0E+00

Table BKG-C.5

Terrestrial Wildlife Risk Calculations for Background Threshold Values (SUF = 1, BTAG TRVs)

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

COPEC	Terrestrial Receptors	Dose From Dietary Components (mg/kg-day)				Total Dose (mg/kg-day)	TRV (mg/kg-day)		HQ (unitless)	
		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil		NOAEL	LOAEL	NOAEL	LOAEL
Molybdenum	Nelson's Desert Bighorn Sheep	4.7E-03	--	--	5.6E-03	1.0E-02	2.6E-01	2.6E+00	4E-02	4E-03
Nickel	Nelson's Desert Bighorn Sheep	1.8E-02	--	--	1.1E-01	1.3E-01	1.3E-01	3.2E+01	1E+00	4E-03
Potassium	Nelson's Desert Bighorn Sheep	--	--	--	1.8E+01	1.8E+01	--	--	--	--
Selenium	Nelson's Desert Bighorn Sheep	1.1E-02	--	--	6.1E-03	1.7E-02	5.0E-02	1.2E+00	3E-01	1E-02
Sodium	Nelson's Desert Bighorn Sheep	--	--	--	8.5E+00	8.5E+00	--	--	--	--
Vanadium	Nelson's Desert Bighorn Sheep	3.5E-03	--	--	2.1E-01	2.2E-01	4.2E+00	8.3E+00	5E-02	3E-02
Zinc	Nelson's Desert Bighorn Sheep	6.3E-01	--	--	2.4E-01	8.7E-01	9.6E+00	4.1E+02	9E-02	2E-03
Polycyclic Aromatic Hydrocarbons										
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	4.6E-02	--	--	1.1E+00	1.1E+00	5.0E+01	1.5E+02	2E-02	8E-03
PAH High molecular weight	Nelson's Desert Bighorn Sheep	7.8E-02	--	--	1.5E-01	2.3E-01	1.3E+00	3.3E+01	2E-01	7E-03
Dioxins (presented in ng/kg)										
TEQ Avian	Nelson's Desert Bighorn Sheep	4.6E-04	--	--	2.5E-02	2.5E-02	--	--	--	--
TEQ Mammals	Nelson's Desert Bighorn Sheep	4.3E-04	--	--	2.3E-02	2.3E-02	1.0E+00	1.0E+01	2E-02	2E-03

See Notes and Abbreviations following Table BKG-C.5.

Table BKG-C Table Notes
Notes for Terrestrial Wildlife Risk Calculations

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

Notes:

[a] Dioxin presented in ng/kg.

[b] Total dose equation is presented below:

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

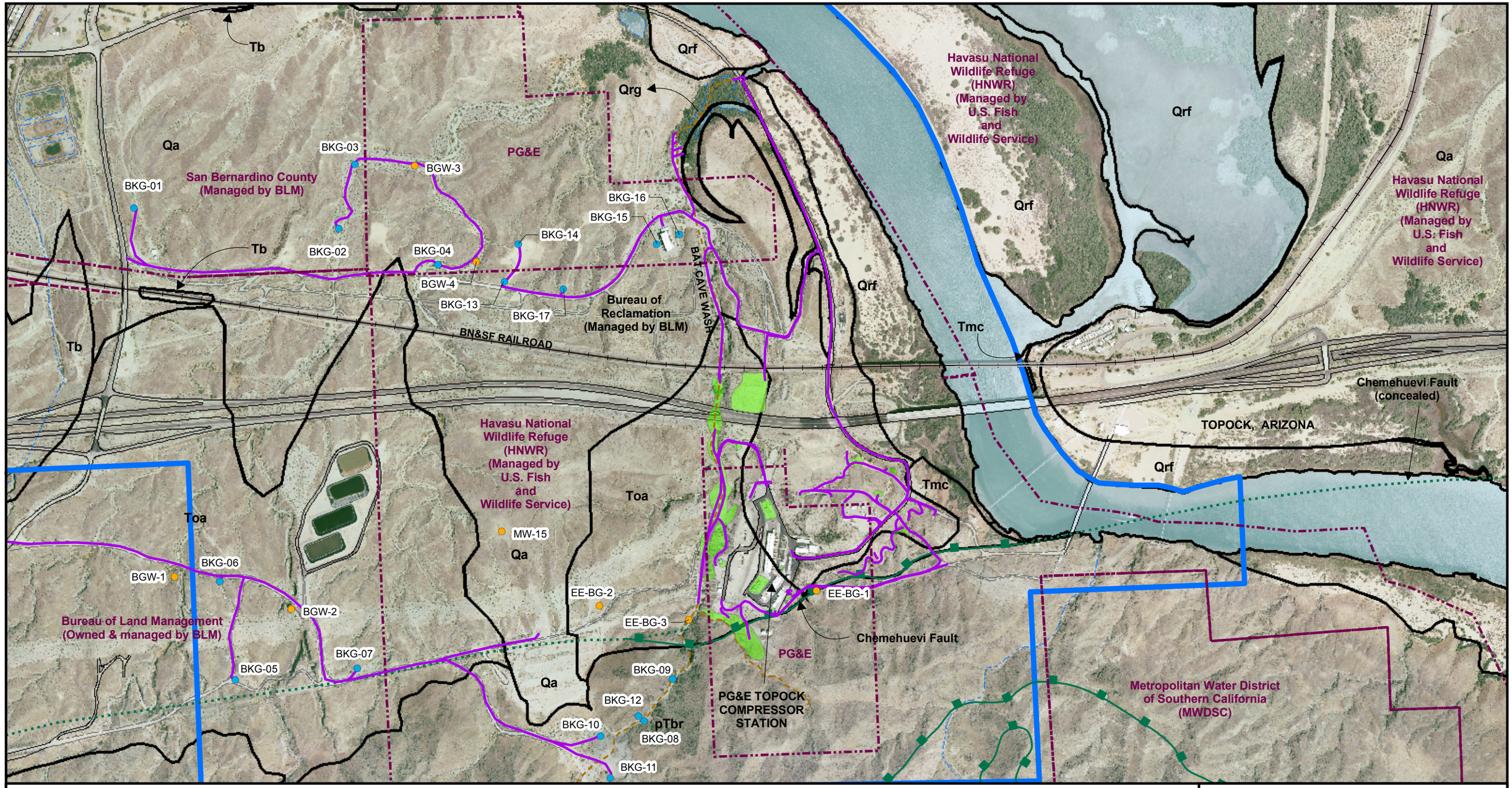
[c] HQ = Total Dose / TRV

Abbreviations:

AOC = area of concern
BTAG = Biological Technical Assistance Group
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)
m = maximum detected concentration
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)
SIR = soil ingestion rate (kg dw/kg bw-day)
SUF = site use factor (fraction)
TRV = toxicity reference value (mg/kg-day)

ATTACHMENT D

Ambient/Background Soil Sample Locations at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California



LEGEND

Qrf = Quaternary Colorado River and recent Floodplain Deposits

Qrg = Quaternary River Gravels

Qa = Quaternary Alluvium and surficial deposits, undifferentiated

Tb = Bouse Formation

Toa = Tertiary Alluvium (Fanglomerate of Metzger and Loeltz)

Tmc = Miocene Conglomerate (Bedrock)

pTbr = Pre-Tertiary Bedrock (Metadiorite, Gneiss, Granitic Rocks)

Detachment Fault
barbs on downthrown side

Detachment Fault concealed

Ravine

2008 Soil Background Location

Pre-Existing Background Soil Sample Locations

Solid Waste Management Unit (SWMU)

Area of Concern (AOC)

Vehicle Access Route *

Area of Potential Effects

N

0 750 1,500 Feet

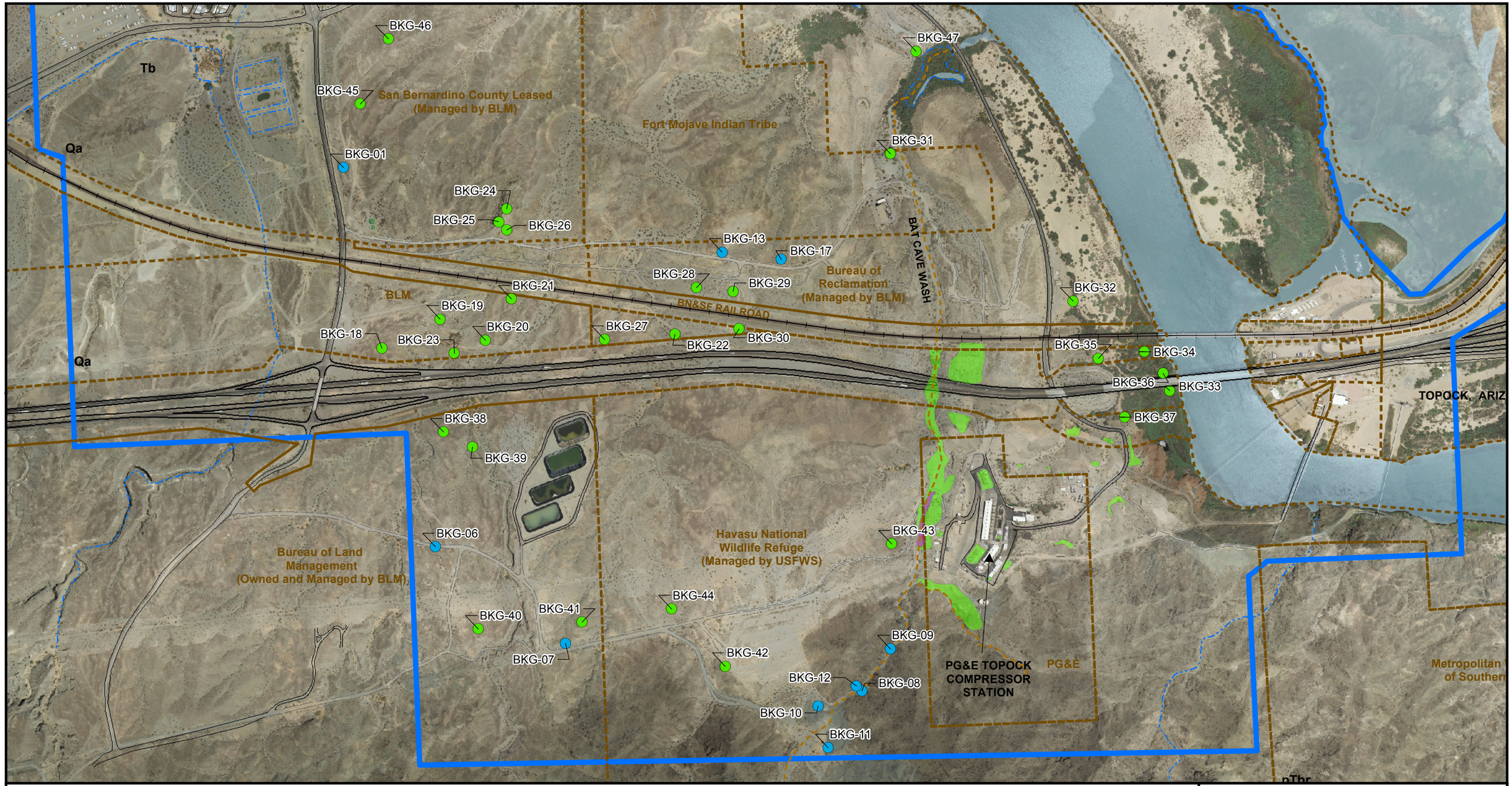
NOTE:
Generalized surface geologic map compiled from Metzger and Loeltz (1973), John (1987), Howard and others (1997) and PG&E technical reports.

FIGURE 1
GEOLOGIC MAP OF STUDY AREA BACKGROUND SOIL SAMPLE LOCATIONS AND SWMUS/AOCS ACCESS ROUTES

TOPOCK SOIL BACKGROUND INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

\\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MAPFILES\2008\SWP\SOIL_BACKGROUND_STUDY.MXD BKAHLER 3/1/2009 17:26:52



Legend

- 2008 Soil Background Location
- 2017 Soil Background Location
- Bat Cave Wash Channel
- Solid Waste Management Unit (SWMU)
- Area of Concern (AOC)
- Area of Potential Effects

N

0 0.05 0.1 0.2 Miles

Figure 1

Ambient/Background Soil Sample Locations
Work Plan for Background Study of Dioxins and Furans
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

ch2m

\\brookside\gis_share\ENBG\00_Proj\P\PGE\Topock\MapFiles\2017\BackgroundStudy\DioxinFuran_Locations_Soil_Background_Study.mxd

ATTACHMENT E

Ambient/Background Soil Analytical Data at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Appendix A-1
Soil Sample Results; Metals
Background Data Set
Soil Background Investigation
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

					Metals (mg/kg)																
Location	Lithologic Unit	Sample Date	Depth (ft bgs)	Sample Type	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium, Hexavalent	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
BGW-1	Toa	02/19/03	0	N	---	---	---	---	---	31.8	ND (4.3)	---	23.2 ^	---	---	---	21.6	---	---	---	---	66.1
BGW-1	Toa	02/19/03	1	N	---	2.39	162	0.672	---	22	4 ^	7.09	11.6	4.75	---	0.529	20.4	0.927	---	---	35.7	33.1
BGW-2	Toa	02/19/03	0	N	---	---	---	---	---	23.7	ND (3.7)	---	10.2	---	---	---	18.3	---	---	---	---	29.5
BGW-2	Toa	02/19/03	1	N	---	1.68	63.5	0.512	---	22.3	ND (4)	7.02	7.73	2.59	---	0.451 J	21	ND (0.943)	---	---	27.7	40.5
BGW-3	Wash (Qya)	02/19/03	0	N	---	---	---	---	---	18.5	ND (4.1)	---	11.8	---	---	---	14.8	---	---	---	---	47.7
BGW-3	Wash (Qya)	02/19/03	1	N	---	1.51	97.3	0.636	---	24.5	ND (4.1)	7.44	11.5	3.43	---	0.542 J	19.9	ND (0.911)	---	---	34.2	34.6
BGW-4	Wash (Qya)	02/19/03	0	N	---	---	---	---	---	21.3	ND (4)	---	14.4	---	---	---	13.8	---	---	---	---	43.6
BGW-4	Wash (Qya)	02/19/03	1	N	---	0.884	66.9	0.459	---	32.4	ND (3.9)	7.61	7.5	3.08	---	0.383 J	16.9	0.738 J	---	---	24.6	29.1
BKG-01	Qa	09/18/08	0-0.5	N	ND (2)	4.2	310	ND (2)	ND (1)	17	ND (0.406)	4.9	14	7.8	ND (0.1)	ND (2)	14	ND (1)	ND (2)	ND (4.1)	24	34
BKG-01	Qa	09/18/08	2-3	N	ND (2)	3.2	200	ND (2)	ND (1)	27	ND (0.406)	7.8	13	3.2	ND (0.1)	ND (2)	23	ND (1)	ND (2)	ND (4)	35	31
BKG-02	Wash (Qya)	09/18/08	0-0.5	N	ND (2)	1.7	77	ND (2)	ND (1)	23	ND (0.41)	6	9.3	6.7	ND (0.1)	ND (2)	14	ND (1)	ND (2)	ND (4)	28	31
BKG-02	Wash (Qya)	09/18/08	2-3	N	ND (2)	2	120	ND (2)	ND (1)	29	ND (0.407)	7.5	10	3.4	ND (0.1)	ND (2)	20	ND (1)	ND (2)	ND (4.1)	33	34
BKG-02	Wash (Qya)	09/18/08	5-6	N	ND (2)	1.6	100	ND (2)	ND (1)	35	ND (0.405)	8.4	10	2.5	ND (0.1)	ND (2)	20	ND (1)	ND (2)	ND (4)	35	35
BKG-02	Wash (Qya)	09/18/08	9-10	N	ND (2)	1.7	88	ND (2)	ND (1)	26	ND (0.407)	8.2	9.9	2.9	ND (0.1)	ND (2)	18	ND (1)	ND (2)	ND (4.1)	36	38
BKG-03	Wash (Qya)	09/18/08	0-0.5	N	ND (2)	2.7	87	ND (2)	ND (1)	24	ND (0.41)	7.6	11	4.8	ND (0.1)	ND (2)	18	ND (1)	ND (2)	ND (4.1)	33	35
BKG-03	Wash (Qya)	09/18/08	2-3	N	ND (2)	ND (1)	99	ND (5)	ND (1)	30	ND (0.404)	8.6	11	2.7	ND (0.1)	ND (5)	21	ND (1)	ND (5)	ND (10)	37	36
BKG-03	Wash (Qya)	09/18/08	5-6	N	ND (2)	1.4	130	ND (5.1)	ND (1)	27	ND (0.404)	8.6	11	3	ND (0.1)	ND (5.1)	19	ND (1)	ND (5.1)	ND (10)	38	38
BKG-03	Wash (Qya)	09/18/08	9-10	N	ND (2)	1.8	160	ND (5.1)	ND (1)	32	ND (0.405)	9.6	12	3.1	ND (0.1)	ND (5.1)	22	ND (1)	ND (5.1)	ND (10)	43	41
BKG-04	Wash (Qya)	09/18/08	0-0.5	N	ND (2)	1.4	81	ND (2)	ND (1)	19	ND (0.408)	6.1	8.6	3.6	ND (0.1)	ND (2)	12	ND (1)	ND (2)	ND (4.1)	34	33
BKG-04	Wash (Qya)	09/18/08	0-0.5	FD	ND (2)	1.4	87	ND (2)	ND (1)	19	ND (0.409)	5.8	7.8	4	ND (0.1)	ND (2)	13	ND (1)	ND (2)	ND (4.1)	35	33
BKG-04	Wash (Qya)	09/18/08	2-3	N	ND (2)	2.2	110	ND (2)	ND (1)	20	ND (0.407)	6.6	9.5	3.9	ND (0.1)	ND (2)	14	ND (1)	ND (2)	ND (4.1)	33	35
BKG-04	Wash (Qya)	09/18/08	5-6	N	ND (2)	3.2	130	ND (2)	ND (1)	18	ND (0.409)	6.3	8.8	3.9	ND (0.1)	ND (2)	12	ND (1)	ND (2)	ND (4.1)	31	33
BKG-04	Wash (Qya)	09/18/08	9-10	N	ND (2)	1.9	120	ND (2)	ND (1)	20	ND (0.407)	7.4	9	3.7	ND (0.1)	ND (2)	13	ND (1)	ND (2)	ND (4.1)	37	33
BKG-05	Toa	09/19/08	0-0.5	N	ND (2.1)	5.4	200	ND (2.1)	ND (1)	19	ND (0.415)	6	14	7.7	ND (0.11)	ND (2.1)	14	ND (1)	ND (2.1)	ND (4.2)	35	35
BKG-05	Toa	09/19/08	2-3	N	ND (2)	3.4	77	ND (1)	ND (1)	4.2	ND (0.402)	2.3	3	3.1	ND (0.099)	1.4	3.9	ND (1)	ND (1)	ND (2)	9.4	12
BKG-05	Toa	09/19/08	5-6	N	ND (2)	2.6	170	ND (1)	ND (1)	18	ND (0.403)	6.9	8.2	1.9	ND (0.1)	ND (1)	13	ND (1)	ND (1)	ND (2)	26	22
BKG-06	Toa	09/19/08	0-0.5	N	ND (2.1)	3.5	210	ND (2.1)	ND (1)	23	ND (0.411)	5.8	11	6.8	ND (0.1)	ND (2.1)	17	ND (1)	ND (2.1)	ND (4.1)	34	35
BKG-06	Toa	09/19/08	2-3	N	ND (2)	2.8	73	ND (5.1)	ND (1)	34	ND (0.41)	9	12	3.1	ND (0.1)	ND (5.1)	25	ND (1)	ND (5.1)	ND (10)	42	39
BKG-06	Toa	09/19/08	5-6	N	ND (2)	5.2	170	ND (2)	ND (1)	32	ND (0.411)	10	11	3.5	ND (0.1)	ND (2)	23	ND (2)	ND (2)	ND (4.1)	45	40
BKG-06	Toa	09/19/08	9-10	N	ND (2.1)	4	150	ND (5.2)	ND (1)	43	ND (0.415)	11	16	1.9	ND (0.1)	ND (5.2)	30	2.7	ND (5.2)	ND (10)	59	43
BKG-07	Toa	09/19/08	0-0.5	N	ND (2.1)	4.7	190	ND (2.1)	ND (1.1)	16	ND (0.421)	4.8	10	8.4	ND (0.11)	ND (2.1)	12	ND (1.1)	ND (2.1)	ND (4.2)	24	33
BKG-07	Toa	09/19/08	0-0.5	FD	ND (2.1U)	5.3	190 J	ND (2.1)	ND (1)	15	0.707	5.3	9.8	8.6	ND (0.1)	ND (2.1)	12	1.6	ND (2.1)	ND (4.2)	22	34
BKG-07	Toa	09/19/08	2-3	N	ND (2)	5.3	150	ND (2)	ND (1)	36	ND (0.409)	11	8.1	2.2	ND (0.1)	ND (2)	23	ND (1)	ND (2)	ND (4.1)	46	39
BKG-07	Toa	09/19/08	5-6	N	ND (2.1)	4.6	120	ND (2.1)	ND (1)	53	ND (0.405)	13	10	2.5	ND (0.1)	ND (2.1)	31	ND (1)	ND (2.1)	ND (4.1)	45	39
BKG-07	Toa	09/19/08	9-10	N	ND (2.1)	2.2	74	ND (5.4)	ND (1.1)	45	ND (0.406)	14	14	ND (5.4)	ND (0.11)	ND (5.4)	29	ND (1.1)	ND (5.4)	ND (11)	52	44
BKG-08	Wash (Qya)	08/23/08	0-0.5	N	ND (10)	12	190	ND (5)	ND (5)	27	ND (0.402)	11	18	9	ND (0.1)	ND (5)	25	ND (5)	ND (5)	ND (10)	47	58
BKG-08	Wash (Qya)	08/23/08	1-2	N	ND (10U)	11	150	ND (5)	ND (5)	27	ND (0.402)	9.7	17	7.1	ND (0.1)	ND (5)	23	ND (5)	ND (5)	ND (10)	46	51
BKG-09	Wash (Qya)	08/23/08	0-0.5	N	ND (4)	5.6	140	ND (2)	ND (2)	19	ND (0.402)	8.2	15	4.6	ND (0.1)	ND (2)	17	ND (2)	ND (2)	ND (4)	37	42
BKG-10	pTbr	09/19/08	0-0.5	N	ND (2)	4.2	150	ND (1)	ND (1)	12	ND (0.404)	4.6	8.4	6.9	ND (0.099)	ND (1)	8.4	ND (1)	ND (1)	ND (2)	24	28
BKG-10	pTbr	09/19/08	1-2	N	ND (2)	4.7	180	ND (2)	ND (1)	17	ND (0.402)	5.7	8.9	5	ND (0.1)	ND (2)	11	ND (1)	ND (2)	ND (4)	25	31
BKG-11	pTbr	09/19/08	0-0.5	N	ND (2)	5.3	200	ND (2)	ND (1)	19	ND (0.412)	8.3	16	7.7	ND (0.1)	ND (2)	14	ND (1)	ND (2)	ND (4)	34	50
BKG-11	pTbr	09/19/08	0-0.5	FD	ND (2)	5.4	200	ND (2)	ND (1)	19	ND (0.403)	8.2	16	7.5	ND (0.1)	ND (2)	15	ND (1)	ND (2)	ND (4)	33	50
BKG-11	pTbr	09/19/08	1-2	N	ND (2)	2.7	110	ND (1)	ND (1)	17	ND (0.402)	7.6	11	3.2	ND (0.1)	ND (1)	11	ND (1)	ND (1)	ND (2)	31	35
BKG-12	pTbr	08/23/08	0-0.5	N	ND (4)	5.5	110	ND (2)	ND (2)	19	ND (0.401)	7.4	13	4.7	ND (0.1)	ND (2)	16	ND (2)	ND (2)	ND (4)	34	38
BKG-12	pTbr	08/23/08	2-3	N	ND (4)	6.9	140	ND (2)	ND (2)	24	ND (0.402)	8.2	15	6.9	ND (0.1)	ND (2)	20	ND (2)	ND (2)	ND (4)	37	49
BKG-12	pTbr	08/23/08	5-6	N	ND (4)	6.3	120	ND (2)	ND (2)	17	ND (0.403)	6.8	12	4.9	ND (0.1)	ND (2)	15	ND (2)	ND (2)	ND (4)	30	38

Appendix A-1
Soil Sample Results; Metals
Background Data Set
Soil Background Investigation
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

					Metals (mg/kg)																
Location	Lithologic Unit	Sample Date	Depth (ft bgs)	Sample Type	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium, Hexavalent	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
BKG-13	Qa	09/20/08	0-0.5	N	ND (2.1)	9.2	660	ND (5.1)	ND (1)	17	ND (0.414)	ND (5.1)	11	10	ND (0.1)	ND (5.1)	13	ND (1)	ND (5.1)	ND (10)	27	37
BKG-13	Qa	09/20/08	2-3	N	ND (2)	3.6	130	ND (1)	ND (1)	21	ND (0.41)	8	8.7	3.1	ND (0.1)	1.2	12	ND (1)	ND (1)	ND (2)	35	39
BKG-13	Qa	09/20/08	5-6	N	ND (2)	3.9	74	ND (1)	ND (1)	26	0.504	9	9.6	3.8	ND (0.1)	ND (1)	15	ND (1)	ND (1)	ND (2)	40	45
BKG-13	Qa	09/20/08	9-10	N	ND (2)	3.7	470	ND (2)	1.1	30	0.83	9	6.8	3.1	ND (0.1)	2.8	14	ND (1)	ND (2)	ND (4)	39	41
BKG-14	Qa	09/20/08	0-0.5	N	ND (2)	7.8	380	ND (2)	ND (1)	15	ND (0.405)	4.6	11	8	ND (0.1)	ND (2)	11	ND (1)	ND (2)	ND (4)	24	29
BKG-14	Qa	09/20/08	0-0.5	FD	ND (2)	7.4	450	ND (2)	ND (1)	15	ND (0.417)	4.4	12	8.2	ND (0.1)	ND (2)	11	ND (1)	ND (2)	ND (4)	24	29
BKG-14	Qa	09/20/08	2-3	N	ND (2)	4.3	160	ND (1)	ND (1)	23	ND (0.406)	8.1	7	2.9	ND (0.1)	ND (1)	12	ND (1)	ND (1)	ND (2)	34	36
BKG-14	Qa	09/20/08	5-6	N	ND (2)	3.5	210	ND (1)	ND (1)	28	ND (0.408)	11	8.5	3.4	ND (0.1)	ND (1)	17	ND (1)	ND (1)	ND (2)	42	49
BKG-14	Qa	09/20/08	9-10	N	ND (2)	3.1	330	ND (1)	ND (1)	28	ND (0.408)	11	7.9	3.1	ND (0.1)	ND (1)	15	1.2	ND (1)	ND (2)	46	53
BKG-15	Qa	09/20/08	0-0.5	N	ND (2)	4.8	160	ND (1)	ND (1)	10	ND (0.404)	4.2	5.4	5.2	ND (0.1)	ND (1)	7.5	ND (1)	ND (1)	ND (2)	22	24
BKG-15	Qa	09/20/08	2-3	N	ND (2)	1.8	120	ND (1)	ND (1)	15	ND (0.408)	7.6	9.1	2.4	ND (0.1)	1	11	1.8	ND (1)	ND (2)	33	34
BKG-15	Qa	09/20/08	5-6	N	ND (2)	2.6	180	ND (1)	ND (1)	21	ND (0.407)	8.5	8.9	2.7	ND (0.1)	1.3	12	ND (1)	ND (1)	ND (2)	33	39
BKG-15	Qa	09/20/08	9-10	N	ND (2)	2.6	100	ND (2)	ND (1)	26	ND (0.409)	12	12	2.6	ND (0.1)	ND (2)	16	2	ND (2)	ND (4.1)	40	47
BKG-16	Qa	09/23/08	0-0.5	N	ND (2)	5.3	160	ND (2)	ND (1)	12	ND (0.435)	5.4	10	6.5	ND (0.1)	ND (2)	9.4	ND (1)	ND (2)	ND (4)	22	35
BKG-16	Qa	09/23/08	2-3	N	ND (2.1)	4.4	210	ND (1)	ND (1)	15	ND (0.407)	6.7	8.5	4	ND (0.1)	ND (1)	10	ND (1)	ND (1)	ND (2.1)	30	34
BKG-16	Qa	09/23/08	5-6	N	ND (2)	2.4	130	ND (1)	ND (1)	14	ND (0.406)	6.3	6.8	2.7	ND (0.1)	1.2	10	ND (1)	ND (1)	ND (2)	29	33
BKG-16	Qa	09/23/08	9-10	N	ND (2)	2.5	130	ND (1)	ND (1)	16	ND (0.41)	8.8	11	2.4	ND (0.1)	ND (1)	10	ND (1)	ND (1)	ND (2)	32	40
BKG-17	Qa	09/20/08	0-0.5	N	ND (2)	6.2	400	ND (1)	ND (1)	8.9	ND (0.403)	3	4.7	5.1	ND (0.1)	ND (1)	6.4	ND (1)	ND (1)	ND (2)	19	19
BKG-17	Qa	09/20/08	2-3	N	ND (2)	3.7	93	ND (1)	ND (1)	26	ND (0.411)	10	12	3.1	ND (0.1)	ND (1)	15	ND (1)	ND (1)	ND (2)	41	49
BKG-17	Qa	09/20/08	5-6	N	ND (2)	9.4	320	ND (2)	ND (1)	22	ND (0.406)	6.8	8.5	5.8	ND (0.099)	ND (2)	12	ND (1)	ND (2)	ND (4)	39	35
BKG-17	Qa	09/20/08	9-10	N	ND (2.1U)	3.5	56	ND (1)	ND (1)	27	ND (0.401)	11	11	4.2	ND (0.1)	ND (1)	16	ND (1)	ND (1)	ND (2.1)	42	48
EEBG-1	pTbr	04/13/99	0	N	---	---	---	---	---	21.8	0.51	---	12.4	---	---	---	16.5	---	---	---	---	52.4
EEBG-2	Toa	04/14/99	0	N	---	---	---	---	---	12.3	0.51	---	13.1	---	---	---	9.6	---	---	---	---	32.7
EEBG-3	Wash (Qya)	04/14/99	0	N	---	---	---	---	---	25.7	0.5	---	15.9	---	---	---	18.1	---	---	---	---	48.3
MW-15	Qa	07/10/97	1	N	---	---	---	---	---	8.6	ND (0.05)	---	7.3	---	---	---	6.7	---	---	---	---	22.2
MW-15	Qa	07/10/97	3	N	---	---	---	---	---	9	ND (0.05)	---	5.9	---	---	---	7.4	---	---	---	---	21.4
MW-15	Qa	07/10/97	6	N	---	---	---	---	---	8.4	ND (0.05)	---	2.3	---	---	---	2.6	---	---	---	---	8.4
MW-15	Qa	07/10/97	10	N	---	---	48.4	---	---	12.8	ND (0.05)	---	2.1	3.2	---	0.49	4	---	---	---	11.3	13

Notes:

ft bgs	feet below ground surface
mg/kg	milligrams per kilogram
N	primary sample
FD	field duplicate sample
^	This concentration was removed from the background dataset because it is considered an outlier
ND	not detected at listed reporting limit
J	estimated value
---	not analyzed
Qa	Quaternary Alluvium and surficial deposits undifferentiated
Toa	Tertiary Alluvium (Fanglomerate of Metzger and Loeltz)
pTbr	Pre-Tertiary Bedrock (Metadiorite, Gneiss, Granitic Rock)
Wash (Qya)	Recent wash deposits

Appendix A-2
Soil Sample Results; PAHs
Background Data Set
Soil Background Investigation
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Location	Lithologic Unit	Sample Date	Depth (ft bgs)	Sample Type	Polycyclic Aromatic Hydrocarbons (ug/kg)																	
					1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (ghi) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
BKG-01	Qa	09/18/08	0-0.5	N	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
BKG-02	Wash (Qya)	09/18/08	0-0.5	N	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
BKG-03	Wash (Qya)	09/18/08	0-0.5	N	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
BKG-04	Wash (Qya)	09/18/08	0-0.5	N	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
BKG-04	Wash (Qya)	09/18/08	0-0.5	FD	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
BKG-05	Toa	09/19/08	0-0.5	N	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2U)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)
BKG-06	Toa	09/19/08	0-0.5	N	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)
BKG-07	Toa	09/19/08	0-0.5	N	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3U)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)
BKG-07	Toa	09/19/08	0-0.5	FD	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3U)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)
BKG-08	Wash (Qya)	08/23/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-09	Wash (Qya)	08/23/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-10	pTbr	09/19/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-11	pTbr	09/19/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-11	pTbr	09/19/08	0-0.5	FD	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-12	pTbr	08/23/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-13	Qa	09/20/08	0-0.5	N	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
BKG-14	Qa	09/20/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-14	Qa	09/20/08	0-0.5	FD	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-15	Qa	09/20/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-16	Qa	09/23/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BKG-17	Qa	09/20/08	0-0.5	N	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)

Notes:

ft bgs	feet below ground surface
ug/kg	micrograms per kilogram
N	primary sample
FD	field duplicate sample
ND	not detected at listed reporting limit
Qa	Quaternary Alluvium and surficial deposits undifferentiated
Toa	Tertiary Alluvium (Fanglomerate of Metzger and Loeltz)
pTbr	Pre-Tertiary Bedrock (Metadiorite, Gneiss, Granitic Rock)
Wash (Qya)	Recent wash deposits

Appendix A-3
Soil Sample Results; Pesticides
Background Data Set
Soil Background Investigation
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

					Pesticides (ug/kg)																		
Location	Lithologic Unit	Sample Date	Depth (ft bgs)	Sample Type	4,4-DDD	4,4-DDE	4,4-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endo sulfan I	Endo sulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC	gamma-Chlordane	Heptachlor	Heptachlor Epoxide	Methoxy chlor	Toxaphene
BKG-01	Qa	09/18/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5.1)	ND (51)
BKG-02	Wash (Qya)	09/18/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5.1)	ND (51)
BKG-03	Wash (Qya)	09/18/08	0-0.5	N	ND (2.1)	ND (2.1)	ND (2.1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2.1)	ND (1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5.1)	ND (51)
BKG-04	Wash (Qya)	09/18/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5.1)	ND (51)
BKG-04	Wash (Qya)	09/18/08	0-0.5	FD	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5.1)	ND (51)
BKG-05	Toa	09/19/08	0-0.5	N	ND (2.1)	ND (2.1)	ND (2.1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2.1)	ND (1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5.2)	ND (52)
BKG-06	Toa	09/19/08	0-0.5	N	ND (2.1)	ND (2.1)	ND (2.1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2.1)	ND (1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5.2)	ND (52)
BKG-07	Toa	09/19/08	0-0.5	N	ND (2.1)	ND (2.1)	ND (2.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (2.1)	ND (1.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (5.3)	ND (53)
BKG-07	Toa	09/19/08	0-0.5	FD	ND (2.1)	ND (2.1)	ND (2.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (2.1)	ND (1.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (5.3)	ND (53)
BKG-08	Wash (Qya)	08/23/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-09	Wash (Qya)	08/23/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-10	pTbr	09/19/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-11	pTbr	09/19/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-11	pTbr	09/19/08	0-0.5	FD	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-12	pTbr	08/23/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-13	Qa	09/20/08	0-0.5	N	ND (2.1)	ND (2.1)	ND (2.1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2.1)	ND (1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5.1)	ND (51)
BKG-14	Qa	09/20/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-14	Qa	09/20/08	0-0.5	FD	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-15	Qa	09/20/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-16	Qa	09/23/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)
BKG-17	Qa	09/20/08	0-0.5	N	ND (2)	ND (2)	ND (2)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (2)	ND (1)	ND (2)	ND (2)	ND (2)	ND (2)	---	ND (1)	ND (1)	ND (1)	ND (1)	ND (5)	ND (50)

Notes:

ft bgs	feet below ground surface
ug/kg	micrograms per kilogram
N	primary sample
FD	field duplicate sample
ND	not detected at listed reporting limit
Qa	Quaternary Alluvium and surficial deposits undifferentiated
Toa	Tertiary Alluvium (Fanglomerate of Metzger and Loeltz)
pTbr	Pre-Tertiary Bedrock (Metadiorite, Gneiss, Granitic Rock)
Wash (Qya)	Recent wash deposits

Attachment E-1

Soil Sample Results: Contract Laboratory Program Inorganics
Background Data Set
Soil Investigation Part A, Phase 1 Data Gaps Evaluation Report
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

					Contract Laboratory Program (CLP) Inorganics (mg/kg)						
Location	**Lithologic Unit**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Aluminum**	**Calcium**	**Iron**	**Magnesium**	**Manganese**	**Potassium**	**Sodium**
BKG-01	Qa	09/18/08	0 - 0.5	N	9,600	41,000	13,000	6,700	260	2,900	230
BKG-01	Qa	09/18/08	2 - 3	N	8,800	24,000	17,000	7,500	220	4,100	1,100
BKG-02	Wash (Qya)	09/18/08	0 - 0.5	N	7,500	16,000	15,000	6,400	220	1,700	170
BKG-02	Wash (Qya)	09/18/08	2 - 3	N	9,900	25,000	18,000	8,600	290	2,100	180
BKG-02	Wash (Qya)	09/18/08	5 - 6	N	11,000	16,000	19,000	8,800	290	2,500	220
BKG-02	Wash (Qya)	09/18/08	9 - 10	N	11,000	13,000	20,000	8,700	310	2,500	240
BKG-03	Wash (Qya)	09/18/08	0 - 0.5	N	9,200	22,000	18,000	8,100	260	2,000	180
BKG-03	Wash (Qya)	09/18/08	2 - 3	N	11,000	20,000	22,000	9,000	300	2,500	190
BKG-03	Wash (Qya)	09/18/08	5 - 6	N	11,000	18,000	22,000	9,000	330	2,600	230
BKG-03	Wash (Qya)	09/18/08	9 - 10	N	12,000	18,000	23,000	9,400	380	2,700	220
BKG-04	Wash (Qya)	09/18/08	0 - 0.5	N	7,300	13,000	17,000	6,100	220	1,500	160
BKG-04	Wash (Qya)	09/18/08	0 - 0.5	FD	7,300	14,000	17,000	6,200	220	1,500	190
BKG-04	Wash (Qya)	09/18/08	2 - 3	N	9,200	16,000	18,000	7,200	260	1,800	180
BKG-04	Wash (Qya)	09/18/08	5 - 6	N	8,600	18,000	16,000	6,400	250	2,000	190
BKG-04	Wash (Qya)	09/18/08	9 - 10	N	8,800	13,000	19,000	6,500	240	1,800	190
BKG-05	Toa	09/19/08	0 - 0.5	N	11,000	39,000	17,000	9,000	300	2,800	4,500
BKG-05	Toa	09/19/08	2 - 3	N	2,600	14,000	5,700	2,500	140	540	1,400
BKG-05	Toa	09/19/08	5 - 6	N	7,100	19,000	14,000	6,700	190	2,500	800
BKG-06	Toa	09/19/08	0 - 0.5	N	11,000	41,000	17,000	9,000	280	2,700	250
BKG-06	Toa	09/19/08	2 - 3	N	13,000	34,000	25,000	9,700	260	3,000	650
BKG-06	Toa	09/19/08	5 - 6	N	13,000	29,000	27,000	10,000	270	3,000	950
BKG-06	Toa	09/19/08	9 - 10	N	17,000	27,000	34,000	12,000	350	2,900	1,500
BKG-07	Toa	09/19/08	0 - 0.5	N	9,500	38,000	14,000	7,200	260	2,500	230
BKG-07	Toa	09/19/08	0 - 0.5	FD	9,600	41,000	13,000	7,100	270	2,200	200
BKG-07	Toa	09/19/08	2 - 3	N	15,000	38,000	26,000	11,000	310	2,900	280
BKG-07	Toa	09/19/08	5 - 6	N	16,000	39,000	26,000	12,000	380	2,900	840
BKG-07	Toa	09/19/08	9 - 10	N	18,000	62,000	32,000	13,000	360	2,900	460
BKG-08	Wash (Qya)	08/23/08	0 - 0.5	N	12,000	36,000	24,000	11,000	540 ^	8,700 ^	410
BKG-08	Wash (Qya)	08/23/08	1 - 2	N	12,000	25,000	23,000	9,700	450	3,900	200

Attachment E-1
Soil Sample Results: Contract Laboratory Program Inorganics
Background Data Set
Soil Investigation Part A, Phase 1 Data Gaps Evaluation Report
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

					Contract Laboratory Program (CLP) Inorganics (mg/kg)						
Location	**Lithologic Unit**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Aluminum**	**Calcium**	**Iron**	**Magnesium**	**Manganese**	**Potassium**	**Sodium**
BKG-09	Wash (Qya)	08/23/08	0 - 0.5	N	4,800	8,600	9,700	3,800	170	3,900	190
BKG-10	pTbr	09/19/08	0 - 0.5	N	8,800	22,000	13,000	5,000	230	2,200	210
BKG-10	pTbr	09/19/08	1 - 2	N	8,900	30,000	15,000	6,100	270	2,400	190
BKG-11	pTbr	09/19/08	0 - 0.5	N	15,000	31,000	20,000	8,300	360	3,800	230
BKG-11	pTbr	09/19/08	0 - 0.5	FD	15,000	31,000	20,000	8,300	350	3,900	230
BKG-11	pTbr	09/19/08	1 - 2	N	9,400	18,000	18,000	6,100	260	3,400	290
BKG-12	pTbr	08/23/08	0 - 0.5	N	8,900	19,000	18,000	7,300	320	2,900	180
BKG-12	pTbr	08/23/08	2 - 3	N	11,000	24,000	19,000	9,200	390	4,300	250
BKG-12	pTbr	08/23/08	5 - 6	N	9,400	20,000	17,000	7,600	310	3,100	210
BKG-13	Qa	09/20/08	0 - 0.5	N	12,000	67,000	14,000	10,000	290	2,300	300
BKG-13	Qa	09/20/08	2 - 3	N	11,000	17,000	18,000	7,800	250	3,100	1,700
BKG-13	Qa	09/20/08	5 - 6	N	12,000	6,900	20,000	8,900	280	3,200	1,700
BKG-13	Qa	09/20/08	9 - 10	N	14,000	52,000	20,000	8,100	1,100 ^	3,300	1,400
BKG-14	Qa	09/20/08	0 - 0.5	N	9,800	39,000	13,000	5,800	220	1,700	200
BKG-14	Qa	09/20/08	0 - 0.5	FD	9,700	36,000	13,000	5,600	210	2,000	200
BKG-14	Qa	09/20/08	2 - 3	N	9,600	11,000	16,000	6,700	220	2,700	760
BKG-14	Qa	09/20/08	5 - 6	N	12,000	8,200	20,000	9,200	320	3,400	780
BKG-14	Qa	09/20/08	9 - 10	N	13,000	6,300	21,000	9,600	310	3,900	630
BKG-15	Qa	09/20/08	0 - 0.5	N	5,200	20,000	11,000	5,100	210	1,100	290
BKG-15	Qa	09/20/08	2 - 3	N	8,100	14,000	18,000	6,200	260	2,500	380
BKG-15	Qa	09/20/08	5 - 6	N	10,000	15,000	20,000	7,300	300	4,100	850
BKG-15	Qa	09/20/08	9 - 10	N	12,000	34,000	22,000	8,300	340	3,300	890
BKG-16	Qa	09/23/08	0 - 0.5	N	8,400	33,000	14,000	8,100	290	2,700	ND (240)
BKG-16	Qa	09/23/08	2 - 3	N	8,700	28,000	16,000	7,000	260	2,700	ND (700)
BKG-16	Qa	09/23/08	5 - 6	N	7,800	17,000	16,000	6,000	240	2,800	ND (1,100)
BKG-16	Qa	09/23/08	9 - 10	N	9,700	13,000	19,000	7,000	290	3,900	ND (850)
BKG-17	Qa	09/20/08	0 - 0.5	N	5,800	16,000	8,800	4,200	150	1,000	170
BKG-17	Qa	09/20/08	2 - 3	N	14,000	14,000	22,000	10,000	290	3,700	2,100
BKG-17	Qa	09/20/08	5 - 6	N	11,000	30,000	19,000	8,200	290	2,000	1,200

Attachment E-1

Soil Sample Results: Contract Laboratory Program Inorganics
Background Data Set
Soil Investigation Part A, Phase 1 Data Gaps Evaluation Report
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

					Contract Laboratory Program (CLP) Inorganics (mg/kg)						
Location	**Lithologic Unit**	**Date**	**Depth (ft bgs)**	**Sample Type**	**Aluminum**	**Calcium**	**Iron**	**Magnesium**	**Manganese**	**Potassium**	**Sodium**
BKG-17	Qa	09/20/08	9 - 10	N	12,000	4,100	22,000	8,800	290	3,300	1,200
EE-BG-1	pTbr	04/13/99	0	N	---	---	23,800	---	281	---	---
EE-BG-2	Toa	04/14/99	0	N	---	---	13,700	---	260	---	---
EE-BG-3	Wash (Qya)	04/14/99	0	N	---	---	23,900	---	413	---	---
MW-15	Qa	07/10/97	10	N	---	---	5,570	---	180	---	---

Notes:

mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
^	This concentration was removed from the background dataset because it is considered an outlier
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation
Qa	Quaternary Alluvium and surficial deposits undifferentiated
Toa	Tertiary Alluvium (Fanglomerate of Metzger and Loeltz)
pTbr	Pre-Tertiary Bedrock (Metadiorite, Gneiss, Granitic Rock)
Wash (Qya)	Recent wash deposits

Table 2. Calculated Values
Ambient Study of Dioxins and Furans
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Location	Sample Type	Sample Date	Depth	TEQ Mammal (ng/kg) TEQMammals0 ND = 0	TEQ Mammal (ng/kg) TEQMammalsHalf ND = 1/2 RL	TEQ Mammal (ng/kg) TEQMammals ND = RL	TEQ Avian (ng/kg) TEQBird0 ND = 0	TEQ Avian (ng/kg) TEQBirdHalf ND = 1/2 RL	TEQ Avian (ng/kg) TEQBird ND = RL	B(a)P Eq. Half (µg/kg)	LMW-PAHs (µg/kg)	HMW-PAHs (µg/kg)
BKG-01	LS	9/18/2008	0 - 0.5	0.1	0.29	0.47	0.08	0.34	0.6	5.9 U	0 U	0 U
BKG-02	LS	9/18/2008	0 - 0.5	-	-	-	-	-	-	5.9 U	0 U	0 U
BKG-03	LS	9/18/2008	0 - 0.5	-	-	-	-	-	-	5.9 U	0 U	0 U
BKG-04	LS	9/18/2008	0 - 0.5	-	-	-	-	-	-	5.9 U	0 U	0 U
BKG-04	LFD	9/18/2008	0 - 0.5	-	-	-	-	-	-	5.9 U	0 U	0 U
BKG-05	LS	9/19/2008	0 - 0.5	-	-	-	-	-	-	6 U	0 U	0 U
BKG-06	LS	9/19/2008	0 - 0.5	0.055	0.29	0.52	0.013	0.3	0.58	6 U	0 U	0 U
BKG-07	LS	9/19/2008	0 - 0.5	0.17	0.45	0.73	0.023	0.38	0.73	6.1 U	0 U	0 U
BKG-07	LFD	9/19/2008	0 - 0.5	-	-	-	-	-	-	6.1 U	0 U	0 U
BKG-08	LS	8/23/2008	0 - 0.5	0.12	0.23	0.34	0.12	0.28	0.44	5.8 U	0 U	0 U
BKG-09	LS	8/23/2008	0 - 0.5	0.064	0.2	0.34	0.042	0.21	0.37	5.8 U	0 U	0 U
BKG-10	LS	9/19/2008	0 - 0.5	0.3	0.9	1.5	0.046	0.67	1.3	5.8 U	0 U	0 U
BKG-11	LS	9/19/2008	0 - 0.5	0.023	0.16	0.29	0.003	0.19	0.38	5.8 U	0 U	0 U
BKG-11	LFD	9/19/2008	0 - 0.5	-	-	-	-	-	-	5.8 U	0 U	0 U
BKG-12	LS	8/23/2008	0 - 0.5	0.024	0.15	0.27	0.006	0.19	0.37	5.8 U	0 U	0 U
BKG-13	LS	9/20/2008	0 - 0.5	0.36	0.57	0.79	0.36	0.74	1.1	5.9 U	0 U	0 U
BKG-14	LS	9/20/2008	0 - 0.5	-	-	-	-	-	-	5.8 U	0 U	0 U
BKG-14	LFD	9/20/2008	0 - 0.5	-	-	-	-	-	-	5.8 U	0 U	0 U
BKG-15	LS	9/20/2008	0 - 0.5	-	-	-	-	-	-	5.8 U	0 U	0 U
BKG-16	LS	9/23/2008	0 - 0.5	-	-	-	-	-	-	5.8 U	0 U	0 U
BKG-17	LS	9/20/2008	0 - 0.5	0.89	1.4	1.9	0.17	0.73	1.3	5.8 U	0 U	0 U
BKG-18	LS	3/18/2017	0 - 0.5	0.026	0.16	0.3	0.007	0.18	0.36	5.8 U	0 U	0 U
BKG-19	LS	3/18/2017	0 - 0.5	0.19	0.43	0.67	0.28	0.54	0.8	55	0 U	187.1
BKG-20	LS	3/18/2017	0 - 0.5	0.075	0.25	0.43	0.011	0.26	0.5	12	0 U	30.8
BKG-21	LS	3/18/2017	0 - 0.5	0.067	0.33	0.59	0.009	0.33	0.65	6.3	0 U	26.1
BKG-22	LS	3/18/2017	0 - 0.5	0.33	0.92	1.5	0.044	0.77	1.5	6.6	0 U	34.7
BKG-23	LS	3/18/2017	0 - 0.5	0.83	1.7	2.6	0.19	1.5	2.7	6.1	0 U	5.1
BKG-24*	LS	3/17/2017	0 - 0.5	0 U	0.23 U	0.45 U	0 U	0.29 U	0.59 U	5.9 U	0 U	0 U

Table 2. Calculated Values

Ambient Study of Dioxins and Furans

Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Location	Sample Type	Sample Date	Depth	TEQ Mammal (ng/kg) TEQMammals0 ND = 0	TEQ Mammal (ng/kg) TEQMammalsHalf ND = 1/2 RL	TEQ Mammal (ng/kg) TEQMammals ND = RL	TEQ Avian (ng/kg) TEQBird0 ND = 0	TEQ Avian (ng/kg) TEQBirdHalf ND = 1/2 RL	TEQ Avian (ng/kg) TEQBird ND = RL	B(a)P Eq. Half (µg/kg)	LMW-PAHs (µg/kg)	HMW-PAHs (µg/kg)
BKG-25*	LS	3/17/2017	0 - 0.5	1.1	1.5	1.9	1.5	2.4	3.2	5.8 U	0 U	0 U
BKG-26*	LS	3/17/2017	0 - 0.5	0.11	0.49	0.87	0.015	0.72	1.4	6.2	5.7	40.2
BKG-27	LS	3/17/2017	0 - 0.5	0.16	0.35	0.54	0.071	0.3	0.52	5.8 U	0 U	0 U
BKG-28	LS	3/17/2017	0 - 0.5	2	2.5	3.1	2.1	2.6	3.1	23	16	267.4
BKG-29	LS	3/17/2017	0 - 0.5	2.8	3.6	4.4	2.1	3	4	18	9.2	183.5
BKG-30	LS	3/17/2017	0 - 0.5	0.12	0.25	0.38	0.079	0.27	0.46	6.1	0 U	11
BKG-31*	LS	3/17/2017	0 - 0.5	0.56	0.95	1.4	1.2	1.7	2.1	89	24.7	754
BKG-32	LS	3/17/2017	0 - 0.5	0 U	0.17 U	0.34 U	0 U	0.27 U	0.55 U	6.1	0 U	6
BKG-33	LS	3/17/2017	0 - 0.5	0.19	0.73	1.3	0.17	0.84	1.5	7.4	0 U	40.9
BKG-34	LS	3/17/2017	0 - 0.5	0.83	1.7	2.6	1.3	2.2	3.1	14	37.6	128.3
BKG-35	LS	3/17/2017	0 - 0.5	0.11	0.5	0.88	0.03	0.5	0.96	10	7.7	122.7
BKG-36	LS	3/17/2017	0 - 0.5	0.31	0.77	1.2	0.9	1.4	2	6.9	36	52.9
BKG-37	LS	3/17/2017	0 - 0.5	1.4	2.3	3.2	0.64	1.8	3	15	6.9	117.9
BKG-38	LS	3/18/2017	0 - 0.5	0.018	0.13	0.25	0.002	0.17	0.33	5.9 U	0 U	0 U
BKG-39	LS	3/18/2017	0 - 0.5	0.015	0.1	0.19	0.002	0.13	0.26	5.8 U	0 U	0 U
BKG-40	LS	3/18/2017	0 - 0.5	0.53	1	1.5	0.11	0.6	1.1	5.8 U	0 U	0 U
BKG-41	LS	3/18/2017	0 - 0.5	0.35	0.49	0.64	0.22	0.46	0.7	5.9 U	0 U	0 U
BKG-42	LS	3/18/2017	0 - 0.5	0 U	0.086 U	0.17 U	0 U	0.12 U	0.24 U	5.9 U	0 U	0 U
BKG-43	LS	3/18/2017	0 - 0.5	0.35	0.6	0.85	0.062	0.37	0.68	5.9 U	0 U	0 U
BKG-44	LS	3/18/2017	0 - 0.5	0.15	0.31	0.48	0.12	0.32	0.53	5.9 U	0 U	0 U
BKG-45	LS	3/18/2017	0 - 0.5	0.00018	0.096	0.19	6E-05	0.13	0.26	5.9 U	0 U	0 U
BKG-46	LS	3/18/2017	0 - 0.5	0.023	0.13	0.25	0.002	0.17	0.34	5.9 U	0 U	0 U
BKG-47*	LS	3/17/2017	0 - 0.5	1.2	1.7	2.2	0.97	1.5	2	7	0 U	42.4

* Location not included in calculation of ambient concentrations.

Notes:

TEQ = toxicity equivalent

B(a)P Eq. = benzo(a)pyrene toxic equivalent factor

µg/kg = micrograms per kilogram

ng/kg = nanograms per kilogram

U = not detected at specified reporting limit

ATTACHMENT 2

Table 1-1. Soil Sample Analytical Results: Dioxins and Furans

Ambient/Background Study of Dioxins and Furans

Pacific Gas and Electric Company Topock Compressor Station, Needles, California

			Dioxins and Furans (ng/kg) *																	
Location	Sample Type	Sample Date	1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-HxCDF	1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDF	2,3,4,6,7,8-HxCDF	2,3,4,7,8-PeCDF	2,3,7,8-TCDD	2,3,7,8-TCDF	OCDD	OCDF
BKG-01	LS	9/18/2008	2.2 J	0.51 J	0.098 U	0.071 U	0.13 U	0.071 U	0.12 U	0.12 U	0.71 J	0.12 U	0.15 U	0.54 U	0.14 U	0.089 U	0.06 U	19 J	0.77 U
BKG-06	LS	9/19/2008	4.1 J	0.63 J	0.11 U	0.18 U	0.15 U	0.26 U	0.14 U	0.16 U	0.17 U	0.14 U	0.12 U	0.52 U	0.085 U	0.13 U	0.072 U	26	0.73 U
BKG-07	LS	9/19/2008	14	1.2 U	0.2 U	0.19 U	0.13 U	0.45 U	0.17 U	0.41 U	0.14 U	0.11 U	0.15 U	0.99 U	0.12 U	0.14 U	0.11 U	91	2.7 J
BKG-08	LS	8/23/2008	1.6 U	0.39 J	0.088 U	0.091 U	0.076 U	0.075 U	0.15 U	0.1 U	0.085 U	0.11 J	0.16 U	0.34 U	0.087 U	0.071 U	0.072 U	13 J	0.88 U
BKG-09	LS	8/23/2008	2 J	0.43 J	0.096 U	0.095 U	0.071 U	0.095 U	0.067 U	0.095 U	0.08 U	0.13 U	0.04 U	0.34 J	0.041 U	0.075 U	0.041 U	20 J	0.77 U
BKG-10	LS	9/19/2008	24	1.8 U	0.29 J	0.13 U	0.097 U	0.82 U	0.091 U	0.13 U	0.11 U	0.11 U	0.1 U	8.4 U	0.083 U	0.064 U	0.069 U	190	5.5 J
BKG-11	LS	9/19/2008	1.8 J	0.18 U	0.071 U	0.048 U	0.063 U	0.047 U	0.06 U	0.046 U	0.45 U	0.085 U	0.06 U	0.3 U	0.062 U	0.054 U	0.07 U	16 J	0.29 U
BKG-12	LS	8/23/2008	1.7 J	0.31 J	0.07 U	0.078 U	0.054 U	0.094 U	0.051 U	0.13 U	0.06 U	0.081 U	0.064 U	0.2 U	0.066 U	0.065 U	0.093 U	12 J	0.37 U
BKG-13	LS	9/20/2008	2.6 J	0.48 J	0.15 U	0.12 U	0.097 U	0.12 U	0.091 U	0.33 U	3.1 J	0.09 U	0.38 J	0.73 U	0.35 U	0.073 U	0.11 U	21 J	0.77 U
BKG-17	LS	9/20/2008	53	3.6 J	0.12 U	0.19 U	0.13 U	1.3 J	0.12 U	0.37 U	0.14 U	0.066 U	0.13 U	8 U	0.067 U	0.055 U	0.045 U	650	13 J
BKG-18	LS	3/18/2017	2.1 J	0.44 J	0.13 U	0.095 U	0.092 U	0.074 U	0.088 U	0.22 U	0.11 U	0.068 U	0.051 U	0.51 U	0.054 U	0.061 U	0.052 U	19 U	0.56 J
BKG-19	LS	3/18/2017	7 J	1.6 J	0.17 U	0.24 U	0.096 U	0.32 U	0.24 U	0.093 U	0.11 U	0.081 U	0.064 U	2.2 U	0.25 J	0.062 U	0.08 U	90	7 J
BKG-20	LS	3/18/2017	6.2 J	1.2 U	0.19 U	0.073 U	0.15 U	0.074 U	0.14 U	0.22 U	0.17 U	0.083 U	0.072 U	0.89 U	0.096 U	0.05 U	0.078 U	42	1.5 J
BKG-21	LS	3/18/2017	5.5 J	0.74 U	0.11 U	0.15 U	0.13 U	0.21 U	0.12 U	0.28 U	0.14 U	0.099 U	0.11 U	2 U	0.12 U	0.07 U	0.055 U	38	1.4 J
BKG-22	LS	3/18/2017	19	2.3 U	0.29 U	0.45 U	0.33 U	0.96 J	0.25 U	0.29 U	0.17 U	0.39 U	0.13 U	3.6 U	0.3 U	0.15 U	0.092 U	150	4.3 J
BKG-23	LS	3/18/2017	43	7.9 J	0.83 U	0.32 U	1.2 U	1.8 J	1.4 U	1.2 U	0.42 U	0.16 U	0.39 U	8.2 U	0.76 U	0.097 U	0.22 U	450 J	19 J
BKG-24	LS	3/17/2017	2.5 U	0.28 U	0.2 U	0.11 U	0.18 U	0.11 U	0.17 U	0.17 U	0.21 U	0.12 U	0.14 U	0.18 U	0.15 U	0.13 U	0.068 U	13 U	0.59 U
BKG-25	LS	3/17/2017	21	5 J	0.19 U	0.64 U	1 U	1.5 J	1.3 J	1.3 J	0.26 U	0.28 U	0.94 J	2.3 U	1.1 J	0.076 U	0.94 U	91	4.3 J
BKG-26	LS	3/17/2017	9.1 J	1.4 U	0.18 U	0.18 U	0.17 U	0.18 U	0.16 U	0.18 U	0.19 U	0.13 U	0.17 U	1.2 U	0.81 U	0.13 U	0.11 U	56	3.6 U
BKG-27	LS	3/17/2017	8 J	1.3 J	0.22 U	0.11 U	0.18 U	0.43 U	0.17 U	0.43 J	0.2 U	0.056 U	0.074 U	1.3 U	0.077 U	0.052 U	0.062 U	64	1.9 J
BKG-28	LS	3/17/2017	54	5.8 J	0.77 J	0.93 U	0.89 J	1.9 U	0.74 U	1.8 J	0.37 U	0.7 J	0.38 U	5.1 U	0.95 J	0.12 U	0.16 U	510	10 J
BKG-29	LS	3/17/2017	120	8.4 J	0.64 U	1.6 J	0.9 J	3.3 J	1 U	2.7 J	0.34 U	0.74 U	0.45 U	6.3 U	1.3 J	0.069 U	0.29 U	980	11 J
BKG-30	LS	3/17/2017	3.8 J	0.83 U	0.2 U	0.16 U	0.14 U	0.24 U	0.13 U	0.16 U	0.16 U	0.07 U	0.13 U	0.73 J	0.14 U	0.032 U	0.045 U	25	1.5 J
BKG-31	LS	3/17/2017	10 J	2.4 J	0.2 U	0.17 U	0.21 U	0.5 J	1.9 U	0.26 U	0.24 U	0.12 U	0.26 U	3.4 U	1.2 J	0.035 U	0.1 U	79	2.8 J
BKG-32	LS	3/17/2017	1 U	0.14 U	0.12 U	0.13 U	0.092 U	0.13 U	0.088 U	0.12 U	0.11 U	0.084 U	0.074 U	0.3 U	0.23 U	0.069 U	0.073 U	7.5 U	0.15 U
BKG-33	LS	3/17/2017	11 J	1.7 J	0.2 U	0.32 U	0.25 U	0.64 U	1.7 U	0.32 U	0.29 U	0.27 U	1.3 J	2.5 U	0.27 U	0.11 U	0.16 U	93	2.4 U
BKG-34	LS	3/17/2017	38	2.5 U	0.26 U	0.4 U	0.4 U	2 J	0.72 J	1.7 U	0.28 U	0.69 U	0.37 U	5.4 U	0.17 U	0.16 U	1.1 J	210	3.6 U
BKG-35	LS	3/17/2017	7.1 J	1.2 J	0.16 U	0.29 U	0.29 U	0.29 U	0.28 U	0.28 U	0.34 U	0.22 U	0.13 U	1.9 U	0.13 U	0.12 U	0.12 U	100	4.6 J
BKG-36	LS	3/17/2017	8.6 J	1.8 U	0.28 U	0.28 U	0.55 U	0.28 U	1.1 J	0.27 U	0.26 U	0.21 U	0.8 J	3.1 U	0.26 U	0.14 U	0.69 J	73	3.2 J
BKG-37	LS	3/17/2017	56	13	0.45 U	1.2 J	0.5 U	2.3 J	0.87 J	1.7 J	0.17 U	0.57 U	0.75 J	7.7 U	0.74 U	0.079 U	0.092 U	410	15 J
BKG-38	LS	3/18/2017	1.8 J	0.4 U	0.12 U	0.072 U	0.077 U	0.072 U	0.074 U	0.071 U	0.089 U	0.051 U	0.099 U	0.36 U	0.1 U	0.049 U	0.039 U	15 U	0.36 U
BKG-39	LS	3/18/2017	1.5 J	0.14 U	0.064 U	0.093 U	0.045 U	0.044 U	0.043 U	0.064 U	0.052 U	0.04 U	0.064 U	0.3 U	0.066 U	0.041 U	0.045 U	14 U	0.28 U
BKG-40	LS	3/18/2017	38	3.5 J	0.49 J	0.48 U	0.21 U	1.1 U	0.2 U	1 U	0.24 U	0.12 U	0.11 U	3.7 U	0.12 U	0.082 U	0.072 U	360	6.1 J

ATTACHMENT 2

Table 1-1. Soil Sample Analytical Results: Dioxins and Furans

Ambient/Background Study of Dioxins and Furans

Pacific Gas and Electric Company Topock Compressor Station, Needles, California

			Dioxins and Furans (ng/kg) *																
Location	Sample Type	Sample Date	1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-HxCDF	1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDF	2,3,4,6,7,8-HxCDF	2,3,4,7,8-PeCDF	2,3,7,8-TCDD	2,3,7,8-TCDF	OCDD	OCDF
BKG-41	LS	3/18/2017	7.7 J	0.86 U	0.25 U	0.18 U	0.095 U	0.55 J	0.22 U	0.26 U	0.23 U	0.2 J	0.081 U	0.67 U	0.2 U	0.042 U	0.061 U	53	1.7 J
BKG-42	LS	3/18/2017	0.12 U	0.12 U	0.059 U	0.077 U	0.051 U	0.055 U	0.049 U	0.054 U	0.049 U	0.054 U	0.058 U	0.081 U	0.061 U	0.049 U	0.033 U	4.8 U	0.053 U
BKG-43	LS	3/18/2017	20	2 J	0.18 U	0.34 U	0.3 U	0.97 J	0.24 U	0.57 U	0.29 U	0.089 U	0.065 U	1.7 U	0.067 U	0.035 U	0.087 U	120	2.1 U
BKG-44	LS	3/18/2017	3.4 J	0.15 U	0.18 U	0.068 U	0.17 U	0.3 U	0.16 U	0.067 U	1.1 J	0.095 U	0.099 U	0.69 U	0.11 U	0.043 U	0.038 U	22 J	1.2 U
BKG-45	LS	3/18/2017	1.3 U	0.15 U	0.062 U	0.072 U	0.068 U	0.046 U	0.065 U	0.056 U	0.078 U	0.034 U	0.03 U	0.18 U	0.08 U	0.055 U	0.034 U	12 U	0.6 J
BKG-46	LS	3/18/2017	2.3 J	0.18 U	0.22 U	0.082 U	0.083 U	0.082 U	0.079 U	0.063 U	0.095 U	0.038 U	0.053 U	0.38 U	0.11 U	0.047 U	0.058 U	20 U	1.4 J
BKG-47	LS	3/17/2017	56	5.8 J	0.54 U	0.54 U	0.64 J	0.2 U	0.53 J	1.2 J	0.18 U	0.41 U	0.18 U	4 U	0.57 J	0.072 U	0.11 U	480	6.7 J

Notes:

* Samples collected in 2008 were analyzed out of holding time in 2017

All samples were collected at 0 - 0.5 feet below ground surface

ng/kg = nanograms per kilogram

N = primary sample

FD = field duplicate sample

U = not detected at specified reporting limit

J = estimated value

ATTACHMENT 2

Table 1-2. Soil Sample Analytical Results: Polycyclic Aromatic Hydrocarbons

Ambient/Background Study of Dioxins and Furans

Pacific Gas and Electric Company Topock Compressor Station, Needles, California

			Polycyclic Aromatic Hydrocarbons (µg/kg)																	
Location	Sample Type	Sample Date	1-Methyl naphthalene	2-Methyl naphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (ghi) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
BKG-01	N	9/18/2008	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-02	N	9/18/2008	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-03	N	9/18/2008	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-04	N	9/18/2008	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-04	FD	9/18/2008	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-05	N	9/19/2008	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 UJ	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U
BKG-06	N	9/19/2008	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U
BKG-07	N	9/19/2008	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 UJ	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U
BKG-07	FD	9/19/2008	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 UJ	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U
BKG-08	N	8/23/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-09	N	8/23/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-10	N	9/19/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-11	N	9/19/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-11	FD	9/19/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-12	N	8/23/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-13	N	9/20/2008	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-14	N	9/20/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-14	FD	9/20/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-15	N	9/20/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-16	N	9/23/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-17	N	9/20/2008	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-18	N	3/18/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-19	N	3/18/2017	5 U	5 U	5 U	5 U	5 U	17	16	17	18	23	20	33	8.4	5 U	28	5 U	5 U	6.7
BKG-20	N	3/18/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5	5 U	5.3	5.7	8.4	5 U	5 U	6.4	5 U	5 U	5 U
BKG-21	N	3/18/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	8	5 U	5 U	5.7	5 U	6.7	5 U	5 U	5 U	5 U	5.7
BKG-22	N	3/18/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	11	5 U	5 U	6	5 U	9.7	5 U	5 U	5 U	5 U	8
BKG-23	N	3/18/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-24	N	3/17/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-25	N	3/17/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-26	N	3/17/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1	5.1 U	5.1 U	5.1	5.1 U	17	5.1 U	5.1 U	5.1 U	5.7	13
BKG-27	N	3/17/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-28	N	3/17/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	9.8	12	70	8.8	13	40	5.1 U	61	5.1 U	7.8	5.1 U	16	45
BKG-29	N	3/17/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	8.5	9.5	45	8.2	8.8	27	5.1 U	39	5.1 U	6.5	5.1 U	9.2	31
BKG-30	N	3/17/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.7	5 U	5 U	5 U	5 U	5.3	5 U	5 U	5 U	5 U	5 U
BKG-31	N	3/17/2017	5 U	5 U	5 U	5 U	5.7	100	62	110	42	37	68	5 U	160	5 U	35	5 U	19	140
BKG-32	N	3/17/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	6	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-33	N	3/17/2017	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	14	5.4 U	5.4 U	8.3	5.4 U	11	5.4 U	5.4 U	5.4 U	5.4 U	7.6
BKG-34	N	3/17/2017	5.4 U	7.6	5.4 U	5.4 U	5.8	9.8	6.5	37	6.5	6.5	20	5.4 U	24	5.4 U	5.4 U	7.2	17	18
BKG-35	N	3/17/2017	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	6.7	5.3 U	39	5.3 U	7	24	5.3 U	29	5.3 U	5.3 U	5.3 U	7.7	17
BKG-36	N	3/17/2017	5.2 U	8	5.2 U	5.2 U	5.2 U	6.2	5.2 U	8.3	5.2 U	5.2 U	9.4	5.2 U	15	5.2 U	5.2 U	5.2 U	28	14
BKG-37	N	3/17/2017	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	7.9	7.9	34	5.2	7.9	17	5.2 U	21	5.2 U	5.2 U	5.2 U	6.9	17
BKG-38	N	3/18/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-39	N	3/18/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BKG-40	N	3/18/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U

ATTACHMENT 2

Table 1-2. Soil Sample Analytical Results: Polycyclic Aromatic Hydrocarbons

Ambient/Background Study of Dioxins and Furans

Pacific Gas and Electric Company Topock Compressor Station, Needles, California

			Polycyclic Aromatic Hydrocarbons (µg/kg)																	
Location	Sample Type	Sample Date	1-Methyl naphthalene	2-Methyl naphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (ghi) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
BKG-41	N	3/18/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-42	N	3/18/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-43	N	3/18/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-44	N	3/18/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-45	N	3/18/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-46	N	3/18/2017	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
BKG-47	N	3/17/2017	5 U	5 U	5 U	5 U	5 U	5 U	5 U	15	5 U	5 U	7	5 U	11	5 U	5 U	5 U	5 U	9.4

Notes:

All samples were collected at 0 - 0.5 feet below ground surface

µg/kg = micrograms per kilogram

N = primary sample

FD = field duplicate sample

U = not detected at specified reporting limit

J = estimated value

ATTACHMENT F

Background Screening Evaluation

ATTACHMENT F

Background Screening Evaluation: ProUCL Outputs for Wilcoxon-Mann-Whitney, Tarone-Ware, Gehan, and Quantile Tests

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 1:31:18 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	506	59
Number of Non-Detects	52	1
Number of Detects	454	58
Minimum Non-Detect	1	1
Maximum Non-Detect	5.3	1
Percent Non-detects	10.28%	1.69%
Minimum Detect	1.1	0.884
Maximum Detect	19	12
Mean of Detects	3.465	4.006
Median of Detects	3	3.5
SD of Detects	2.138	2.357
KM Mean	3.215	3.953
KM SD	2.155	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-2.759
TW Critical Value (0.05)	1.645
P-Value	0.997

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 1:29:31 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	506	59
Number of Non-Detects	52	1
Number of Detect Data	454	58
Minimum Non-Detect	1	1
Maximum Non-Detect	5.3	1
Percent Non-detects	10.28%	1.69%
Minimum Detect	1.1	0.884
Maximum Detect	19	12
Mean of Detects	3.465	4.006
Median of Detects	3	3.5
SD of Detects	2.138	2.357
KM Mean	3.215	3.953
KM SD	2.155	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-2.82
Critical z (0.05)	1.645
P-Value	0.998

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:31:30 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	519	60
Number of Non-Detects	0	0
Number of Detect Data	519	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	22	48.4
Maximum Detect	1900	660
Mean of Detects	113.8	164.6
Median of Detects	100	135
SD of Detects	96.31	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	144555
Standardized WMW U-Stat	-4.86
Mean (U)	15570
SD(U) - Adj ties	1226
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 1:41:23 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	506	55
Number of Non-Detects	483	54
Number of Detects	23	1
Minimum Non-Detect	1	1
Maximum Non-Detect	2.9	5
Percent Non-detects	95.45%	98.18%
Minimum Detect	1	1.1
Maximum Detect	1.5	1.1
Mean of Detects	1.209	1.1
Median of Detects	1.2	1.1
SD of Detects	0.131	N/A
KM Mean	1.01	1.002
KM SD	0.0516	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.884
TW Critical Value (0.05)	1.645
P-Value	0.188

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 1:41:47 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	506	55
Number of Non-Detects	483	54
Number of Detect Data	23	1
Minimum Non-Detect	1	1
Maximum Non-Detect	2.9	5
Percent Non-detects	95.45%	98.18%
Minimum Detect	1	1.1
Maximum Detect	1.5	1.1
Mean of Detects	1.209	1.1
Median of Detects	1.2	1.1
SD of Detects	0.131	N/A
KM Mean	1.01	1.002
KM SD	0.0516	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.856
Critical z (0.05)	1.645
P-Value	0.196

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 5:46:29 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_calcium)

Sample 2 Data: Res(bkgd_calcium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	55
Number of Non-Detects	0	0
Number of Detect Data	53	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	6000	4100
Maximum Detect	280000	67000
Mean of Detects	36568	24293
Median of Detects	21000	20000
SD of Detects	52330	13273

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2975
Standardized WMW U-Stat	0.526
Mean (U)	1458
SD(U) - Adj ties	162.6
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.299

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	0-15_AllData.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(BCW_calcium)

Background Data: Res(bkgd_calcium)

Raw Statistics

	Site	Background
Number of Valid Data	53	55
Number of Non-Detect Data	0	0
Number of Detect Data	53	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	6000	4100
Maximum Detected	280000	67000
Mean of Detected Data	36568	24293
Median of Detected Data	21000	20000
SD of Detected Data	52330	13273

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	4
Approximate K Value (0.059)	4
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0546

Conclusion with Alpha = 0.059

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:37:41 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	585	70
Number of Non-Detects	414	67
Number of Detects	171	3
Minimum Non-Detect	0.05	0.05
Maximum Non-Detect	1.9	4.3
Percent Non-detects	70.77%	95.71%
Minimum Detect	0.06	0.504
Maximum Detect	80	0.83
Mean of Detects	5.469	0.68
Median of Detects	0.91	0.707
SD of Detects	11.72	0.165

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.41
TW Critical Value (0.05)	1.645
P-Value	3.2529E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:36:41 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	585	70
Number of Non-Detects	414	67
Number of Detect Data	171	3
Minimum Non-Detect	0.05	0.05
Maximum Non-Detect	1.9	4.3
Percent Non-detects	70.77%	95.71%
Minimum Detect	0.06	0.504
Maximum Detect	80	0.83
Mean of Detects	5.469	0.68
Median of Detects	0.91	0.707
SD of Detects	11.72	0.165

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.376
Critical z (0.05)	1.645
P-Value	3.6829E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:41:56 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	578	70
Number of Non-Detects	0	0
Number of Detect Data	578	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	7.1	4.2
Maximum Detect	4400	53
Mean of Detects	142.8	22.35
Median of Detects	24	21.9
SD of Detects	477.1	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	191539
Standardized WMW U-Stat	2.69
Mean (U)	20230
SD(U) - Adj ties	1479
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.00358

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:48:47 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	505	59
Number of Non-Detects	0	1
Number of Detects	505	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	3.3	2.3
Maximum Detect	19	14
Mean of Detects	8.22	7.854
Median of Detects	7.9	7.605
SD of Detects	1.854	2.317

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.107
TW Critical Value (0.05)	1.645
P-Value	0.0176

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:49:34 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	505	59
Number of Non-Detects	0	1
Number of Detect Data	505	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	3.3	2.3
Maximum Detect	19	14
Mean of Detects	8.22	7.854
Median of Detects	7.9	7.605
SD of Detects	1.854	2.317

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.116
Critical z (0.05)	1.645
P-Value	0.132

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:46:18 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	579	69
Number of Non-Detects	1	0
Number of Detects	578	69
Minimum Non-Detect	7.3	N/A
Maximum Non-Detect	7.3	N/A
Percent Non-detects	0.17%	0.00%
Minimum Detect	3	2.1
Maximum Detect	85	18
Mean of Detects	12.08	10.32
Median of Detects	10.5	10
SD of Detects	6.367	3.255

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.463
TW Critical Value (0.05)	1.645
P-Value	0.0717

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:43:32 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	579	69
Number of Non-Detects	1	0
Number of Detect Data	578	69
Minimum Non-Detect	7.3	N/A
Maximum Non-Detect	7.3	N/A
Percent Non-detects	0.17%	0.00%
Minimum Detect	3	2.1
Maximum Detect	85	18
Mean of Detects	12.08	10.32
Median of Detects	10.5	10
SD of Detects	6.367	3.255

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.037
Critical z (0.05)	1.645
P-Value	0.15

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:56:23 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	519	60
Number of Non-Detects	20	1
Number of Detects	499	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	1.2	5.4
Percent Non-detects	3.85%	1.67%
Minimum Detect	1	1.9
Maximum Detect	120	10
Mean of Detects	4.545	4.377
Median of Detects	3.1	3.5
SD of Detects	6.459	2.012

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-3.964
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:54:45 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	519	60
Number of Non-Detects	20	1
Number of Detect Data	499	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	1.2	5.4
Percent Non-detects	3.85%	1.67%
Minimum Detect	1	1.9
Maximum Detect	120	10
Mean of Detects	4.545	4.377
Median of Detects	3.1	3.5
SD of Detects	6.459	2.012

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-3.25
Critical z (0.05)	1.645
P-Value	0.999

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 5:56:33 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_magnesium)

Sample 2 Data: Res(bkgd_magnesium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	55
Number of Non-Detects	0	0
Number of Detect Data	53	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4500	2500
Maximum Detect	14700	13000
Mean of Detects	7308	7945
Median of Detects	6800	8100
SD of Detects	2194	2049

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2490
Standardized WMW U-Stat	-2.453
Mean (U)	1458
SD(U) - Adj ties	162.7
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.993

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	0-15_AllData.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(BCW_magnesium)

Background Data: Res(bkgd_magnesium)

Raw Statistics

	Site	Background
Number of Valid Data	53	55
Number of Non-Detect Data	0	0
Number of Detect Data	53	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	4500	2500
Maximum Detected	14700	13000
Mean of Detected Data	7308	7945
Median of Detected Data	6800	8100
SD of Detected Data	2194	2049

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	4
Approximate K Value (0.059)	4
R Value Adjusted for Ties in Data	7
K Value Adjusted for Ties in Data	7
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0546

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 1:32:51 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_manganese)

Sample 2 Data: Res(bkgd_manganese)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	66	57
Number of Non-Detects	0	0
Number of Detect Data	66	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	67.4	140
Maximum Detect	720	450
Mean of Detects	241.5	279.5
Median of Detects	240	280
SD of Detects	81.89	61.51

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	3284
Standardized WMW U-Stat	-4.11
Mean (U)	1881
SD(U) - Adj ties	196.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	I:\pg&e\topock\Soil Risk Assessment\Background Metals Screen\ProUCL\ProUCL_COPCSelect_AllData_input_
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(BCW_manganese)

Background Data: Res(bkgd_manganese)

Raw Statistics

	Site	Background
Number of Valid Data	66	57
Number of Non-Detect Data	0	0
Number of Detect Data	66	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	67.4	140
Maximum Detected	720	450
Mean of Detected Data	241.5	279.5
Median of Detected Data	240	280
SD of Detected Data	81.89	61.51

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	5
Approximate K Value (0.043)	5
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0414

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:14:47 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	519	60
Number of Non-Detects	444	49
Number of Detects	75	11
Minimum Non-Detect	0.2	1
Maximum Non-Detect	5.3	5.4
Percent Non-detects	85.55%	81.67%
Minimum Detect	0.071	0.383
Maximum Detect	20	2.8
Mean of Detects	3.234	1.027
Median of Detects	1.9	1
SD of Detects	3.649	0.703

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.206
TW Critical Value (0.05)	1.645
P-Value	0.582

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:57:36 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	519	60
Number of Non-Detects	444	49
Number of Detect Data	75	11
Minimum Non-Detect	0.2	1
Maximum Non-Detect	5.3	5.4
Percent Non-detects	85.55%	81.67%
Minimum Detect	0.071	0.383
Maximum Detect	20	2.8
Mean of Detects	3.234	1.027
Median of Detects	1.9	1
SD of Detects	3.649	0.703

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.151
Critical z (0.05)	1.645
P-Value	0.44

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 2:30:41 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	579	70
Number of Non-Detects	0	0
Number of Detect Data	579	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	3.6	2.6
Maximum Detect	51	31
Mean of Detects	13.34	15.42
Median of Detects	12	15
SD of Detects	6.022	5.975

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	182472
Standardized WMW U-Stat	-3.859
Mean (U)	20265
SD(U) - Adj ties	1478
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 6:08:02 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_potassium)

Sample 2 Data: Res(bkgd_potassium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	54
Number of Non-Detects	0	0
Number of Detect Data	53	54
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	1040	540
Maximum Detect	4900	4300
Mean of Detects	2448	2747
Median of Detects	2400	2750
SD of Detects	719.4	811.2

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2459
Standardized WMW U-Stat	-2.521
Mean (U)	1431
SD(U) - Adj ties	160.2
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.994

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	0-15_AllData.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(BCW_potassium)

Background Data: Res(bkgd_potassium)

Raw Statistics

	Site	Background
Number of Valid Data	53	54
Number of Non-Detect Data	0	0
Number of Detect Data	53	54
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	1040	540
Maximum Detected	4900	4300
Mean of Detected Data	2448	2747
Median of Detected Data	2400	2750
SD of Detected Data	719.4	811.2

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	4
Approximate K Value (0.059)	4
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0567

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 1:42:55 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	506	59
Number of Non-Detects	501	52
Number of Detects	5	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	2.9	5
Percent Non-detects	99.01%	88.14%
Minimum Detect	1.1	0.738
Maximum Detect	2.5	2.7
Mean of Detects	1.72	1.566
Median of Detects	1.6	1.6
SD of Detects	0.576	0.678
KM Mean	1.007	0.898
KM SD	0.0879	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-4.416
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 1:43:21 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	506	59
Number of Non-Detects	501	52
Number of Detect Data	5	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	2.9	5
Percent Non-detects	99.01%	88.14%
Minimum Detect	1.1	0.738
Maximum Detect	2.5	2.7
Mean of Detects	1.72	1.566
Median of Detects	1.6	1.6
SD of Detects	0.576	0.678
KM Mean	1.007	0.898
KM SD	0.0879	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-4.225
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 6:12:59 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	55
Number of Non-Detects	11	4
Number of Detects	42	51
Minimum Non-Detect	210	240
Maximum Non-Detect	1000	1100
Percent Non-detects	20.75%	7.27%
Minimum Detect	140	170
Maximum Detect	2700	4500
Mean of Detects	521.7	636.9
Median of Detects	340	280
SD of Detects	511.9	744.4
KM Mean	460.7	610.9
KM SD	467.8	717.3

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.242
TW Critical Value (0.05)	1.645
P-Value	0.596

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 6:13:16 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	55
Number of Non-Detects	11	4
Number of Detect Data	42	51
Minimum Non-Detect	210	240
Maximum Non-Detect	1000	1100
Percent Non-detects	20.75%	7.27%
Minimum Detect	140	170
Maximum Detect	2700	4500
Mean of Detects	521.7	636.9
Median of Detects	340	280
SD of Detects	511.9	744.4
KM Mean	460.7	610.9
KM SD	467.8	717.3

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.467
Critical z (0.05)	1.645
P-Value	0.68

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	0-15_AllData.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(BCW_sodium)

Background Data: Res(bkgd_sodium)

Raw Statistics

	Site	Background
Number of Valid Data	53	55
Number of Non-Detect Data	11	4
Number of Detect Data	42	51
Minimum Non-Detect	210	240
Maximum Non-Detect	1000	1100
Percent Non detects	20.75%	7.27%
Minimum Detected	140	170
Maximum Detected	2700	4500
Mean of Detected Data	521.7	636.9
Median of Detected Data	340	280
SD of Detected Data	511.9	744.4

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	4
Approximate K Value (0.059)	4
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0546

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 1:35:00 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_vanadium)

Sample 2 Data: Res(bkgd_vanadium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	519	60
Number of Non-Detects	0	0
Number of Detect Data	519	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	15	9.4
Maximum Detect	70	59
Mean of Detects	32.15	34.05
Median of Detects	32	34.1
SD of Detects	7.119	8.997

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	147609
Standardized WMW U-Stat	-2.368
Mean (U)	15570
SD(U) - Adj ties	1225
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.991

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:15:26 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	579	70
Number of Non-Detects	0	0
Number of Detect Data	579	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	6.4	8.4
Maximum Detect	673	66.1
Mean of Detects	51.43	36.82
Median of Detects	39	35.5
SD of Detects	51.35	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	191296
Standardized WMW U-Stat	2.107
Mean (U)	20265
SD(U) - Adj ties	1481
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0176

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:23:55 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	372	42
Number of Non-Detects	0	28
Number of Detects	372	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	2870	267.4
Mean of Detects	50.1	86.74
Median of Detects	0	46.9
SD of Detects	238.8	82.16

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.023
TW Critical Value (0.05)	1.645
P-Value	8.541E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:27:30 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	372	42
Number of Non-Detects	0	28
Number of Detect Data	372	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	2870	267.4
Mean of Detects	50.1	86.74
Median of Detects	0	46.9
SD of Detects	238.8	82.16

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.422
Critical z (0.05)	1.645
P-Value	4.8891E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:29:30 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	372	42
Number of Non-Detects	0	36
Number of Detects	372	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	182	37.6
Mean of Detects	3.417	18.9
Median of Detects	0	12.6
SD of Detects	16.45	14.24

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	11.26
TW Critical Value (0.05)	1.645
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 5:30:32 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	372	42
Number of Non-Detects	0	36
Number of Detect Data	372	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	182	37.6
Mean of Detects	3.417	18.9
Median of Detects	0	12.6
SD of Detects	16.45	14.24

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	7.766
Critical z (0.05)	1.645
P-Value	3.997E-15

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:23:55 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	370	42
Number of Non-Detects	291	28
Number of Detects	79	14
Minimum Non-Detect	0	5.8
Maximum Non-Detect	400	6.1
Percent Non-detects	78.65%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	490	55
Mean of Detects	34.68	13.75
Median of Detects	13	8.7
SD of Detects	67.45	12.99

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.469
TW Critical Value (0.05)	1.645
P-Value	0.929

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:23:03 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	370	42
Number of Non-Detects	291	28
Number of Detect Data	79	14
Minimum Non-Detect	0	5.8
Maximum Non-Detect	400	6.1
Percent Non-detects	78.65%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	490	55
Mean of Detects	34.68	13.75
Median of Detects	13	8.7
SD of Detects	67.45	12.99

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.562
Critical z (0.05)	1.645
P-Value	0.941

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:19:06 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	227	35
Number of Non-Detects	12	2
Number of Detects	215	33
Minimum Non-Detect	0.11	0.12
Maximum Non-Detect	0.42	0.27
Percent Non-detects	5.29%	5.71%
Minimum Detect	0.099	0.13
Maximum Detect	11000	3
Mean of Detects	88.65	0.693
Median of Detects	3.4	0.37
SD of Detects	756.7	0.737

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.305
TW Critical Value (0.05)	1.645
P-Value	8.3468E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:20:16 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	227	35
Number of Non-Detects	12	2
Number of Detect Data	215	33
Minimum Non-Detect	0.11	0.12
Maximum Non-Detect	0.42	0.27
Percent Non-detects	5.29%	5.71%
Minimum Detect	0.099	0.13
Maximum Detect	11000	3
Mean of Detects	88.65	0.693
Median of Detects	3.4	0.37
SD of Detects	756.7	0.737

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.124
Critical z (0.05)	1.645
P-Value	1.4935E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:22:09 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	227	35
Number of Non-Detects	12	2
Number of Detects	215	33
Minimum Non-Detect	0.067	0.086
Maximum Non-Detect	0.44	0.17
Percent Non-detects	5.29%	5.71%
Minimum Detect	0.074	0.096
Maximum Detect	12000	3.6
Mean of Detects	113.1	0.727
Median of Detects	5.5	0.43
SD of Detects	833.6	0.81

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.755
TW Critical Value (0.05)	1.645
P-Value	8.6602E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:21:23 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	227	35
Number of Non-Detects	12	2
Number of Detect Data	215	33
Minimum Non-Detect	0.067	0.086
Maximum Non-Detect	0.44	0.17
Percent Non-detects	5.29%	5.71%
Minimum Detect	0.074	0.096
Maximum Detect	12000	3.6
Mean of Detects	113.1	0.727
Median of Detects	5.5	0.43
SD of Detects	833.6	0.81

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.719
Critical z (0.05)	1.645
P-Value	1.1879E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:22:09 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	227	35
Number of Non-Detects	12	2
Number of Detects	215	33
Minimum Non-Detect	0.067	0.086
Maximum Non-Detect	0.44	0.17
Percent Non-detects	5.29%	5.71%
Minimum Detect	0.074	0.096
Maximum Detect	12000	3.6
Mean of Detects	113.1	0.727
Median of Detects	5.5	0.43
SD of Detects	833.6	0.81

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.755
TW Critical Value (0.05)	1.645
P-Value	8.6602E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:21:23 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(BCW_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	227	35
Number of Non-Detects	12	2
Number of Detect Data	215	33
Minimum Non-Detect	0.067	0.086
Maximum Non-Detect	0.44	0.17
Percent Non-detects	5.29%	5.71%
Minimum Detect	0.074	0.096
Maximum Detect	12000	3.6
Mean of Detects	113.1	0.727
Median of Detects	5.5	0.43
SD of Detects	833.6	0.81

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.719
Critical z (0.05)	1.645
P-Value	1.1879E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/10/2018 12:52:50 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	60
Number of Non-Detects	0	0
Number of Detect Data	97	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	63	48.4
Maximum Detect	1300	660
Mean of Detects	273.7	164.6
Median of Detects	210	135
SD of Detects	180.4	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	9255
Standardized WMW U-Stat	5.755
Mean (U)	2910
SD(U) - Adj ties	276.5
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	4.3238E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:40:15 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	55
Number of Non-Detects	90	54
Number of Detects	7	1
Minimum Non-Detect	1	1
Maximum Non-Detect	5.5	5
Percent Non-detects	92.78%	98.18%
Minimum Detect	1.1	1.1
Maximum Detect	1.7	1.1
Mean of Detects	1.471	1.1
Median of Detects	1.5	1.1
SD of Detects	0.236	N/A
KM Mean	1.036	1.002
KM SD	0.139	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.395
TW Critical Value (0.05)	1.645
P-Value	0.0815

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:40:59 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	55
Number of Non-Detects	90	54
Number of Detect Data	7	1
Minimum Non-Detect	1	1
Maximum Non-Detect	5.5	5
Percent Non-detects	92.78%	98.18%
Minimum Detect	1.1	1.1
Maximum Detect	1.7	1.1
Mean of Detects	1.471	1.1
Median of Detects	1.5	1.1
SD of Detects	0.236	N/A
KM Mean	1.036	1.002
KM SD	0.139	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.401
Critical z (0.05)	1.645
P-Value	0.0805

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/24/2018 11:57:11 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	92	70
Number of Non-Detects	72	67
Number of Detects	20	3
Minimum Non-Detect	0.21	0.05
Maximum Non-Detect	0.47	4.3
Percent Non-detects	78.26%	95.71%
Minimum Detect	0.49	0.504
Maximum Detect	16	0.83
Mean of Detects	2.579	0.68
Median of Detects	1.02	0.707
SD of Detects	3.838	0.165
KM Mean	0.725	0.0808
KM SD	1.999	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.936
TW Critical Value (0.05)	1.645
P-Value	0.00166

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:36:08 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	92	70
Number of Non-Detects	72	67
Number of Detect Data	20	3
Minimum Non-Detect	0.21	0.05
Maximum Non-Detect	0.47	4.3
Percent Non-detects	78.26%	95.71%
Minimum Detect	0.49	0.504
Maximum Detect	16	0.83
Mean of Detects	2.579	0.68
Median of Detects	1.02	0.707
SD of Detects	3.838	0.165
KM Mean	0.725	0.0808
KM SD	1.999	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.958
Critical z (0.05)	1.645
P-Value	0.00155

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 10:50:10 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	70
Number of Non-Detects	0	0
Number of Detect Data	97	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	11	4.2
Maximum Detect	160	53
Mean of Detects	45.29	22.35
Median of Detects	39	21.9
SD of Detects	27.68	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	10419
Standardized WMW U-Stat	7.366
Mean (U)	3395
SD(U) - Adj ties	308.2
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	8.804E-14

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/13/2018 3:12:09 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	59
Number of Non-Detects	0	1
Number of Detects	97	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	4.3	2.3
Maximum Detect	20	14
Mean of Detects	9.505	7.854
Median of Detects	9	7.605
SD of Detects	3.209	2.317
KM Mean	9.505	7.788
KM SD	3.209	2.336

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.975
TW Critical Value (0.05)	1.645
P-Value	0.00147

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 2:44:00 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	59
Number of Non-Detects	0	1
Number of Detect Data	97	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	4.3	2.3
Maximum Detect	20	14
Mean of Detects	9.505	7.854
Median of Detects	9	7.605
SD of Detects	3.209	2.317
KM Mean	9.505	7.788
KM SD	3.209	2.336

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.013
Critical z (0.05)	1.645
P-Value	0.00129

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 10:51:33 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	69
Number of Non-Detects	0	0
Number of Detect Data	97	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	5.7	2.1
Maximum Detect	790	18
Mean of Detects	32.32	10.32
Median of Detects	17	10
SD of Detects	83.18	3.255

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	10248
Standardized WMW U-Stat	7.043
Mean (U)	3347
SD(U) - Adj ties	304.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	9.426E-13

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/24/2018 11:59:12 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	60
Number of Non-Detects	1	1
Number of Detects	96	59
Minimum Non-Detect	5.5	5.4
Maximum Non-Detect	5.5	5.4
Percent Non-detects	1.03%	1.67%
Minimum Detect	2.4	1.9
Maximum Detect	220	10
Mean of Detects	11.42	4.377
Median of Detects	5.85	3.5
SD of Detects	25.64	2.012
KM Mean	11.34	4.361
KM SD	25.39	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.964
TW Critical Value (0.05)	1.645
P-Value	1.2279E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:41:57 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	60
Number of Non-Detects	1	1
Number of Detect Data	96	59
Minimum Non-Detect	5.5	5.4
Maximum Non-Detect	5.5	5.4
Percent Non-detects	1.03%	1.67%
Minimum Detect	2.4	1.9
Maximum Detect	220	10
Mean of Detects	11.42	4.377
Median of Detects	5.85	3.5
SD of Detects	25.64	2.012
KM Mean	11.34	4.361
KM SD	25.39	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.576
Critical z (0.05)	1.645
P-Value	1.2302E-8

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 10:52:19 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	70
Number of Non-Detects	0	0
Number of Detect Data	97	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	9.8	2.6
Maximum Detect	75	31
Mean of Detects	27.94	15.42
Median of Detects	26	15
SD of Detects	11.69	5.975

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	10512
Standardized WMW U-Stat	7.668
Mean (U)	3395
SD(U) - Adj ties	308.2
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	8.771E-15

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 2:45:56 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_vanadium)

Sample 2 Data: Res(bkgd_vanadium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	60
Number of Non-Detects	0	0
Number of Detect Data	97	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	19	9.4
Maximum Detect	100	59
Mean of Detects	44.93	34.05
Median of Detects	41	34.1
SD of Detects	16.27	8.997

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	8800
Standardized WMW U-Stat	4.106
Mean (U)	2910
SD(U) - Adj ties	276.7
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	2.0165E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 10:53:25 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	70
Number of Non-Detects	0	0
Number of Detect Data	97	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	29	8.4
Maximum Detect	410	66.1
Mean of Detects	54.51	36.82
Median of Detects	43	35.5
SD of Detects	52.2	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	9490
Standardized WMW U-Stat	4.354
Mean (U)	3395
SD(U) - Adj ties	308
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	6.6922E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 10:48:01 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	101	42
Number of Non-Detects	0	28
Number of Detects	101	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	10200	267.4
Mean of Detects	554.9	86.74
Median of Detects	55.4	46.9
SD of Detects	1606	82.16
KM Mean	554.9	28.91
KM SD	1606	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.297
TW Critical Value (0.05)	1.645
P-Value	1.514E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:32:32 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	101	42
Number of Non-Detects	0	28
Number of Detect Data	101	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	10200	267.4
Mean of Detects	554.9	86.74
Median of Detects	55.4	46.9
SD of Detects	1606	82.16
KM Mean	554.9	28.91
KM SD	1606	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.126
Critical z (0.05)	1.645
P-Value	4.500E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 10:48:49 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	101	42
Number of Non-Detects	0	36
Number of Detects	101	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	1340	37.6
Mean of Detects	30.4	18.9
Median of Detects	0	12.6
SD of Detects	139.5	14.24
KM Mean	30.4	2.7
KM SD	139.5	8.239

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	7.752
TW Critical Value (0.05)	1.645
P-Value	4.552E-15

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:34:08 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	101	42
Number of Non-Detects	0	36
Number of Detect Data	101	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	1340	37.6
Mean of Detects	30.4	18.9
Median of Detects	0	12.6
SD of Detects	139.5	14.24
KM Mean	30.4	2.7
KM SD	139.5	8.239

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	7.368
Critical z (0.05)	1.645
P-Value	8.682E-14

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:09:38 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	101	42
Number of Non-Detects	33	28
Number of Detects	68	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	6.6	6.1
Percent Non-detects	32.67%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	1100	55
Mean of Detects	90.73	13.75
Median of Detects	18.5	8.7
SD of Detects	206.1	12.99
KM Mean	62.99	8.45
KM SD	172.5	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.177
TW Critical Value (0.05)	1.645
P-Value	1.4769E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:35:20 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	101	42
Number of Non-Detects	33	28
Number of Detect Data	68	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	6.6	6.1
Percent Non-detects	32.67%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	1100	55
Mean of Detects	90.73	13.75
Median of Detects	18.5	8.7
SD of Detects	206.1	12.99
KM Mean	62.99	8.45
KM SD	172.5	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.311
Critical z (0.05)	1.645
P-Value	8.1231E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:04:14 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	102	35
Number of Non-Detects	1	2
Number of Detects	101	33
Minimum Non-Detect	0.71	0.12
Maximum Non-Detect	0.71	0.27
Percent Non-detects	0.98%	5.71%
Minimum Detect	0.025	0.13
Maximum Detect	280	3
Mean of Detects	18.65	0.693
Median of Detects	5.5	0.37
SD of Detects	37.51	0.737
KM Mean	18.47	0.662
KM SD	37.19	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	7.325
TW Critical Value (0.05)	1.645
P-Value	1.193E-13

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:44:49 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	102	35
Number of Non-Detects	1	2
Number of Detect Data	101	33
Minimum Non-Detect	0.71	0.12
Maximum Non-Detect	0.71	0.27
Percent Non-detects	0.98%	5.71%
Minimum Detect	0.025	0.13
Maximum Detect	280	3
Mean of Detects	18.65	0.693
Median of Detects	5.5	0.37
SD of Detects	37.51	0.737
KM Mean	18.47	0.662
KM SD	37.19	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	7.539
Critical z (0.05)	1.645
P-Value	2.365E-14

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:05:40 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	102	35
Number of Non-Detects	1	2
Number of Detects	101	33
Minimum Non-Detect	0.47	0.086
Maximum Non-Detect	0.47	0.17
Percent Non-detects	0.98%	5.71%
Minimum Detect	0.021	0.096
Maximum Detect	250	3.6
Mean of Detects	23.42	0.727
Median of Detects	8	0.43
SD of Detects	41.87	0.81
KM Mean	23.19	0.691
KM SD	41.53	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	7.34
TW Critical Value (0.05)	1.645
P-Value	1.069E-13

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:43:53 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	102	35
Number of Non-Detects	1	2
Number of Detect Data	101	33
Minimum Non-Detect	0.47	0.086
Maximum Non-Detect	0.47	0.17
Percent Non-detects	0.98%	5.71%
Minimum Detect	0.021	0.096
Maximum Detect	250	3.6
Mean of Detects	23.42	0.727
Median of Detects	8	0.43
SD of Detects	41.87	0.81
KM Mean	23.19	0.691
KM SD	41.53	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	7.598
Critical z (0.05)	1.645
P-Value	1.499E-14

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:07:27 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_teq mammals)

Sample 2 Data: Res(bkgd_teqmammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	102	35
Number of Non-Detects	1	2
Number of Detects	101	33
Minimum Non-Detect	0.47	0.17
Maximum Non-Detect	0.47	0.34
Percent Non-detects	0.98%	5.71%
Minimum Detect	0.021	0.19
Maximum Detect	250	4.4
Mean of Detects	23.42	1.066
Median of Detects	8	0.64
SD of Detects	41.87	1.039
KM Mean	23.19	1.017
KM SD	41.53	1.014

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.732
TW Critical Value (0.05)	1.645
P-Value	8.348E-12

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:43:53 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc4_teq mammal)

Sample 2 Data: Res(bkgd_teq mammal)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	102	35
Number of Non-Detects	1	2
Number of Detect Data	101	33
Minimum Non-Detect	0.47	0.086
Maximum Non-Detect	0.47	0.17
Percent Non-detects	0.98%	5.71%
Minimum Detect	0.021	0.096
Maximum Detect	250	3.6
Mean of Detects	23.42	0.727
Median of Detects	8	0.43
SD of Detects	41.87	0.81
KM Mean	23.19	0.691
KM SD	41.53	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	7.598
Critical z (0.05)	1.645
P-Value	1.499E-14

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:43:57 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	96	59
Number of Non-Detects	0	1
Number of Detects	96	58
Minimum Non-Detect	N/A	1
Maximum Non-Detect	N/A	1
Percent Non-detects	0.00%	1.69%
Minimum Detect	1.5	0.884
Maximum Detect	17	12
Mean of Detects	4.468	4.006
Median of Detects	3.8	3.5
SD of Detects	2.293	2.357
KM Mean	4.468	3.953
KM SD	2.293	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.629
TW Critical Value (0.05)	1.645
P-Value	0.00429

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:44:49 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	96	59
Number of Non-Detects	0	1
Number of Detect Data	96	58
Minimum Non-Detect	N/A	1
Maximum Non-Detect	N/A	1
Percent Non-detects	0.00%	1.69%
Minimum Detect	1.5	0.884
Maximum Detect	17	12
Mean of Detects	4.468	4.006
Median of Detects	3.8	3.5
SD of Detects	2.293	2.357
KM Mean	4.468	3.953
KM SD	2.293	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.765
Critical z (0.05)	1.645
P-Value	0.0388

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:48:03 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	96	60
Number of Non-Detects	0	0
Number of Detect Data	96	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	52	48.4
Maximum Detect	590	660
Mean of Detects	126	164.6
Median of Detects	110	135
SD of Detects	69.76	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	6806
Standardized WMW U-Stat	-2.666
Mean (U)	2880
SD(U) - Adj ties	274.2
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.996

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(AOC 9_barium)

Background Data: Res(bkgd_barium)

Raw Statistics

	Site	Background
Number of Valid Data	96	60
Number of Non-Detect Data	0	0
Number of Detect Data	96	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	52	48.4
Maximum Detected	590	660
Mean of Detected Data	126	164.6
Median of Detected Data	110	135
SD of Detected Data	69.76	109.9

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.05)	6
Approximate K Value (0.05)	6
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.051

Conclusion with Alpha = 0.05

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:11:51 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	96	55
Number of Non-Detects	89	54
Number of Detects	7	1
Minimum Non-Detect	1	1
Maximum Non-Detect	1.2	5
Percent Non-detects	92.71%	98.18%
Minimum Detect	1.1	1.1
Maximum Detect	7.4	1.1
Mean of Detects	2.586	1.1
Median of Detects	1.2	1.1
SD of Detects	2.437	N/A
KM Mean	1.116	1.002
KM SD	0.736	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.356
TW Critical Value (0.05)	1.645
P-Value	0.0876

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:14:28 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	96	55
Number of Non-Detects	89	54
Number of Detect Data	7	1
Minimum Non-Detect	1	1
Maximum Non-Detect	1.2	5
Percent Non-detects	92.71%	98.18%
Minimum Detect	1.1	1.1
Maximum Detect	7.4	1.1
Mean of Detects	2.586	1.1
Median of Detects	1.2	1.1
SD of Detects	2.437	N/A
KM Mean	1.116	1.002
KM SD	0.736	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.337
Critical z (0.05)	1.645
P-Value	0.0906

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:25:00 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	93	70
Number of Non-Detects	44	67
Number of Detects	49	3
Minimum Non-Detect	0.2	0.05
Maximum Non-Detect	0.5	4.3
Percent Non-detects	47.31%	95.71%
Minimum Detect	0.2	0.504
Maximum Detect	2700	0.83
Mean of Detects	60.32	0.68
Median of Detects	1.1	0.707
SD of Detects	385.3	0.165
KM Mean	31.88	0.0808
KM SD	278.5	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.747
TW Critical Value (0.05)	1.645
P-Value	4.5523E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:52:12 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	93	70
Number of Non-Detects	44	67
Number of Detect Data	49	3
Minimum Non-Detect	0.2	0.05
Maximum Non-Detect	0.5	4.3
Percent Non-detects	47.31%	95.71%
Minimum Detect	0.2	0.504
Maximum Detect	2700	0.83
Mean of Detects	60.32	0.68
Median of Detects	1.1	0.707
SD of Detects	385.3	0.165
KM Mean	31.88	0.0808
KM SD	278.5	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.741
Critical z (0.05)	1.645
P-Value	4.7001E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:26:54 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	106	70
Number of Non-Detects	0	0
Number of Detect Data	106	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	3.6	4.2
Maximum Detect	2800	53
Mean of Detects	66.51	22.35
Median of Detects	27.5	21.9
SD of Detects	273.9	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	10172
Standardized WMW U-Stat	2.389
Mean (U)	3710
SD(U) - Adj ties	330.7
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.00846

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:17:56 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	96	59
Number of Non-Detects	1	1
Number of Detects	95	58
Minimum Non-Detect	5.4	5.1
Maximum Non-Detect	5.4	5.1
Percent Non-detects	1.04%	1.69%
Minimum Detect	1.9	2.3
Maximum Detect	36	14
Mean of Detects	6.444	7.854
Median of Detects	5.4	7.605
SD of Detects	4.603	2.317
KM Mean	6.417	7.788
KM SD	4.563	2.336

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-4.971
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:53:44 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	96	59
Number of Non-Detects	1	1
Number of Detect Data	95	58
Minimum Non-Detect	5.4	5.1
Maximum Non-Detect	5.4	5.1
Percent Non-detects	1.04%	1.69%
Minimum Detect	1.9	2.3
Maximum Detect	36	14
Mean of Detects	6.444	7.854
Median of Detects	5.4	7.605
SD of Detects	4.603	2.317
KM Mean	6.417	7.788
KM SD	4.563	2.336

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-4.607
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(AOC 9_cobalt)

Background Data: Res(bkgd_cobalt)

Raw Statistics

	Site	Background
Number of Valid Data	96	59
Number of Non-Detect Data	1	1
Number of Detect Data	95	58
Minimum Non-Detect	5.4	5.1
Maximum Non-Detect	5.4	5.1
Percent Non detects	1.04%	1.69%
Minimum Detected	1.9	2.3
Maximum Detected	36	14
Mean of Detected Data	6.444	7.854
Median of Detected Data	5.4	7.605
SD of Detected Data	4.603	2.317

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.05)	6
Approximate K Value (0.05)	6
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0531

Conclusion with Alpha = 0.05

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:22:51 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	69
Number of Non-Detects	0	0
Number of Detect Data	105	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	2.6	2.1
Maximum Detect	3100	18
Mean of Detects	55.74	10.32
Median of Detects	12.4	10
SD of Detects	307.3	3.255

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	10128
Standardized WMW U-Stat	2.895
Mean (U)	3623
SD(U) - Adj ties	324.7
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0019

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:13:27 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	60
Number of Non-Detects	0	1
Number of Detects	100	59
Minimum Non-Detect	N/A	5.4
Maximum Non-Detect	N/A	5.4
Percent Non-detects	0.00%	1.67%
Minimum Detect	1.7	1.9
Maximum Detect	920	10
Mean of Detects	24.35	4.377
Median of Detects	7.5	3.5
SD of Detects	94.39	2.012
KM Mean	24.35	4.361
KM SD	94.39	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.281
TW Critical Value (0.05)	1.645
P-Value	5.1751E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:57:28 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	60
Number of Non-Detects	0	1
Number of Detect Data	100	59
Minimum Non-Detect	N/A	5.4
Maximum Non-Detect	N/A	5.4
Percent Non-detects	0.00%	1.67%
Minimum Detect	1.7	1.9
Maximum Detect	920	10
Mean of Detects	24.35	4.377
Median of Detects	7.5	3.5
SD of Detects	94.39	2.012
KM Mean	24.35	4.361
KM SD	94.39	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.183
Critical z (0.05)	1.645
P-Value	1.4399E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:15:09 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	60
Number of Non-Detects	86	49
Number of Detects	11	11
Minimum Non-Detect	1	1
Maximum Non-Detect	5.4	5.4
Percent Non-detects	88.66%	81.67%
Minimum Detect	1	0.383
Maximum Detect	19	2.8
Mean of Detects	5.936	1.027
Median of Detects	4.5	1
SD of Detects	5.551	0.703
KM Mean	1.563	0.682
KM SD	2.372	0.433

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.0719
TW Critical Value (0.05)	1.645
P-Value	0.529

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:17:20 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	97	60
Number of Non-Detects	86	49
Number of Detect Data	11	11
Minimum Non-Detect	1	1
Maximum Non-Detect	5.4	5.4
Percent Non-detects	88.66%	81.67%
Minimum Detect	1	0.383
Maximum Detect	19	2.8
Mean of Detects	5.936	1.027
Median of Detects	4.5	1
SD of Detects	5.551	0.703
KM Mean	1.563	0.682
KM SD	2.372	0.433

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.235
Critical z (0.05)	1.645
P-Value	0.407

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 2:48:30 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	70
Number of Non-Detects	0	0
Number of Detect Data	105	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	2.7	2.6
Maximum Detect	51	31
Mean of Detects	14.9	15.42
Median of Detects	12	15
SD of Detects	8.97	5.975

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	8661
Standardized WMW U-Stat	-1.766
Mean (U)	3675
SD(U) - Adj ties	328.1
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.961

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:24:10 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	70
Number of Non-Detects	0	0
Number of Detect Data	105	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	9.5	8.4
Maximum Detect	1000	66.1
Mean of Detects	88.74	36.82
Median of Detects	42	35.5
SD of Detects	162.9	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	10245
Standardized WMW U-Stat	3.059
Mean (U)	3675
SD(U) - Adj ties	328.2
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.00111

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 10:42:37 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	42
Number of Non-Detects	0	28
Number of Detects	100	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	32900	267.4
Mean of Detects	1111	86.74
Median of Detects	94.45	46.9
SD of Detects	3993	82.16
KM Mean	1111	28.91
KM SD	3993	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.421
TW Critical Value (0.05)	1.645
P-Value	6.752E-11

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:49:43 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	42
Number of Non-Detects	0	28
Number of Detect Data	100	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	32900	267.4
Mean of Detects	1111	86.74
Median of Detects	94.45	46.9
SD of Detects	3993	82.16
KM Mean	1111	28.91
KM SD	3993	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.363
Critical z (0.05)	1.645
P-Value	9.910E-11

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 10:43:36 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	42
Number of Non-Detects	0	36
Number of Detects	100	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	1770	37.6
Mean of Detects	74.35	18.9
Median of Detects	5.5	12.6
SD of Detects	227.6	14.24
KM Mean	74.35	2.7
KM SD	227.6	8.239

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	7.865
TW Critical Value (0.05)	1.645
P-Value	1.887E-15

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:50:50 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	42
Number of Non-Detects	0	36
Number of Detect Data	100	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	1770	37.6
Mean of Detects	74.35	18.9
Median of Detects	5.5	12.6
SD of Detects	227.6	14.24
KM Mean	74.35	2.7
KM SD	227.6	8.239

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	7.652
Critical z (0.05)	1.645
P-Value	9.881E-15

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:22:26 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	42
Number of Non-Detects	36	28
Number of Detects	64	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	300	6.1
Percent Non-detects	36.00%	66.67%
Minimum Detect	6	6.1
Maximum Detect	8200	55
Mean of Detects	312.7	13.75
Median of Detects	46	8.7
SD of Detects	1083	12.99
KM Mean	202.7	8.45
KM SD	872.3	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.346
TW Critical Value (0.05)	1.645
P-Value	6.9248E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:10:57 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	42
Number of Non-Detects	36	28
Number of Detect Data	64	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	300	6.1
Percent Non-detects	36.00%	66.67%
Minimum Detect	6	6.1
Maximum Detect	8200	55
Mean of Detects	312.7	13.75
Median of Detects	46	8.7
SD of Detects	1083	12.99
KM Mean	202.7	8.45
KM SD	872.3	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.753
Critical z (0.05)	1.645
P-Value	1.0021E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:23:32 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	35
Number of Non-Detects	1	2
Number of Detects	40	33
Minimum Non-Detect	0.46	0.12
Maximum Non-Detect	0.46	0.27
Percent Non-detects	2.44%	5.71%
Minimum Detect	0.26	0.13
Maximum Detect	1100	3
Mean of Detects	75.78	0.693
Median of Detects	15	0.37
SD of Detects	187.6	0.737
KM Mean	73.94	0.662
KM SD	183.3	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.141
TW Critical Value (0.05)	1.645
P-Value	4.093E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:07:13 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	35
Number of Non-Detects	1	2
Number of Detect Data	40	33
Minimum Non-Detect	0.46	0.12
Maximum Non-Detect	0.46	0.27
Percent Non-detects	2.44%	5.71%
Minimum Detect	0.26	0.13
Maximum Detect	1100	3
Mean of Detects	75.78	0.693
Median of Detects	15	0.37
SD of Detects	187.6	0.737
KM Mean	73.94	0.662
KM SD	183.3	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.871
Critical z (0.05)	1.645
P-Value	2.1601E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:24:17 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	35
Number of Non-Detects	1	2
Number of Detects	40	33
Minimum Non-Detect	0.3	0.086
Maximum Non-Detect	0.3	0.17
Percent Non-detects	2.44%	5.71%
Minimum Detect	0.15	0.096
Maximum Detect	1600	3.6
Mean of Detects	128.9	0.727
Median of Detects	24.5	0.43
SD of Detects	308.5	0.81
KM Mean	125.8	0.691
KM SD	301.6	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.676
TW Critical Value (0.05)	1.645
P-Value	6.8986E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:08:52 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	35
Number of Non-Detects	1	2
Number of Detect Data	40	33
Minimum Non-Detect	0.3	0.086
Maximum Non-Detect	0.3	0.17
Percent Non-detects	2.44%	5.71%
Minimum Detect	0.15	0.096
Maximum Detect	1600	3.6
Mean of Detects	128.9	0.727
Median of Detects	24.5	0.43
SD of Detects	308.5	0.81
KM Mean	125.8	0.691
KM SD	301.6	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.6
Critical z (0.05)	1.645
P-Value	1.0718E-8

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 11:24:57 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_teq mammals)

Sample 2 Data: Res(bkgd_teqmammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	35
Number of Non-Detects	1	2
Number of Detects	40	33
Minimum Non-Detect	0.3	0.17
Maximum Non-Detect	0.3	0.34
Percent Non-detects	2.44%	5.71%
Minimum Detect	0.15	0.19
Maximum Detect	1600	4.4
Mean of Detects	128.9	1.066
Median of Detects	24.5	0.64
SD of Detects	308.5	1.039
KM Mean	125.8	1.017
KM SD	301.6	1.014

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.706
TW Critical Value (0.05)	1.645
P-Value	1.2600E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:09:59 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(AOC 9_teq mammals)

Sample 2 Data: Res(bkgd_teq mammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	35
Number of Non-Detects	1	2
Number of Detect Data	40	33
Minimum Non-Detect	0.3	0.086
Maximum Non-Detect	0.3	0.17
Percent Non-detects	2.44%	5.71%
Minimum Detect	0.15	0.096
Maximum Detect	1600	3.6
Mean of Detects	128.9	0.727
Median of Detects	24.5	0.43
SD of Detects	308.5	0.81
KM Mean	125.8	0.691
KM SD	301.6	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.6
Critical z (0.05)	1.645
P-Value	1.0718E-8

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2018 5:31:56 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_aluminum)

Sample 2 Data: Res(bkgd_aluminum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	55
Number of Non-Detects	0	0
Number of Detect Data	10	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4900	2600
Maximum Detect	18000	18000
Mean of Detects	8870	10445
Median of Detects	8150	10000
SD of Detects	3615	2908

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	209
Standardized WMW U-Stat	-2.216
Mean (U)	275
SD(U) - Adj ties	54.83
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.987

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	I:\pg&e\topock\Soil Risk Assessment\Background Metals Screen\ProUCL\Input\ProUCL_COPCSelect_AllData_i
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc10_aluminum)

Background Data: Res(bkgd_aluminum)

Raw Statistics

	Site	Background
Number of Valid Data	10	55
Number of Non-Detect Data	0	0
Number of Detect Data	10	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	4900	2600
Maximum Detected	18000	18000
Mean of Detected Data	8870	10445
Median of Detected Data	8150	10000
SD of Detected Data	3615	2908

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	3
Approximate K Value (0.059)	2
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0594

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2018 5:36:35 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	59
Number of Non-Detects	3	1
Number of Detects	121	58
Minimum Non-Detect	1	1
Maximum Non-Detect	2.1	1
Percent Non-detects	2.42%	1.69%
Minimum Detect	1.2	0.884
Maximum Detect	12	12
Mean of Detects	5.113	4.006
Median of Detects	4.5	3.5
SD of Detects	2.154	2.357
KM Mean	5.014	3.953
KM SD	2.21	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.741
TW Critical Value (0.05)	1.645
P-Value	9.1582E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2018 5:37:36 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	59
Number of Non-Detects	3	1
Number of Detect Data	121	58
Minimum Non-Detect	1	1
Maximum Non-Detect	2.1	1
Percent Non-detects	2.42%	1.69%
Minimum Detect	1.2	0.884
Maximum Detect	12	12
Mean of Detects	5.113	4.006
Median of Detects	4.5	3.5
SD of Detects	2.154	2.357
KM Mean	5.014	3.953
KM SD	2.21	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.334
Critical z (0.05)	1.645
P-Value	4.2840E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 5:06:30 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	60
Number of Non-Detects	0	0
Number of Detect Data	124	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	44	48.4
Maximum Detect	1300	660
Mean of Detects	170	164.6
Median of Detects	130	135
SD of Detects	136.1	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	11555
Standardized WMW U-Stat	0.248
Mean (U)	3720
SD(U) - Adj ties	338.2
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.402

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2018 5:45:51 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	55
Number of Non-Detects	123	54
Number of Detects	1	1
Minimum Non-Detect	1	1
Maximum Non-Detect	9.8	5
Percent Non-detects	99.19%	98.18%
Minimum Detect	1.5	1.1
Maximum Detect	1.5	1.1
Mean of Detects	1.5	1.1
Median of Detects	1.5	1.1
SD of Detects	N/A	N/A
KM Mean	1.004	1.002
KM SD	0.046	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.629
TW Critical Value (0.05)	1.645
P-Value	0.735

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2018 6:32:38 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	55
Number of Non-Detects	123	54
Number of Detect Data	1	1
Minimum Non-Detect	1	1
Maximum Non-Detect	9.8	5
Percent Non-detects	99.19%	98.18%
Minimum Detect	1.5	1.1
Maximum Detect	1.5	1.1
Mean of Detects	1.5	1.1
Median of Detects	1.5	1.1
SD of Detects	N/A	N/A
KM Mean	1.004	1.002
KM SD	0.046	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.621
Critical z (0.05)	1.645
P-Value	0.733

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 6:05:52 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_calcium)

Sample 2 Data: Res(bkgd_calcium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	55
Number of Non-Detects	0	0
Number of Detect Data	14	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	18000	4100
Maximum Detect	265000	67000
Mean of Detects	65250	24293
Median of Detects	24500	20000
SD of Detects	84187	13273

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	631.5
Standardized WMW U-Stat	2.106
Mean (U)	385
SD(U) - Adj ties	66.96
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0176

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:32:49 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	143	70
Number of Non-Detects	70	67
Number of Detects	73	3
Minimum Non-Detect	0.16	0.05
Maximum Non-Detect	4.7	4.3
Percent Non-detects	48.95%	95.71%
Minimum Detect	0.24	0.504
Maximum Detect	150	0.83
Mean of Detects	7.358	0.68
Median of Detects	1.3	0.707
SD of Detects	21.62	0.165
KM Mean	3.861	0.0808
KM SD	15.75	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.921
TW Critical Value (0.05)	1.645
P-Value	1.6045E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 12:01:59 AM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	143	70
Number of Non-Detects	70	67
Number of Detect Data	73	3
Minimum Non-Detect	0.16	0.05
Maximum Non-Detect	4.7	4.3
Percent Non-detects	48.95%	95.71%
Minimum Detect	0.24	0.504
Maximum Detect	150	0.83
Mean of Detects	7.358	0.68
Median of Detects	1.3	0.707
SD of Detects	21.62	0.165
KM Mean	3.861	0.0808
KM SD	15.75	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.013
Critical z (0.05)	1.645
P-Value	9.106E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:35:33 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	143	70
Number of Non-Detects	0	0
Number of Detect Data	143	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.9	4.2
Maximum Detect	4000	53
Mean of Detects	162.3	22.35
Median of Detects	31	21.9
SD of Detects	522.4	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	17544
Standardized WMW U-Stat	5.308
Mean (U)	5005
SD(U) - Adj ties	422.4
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	5.5367E-8

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:36:54 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	137	69
Number of Non-Detects	0	0
Number of Detect Data	137	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.1	2.1
Maximum Detect	300	18
Mean of Detects	26.39	10.32
Median of Detects	14	10
SD of Detects	42.34	3.255

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	16713
Standardized WMW U-Stat	6.279
Mean (U)	4727
SD(U) - Adj ties	403.3
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1.700E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:37:58 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	60
Number of Non-Detects	1	1
Number of Detects	123	59
Minimum Non-Detect	5.1	5.4
Maximum Non-Detect	5.1	5.4
Percent Non-detects	0.81%	1.67%
Minimum Detect	1.5	1.9
Maximum Detect	160	10
Mean of Detects	10.61	4.377
Median of Detects	5.4	3.5
SD of Detects	16.42	2.012
KM Mean	10.55	4.361
KM SD	16.3	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.825
TW Critical Value (0.05)	1.645
P-Value	0.00236

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 12:04:47 AM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	60
Number of Non-Detects	1	1
Number of Detect Data	123	59
Minimum Non-Detect	5.1	5.4
Maximum Non-Detect	5.1	5.4
Percent Non-detects	0.81%	1.67%
Minimum Detect	1.5	1.9
Maximum Detect	160	10
Mean of Detects	10.61	4.377
Median of Detects	5.4	3.5
SD of Detects	16.42	2.012
KM Mean	10.55	4.361
KM SD	16.3	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.463
Critical z (0.05)	1.645
P-Value	2.6671E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 5:59:16 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_magnesium)

Sample 2 Data: Res(bkgd_magnesium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	55
Number of Non-Detects	0	0
Number of Detect Data	14	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4700	2500
Maximum Detect	14300	13000
Mean of Detects	8850	7945
Median of Detects	7200	8100
SD of Detects	3355	2049

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	504.5
Standardized WMW U-Stat	0.209
Mean (U)	385
SD(U) - Adj ties	66.99
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.417

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	0-15_AllData.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc10_magnesium)

Background Data: Res(bkgd_magnesium)

Raw Statistics

	Site	Background
Number of Valid Data	14	55
Number of Non-Detect Data	0	0
Number of Detect Data	14	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	4700	2500
Maximum Detected	14300	13000
Mean of Detected Data	8850	7945
Median of Detected Data	7200	8100
SD of Detected Data	3355	2049

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	2
Approximate K Value (0.043)	2
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0388

Conclusion with Alpha = 0.043

Reject H0, Conclude Site Concentration > Background Concentration

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:39:05 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_manganese)

Sample 2 Data: Res(bkgd_manganese)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	57
Number of Non-Detects	0	0
Number of Detect Data	10	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	160	140
Maximum Detect	1300	450
Mean of Detects	375	279.5
Median of Detects	265	280
SD of Detects	337.8	61.51

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	328.5
Standardized WMW U-Stat	-0.212
Mean (U)	285
SD(U) - Adj ties	56.68
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.584

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	0-15_AllData.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc10_manganese)

Background Data: Res(bkgd_manganese)

Raw Statistics

	Site	Background
Number of Valid Data	10	57
Number of Non-Detect Data	0	0
Number of Detect Data	10	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	160	140
Maximum Detected	1300	450
Mean of Detected Data	375	279.5
Median of Detected Data	265	280
SD of Detected Data	337.8	61.51

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	3
Approximate K Value (0.059)	2
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.056

Conclusion with Alpha = 0.059

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:43:19 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	125	60
Number of Non-Detects	102	49
Number of Detects	23	11
Minimum Non-Detect	1	1
Maximum Non-Detect	5.2	5.4
Percent Non-detects	81.60%	81.67%
Minimum Detect	1	0.383
Maximum Detect	14	2.8
Mean of Detects	3.326	1.027
Median of Detects	1.5	1
SD of Detects	3.769	0.703
KM Mean	1.461	0.682
KM SD	1.822	0.433

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.108
TW Critical Value (0.05)	1.645
P-Value	0.134

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.18/17/2018 12:57:10 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	125	60
Number of Non-Detects	102	49
Number of Detect Data	23	11
Minimum Non-Detect	1	1
Maximum Non-Detect	5.2	5.4
Percent Non-detects	81.60%	81.67%
Minimum Detect	1	0.383
Maximum Detect	14	2.8
Mean of Detects	3.326	1.027
Median of Detects	1.5	1
SD of Detects	3.769	0.703
KM Mean	1.461	0.682
KM SD	1.822	0.433

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.245
Critical z (0.05)	1.645
P-Value	0.107

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2018 5:48:52 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	137	70
Number of Non-Detects	3	0
Number of Detects	134	70
Minimum Non-Detect	4.4	N/A
Maximum Non-Detect	4.9	N/A
Percent Non-detects	2.19%	0.00%
Minimum Detect	4.3	2.6
Maximum Detect	28	31
Mean of Detects	16.25	15.42
Median of Detects	16	15
SD of Detects	4.899	5.975
KM Mean	15.98	15.42
KM SD	5.134	5.975

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.077
TW Critical Value (0.05)	1.645
P-Value	0.141

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2018 5:49:46 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	137	70
Number of Non-Detects	3	0
Number of Detect Data	134	70
Minimum Non-Detect	4.4	N/A
Maximum Non-Detect	4.9	N/A
Percent Non-detects	2.19%	0.00%
Minimum Detect	4.3	2.6
Maximum Detect	28	31
Mean of Detects	16.25	15.42
Median of Detects	16	15
SD of Detects	4.899	5.975
KM Mean	15.98	15.42
KM SD	5.134	5.975

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.556
Critical z (0.05)	1.645
P-Value	0.289

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:46:35 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	59
Number of Non-Detects	121	52
Number of Detects	3	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	4.9	5
Percent Non-detects	97.58%	88.14%
Minimum Detect	1.1	0.738
Maximum Detect	9.1	2.7
Mean of Detects	4.033	1.566
Median of Detects	1.9	1.6
SD of Detects	4.406	0.678
KM Mean	1.074	0.898
KM SD	0.728	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.942
TW Critical Value (0.05)	1.645
P-Value	0.974

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:47:49 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	124	59
Number of Non-Detects	121	52
Number of Detect Data	3	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	4.9	5
Percent Non-detects	97.58%	88.14%
Minimum Detect	1.1	0.738
Maximum Detect	9.1	2.7
Mean of Detects	4.033	1.566
Median of Detects	1.9	1.6
SD of Detects	4.406	0.678
KM Mean	1.074	0.898
KM SD	0.728	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.908
Critical z (0.05)	1.645
P-Value	0.972

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 6:15:25 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	55
Number of Non-Detects	0	4
Number of Detects	14	51
Minimum Non-Detect	N/A	240
Maximum Non-Detect	N/A	1100
Percent Non-detects	0.00%	7.27%
Minimum Detect	170	170
Maximum Detect	2790	4500
Mean of Detects	769.3	636.9
Median of Detects	345	280
SD of Detects	821.2	744.4
KM Mean	769.3	610.9
KM SD	821.2	717.3

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.852
TW Critical Value (0.05)	1.645
P-Value	0.197

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 6:15:46 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	55
Number of Non-Detects	0	4
Number of Detect Data	14	51
Minimum Non-Detect	N/A	240
Maximum Non-Detect	N/A	1100
Percent Non-detects	0.00%	7.27%
Minimum Detect	170	170
Maximum Detect	2790	4500
Mean of Detects	769.3	636.9
Median of Detects	345	280
SD of Detects	821.2	744.4
KM Mean	769.3	610.9
KM SD	821.2	717.3

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.76
Critical z (0.05)	1.645
P-Value	0.223

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	0-15_AllData.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc10_sodium)

Background Data: Res(bkgd_sodium)

Raw Statistics

	Site	Background
Number of Valid Data	14	55
Number of Non-Detect Data	0	4
Number of Detect Data	14	51
Minimum Non-Detect	N/A	240
Maximum Non-Detect	N/A	1100
Percent Non detects	0.00%	7.27%
Minimum Detected	170	170
Maximum Detected	2790	4500
Mean of Detected Data	769.3	636.9
Median of Detected Data	345	280
SD of Detected Data	821.2	744.4

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	2
Approximate K Value (0.043)	2
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0388

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:48:57 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	137	70
Number of Non-Detects	0	0
Number of Detect Data	137	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	14	8.4
Maximum Detect	300	66.1
Mean of Detects	69.78	36.82
Median of Detects	52	35.5
SD of Detects	53	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	17252
Standardized WMW U-Stat	7.369
Mean (U)	4795
SD(U) - Adj ties	407.6
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	8.593E-14

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:31:01 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	119	42
Number of Non-Detects	0	28
Number of Detects	119	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	3060	267.4
Mean of Detects	167.7	86.74
Median of Detects	0	46.9
SD of Detects	421.8	82.16
KM Mean	167.7	28.91
KM SD	421.8	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.546
TW Critical Value (0.05)	1.645
P-Value	1.4650E-8

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:58:38 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	119	42
Number of Non-Detects	0	28
Number of Detect Data	119	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	3060	267.4
Mean of Detects	167.7	86.74
Median of Detects	0	46.9
SD of Detects	421.8	82.16
KM Mean	167.7	28.91
KM SD	421.8	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.145
Critical z (0.05)	1.645
P-Value	1.3356E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:31:59 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	119	42
Number of Non-Detects	0	36
Number of Detects	119	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	279	37.6
Mean of Detects	12.36	18.9
Median of Detects	0	12.6
SD of Detects	37.1	14.24
KM Mean	12.36	2.7
KM SD	37.1	8.239

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	8.112
TW Critical Value (0.05)	1.645
P-Value	2.220E-16

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:59:36 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	119	42
Number of Non-Detects	0	36
Number of Detect Data	119	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	279	37.6
Mean of Detects	12.36	18.9
Median of Detects	0	12.6
SD of Detects	37.1	14.24
KM Mean	12.36	2.7
KM SD	37.1	8.239

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	7.379
Critical z (0.05)	1.645
P-Value	7.971E-14

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:27:42 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	116	42
Number of Non-Detects	71	28
Number of Detects	45	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	58	6.1
Percent Non-detects	61.21%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	430	55
Mean of Detects	65.47	13.75
Median of Detects	37	8.7
SD of Detects	82.84	12.99

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.39
TW Critical Value (0.05)	1.645
P-Value	0.0823

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	1/16/2018 6:26:40 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	116	42
Number of Non-Detects	71	28
Number of Detect Data	45	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	58	6.1
Percent Non-detects	61.21%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	430	55
Mean of Detects	65.47	13.75
Median of Detects	37	8.7
SD of Detects	82.84	12.99

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.605
Critical z (0.05)	1.645
P-Value	0.0543

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	0-15_AllData.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc10_b(a)p equivalent)

Background Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Site	Background
Number of Valid Data	116	42
Number of Non-Detect Data	71	28
Number of Detect Data	45	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	58	6.1
Percent Non detects	61.21%	66.67%
Minimum Detected	5.8	6.1
Maximum Detected	430	55
Mean of Detected Data	65.47	13.75
Median of Detected Data	37	8.7
SD of Detected Data	82.84	12.99

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	9
Approximate K Value (0.043)	9
Number of Site Observations in 'R' Largest	9
Calculated Alpha	0.0569

Conclusion with Alpha = 0.043

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:51:00 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	44	35
Number of Non-Detects	3	2
Number of Detects	41	33
Minimum Non-Detect	0.25	0.12
Maximum Non-Detect	3.4	0.27
Percent Non-detects	6.82%	5.71%
Minimum Detect	0.35	0.13
Maximum Detect	300	3
Mean of Detects	45.16	0.693
Median of Detects	11	0.37
SD of Detects	71.71	0.737
KM Mean	42.12	0.662
KM SD	69.29	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.167
TW Critical Value (0.05)	1.645
P-Value	3.483E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 3:10:20 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	44	35
Number of Non-Detects	3	2
Number of Detect Data	41	33
Minimum Non-Detect	0.25	0.12
Maximum Non-Detect	3.4	0.27
Percent Non-detects	6.82%	5.71%
Minimum Detect	0.35	0.13
Maximum Detect	300	3
Mean of Detects	45.16	0.693
Median of Detects	11	0.37
SD of Detects	71.71	0.737
KM Mean	42.12	0.662
KM SD	69.29	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.928
Critical z (0.05)	1.645
P-Value	1.5314E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:58:01 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	44	35
Number of Non-Detects	3	2
Number of Detects	41	33
Minimum Non-Detect	0.14	0.086
Maximum Non-Detect	2.3	0.17
Percent Non-detects	6.82%	5.71%
Minimum Detect	0.2	0.096
Maximum Detect	410	3.6
Mean of Detects	63.33	0.727
Median of Detects	13	0.43
SD of Detects	103.2	0.81
KM Mean	59.03	0.691
KM SD	99.67	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.674
TW Critical Value (0.05)	1.645
P-Value	6.9791E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 12:06:18 AM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	44	35
Number of Non-Detects	3	2
Number of Detect Data	41	33
Minimum Non-Detect	0.14	0.086
Maximum Non-Detect	2.3	0.17
Percent Non-detects	6.82%	5.71%
Minimum Detect	0.2	0.096
Maximum Detect	410	3.6
Mean of Detects	63.33	0.727
Median of Detects	13	0.43
SD of Detects	103.2	0.81
KM Mean	59.03	0.691
KM SD	99.67	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.634
Critical z (0.05)	1.645
P-Value	8.7878E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/5/2018 5:56:56 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_teq mammals)

Sample 2 Data: Res(bkgd_teqmammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	44	35
Number of Non-Detects	3	2
Number of Detects	41	33
Minimum Non-Detect	0.14	0.17
Maximum Non-Detect	2.3	0.34
Percent Non-detects	6.82%	5.71%
Minimum Detect	0.2	0.19
Maximum Detect	410	4.4
Mean of Detects	63.33	1.066
Median of Detects	13	0.64
SD of Detects	103.2	1.039
KM Mean	59.03	1.017
KM SD	99.67	1.014

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.767
TW Critical Value (0.05)	1.645
P-Value	9.3689E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 12:07:28 AM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10_teq mammals)

Sample 2 Data: Res(bkgd_teqmammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	44	35
Number of Non-Detects	3	2
Number of Detect Data	41	33
Minimum Non-Detect	0.14	0.17
Maximum Non-Detect	2.3	0.34
Percent Non-detects	6.82%	5.71%
Minimum Detect	0.2	0.19
Maximum Detect	410	4.4
Mean of Detects	63.33	1.066
Median of Detects	13	0.64
SD of Detects	103.2	1.039
KM Mean	59.03	1.017
KM SD	99.67	1.014

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.032
Critical z (0.05)	1.645
P-Value	2.4293E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 10:36:31 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_aluminum)

Sample 2 Data: Res(bkgd_aluminum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	21	55
Number of Non-Detects	0	0
Number of Detect Data	21	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	3500	2600
Maximum Detect	20000	18000
Mean of Detects	8252	10445
Median of Detects	6600	10000
SD of Detects	4725	2908

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	546.5
Standardized WMW U-Stat	-3.057
Mean (U)	577.5
SD(U) - Adj ties	85.86
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.999

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc11_aluminum)

Background Data: Res(bkgd_aluminum)

Raw Statistics

	Site	Background
Number of Valid Data	21	55
Number of Non-Detect Data	0	0
Number of Detect Data	21	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	3500	2600
Maximum Detected	20000	18000
Mean of Detected Data	8252	10445
Median of Detected Data	6600	10000
SD of Detected Data	4725	2908

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.056)	4
Approximate K Value (0.056)	3
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0617

Conclusion with Alpha = 0.056

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:18:05 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	59
Number of Non-Detects	0	1
Number of Detects	159	58
Minimum Non-Detect	N/A	1
Maximum Non-Detect	N/A	1
Percent Non-detects	0.00%	1.69%
Minimum Detect	2.2	0.884
Maximum Detect	13	12
Mean of Detects	5.079	4.006
Median of Detects	4.6	3.5
SD of Detects	2.021	2.357
KM Mean	5.079	3.953
KM SD	2.021	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.579
TW Critical Value (0.05)	1.645
P-Value	2.3315E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:18:39 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	59
Number of Non-Detects	0	1
Number of Detect Data	159	58
Minimum Non-Detect	N/A	1
Maximum Non-Detect	N/A	1
Percent Non-detects	0.00%	1.69%
Minimum Detect	2.2	0.884
Maximum Detect	13	12
Mean of Detects	5.079	4.006
Median of Detects	4.6	3.5
SD of Detects	2.021	2.357
KM Mean	5.079	3.953
KM SD	2.021	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.854
Critical z (0.05)	1.645
P-Value	5.8193E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 11:48:47 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	60
Number of Non-Detects	0	0
Number of Detect Data	159	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	37	48.4
Maximum Detect	1300	660
Mean of Detects	160.7	164.6
Median of Detects	120	135
SD of Detects	145	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	17123
Standardized WMW U-Stat	-0.879
Mean (U)	4770
SD(U) - Adj ties	417.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.81

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:22:02 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	55
Number of Non-Detects	158	54
Number of Detects	1	1
Minimum Non-Detect	1	1
Maximum Non-Detect	1.4	5
Percent Non-detects	99.37%	98.18%
Minimum Detect	1.2	1.1
Maximum Detect	1.2	1.1
Mean of Detects	1.2	1.1
Median of Detects	1.2	1.1
SD of Detects	N/A	N/A
KM Mean	1.001	1.002
KM SD	0.0159	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.862
TW Critical Value (0.05)	1.645
P-Value	0.806

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:22:42 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	55
Number of Non-Detects	158	54
Number of Detect Data	1	1
Minimum Non-Detect	1	1
Maximum Non-Detect	1.4	5
Percent Non-detects	99.37%	98.18%
Minimum Detect	1.2	1.1
Maximum Detect	1.2	1.1
Mean of Detects	1.2	1.1
Median of Detects	1.2	1.1
SD of Detects	N/A	N/A
KM Mean	1.001	1.002
KM SD	0.0159	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.835
Critical z (0.05)	1.645
P-Value	0.798

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:26:35 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	157	70
Number of Non-Detects	98	67
Number of Detects	59	3
Minimum Non-Detect	0.2	0.05
Maximum Non-Detect	0.44	4.3
Percent Non-detects	62.42%	95.71%
Minimum Detect	0.22	0.504
Maximum Detect	16	0.83
Mean of Detects	1.552	0.68
Median of Detects	0.79	0.707
SD of Detects	2.29	0.165
KM Mean	0.711	0.0808
KM SD	1.537	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.273
TW Critical Value (0.05)	1.645
P-Value	9.6299E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 8:58:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	157	70
Number of Non-Detects	98	67
Number of Detect Data	59	3
Minimum Non-Detect	0.2	0.05
Maximum Non-Detect	0.44	4.3
Percent Non-detects	62.42%	95.71%
Minimum Detect	0.22	0.504
Maximum Detect	16	0.83
Mean of Detects	1.552	0.68
Median of Detects	0.79	0.707
SD of Detects	2.29	0.165
KM Mean	0.711	0.0808
KM SD	1.537	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.267
Critical z (0.05)	1.645
P-Value	9.8901E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:28:11 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	70
Number of Non-Detects	0	0
Number of Detect Data	159	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	7.9	4.2
Maximum Detect	320	53
Mean of Detects	29.3	22.35
Median of Detects	21	21.9
SD of Detects	31.77	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	18389
Standardized WMW U-Stat	0.223
Mean (U)	5565
SD(U) - Adj ties	461.6
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.412

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:29:19 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	69
Number of Non-Detects	0	0
Number of Detect Data	159	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.3	2.1
Maximum Detect	44	18
Mean of Detects	12.13	10.32
Median of Detects	10	10
SD of Detects	6.428	3.255

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	18565
Standardized WMW U-Stat	0.785
Mean (U)	5486
SD(U) - Adj ties	457.1
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.216

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:45:01 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	60
Number of Non-Detects	1	1
Number of Detects	158	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	1	5.4
Percent Non-detects	0.63%	1.67%
Minimum Detect	1.7	1.9
Maximum Detect	220	10
Mean of Detects	11.79	4.377
Median of Detects	6.1	3.5
SD of Detects	21.97	2.012
KM Mean	11.73	4.361
KM SD	21.84	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.109
TW Critical Value (0.05)	1.645
P-Value	1.9900E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:00:57 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	60
Number of Non-Detects	1	1
Number of Detect Data	158	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	1	5.4
Percent Non-detects	0.63%	1.67%
Minimum Detect	1.7	1.9
Maximum Detect	220	10
Mean of Detects	11.79	4.377
Median of Detects	6.1	3.5
SD of Detects	21.97	2.012
KM Mean	11.73	4.361
KM SD	21.84	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.813
Critical z (0.05)	1.645
P-Value	7.4305E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:26:03 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_manganese)

Sample 2 Data: Res(bkgd_manganese)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	22	57
Number of Non-Detects	0	0
Number of Detect Data	22	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	130	140
Maximum Detect	440	450
Mean of Detects	234.1	279.5
Median of Detects	200	280
SD of Detects	86.89	61.51

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	631.5
Standardized WMW U-Stat	-2.728
Mean (U)	627
SD(U) - Adj ties	91.26
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.997

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc11_manganese)

Background Data: Res(bkgd_manganese)

Raw Statistics

	Site	Background
Number of Valid Data	22	57
Number of Non-Detect Data	0	0
Number of Detect Data	22	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	130	140
Maximum Detected	440	450
Mean of Detected Data	234.1	279.5
Median of Detected Data	200	280
SD of Detected Data	86.89	61.51

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.056)	4
Approximate K Value (0.056)	3
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0633

Conclusion with Alpha = 0.056

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:36:34 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	60
Number of Non-Detects	134	49
Number of Detects	25	11
Minimum Non-Detect	1	1
Maximum Non-Detect	5.1	5.4
Percent Non-detects	84.28%	81.67%
Minimum Detect	1	0.383
Maximum Detect	7.1	2.8
Mean of Detects	2.156	1.027
Median of Detects	1.7	1
SD of Detects	1.279	0.703
KM Mean	1.193	0.682
KM SD	0.655	0.433

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.413
TW Critical Value (0.05)	1.645
P-Value	0.34

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:02:26 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	60
Number of Non-Detects	134	49
Number of Detect Data	25	11
Minimum Non-Detect	1	1
Maximum Non-Detect	5.1	5.4
Percent Non-detects	84.28%	81.67%
Minimum Detect	1	0.383
Maximum Detect	7.1	2.8
Mean of Detects	2.156	1.027
Median of Detects	1.7	1
SD of Detects	1.279	0.703
KM Mean	1.193	0.682
KM SD	0.655	0.433

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.573
Critical z (0.05)	1.645
P-Value	0.283

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 9:43:55 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_potassium)

Sample 2 Data: Res(bkgd_potassium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	22	54
Number of Non-Detects	0	0
Number of Detect Data	22	54
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	860	540
Maximum Detect	5300	4300
Mean of Detects	2130	2747
Median of Detects	1700	2750
SD of Detects	1141	811.2

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	543.5
Standardized WMW U-Stat	-3.487
Mean (U)	594
SD(U) - Adj ties	87.18
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc11_potassium)

Background Data: Res(bkgd_potassium)

Raw Statistics

	Site	Background
Number of Valid Data	22	54
Number of Non-Detect Data	0	0
Number of Detect Data	22	54
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	860	540
Maximum Detected	5300	4300
Mean of Detected Data	2130	2747
Median of Detected Data	1700	2750
SD of Detected Data	1141	811.2

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.056)	4
Approximate K Value (0.056)	3
R Value Adjusted for Ties in Data	5
K Value Adjusted for Ties in Data	4
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0705

Conclusion with Alpha = 0.056

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 11:49:51 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	59
Number of Non-Detects	157	52
Number of Detects	2	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	2.1	5
Percent Non-detects	98.74%	88.14%
Minimum Detect	1.6	0.738
Maximum Detect	3.2	2.7
Mean of Detects	2.4	1.566
Median of Detects	2.4	1.6
SD of Detects	1.131	0.678
KM Mean	1.018	0.898
KM SD	0.18	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-2.83
TW Critical Value (0.05)	1.645
P-Value	0.998

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 11:50:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	59
Number of Non-Detects	157	52
Number of Detect Data	2	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	2.1	5
Percent Non-detects	98.74%	88.14%
Minimum Detect	1.6	0.738
Maximum Detect	3.2	2.7
Mean of Detects	2.4	1.566
Median of Detects	2.4	1.6
SD of Detects	1.131	0.678
KM Mean	1.018	0.898
KM SD	0.18	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-2.755
Critical z (0.05)	1.645
P-Value	0.997

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 9:47:07 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	22	55
Number of Non-Detects	1	4
Number of Detects	21	51
Minimum Non-Detect	580	240
Maximum Non-Detect	580	1100
Percent Non-detects	4.55%	7.27%
Minimum Detect	170	170
Maximum Detect	4300	4500
Mean of Detects	667.1	636.9
Median of Detects	400	280
SD of Detects	958.7	744.4
KM Mean	650.8	610.9
KM SD	917.5	717.3

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.389
TW Critical Value (0.05)	1.645
P-Value	0.349

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 9:47:32 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	22	55
Number of Non-Detects	1	4
Number of Detect Data	21	51
Minimum Non-Detect	580	240
Maximum Non-Detect	580	1100
Percent Non-detects	4.55%	7.27%
Minimum Detect	170	170
Maximum Detect	4300	4500
Mean of Detects	667.1	636.9
Median of Detects	400	280
SD of Detects	958.7	744.4
KM Mean	650.8	610.9
KM SD	917.5	717.3

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.142
Critical z (0.05)	1.645
P-Value	0.444

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc11_sodium)

Background Data: Res(bkgd_sodium)

Raw Statistics

	Site	Background
Number of Valid Data	22	55
Number of Non-Detect Data	1	4
Number of Detect Data	21	51
Minimum Non-Detect	580	240
Maximum Non-Detect	580	1100
Percent Non detects	4.55%	7.27%
Minimum Detected	170	170
Maximum Detected	4300	4500
Mean of Detected Data	667.1	636.9
Median of Detected Data	400	280
SD of Detected Data	958.7	744.4

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.056)	4
Approximate K Value (0.056)	3
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.068

Conclusion with Alpha = 0.056

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:30:05 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_vanadium)

Sample 2 Data: Res(bkgd_vanadium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	60
Number of Non-Detects	0	0
Number of Detect Data	159	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	13	9.4
Maximum Detect	55	59
Mean of Detects	27.45	34.05
Median of Detects	27	34.1
SD of Detects	8.365	8.997

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	15417
Standardized WMW U-Stat	-4.961
Mean (U)	4770
SD(U) - Adj ties	417.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:36:10 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	159	70
Number of Non-Detects	0	0
Number of Detect Data	159	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	17	8.4
Maximum Detect	1100	66.1
Mean of Detects	68.65	36.82
Median of Detects	48	35.5
SD of Detects	94.89	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	20813
Standardized WMW U-Stat	5.473
Mean (U)	5565
SD(U) - Adj ties	461.8
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	2.2182E-8

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:22:50 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	163	42
Number of Non-Detects	0	28
Number of Detects	163	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	18200	267.4
Mean of Detects	399.8	86.74
Median of Detects	29.4	46.9
SD of Detects	1616	82.16
KM Mean	399.8	28.91
KM SD	1616	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.396
TW Critical Value (0.05)	1.645
P-Value	7.977E-11

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 8:46:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	163	42
Number of Non-Detects	0	28
Number of Detect Data	163	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	18200	267.4
Mean of Detects	399.8	86.74
Median of Detects	29.4	46.9
SD of Detects	1616	82.16
KM Mean	399.8	28.91
KM SD	1616	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.198
Critical z (0.05)	1.645
P-Value	2.863E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:23:36 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	163	42
Number of Non-Detects	0	36
Number of Detects	163	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	1380	37.6
Mean of Detects	27.26	18.9
Median of Detects	0	12.6
SD of Detects	124.3	14.24
KM Mean	27.26	2.7
KM SD	124.3	8.239

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	8.335
TW Critical Value (0.05)	1.645
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 8:57:22 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	163	42
Number of Non-Detects	0	36
Number of Detect Data	163	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	1380	37.6
Mean of Detects	27.26	18.9
Median of Detects	0	12.6
SD of Detects	124.3	14.24
KM Mean	27.26	2.7
KM SD	124.3	8.239

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	7.818
Critical z (0.05)	1.645
P-Value	2.665E-15

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:24:11 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	162	42
Number of Non-Detects	56	28
Number of Detects	106	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	58	6.1
Percent Non-detects	34.57%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	2300	55
Mean of Detects	92.3	13.75
Median of Detects	25.5	8.7
SD of Detects	260.7	12.99
KM Mean	62.49	8.45
KM SD	213.9	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4
TW Critical Value (0.05)	1.645
P-Value	3.1711E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:09:26 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	162	42
Number of Non-Detects	56	28
Number of Detect Data	106	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	58	6.1
Percent Non-detects	34.57%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	2300	55
Mean of Detects	92.3	13.75
Median of Detects	25.5	8.7
SD of Detects	260.7	12.99
KM Mean	62.49	8.45
KM SD	213.9	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.241
Critical z (0.05)	1.645
P-Value	1.1129E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:24:51 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	63	35
Number of Non-Detects	3	2
Number of Detects	60	33
Minimum Non-Detect	0.079	0.12
Maximum Non-Detect	190	0.27
Percent Non-detects	4.76%	5.71%
Minimum Detect	0.13	0.13
Maximum Detect	680	3
Mean of Detects	28.91	0.693
Median of Detects	1.6	0.37
SD of Detects	97.13	0.737
KM Mean	27.74	0.662
KM SD	94.23	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.136
TW Critical Value (0.05)	1.645
P-Value	1.7656E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:04:29 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	63	35
Number of Non-Detects	3	2
Number of Detect Data	60	33
Minimum Non-Detect	0.079	0.12
Maximum Non-Detect	190	0.27
Percent Non-detects	4.76%	5.71%
Minimum Detect	0.13	0.13
Maximum Detect	680	3
Mean of Detects	28.91	0.693
Median of Detects	1.6	0.37
SD of Detects	97.13	0.737
KM Mean	27.74	0.662
KM SD	94.23	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.381
Critical z (0.05)	1.645
P-Value	5.8953E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:25:32 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	63	35
Number of Non-Detects	3	2
Number of Detects	60	33
Minimum Non-Detect	0.062	0.086
Maximum Non-Detect	130	0.17
Percent Non-detects	4.76%	5.71%
Minimum Detect	0.09	0.096
Maximum Detect	940	3.6
Mean of Detects	43.28	0.727
Median of Detects	2.3	0.43
SD of Detects	142	0.81
KM Mean	41.35	0.691
KM SD	137.7	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.169
TW Critical Value (0.05)	1.645
P-Value	1.5291E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:06:24 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	63	35
Number of Non-Detects	3	2
Number of Detect Data	60	33
Minimum Non-Detect	0.062	0.086
Maximum Non-Detect	130	0.17
Percent Non-detects	4.76%	5.71%
Minimum Detect	0.09	0.096
Maximum Detect	940	3.6
Mean of Detects	43.28	0.727
Median of Detects	2.3	0.43
SD of Detects	142	0.81
KM Mean	41.35	0.691
KM SD	137.7	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.57
Critical z (0.05)	1.645
P-Value	2.4329E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 3:26:04 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_teq mammals)

Sample 2 Data: Res(bkgd_teq mammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	63	35
Number of Non-Detects	3	2
Number of Detects	60	33
Minimum Non-Detect	0.062	0.086
Maximum Non-Detect	130	0.17
Percent Non-detects	4.76%	5.71%
Minimum Detect	0.09	0.096
Maximum Detect	940	3.6
Mean of Detects	43.28	0.727
Median of Detects	2.3	0.43
SD of Detects	142	0.81
KM Mean	41.35	0.691
KM SD	137.7	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.169
TW Critical Value (0.05)	1.645
P-Value	1.5291E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:07:05 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc11_teq mammals)

Sample 2 Data: Res(bkgd_teq mammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	63	35
Number of Non-Detects	3	2
Number of Detect Data	60	33
Minimum Non-Detect	0.062	0.086
Maximum Non-Detect	130	0.17
Percent Non-detects	4.76%	5.71%
Minimum Detect	0.09	0.096
Maximum Detect	940	3.6
Mean of Detects	43.28	0.727
Median of Detects	2.3	0.43
SD of Detects	142	0.81
KM Mean	41.35	0.691
KM SD	137.7	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.57
Critical z (0.05)	1.645
P-Value	2.4329E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:39:40 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	59
Number of Non-Detects	0	1
Number of Detects	14	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	1.6	2.3
Maximum Detect	14	14
Mean of Detects	7.629	7.854
Median of Detects	7.65	7.605
SD of Detects	2.889	2.317
KM Mean	7.629	7.788
KM SD	2.889	2.336

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.0778
TW Critical Value (0.05)	1.645
P-Value	0.531

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:40:29 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	59
Number of Non-Detects	0	1
Number of Detect Data	14	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	1.6	2.3
Maximum Detect	14	14
Mean of Detects	7.629	7.854
Median of Detects	7.65	7.605
SD of Detects	2.889	2.317
KM Mean	7.629	7.788
KM SD	2.889	2.336

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.0701
Critical z (0.05)	1.645
P-Value	0.528

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc12_cobalt)

Background Data: Res(bkgd_cobalt)

Raw Statistics

	Site	Background
Number of Valid Data	14	59
Number of Non-Detect Data	0	1
Number of Detect Data	14	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non detects	0.00%	1.69%
Minimum Detected	1.6	2.3
Maximum Detected	14	14
Mean of Detected Data	7.629	7.854
Median of Detected Data	7.65	7.605
SD of Detected Data	2.889	2.317

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.052)	5
Approximate K Value (0.052)	3
R Value Adjusted for Ties in Data	10
K Value Adjusted for Ties in Data	8
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0455

Conclusion with Alpha = 0.052

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:48:28 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	69
Number of Non-Detects	1	0
Number of Detects	13	69
Minimum Non-Detect	2	N/A
Maximum Non-Detect	2	N/A
Percent Non-detects	7.14%	0.00%
Minimum Detect	5.6	2.1
Maximum Detect	18	18
Mean of Detects	11.08	10.32
Median of Detects	11	10
SD of Detects	3.15	3.255
KM Mean	10.43	10.32
KM SD	3.738	3.255

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.123
TW Critical Value (0.05)	1.645
P-Value	0.451

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:48:54 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	69
Number of Non-Detects	1	0
Number of Detect Data	13	69
Minimum Non-Detect	2	N/A
Maximum Non-Detect	2	N/A
Percent Non-detects	7.14%	0.00%
Minimum Detect	5.6	2.1
Maximum Detect	18	18
Mean of Detects	11.08	10.32
Median of Detects	11	10
SD of Detects	3.15	3.255
KM Mean	10.43	10.32
KM SD	3.738	3.255

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.0608
Critical z (0.05)	1.645
P-Value	0.476

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc12_copper)

Background Data: Res(bkgd_copper)

Raw Statistics

	Site	Background
Number of Valid Data	14	69
Number of Non-Detect Data	1	0
Number of Detect Data	13	69
Minimum Non-Detect	2	N/A
Maximum Non-Detect	2	N/A
Percent Non detects	7.14%	0.00%
Minimum Detected	5.6	2.1
Maximum Detected	18	18
Mean of Detected Data	11.08	10.32
Median of Detected Data	11	10
SD of Detected Data	3.15	3.255

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.048)	9
Approximate K Value (0.048)	4
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.04

Conclusion with Alpha = 0.048

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:53:05 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	59
Number of Non-Detects	13	52
Number of Detects	1	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	1.1	5
Percent Non-detects	92.86%	88.14%
Minimum Detect	2.5	0.738
Maximum Detect	2.5	2.7
Mean of Detects	2.5	1.566
Median of Detects	2.5	1.6
SD of Detects	N/A	0.678
KM Mean	1.107	0.898
KM SD	0.386	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.186
TW Critical Value (0.05)	1.645
P-Value	0.574

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:53:44 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	59
Number of Non-Detects	13	52
Number of Detect Data	1	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	1.1	5
Percent Non-detects	92.86%	88.14%
Minimum Detect	2.5	0.738
Maximum Detect	2.5	2.7
Mean of Detects	2.5	1.566
Median of Detects	2.5	1.6
SD of Detects	N/A	0.678
KM Mean	1.107	0.898
KM SD	0.386	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.157
Critical z (0.05)	1.645
P-Value	0.562

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:56:41 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	70
Number of Non-Detects	0	0
Number of Detect Data	14	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	9	8.4
Maximum Detect	77	66.1
Mean of Detects	46.79	36.82
Median of Detects	49.5	35.5
SD of Detects	15.82	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	855.5
Standardized WMW U-Stat	3.124
Mean (U)	490
SD(U) - Adj ties	83.24
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	8.9337E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:34:28 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	42
Number of Non-Detects	0	28
Number of Detects	14	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	407	267.4
Mean of Detects	48.59	86.74
Median of Detects	0	46.9
SD of Detects	113.6	82.16
KM Mean	48.59	28.91
KM SD	113.6	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.987
TW Critical Value (0.05)	1.645
P-Value	0.00141

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/7/2018 11:35:04 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	42
Number of Non-Detects	0	28
Number of Detect Data	14	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	407	267.4
Mean of Detects	48.59	86.74
Median of Detects	0	46.9
SD of Detects	113.6	82.16
KM Mean	48.59	28.91
KM SD	113.6	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.71
Critical z (0.05)	1.645
P-Value	0.00336

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:03:23 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	42
Number of Non-Detects	9	28
Number of Detects	5	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	6.2	6.1
Percent Non-detects	64.29%	66.67%
Minimum Detect	5.9	6.1
Maximum Detect	61	55
Mean of Detects	21.58	13.75
Median of Detects	16	8.7
SD of Detects	22.81	12.99
KM Mean	11.44	8.45
KM SD	14.34	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.221
TW Critical Value (0.05)	1.645
P-Value	0.413

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:03:52 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc12_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	14	42
Number of Non-Detects	9	28
Number of Detect Data	5	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	6.2	6.1
Percent Non-detects	64.29%	66.67%
Minimum Detect	5.9	6.1
Maximum Detect	61	55
Mean of Detects	21.58	13.75
Median of Detects	16	8.7
SD of Detects	22.81	12.99
KM Mean	11.44	8.45
KM SD	14.34	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.193
Critical z (0.05)	1.645
P-Value	0.424

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc12_b(a)p equivalent)

Background Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Site	Background
Number of Valid Data	14	42
Number of Non-Detect Data	9	28
Number of Detect Data	5	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	6.2	6.1
Percent Non detects	64.29%	66.67%
Minimum Detected	5.9	6.1
Maximum Detected	61	55
Mean of Detected Data	21.58	13.75
Median of Detected Data	16	8.7
SD of Detected Data	22.81	12.99

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.057)	4
Approximate K Value (0.057)	3
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0443

Conclusion with Alpha = 0.057

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:06:36 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	59
Number of Non-Detects	3	1
Number of Detects	102	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1	1
Percent Non-detects	2.86%	1.69%
Minimum Detect	1	0.884
Maximum Detect	19	12
Mean of Detects	4.202	4.006
Median of Detects	3.4	3.5
SD of Detects	2.745	2.357
KM Mean	4.11	3.953
KM SD	2.745	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.382
TW Critical Value (0.05)	1.645
P-Value	0.351

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:07:10 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	59
Number of Non-Detects	3	1
Number of Detect Data	102	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1	1
Percent Non-detects	2.86%	1.69%
Minimum Detect	1	0.884
Maximum Detect	19	12
Mean of Detects	4.202	4.006
Median of Detects	3.4	3.5
SD of Detects	2.745	2.357
KM Mean	4.11	3.953
KM SD	2.745	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.159
Critical z (0.05)	1.645
P-Value	0.437

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc14_arsenic)

Background Data: Res(bkgd_arsenic)

Raw Statistics

	Site	Background
Number of Valid Data	105	59
Number of Non-Detect Data	3	1
Number of Detect Data	102	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1	1
Percent Non detects	2.86%	1.69%
Minimum Detected	1	0.884
Maximum Detected	19	12
Mean of Detected Data	4.202	4.006
Median of Detected Data	3.4	3.5
SD of Detected Data	2.745	2.357

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.056)	6
Approximate K Value (0.056)	6
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0653

Conclusion with Alpha = 0.056

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:50:45 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	55
Number of Non-Detects	100	54
Number of Detects	5	1
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	5
Percent Non-detects	95.24%	98.18%
Minimum Detect	1.3	1.1
Maximum Detect	7.1	1.1
Mean of Detects	3.18	1.1
Median of Detects	1.9	1.1
SD of Detects	2.487	N/A
KM Mean	1.104	1.002
KM SD	0.672	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.866
TW Critical Value (0.05)	1.645
P-Value	0.193

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:16:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	55
Number of Non-Detects	100	54
Number of Detect Data	5	1
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	5
Percent Non-detects	95.24%	98.18%
Minimum Detect	1.3	1.1
Maximum Detect	7.1	1.1
Mean of Detects	3.18	1.1
Median of Detects	1.9	1.1
SD of Detects	2.487	N/A
KM Mean	1.104	1.002
KM SD	0.672	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.87
Critical z (0.05)	1.645
P-Value	0.192

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 10:45:02 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_calcium)

Sample 2 Data: Res(bkgd_calcium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	11	55
Number of Non-Detects	0	0
Number of Detect Data	11	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	11000	4100
Maximum Detect	379000	67000
Mean of Detects	58209	24293
Median of Detects	26300	20000
SD of Detects	106937	13273

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	433.5
Standardized WMW U-Stat	1.11
Mean (U)	302.5
SD(U) - Adj ties	58.08
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.133

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc14_calcium)

Background Data: Res(bkgd_calcium)

Raw Statistics

	Site	Background
Number of Valid Data	11	55
Number of Non-Detect Data	0	0
Number of Detect Data	11	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	11000	4100
Maximum Detected	379000	67000
Mean of Detected Data	58209	24293
Median of Detected Data	26300	20000
SD of Detected Data	106937	13273

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	3
Approximate K Value (0.059)	2
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0697

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:51:57 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	136	70
Number of Non-Detects	103	67
Number of Detects	33	3
Minimum Non-Detect	0.2	0.05
Maximum Non-Detect	0.51	4.3
Percent Non-detects	75.74%	95.71%
Minimum Detect	0.21	0.504
Maximum Detect	20	0.83
Mean of Detects	2.767	0.68
Median of Detects	0.88	0.707
SD of Detects	4.586	0.165
KM Mean	0.83	0.0808
KM SD	2.48	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.897
TW Critical Value (0.05)	1.645
P-Value	0.00188

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:24:10 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	136	70
Number of Non-Detects	103	67
Number of Detect Data	33	3
Minimum Non-Detect	0.2	0.05
Maximum Non-Detect	0.51	4.3
Percent Non-detects	75.74%	95.71%
Minimum Detect	0.21	0.504
Maximum Detect	20	0.83
Mean of Detects	2.767	0.68
Median of Detects	0.88	0.707
SD of Detects	4.586	0.165
KM Mean	0.83	0.0808
KM SD	2.48	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.872
Critical z (0.05)	1.645
P-Value	0.00204

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 2:39:01 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	136	70
Number of Non-Detects	0	0
Number of Detect Data	136	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	8.2	4.2
Maximum Detect	420	53
Mean of Detects	27.21	22.35
Median of Detects	16	21.9
SD of Detects	55.22	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	12705
Standardized WMW U-Stat	-3.387
Mean (U)	4760
SD(U) - Adj ties	404.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:11:23 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	59
Number of Non-Detects	2	1
Number of Detects	103	58
Minimum Non-Detect	11	5.1
Maximum Non-Detect	11	5.1
Percent Non-detects	1.90%	1.69%
Minimum Detect	2.4	2.3
Maximum Detect	17	14
Mean of Detects	6.588	7.854
Median of Detects	6.8	7.605
SD of Detects	1.917	2.317
KM Mean	6.586	7.788
KM SD	1.901	2.336

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-3.261
TW Critical Value (0.05)	1.645
P-Value	0.999

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:11:59 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	59
Number of Non-Detects	2	1
Number of Detect Data	103	58
Minimum Non-Detect	11	5.1
Maximum Non-Detect	11	5.1
Percent Non-detects	1.90%	1.69%
Minimum Detect	2.4	2.3
Maximum Detect	17	14
Mean of Detects	6.588	7.854
Median of Detects	6.8	7.605
SD of Detects	1.917	2.317
KM Mean	6.586	7.788
KM SD	1.901	2.336

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-3.657
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: AOC14_Cobalt

Background Data: Bkgd_Cobalt

Raw Statistics

	Site	Background
Number of Valid Data	103	58
Number of Non-Detect Data	0	0
Number of Detect Data	103	58
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	2.4	2.3
Maximum Detected	17	14
Mean of Detected Data	6.588	7.854
Median of Detected Data	6.8	7.605
SD of Detected Data	1.917	2.317

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.056)	6
Approximate K Value (0.056)	6
R Value Adjusted for Ties in Data	11
K Value Adjusted for Ties in Data	11
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.065

Conclusion with Alpha = 0.056

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:55:49 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	136	69
Number of Non-Detects	2	0
Number of Detects	134	69
Minimum Non-Detect	21	N/A
Maximum Non-Detect	23	N/A
Percent Non-detects	1.47%	0.00%
Minimum Detect	1.8	2.1
Maximum Detect	1800	18
Mean of Detects	35.51	10.32
Median of Detects	9.45	10
SD of Detects	190.5	3.255
KM Mean	35.12	10.32
KM SD	188.4	3.255

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.778
TW Critical Value (0.05)	1.645
P-Value	0.962

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:18:40 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	136	69
Number of Non-Detects	2	0
Number of Detect Data	134	69
Minimum Non-Detect	21	N/A
Maximum Non-Detect	23	N/A
Percent Non-detects	1.47%	0.00%
Minimum Detect	1.8	2.1
Maximum Detect	1800	18
Mean of Detects	35.51	10.32
Median of Detects	9.45	10
SD of Detects	190.5	3.255
KM Mean	35.12	10.32
KM SD	188.4	3.255

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.909
Critical z (0.05)	1.645
P-Value	0.972

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:58:37 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	60
Number of Non-Detects	1	1
Number of Detects	104	59
Minimum Non-Detect	1.1	5.4
Maximum Non-Detect	1.1	5.4
Percent Non-detects	0.95%	1.67%
Minimum Detect	1.1	1.9
Maximum Detect	1600	10
Mean of Detects	23.87	4.377
Median of Detects	3.6	3.5
SD of Detects	157.3	2.012
KM Mean	23.65	4.361
KM SD	155.8	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.285
TW Critical Value (0.05)	1.645
P-Value	0.612

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:00:38 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	60
Number of Non-Detects	1	1
Number of Detect Data	104	59
Minimum Non-Detect	1.1	5.4
Maximum Non-Detect	1.1	5.4
Percent Non-detects	0.95%	1.67%
Minimum Detect	1.1	1.9
Maximum Detect	1600	10
Mean of Detects	23.87	4.377
Median of Detects	3.6	3.5
SD of Detects	157.3	2.012
KM Mean	23.65	4.361
KM SD	155.8	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.221
Critical z (0.05)	1.645
P-Value	0.413

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc14_lead)

Background Data: Res(bkgd_lead)

Raw Statistics

	Site	Background
Number of Valid Data	105	60
Number of Non-Detect Data	1	1
Number of Detect Data	104	59
Minimum Non-Detect	1.1	5.4
Maximum Non-Detect	1.1	5.4
Percent Non detects	0.95%	1.67%
Minimum Detected	1.1	1.9
Maximum Detected	1600	10
Mean of Detected Data	23.87	4.377
Median of Detected Data	3.6	3.5
SD of Detected Data	157.3	2.012

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.056)	6
Approximate K Value (0.056)	6
Number of Site Observations in 'R' Largest	6
Calculated Alpha	0.063

Conclusion with Alpha = 0.056

Reject H0, Conclude Site Concentration > Background Concentration

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 11:02:43 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_magnesium)

Sample 2 Data: Res(bkgd_magnesium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	11	55
Number of Non-Detects	0	0
Number of Detect Data	11	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	2600	2500
Maximum Detect	23000	13000
Mean of Detects	7957	7945
Median of Detects	7000	8100
SD of Detects	5270	2049

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	284.5
Standardized WMW U-Stat	-1.455
Mean (U)	302.5
SD(U) - Adj ties	58.09
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.927

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc14_magnesium)

Background Data: Res(bkgd_magnesium)

Raw Statistics

	Site	Background
Number of Valid Data	11	55
Number of Non-Detect Data	0	0
Number of Detect Data	11	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	2600	2500
Maximum Detected	23000	13000
Mean of Detected Data	7957	7945
Median of Detected Data	7000	8100
SD of Detected Data	5270	2049

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	3
Approximate K Value (0.059)	2
R Value Adjusted for Ties in Data	4
K Value Adjusted for Ties in Data	3
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0697

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:03:30 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	60
Number of Non-Detects	86	49
Number of Detects	19	11
Minimum Non-Detect	1	1
Maximum Non-Detect	11	5.4
Percent Non-detects	81.90%	81.67%
Minimum Detect	1	0.383
Maximum Detect	63	2.8
Mean of Detects	6.547	1.027
Median of Detects	2	1
SD of Detects	14.3	0.703
KM Mean	2.013	0.682
KM SD	6.293	0.433

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.69
TW Critical Value (0.05)	1.645
P-Value	0.245

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:04:36 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	60
Number of Non-Detects	86	49
Number of Detect Data	19	11
Minimum Non-Detect	1	1
Maximum Non-Detect	11	5.4
Percent Non-detects	81.90%	81.67%
Minimum Detect	1	0.383
Maximum Detect	63	2.8
Mean of Detects	6.547	1.027
Median of Detects	2	1
SD of Detects	14.3	0.703
KM Mean	2.013	0.682
KM SD	6.293	0.433

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.858
Critical z (0.05)	1.645
P-Value	0.195

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 2:38:07 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	136	70
Number of Non-Detects	0	0
Number of Detect Data	136	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	0.28	2.6
Maximum Detect	270	31
Mean of Detects	12.45	15.42
Median of Detects	9.7	15
SD of Detects	26.42	5.975

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	11120
Standardized WMW U-Stat	-7.305
Mean (U)	4760
SD(U) - Adj ties	404.8
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:21:51 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	59
Number of Non-Detects	102	52
Number of Detects	3	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	2	5
Percent Non-detects	97.14%	88.14%
Minimum Detect	1.2	0.738
Maximum Detect	1.6	2.7
Mean of Detects	1.433	1.566
Median of Detects	1.5	1.6
SD of Detects	0.208	0.678
KM Mean	1.013	0.898
KM SD	0.0781	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.814
TW Critical Value (0.05)	1.645
P-Value	0.965

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:22:27 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	59
Number of Non-Detects	102	52
Number of Detect Data	3	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	2	5
Percent Non-detects	97.14%	88.14%
Minimum Detect	1.2	0.738
Maximum Detect	1.6	2.7
Mean of Detects	1.433	1.566
Median of Detects	1.5	1.6
SD of Detects	0.208	0.678
KM Mean	1.013	0.898
KM SD	0.0781	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.803
Critical z (0.05)	1.645
P-Value	0.964

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 11:07:59 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	11	55
Number of Non-Detects	1	4
Number of Detects	10	51
Minimum Non-Detect	410	240
Maximum Non-Detect	410	1100
Percent Non-detects	9.09%	7.27%
Minimum Detect	190	170
Maximum Detect	6590	4500
Mean of Detects	1049	636.9
Median of Detects	370	280
SD of Detects	1958	744.4
KM Mean	981.2	610.9
KM SD	1784	717.3

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.912
TW Critical Value (0.05)	1.645
P-Value	0.181

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 11:08:24 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	11	55
Number of Non-Detects	1	4
Number of Detect Data	10	51
Minimum Non-Detect	410	240
Maximum Non-Detect	410	1100
Percent Non-detects	9.09%	7.27%
Minimum Detect	190	170
Maximum Detect	6590	4500
Mean of Detects	1049	636.9
Median of Detects	370	280
SD of Detects	1958	744.4
KM Mean	981.2	610.9
KM SD	1784	717.3

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.562
Critical z (0.05)	1.645
P-Value	0.287

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc14_sodium)

Background Data: Res(bkgd_sodium)

Raw Statistics

	Site	Background
Number of Valid Data	11	55
Number of Non-Detect Data	1	4
Number of Detect Data	10	51
Minimum Non-Detect	410	240
Maximum Non-Detect	410	1100
Percent Non detects	9.09%	7.27%
Minimum Detected	190	170
Maximum Detected	6590	4500
Mean of Detected Data	1049	636.9
Median of Detected Data	370	280
SD of Detected Data	1958	744.4

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	3
Approximate K Value (0.059)	2
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0697

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:25:35 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_vanadium)

Sample 2 Data: Res(bkgd_vanadium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	105	60
Number of Non-Detects	0	0
Number of Detect Data	105	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	11	9.4
Maximum Detect	58	59
Mean of Detects	26.84	34.05
Median of Detects	27	34.1
SD of Detects	6.242	8.997

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	6998
Standardized WMW U-Stat	-5.825
Mean (U)	3150
SD(U) - Adj ties	294.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc14_vanadium)

Background Data: Res(bkgd_vanadium)

Raw Statistics

	Site	Background
Number of Valid Data	105	60
Number of Non-Detect Data	0	0
Number of Detect Data	105	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	11	9.4
Maximum Detected	58	59
Mean of Detected Data	26.84	34.05
Median of Detected Data	27	34.1
SD of Detected Data	6.242	8.997

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.056)	6
Approximate K Value (0.056)	6
R Value Adjusted for Ties in Data	7
K Value Adjusted for Ties in Data	7
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.063

Conclusion with Alpha = 0.056

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:09:29 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	136	70
Number of Non-Detects	1	0
Number of Detects	135	70
Minimum Non-Detect	11	N/A
Maximum Non-Detect	11	N/A
Percent Non-detects	0.74%	0.00%
Minimum Detect	1.9	8.4
Maximum Detect	2000	66.1
Mean of Detects	53.68	36.82
Median of Detects	34	35.5
SD of Detects	172.9	10.14
KM Mean	53.32	36.82
KM SD	171.6	10.14

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-2.487
TW Critical Value (0.05)	1.645
P-Value	0.994

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/10/2018 4:59:11 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	136	70
Number of Non-Detects	1	0
Number of Detect Data	135	70
Minimum Non-Detect	11	N/A
Maximum Non-Detect	11	N/A
Percent Non-detects	0.74%	0.00%
Minimum Detect	1.9	8.4
Maximum Detect	2000	66.1
Mean of Detects	53.68	36.82
Median of Detects	34	35.5
SD of Detects	172.9	10.14
KM Mean	53.32	36.82
KM SD	171.6	10.14

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-2.706
Critical z (0.05)	1.645
P-Value	0.997

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 12:56:41 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	42
Number of Non-Detects	0	28
Number of Detects	95	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	8070	267.4
Mean of Detects	118.8	86.74
Median of Detects	0	46.9
SD of Detects	838.6	82.16
KM Mean	118.8	28.91
KM SD	838.6	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.638
TW Critical Value (0.05)	1.645
P-Value	1.7611E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:14:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	42
Number of Non-Detects	0	28
Number of Detect Data	95	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	8070	267.4
Mean of Detects	118.8	86.74
Median of Detects	0	46.9
SD of Detects	838.6	82.16
KM Mean	118.8	28.91
KM SD	838.6	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.901
Critical z (0.05)	1.645
P-Value	4.7949E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 1:08:30 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	42
Number of Non-Detects	0	36
Number of Detects	95	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	380	37.6
Mean of Detects	6.131	18.9
Median of Detects	0	12.6
SD of Detects	41.49	14.24
KM Mean	6.131	2.7
KM SD	41.49	8.239

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	8.123
TW Critical Value (0.05)	1.645
P-Value	2.220E-16

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:16:07 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	42
Number of Non-Detects	0	36
Number of Detect Data	95	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	380	37.6
Mean of Detects	6.131	18.9
Median of Detects	0	12.6
SD of Detects	41.49	14.24
KM Mean	6.131	2.7
KM SD	41.49	8.239

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.812
Critical z (0.05)	1.645
P-Value	4.796E-12

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 2:40:19 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	42
Number of Non-Detects	73	28
Number of Detects	22	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	380	6.1
Percent Non-detects	76.84%	66.67%
Minimum Detect	5.9	6.1
Maximum Detect	740	55
Mean of Detects	55.27	13.75
Median of Detects	14	8.7
SD of Detects	155.5	12.99
KM Mean	17.43	8.45
KM SD	76.07	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.902
TW Critical Value (0.05)	1.645
P-Value	0.816

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:26:09 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	42
Number of Non-Detects	73	28
Number of Detect Data	22	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	380	6.1
Percent Non-detects	76.84%	66.67%
Minimum Detect	5.9	6.1
Maximum Detect	740	55
Mean of Detects	55.27	13.75
Median of Detects	14	8.7
SD of Detects	155.5	12.99
KM Mean	17.43	8.45
KM SD	76.07	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.898
Critical z (0.05)	1.645
P-Value	0.816

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 2:44:10 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	39	35
Number of Non-Detects	1	2
Number of Detects	38	33
Minimum Non-Detect	0.21	0.12
Maximum Non-Detect	0.21	0.27
Percent Non-detects	2.56%	5.71%
Minimum Detect	0.12	0.13
Maximum Detect	780	3
Mean of Detects	29.02	0.693
Median of Detects	1.2	0.37
SD of Detects	129.7	0.737
KM Mean	28.28	0.662
KM SD	126.4	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.007
TW Critical Value (0.05)	1.645
P-Value	0.00132

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:27:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	39	35
Number of Non-Detects	1	2
Number of Detect Data	38	33
Minimum Non-Detect	0.21	0.12
Maximum Non-Detect	0.21	0.27
Percent Non-detects	2.56%	5.71%
Minimum Detect	0.12	0.13
Maximum Detect	780	3
Mean of Detects	29.02	0.693
Median of Detects	1.2	0.37
SD of Detects	129.7	0.737
KM Mean	28.28	0.662
KM SD	126.4	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.188
Critical z (0.05)	1.645
P-Value	7.1702E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 2:44:59 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	39	35
Number of Non-Detects	1	2
Number of Detects	38	33
Minimum Non-Detect	0.19	0.086
Maximum Non-Detect	0.19	0.17
Percent Non-detects	2.56%	5.71%
Minimum Detect	0.075	0.096
Maximum Detect	480	3.6
Mean of Detects	20.16	0.727
Median of Detects	1.3	0.43
SD of Detects	80.01	0.81
KM Mean	19.64	0.691
KM SD	78	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.555
TW Critical Value (0.05)	1.645
P-Value	0.00532

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:30:30 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	39	35
Number of Non-Detects	1	2
Number of Detect Data	38	33
Minimum Non-Detect	0.19	0.086
Maximum Non-Detect	0.19	0.17
Percent Non-detects	2.56%	5.71%
Minimum Detect	0.075	0.096
Maximum Detect	480	3.6
Mean of Detects	20.16	0.727
Median of Detects	1.3	0.43
SD of Detects	80.01	0.81
KM Mean	19.64	0.691
KM SD	78	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.96
Critical z (0.05)	1.645
P-Value	0.00154

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/6/2018 2:44:59 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_teq mammal)

Sample 2 Data: Res(bkgd_teq mammal)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	39	35
Number of Non-Detects	1	2
Number of Detects	38	33
Minimum Non-Detect	0.19	0.086
Maximum Non-Detect	0.19	0.17
Percent Non-detects	2.56%	5.71%
Minimum Detect	0.075	0.096
Maximum Detect	480	3.6
Mean of Detects	20.16	0.727
Median of Detects	1.3	0.43
SD of Detects	80.01	0.81
KM Mean	19.64	0.691
KM SD	78	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.555
TW Critical Value (0.05)	1.645
P-Value	0.00532

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:30:30 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc14_teq mammal)

Sample 2 Data: Res(bkgd_teq mammal)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	39	35
Number of Non-Detects	1	2
Number of Detect Data	38	33
Minimum Non-Detect	0.19	0.086
Maximum Non-Detect	0.19	0.17
Percent Non-detects	2.56%	5.71%
Minimum Detect	0.075	0.096
Maximum Detect	480	3.6
Mean of Detects	20.16	0.727
Median of Detects	1.3	0.43
SD of Detects	80.01	0.81
KM Mean	19.64	0.691
KM SD	78	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.96
Critical z (0.05)	1.645
P-Value	0.00154

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:29:43 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	59
Number of Non-Detects	1	1
Number of Detects	59	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1	1
Percent Non-detects	1.67%	1.69%
Minimum Detect	1.1	0.884
Maximum Detect	20	12
Mean of Detects	3.232	4.006
Median of Detects	2.7	3.5
SD of Detects	2.492	2.357
KM Mean	3.195	3.953
KM SD	2.467	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.802
TW Critical Value (0.05)	1.645
P-Value	0.964

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:30:21 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	59
Number of Non-Detects	1	1
Number of Detect Data	59	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1	1
Percent Non-detects	1.67%	1.69%
Minimum Detect	1.1	0.884
Maximum Detect	20	12
Mean of Detects	3.232	4.006
Median of Detects	2.7	3.5
SD of Detects	2.492	2.357
KM Mean	3.195	3.953
KM SD	2.467	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-2.307
Critical z (0.05)	1.645
P-Value	0.989

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc27_arsenic)

Background Data: Res(bkgd_arsenic)

Raw Statistics

	Site	Background
Number of Valid Data	60	59
Number of Non-Detect Data	1	1
Number of Detect Data	59	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1	1
Percent Non detects	1.67%	1.69%
Minimum Detected	1.1	0.884
Maximum Detected	20	12
Mean of Detected Data	3.232	4.006
Median of Detected Data	2.7	3.5
SD of Detected Data	2.492	2.357

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	4
Approximate K Value (0.059)	4
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0614

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/11/2018 2:29:59 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	55
Number of Non-Detects	50	54
Number of Detects	10	1
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	5
Percent Non-detects	83.33%	98.18%
Minimum Detect	0.3	1.1
Maximum Detect	4.5	1.1
Mean of Detects	1.661	1.1
Median of Detects	1.5	1.1
SD of Detects	1.146	N/A
KM Mean	0.698	1.002
KM SD	0.646	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.176
TW Critical Value (0.05)	1.645
P-Value	0.0148

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:57:25 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	55
Number of Non-Detects	50	54
Number of Detect Data	10	1
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	5
Percent Non-detects	83.33%	98.18%
Minimum Detect	0.3	1.1
Maximum Detect	4.5	1.1
Mean of Detects	1.661	1.1
Median of Detects	1.5	1.1
SD of Detects	1.146	N/A
KM Mean	0.698	1.002
KM SD	0.646	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.18
Critical z (0.05)	1.645
P-Value	0.0146

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:12:21 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	70
Number of Non-Detects	39	67
Number of Detects	21	3
Minimum Non-Detect	0.2	0.05
Maximum Non-Detect	0.4	4.3
Percent Non-detects	65.00%	95.71%
Minimum Detect	0.2	0.504
Maximum Detect	4.8	0.83
Mean of Detects	0.951	0.68
Median of Detects	0.36	0.707
SD of Detects	1.286	0.165
KM Mean	0.464	0.0808
KM SD	0.824	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.169
TW Critical Value (0.05)	1.645
P-Value	0.015

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:59:01 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	70
Number of Non-Detects	39	67
Number of Detect Data	21	3
Minimum Non-Detect	0.2	0.05
Maximum Non-Detect	0.4	4.3
Percent Non-detects	65.00%	95.71%
Minimum Detect	0.2	0.504
Maximum Detect	4.8	0.83
Mean of Detects	0.951	0.68
Median of Detects	0.36	0.707
SD of Detects	1.286	0.165
KM Mean	0.464	0.0808
KM SD	0.824	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.025
Critical z (0.05)	1.645
P-Value	0.0214

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:13:57 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	70
Number of Non-Detects	0	0
Number of Detect Data	60	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	10	4.2
Maximum Detect	290	53
Mean of Detects	24.48	22.35
Median of Detects	16	21.9
SD of Detects	39.48	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	3180
Standardized WMW U-Stat	-3.511
Mean (U)	2100
SD(U) - Adj ties	213.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc27_chromium, total)

Background Data: Res(bkgd_chromium, total)

Raw Statistics

	Site	Background
Number of Valid Data	60	70
Number of Non-Detect Data	0	0
Number of Detect Data	60	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	10	4.2
Maximum Detected	290	53
Mean of Detected Data	24.48	22.35
Median of Detected Data	16	21.9
SD of Detected Data	39.48	8.814

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	4
Approximate K Value (0.043)	4
Number of Site Observations in 'R' Largest	3
Calculated Alpha	0.0429

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:33:46 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	59
Number of Non-Detects	0	1
Number of Detects	60	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	3.2	2.3
Maximum Detect	16	14
Mean of Detects	6.422	7.854
Median of Detects	6.45	7.605
SD of Detects	2.035	2.317
KM Mean	6.422	7.788
KM SD	2.035	2.336

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-3.398
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 12:34:26 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	59
Number of Non-Detects	0	1
Number of Detect Data	60	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	3.2	2.3
Maximum Detect	16	14
Mean of Detects	6.422	7.854
Median of Detects	6.45	7.605
SD of Detects	2.035	2.317
KM Mean	6.422	7.788
KM SD	2.035	2.336

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-3.815
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc27_cobalt)

Background Data: Res(bkgd_cobalt)

Raw Statistics

	Site	Background
Number of Valid Data	60	59
Number of Non-Detect Data	0	1
Number of Detect Data	60	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non detects	0.00%	1.69%
Minimum Detected	3.2	2.3
Maximum Detected	16	14
Mean of Detected Data	6.422	7.854
Median of Detected Data	6.45	7.605
SD of Detected Data	2.035	2.317

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.059)	4
Approximate K Value (0.059)	4
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0614

Conclusion with Alpha = 0.059

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:35:49 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	69
Number of Non-Detects	0	0
Number of Detect Data	60	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	5.6	2.1
Maximum Detect	1000	18
Mean of Detects	47.77	10.32
Median of Detects	9.45	10
SD of Detects	158	3.255

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	3889
Standardized WMW U-Stat	-0.0568
Mean (U)	2070
SD(U) - Adj ties	211.4
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.523

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc27_copper)

Background Data: Res(bkgd_copper)

Raw Statistics

	Site	Background
Number of Valid Data	60	69
Number of Non-Detect Data	0	0
Number of Detect Data	60	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	5.6	2.1
Maximum Detected	1000	18
Mean of Detected Data	47.77	10.32
Median of Detected Data	9.45	10
SD of Detected Data	158	3.255

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	4
Approximate K Value (0.043)	4
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0443

Conclusion with Alpha = 0.043

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:23:09 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	60
Number of Non-Detects	1	1
Number of Detects	59	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	1	5.4
Percent Non-detects	1.67%	1.67%
Minimum Detect	1.4	1.9
Maximum Detect	630	10
Mean of Detects	35.01	4.377
Median of Detects	5.7	3.5
SD of Detects	112.1	2.012
KM Mean	34.45	4.361
KM SD	110.3	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.657
TW Critical Value (0.05)	1.645
P-Value	0.0487

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:00:18 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	60
Number of Non-Detects	1	1
Number of Detect Data	59	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	1	5.4
Percent Non-detects	1.67%	1.67%
Minimum Detect	1.4	1.9
Maximum Detect	630	10
Mean of Detects	35.01	4.377
Median of Detects	5.7	3.5
SD of Detects	112.1	2.012
KM Mean	34.45	4.361
KM SD	110.3	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.249
Critical z (0.05)	1.645
P-Value	0.0123

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:26:53 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	60
Number of Non-Detects	54	49
Number of Detects	6	11
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	5.4
Percent Non-detects	90.00%	81.67%
Minimum Detect	0.63	0.383
Maximum Detect	26	2.8
Mean of Detects	8.555	1.027
Median of Detects	6.5	1
SD of Detects	9.484	0.703
KM Mean	1.454	0.682
KM SD	3.619	0.433

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.793
TW Critical Value (0.05)	1.645
P-Value	0.786

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:07:22 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	60
Number of Non-Detects	54	49
Number of Detect Data	6	11
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	5.4
Percent Non-detects	90.00%	81.67%
Minimum Detect	0.63	0.383
Maximum Detect	26	2.8
Mean of Detects	8.555	1.027
Median of Detects	6.5	1
SD of Detects	9.484	0.703
KM Mean	1.454	0.682
KM SD	3.619	0.433

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.604
Critical z (0.05)	1.645
P-Value	0.727

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:41:08 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	70
Number of Non-Detects	0	0
Number of Detect Data	60	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	5.2	2.6
Maximum Detect	97	31
Mean of Detects	12.29	15.42
Median of Detects	9.8	15
SD of Detects	12.12	5.975

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2860
Standardized WMW U-Stat	-5.007
Mean (U)	2100
SD(U) - Adj ties	213.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc27_nickel)

Background Data: Res(bkgd_nickel)

Raw Statistics

	Site	Background
Number of Valid Data	60	70
Number of Non-Detect Data	0	0
Number of Detect Data	60	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	5.2	2.6
Maximum Detected	97	31
Mean of Detected Data	12.29	15.42
Median of Detected Data	9.8	15
SD of Detected Data	12.12	5.975

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	4
Approximate K Value (0.043)	4
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0429

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/11/2018 1:24:23 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	59
Number of Non-Detects	58	52
Number of Detects	2	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	1.1	5
Percent Non-detects	96.67%	88.14%
Minimum Detect	1.4	0.738
Maximum Detect	6.2	2.7
Mean of Detects	3.8	1.566
Median of Detects	3.8	1.6
SD of Detects	3.394	0.678
KM Mean	1.093	0.898
KM SD	0.667	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.285
TW Critical Value (0.05)	1.645
P-Value	0.901

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/11/2018 1:28:34 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	59
Number of Non-Detects	58	52
Number of Detect Data	2	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	1.1	5
Percent Non-detects	96.67%	88.14%
Minimum Detect	1.4	0.738
Maximum Detect	6.2	2.7
Mean of Detects	3.8	1.566
Median of Detects	3.8	1.6
SD of Detects	3.394	0.678
KM Mean	1.093	0.898
KM SD	0.667	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.268
Critical z (0.05)	1.645
P-Value	0.898

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:43:54 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	70
Number of Non-Detects	0	0
Number of Detect Data	60	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	16	8.4
Maximum Detect	1300	66.1
Mean of Detects	115.7	36.82
Median of Detects	34.5	35.5
SD of Detects	246.1	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	3851
Standardized WMW U-Stat	-0.372
Mean (U)	2100
SD(U) - Adj ties	214
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.645

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc27_zinc)

Background Data: Res(bkgd_zinc)

Raw Statistics

	Site	Background
Number of Valid Data	60	70
Number of Non-Detect Data	0	0
Number of Detect Data	60	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	16	8.4
Maximum Detected	1300	66.1
Mean of Detected Data	115.7	36.82
Median of Detected Data	34.5	35.5
SD of Detected Data	246.1	10.14

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	4
Approximate K Value (0.043)	4
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0429

Conclusion with Alpha = 0.043

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 1:46:17 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	42
Number of Non-Detects	0	28
Number of Detects	60	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	31500	267.4
Mean of Detects	1064	86.74
Median of Detects	6.15	46.9
SD of Detects	4393	82.16
KM Mean	1064	28.91
KM SD	4393	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.164
TW Critical Value (0.05)	1.645
P-Value	1.2083E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:51:23 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	42
Number of Non-Detects	0	28
Number of Detect Data	60	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	31500	267.4
Mean of Detects	1064	86.74
Median of Detects	6.15	46.9
SD of Detects	4393	82.16
KM Mean	1064	28.91
KM SD	4393	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.816
Critical z (0.05)	1.645
P-Value	7.3082E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 1:47:24 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	42
Number of Non-Detects	0	36
Number of Detects	60	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	3880	37.6
Mean of Detects	105.5	18.9
Median of Detects	0	12.6
SD of Detects	516	14.24
KM Mean	105.5	2.7
KM SD	516	8.239

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	7.098
TW Critical Value (0.05)	1.645
P-Value	6.329E-13

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 9:52:25 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	42
Number of Non-Detects	0	36
Number of Detect Data	60	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	3880	37.6
Mean of Detects	105.5	18.9
Median of Detects	0	12.6
SD of Detects	516	14.24
KM Mean	105.5	2.7
KM SD	516	8.239

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.669
Critical z (0.05)	1.645
P-Value	1.290E-11

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 1:50:34 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	42
Number of Non-Detects	26	28
Number of Detects	34	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	6.4	6.1
Percent Non-detects	43.33%	66.67%
Minimum Detect	6.1	6.1
Maximum Detect	3300	55
Mean of Detects	246.4	13.75
Median of Detects	22	8.7
SD of Detects	622.6	12.99
KM Mean	142.1	8.45
KM SD	476.9	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.665
TW Critical Value (0.05)	1.645
P-Value	0.00385

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:08:31 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	60	42
Number of Non-Detects	26	28
Number of Detect Data	34	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	6.4	6.1
Percent Non-detects	43.33%	66.67%
Minimum Detect	6.1	6.1
Maximum Detect	3300	55
Mean of Detects	246.4	13.75
Median of Detects	22	8.7
SD of Detects	622.6	12.99
KM Mean	142.1	8.45
KM SD	476.9	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.758
Critical z (0.05)	1.645
P-Value	0.00291

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 1:48:43 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	32	35
Number of Non-Detects	1	2
Number of Detects	31	33
Minimum Non-Detect	0.37	0.12
Maximum Non-Detect	0.37	0.27
Percent Non-detects	3.13%	5.71%
Minimum Detect	0.17	0.13
Maximum Detect	260	3
Mean of Detects	23.78	0.693
Median of Detects	5.2	0.37
SD of Detects	52.72	0.737
KM Mean	23.04	0.662
KM SD	51.21	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.298
TW Critical Value (0.05)	1.645
P-Value	5.8546E-8

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:09:37 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	32	35
Number of Non-Detects	1	2
Number of Detect Data	31	33
Minimum Non-Detect	0.37	0.12
Maximum Non-Detect	0.37	0.27
Percent Non-detects	3.13%	5.71%
Minimum Detect	0.17	0.13
Maximum Detect	260	3
Mean of Detects	23.78	0.693
Median of Detects	5.2	0.37
SD of Detects	52.72	0.737
KM Mean	23.04	0.662
KM SD	51.21	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.112
Critical z (0.05)	1.645
P-Value	1.5933E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:32:21 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	32	35
Number of Non-Detects	1	2
Number of Detects	31	33
Minimum Non-Detect	0.34	0.086
Maximum Non-Detect	0.34	0.17
Percent Non-detects	3.13%	5.71%
Minimum Detect	0.12	0.096
Maximum Detect	230	3.6
Mean of Detects	24.03	0.727
Median of Detects	6.9	0.43
SD of Detects	47.96	0.81
KM Mean	23.29	0.691
KM SD	46.62	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.949
TW Critical Value (0.05)	1.645
P-Value	3.7214E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:10:21 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	32	35
Number of Non-Detects	1	2
Number of Detect Data	31	33
Minimum Non-Detect	0.34	0.086
Maximum Non-Detect	0.34	0.17
Percent Non-detects	3.13%	5.71%
Minimum Detect	0.12	0.096
Maximum Detect	230	3.6
Mean of Detects	24.03	0.727
Median of Detects	6.9	0.43
SD of Detects	47.96	0.81
KM Mean	23.29	0.691
KM SD	46.62	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.89
Critical z (0.05)	1.645
P-Value	5.0532E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/25/2018 12:32:21 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_teq mammal)

Sample 2 Data: Res(bkgd_teq mammal)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	32	35
Number of Non-Detects	1	2
Number of Detects	31	33
Minimum Non-Detect	0.34	0.086
Maximum Non-Detect	0.34	0.17
Percent Non-detects	3.13%	5.71%
Minimum Detect	0.12	0.096
Maximum Detect	230	3.6
Mean of Detects	24.03	0.727
Median of Detects	6.9	0.43
SD of Detects	47.96	0.81
KM Mean	23.29	0.691
KM SD	46.62	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.949
TW Critical Value (0.05)	1.645
P-Value	3.7214E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 10:10:21 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc27_teq mammal)

Sample 2 Data: Res(bkgd_teq mammal)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	32	35
Number of Non-Detects	1	2
Number of Detect Data	31	33
Minimum Non-Detect	0.34	0.086
Maximum Non-Detect	0.34	0.17
Percent Non-detects	3.13%	5.71%
Minimum Detect	0.12	0.096
Maximum Detect	230	3.6
Mean of Detects	24.03	0.727
Median of Detects	6.9	0.43
SD of Detects	47.96	0.81
KM Mean	23.29	0.691
KM SD	46.62	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.89
Critical z (0.05)	1.645
P-Value	5.0532E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/10/2018 9:14:28 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ua-2_300b_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	17	59
Number of Non-Detects	0	1
Number of Detects	17	58
Minimum Non-Detect	N/A	1
Maximum Non-Detect	N/A	1
Percent Non-detects	0.00%	1.69%
Minimum Detect	8	0.884
Maximum Detect	24	12
Mean of Detects	12.04	4.006
Median of Detects	11	3.5
SD of Detects	3.848	2.357
KM Mean	12.04	3.953
KM SD	3.848	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	9.368
TW Critical Value (0.05)	1.645
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/10/2018 9:14:53 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ua-2_300b_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	17	59
Number of Non-Detects	0	1
Number of Detect Data	17	58
Minimum Non-Detect	N/A	1
Maximum Non-Detect	N/A	1
Percent Non-detects	0.00%	1.69%
Minimum Detect	8	0.884
Maximum Detect	24	12
Mean of Detects	12.04	4.006
Median of Detects	11	3.5
SD of Detects	3.848	2.357
KM Mean	12.04	3.953
KM SD	3.848	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.89
Critical z (0.05)	1.645
P-Value	1.9335E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/10/2018 9:18:10 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ua-2_300b_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	17	60
Number of Non-Detects	0	0
Number of Detect Data	17	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	150	48.4
Maximum Detect	890	660
Mean of Detects	311.2	164.6
Median of Detects	280	135
SD of Detects	173.6	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	1039
Standardized WMW U-Stat	4.609
Mean (U)	510
SD(U) - Adj ties	81.37
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	2.0273E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 3:38:48 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ua-2_300b_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	17	60
Number of Non-Detects	0	1
Number of Detects	17	59
Minimum Non-Detect	N/A	5.4
Maximum Non-Detect	N/A	5.4
Percent Non-detects	0.00%	1.67%
Minimum Detect	3.2	1.9
Maximum Detect	13	10
Mean of Detects	5.147	4.377
Median of Detects	4.3	3.5
SD of Detects	2.448	2.012
KM Mean	5.147	4.361
KM SD	2.448	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.288
TW Critical Value (0.05)	1.645
P-Value	0.0111

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/28/2017 3:39:25 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ua-2_300b_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	17	60
Number of Non-Detects	0	1
Number of Detect Data	17	59
Minimum Non-Detect	N/A	5.4
Maximum Non-Detect	N/A	5.4
Percent Non-detects	0.00%	1.67%
Minimum Detect	3.2	1.9
Maximum Detect	13	10
Mean of Detects	5.147	4.377
Median of Detects	4.3	3.5
SD of Detects	2.448	2.012
KM Mean	5.147	4.361
KM SD	2.448	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.744
Critical z (0.05)	1.645
P-Value	0.0406

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 2:51:19 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ua-2_300b_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	17	70
Number of Non-Detects	0	0
Number of Detect Data	17	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	46	8.4
Maximum Detect	65	66.1
Mean of Detects	57.71	36.82
Median of Detects	60	35.5
SD of Detects	6.43	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	1287
Standardized WMW U-Stat	5.769
Mean (U)	595
SD(U) - Adj ties	93.35
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	3.9916E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 8:46:51 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_aluminum)

Sample 2 Data: Res(bkgd_aluminum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	100	55
Number of Non-Detects	0	0
Number of Detect Data	100	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	2600	2600
Maximum Detect	20000	18000
Mean of Detects	8481	10445
Median of Detects	8400	10000
SD of Detects	3005	2908

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	6598
Standardized WMW U-Stat	-4.503
Mean (U)	2750
SD(U) - Adj ties	267
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_OCS.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(ocs_aluminum)

Background Data: Res(bkgd_aluminum)

Raw Statistics

	Site	Background
Number of Valid Data	100	55
Number of Non-Detect Data	0	0
Number of Detect Data	100	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	2600	2600
Maximum Detected	20000	18000
Mean of Detected Data	8481	10445
Median of Detected Data	8400	10000
SD of Detected Data	3005	2908

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	7
Approximate K Value (0.043)	7
R Value Adjusted for Ties in Data	9
K Value Adjusted for Ties in Data	9
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0431

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 8:51:49 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1181	59
Number of Non-Detects	120	1
Number of Detects	1061	58
Minimum Non-Detect	1	1
Maximum Non-Detect	5.5	1
Percent Non-detects	10.16%	1.69%
Minimum Detect	1	0.884
Maximum Detect	24	12
Mean of Detects	4.212	4.006
Median of Detects	3.6	3.5
SD of Detects	2.557	2.357
KM Mean	3.893	3.953
KM SD	2.605	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.607
TW Critical Value (0.05)	1.645
P-Value	0.728

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 8:49:22 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1181	59
Number of Non-Detects	120	1
Number of Detect Data	1061	58
Minimum Non-Detect	1	1
Maximum Non-Detect	5.5	1
Percent Non-detects	10.16%	1.69%
Minimum Detect	1	0.884
Maximum Detect	24	12
Mean of Detects	4.212	4.006
Median of Detects	3.6	3.5
SD of Detects	2.557	2.357
KM Mean	3.893	3.953
KM SD	2.605	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.611
Critical z (0.05)	1.645
P-Value	0.729

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 9:07:55 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1194	60
Number of Non-Detects	0	0
Number of Detect Data	1194	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	14	48.4
Maximum Detect	1900	660
Mean of Detects	145.5	164.6
Median of Detects	120	135
SD of Detects	122.2	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	743491
Standardized WMW U-Stat	-2.1
Mean (U)	35820
SD(U) - Adj ties	2735
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.982

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 9:33:38 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1181	55
Number of Non-Detects	1127	54
Number of Detects	54	1
Minimum Non-Detect	1	1
Maximum Non-Detect	9.8	5
Percent Non-detects	95.43%	98.18%
Minimum Detect	0.3	1.1
Maximum Detect	7.4	1.1
Mean of Detects	1.693	1.1
Median of Detects	1.3	1.1
SD of Detects	1.343	N/A
KM Mean	0.56	1.002
KM SD	0.428	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.852
TW Critical Value (0.05)	1.645
P-Value	0.197

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 9:30:04 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1181	55
Number of Non-Detects	1127	54
Number of Detect Data	54	1
Minimum Non-Detect	1	1
Maximum Non-Detect	9.8	5
Percent Non-detects	95.43%	98.18%
Minimum Detect	0.3	1.1
Maximum Detect	7.4	1.1
Mean of Detects	1.693	1.1
Median of Detects	1.3	1.1
SD of Detects	1.343	N/A
KM Mean	0.56	1.002
KM SD	0.428	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.83
Critical z (0.05)	1.645
P-Value	0.203

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 3:53:37 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_calcium)

Sample 2 Data: Res(bkgd_calcium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	113	55
Number of Non-Detects	0	0
Number of Detect Data	113	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	6000	4100
Maximum Detect	379000	67000
Mean of Detects	38875	24293
Median of Detects	23000	20000
SD of Detects	57612	13273

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	10016
Standardized WMW U-Stat	1.578
Mean (U)	3108
SD(U) - Adj ties	295.7
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0573

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_OCS.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(ocs_calcium)

Background Data: Res(bkgd_calcium)

Raw Statistics

	Site	Background
Number of Valid Data	113	55
Number of Non-Detect Data	0	0
Number of Detect Data	113	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	6000	4100
Maximum Detected	379000	67000
Mean of Detected Data	38875	24293
Median of Detected Data	23000	20000
SD of Detected Data	57612	13273

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	7
Approximate K Value (0.043)	7
Number of Site Observations in 'R' Largest	7
Calculated Alpha	0.0585

Conclusion with Alpha = 0.043

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 9:55:24 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1301	70
Number of Non-Detects	874	67
Number of Detects	427	3
Minimum Non-Detect	0.05	0.05
Maximum Non-Detect	4.7	4.3
Percent Non-detects	67.18%	95.71%
Minimum Detect	0.06	0.504
Maximum Detect	2700	0.83
Mean of Detects	10.97	0.68
Median of Detects	0.94	0.707
SD of Detects	131.1	0.165
KM Mean	3.648	0.0808
KM SD	75.2	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.89
TW Critical Value (0.05)	1.645
P-Value	5.0170E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 9:53:42 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1301	70
Number of Non-Detects	874	67
Number of Detect Data	427	3
Minimum Non-Detect	0.05	0.05
Maximum Non-Detect	4.7	4.3
Percent Non-detects	67.18%	95.71%
Minimum Detect	0.06	0.504
Maximum Detect	2700	0.83
Mean of Detects	10.97	0.68
Median of Detects	0.94	0.707
SD of Detects	131.1	0.165
KM Mean	3.648	0.0808
KM SD	75.2	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.904
Critical z (0.05)	1.645
P-Value	4.7323E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 9:48:57 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1313	70
Number of Non-Detects	0	0
Number of Detect Data	1313	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	2.9	4.2
Maximum Detect	4400	53
Mean of Detects	97.28	22.35
Median of Detects	24	21.9
SD of Detects	373.3	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	915781
Standardized WMW U-Stat	2.207
Mean (U)	45955
SD(U) - Adj ties	3255
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0136

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 9:55:08 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1180	59
Number of Non-Detects	6	1
Number of Detects	1174	58
Minimum Non-Detect	4.4	5.1
Maximum Non-Detect	11	5.1
Percent Non-detects	0.51%	1.69%
Minimum Detect	1.6	2.3
Maximum Detect	36	14
Mean of Detects	7.552	7.854
Median of Detects	7.4	7.605
SD of Detects	2.578	2.317
KM Mean	7.539	7.788
KM SD	2.581	2.336

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.017
TW Critical Value (0.05)	1.645
P-Value	0.845

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 9:53:29 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1180	59
Number of Non-Detects	6	1
Number of Detect Data	1174	58
Minimum Non-Detect	4.4	5.1
Maximum Non-Detect	11	5.1
Percent Non-detects	0.51%	1.69%
Minimum Detect	1.6	2.3
Maximum Detect	36	14
Mean of Detects	7.552	7.854
Median of Detects	7.4	7.605
SD of Detects	2.578	2.317
KM Mean	7.539	7.788
KM SD	2.581	2.336

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.281
Critical z (0.05)	1.645
P-Value	0.9

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:00:27 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1306	69
Number of Non-Detects	6	0
Number of Detects	1300	69
Minimum Non-Detect	2	N/A
Maximum Non-Detect	23	N/A
Percent Non-detects	0.46%	0.00%
Minimum Detect	1.8	2.1
Maximum Detect	3100	18
Mean of Detects	22.7	10.32
Median of Detects	11	10
SD of Detects	115.5	3.255
KM Mean	22.63	10.32
KM SD	115.2	3.255

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.955
TW Critical Value (0.05)	1.645
P-Value	0.0253

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 9:59:28 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1306	69
Number of Non-Detects	6	0
Number of Detect Data	1300	69
Minimum Non-Detect	2	N/A
Maximum Non-Detect	23	N/A
Percent Non-detects	0.46%	0.00%
Minimum Detect	1.8	2.1
Maximum Detect	3100	18
Mean of Detects	22.7	10.32
Median of Detects	11	10
SD of Detects	115.5	3.255
KM Mean	22.63	10.32
KM SD	115.2	3.255

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.929
Critical z (0.05)	1.645
P-Value	0.0269

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 4:19:43 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_iron)

Sample 2 Data: Res(bkgd_iron)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	126	59
Number of Non-Detects	0	0
Number of Detect Data	126	59
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	425	5570
Maximum Detect	32000	34000
Mean of Detects	16303	18444
Median of Detects	16500	18000
SD of Detects	5560	5375

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	10909
Standardized WMW U-Stat	-2.389
Mean (U)	3717
SD(U) - Adj ties	338.9
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.992

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:06:02 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1198	60
Number of Non-Detects	25	1
Number of Detects	1173	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	5.5	5.4
Percent Non-detects	2.09%	1.67%
Minimum Detect	1	1.9
Maximum Detect	1600	10
Mean of Detects	11.66	4.377
Median of Detects	4.2	3.5
SD of Detects	61.56	2.012
KM Mean	11.44	4.361
KM SD	60.91	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.171
TW Critical Value (0.05)	1.645
P-Value	0.432

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:07:49 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1198	60
Number of Non-Detects	25	1
Number of Detect Data	1173	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	5.5	5.4
Percent Non-detects	2.09%	1.67%
Minimum Detect	1	1.9
Maximum Detect	1600	10
Mean of Detects	11.66	4.377
Median of Detects	4.2	3.5
SD of Detects	61.56	2.012
KM Mean	11.44	4.361
KM SD	60.91	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.925
Critical z (0.05)	1.645
P-Value	0.178

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 4:22:32 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_magnesium)

Sample 2 Data: Res(bkgd_magnesium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	113	55
Number of Non-Detects	0	0
Number of Detect Data	113	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	2600	2500
Maximum Detect	23000	13000
Mean of Detects	7325	7945
Median of Detects	6800	8100
SD of Detects	2906	2049

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	8720
Standardized WMW U-Stat	-2.803
Mean (U)	3108
SD(U) - Adj ties	295.8
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.997

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_OCS.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(ocs_magnesium)

Background Data: Res(bkgd_magnesium)

Raw Statistics

	Site	Background
Number of Valid Data	113	55
Number of Non-Detect Data	0	0
Number of Detect Data	113	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	2600	2500
Maximum Detected	23000	13000
Mean of Detected Data	7325	7945
Median of Detected Data	6800	8100
SD of Detected Data	2906	2049

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	7
Approximate K Value (0.043)	7
R Value Adjusted for Ties in Data	8
K Value Adjusted for Ties in Data	8
Number of Site Observations in 'R' Largest	7
Calculated Alpha	0.0585

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 6:26:34 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_manganese)

Sample 2 Data: Res(bkgd_manganese)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	120	57
Number of Non-Detects	0	0
Number of Detect Data	120	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	67.4	140
Maximum Detect	1300	450
Mean of Detects	259.3	279.5
Median of Detects	240	280
SD of Detects	141.1	61.51

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	9465
Standardized WMW U-Stat	-3.821
Mean (U)	3420
SD(U) - Adj ties	318.1
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:09:36 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1197	60
Number of Non-Detects	1034	49
Number of Detects	163	11
Minimum Non-Detect	0.2	1
Maximum Non-Detect	11	5.4
Percent Non-detects	86.38%	81.67%
Minimum Detect	0.071	0.383
Maximum Detect	63	2.8
Mean of Detects	3.833	1.027
Median of Detects	1.9	1
SD of Detects	6.195	0.703
KM Mean	0.764	0.682
KM SD	2.602	0.433

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.0771
TW Critical Value (0.05)	1.645
P-Value	0.531

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:09:12 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1197	60
Number of Non-Detects	1034	49
Number of Detect Data	163	11
Minimum Non-Detect	0.2	1
Maximum Non-Detect	11	5.4
Percent Non-detects	86.38%	81.67%
Minimum Detect	0.071	0.383
Maximum Detect	63	2.8
Mean of Detects	3.833	1.027
Median of Detects	1.9	1
SD of Detects	6.195	0.703
KM Mean	0.764	0.682
KM SD	2.602	0.433

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.194
Critical z (0.05)	1.645
P-Value	0.423

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:18:57 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1306	70
Number of Non-Detects	3	0
Number of Detects	1303	70
Minimum Non-Detect	4.4	N/A
Maximum Non-Detect	4.9	N/A
Percent Non-detects	0.23%	0.00%
Minimum Detect	0.28	2.6
Maximum Detect	270	31
Mean of Detects	14.66	15.42
Median of Detects	13	15
SD of Detects	11.51	5.975
KM Mean	14.63	15.42
KM SD	11.5	5.975

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-2.819
TW Critical Value (0.05)	1.645
P-Value	0.998

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:18:30 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1306	70
Number of Non-Detects	3	0
Number of Detect Data	1303	70
Minimum Non-Detect	4.4	N/A
Maximum Non-Detect	4.9	N/A
Percent Non-detects	0.23%	0.00%
Minimum Detect	0.28	2.6
Maximum Detect	270	31
Mean of Detects	14.66	15.42
Median of Detects	13	15
SD of Detects	11.51	5.975
KM Mean	14.63	15.42
KM SD	11.5	5.975

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-3.315
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 6:29:45 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_potassium)

Sample 2 Data: Res(bkgd_potassium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	112	54
Number of Non-Detects	0	0
Number of Detect Data	112	54
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	89.6	540
Maximum Detect	5300	4300
Mean of Detects	2241	2747
Median of Detects	2300	2750
SD of Detects	866.6	811.2

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	8137
Standardized WMW U-Stat	-4.194
Mean (U)	3024
SD(U) - Adj ties	289.8
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_OCS.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(ocs_potassium)

Background Data: Res(bkgd_potassium)

Raw Statistics

	Site	Background
Number of Valid Data	112	54
Number of Non-Detect Data	0	0
Number of Detect Data	112	54
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	89.6	540
Maximum Detected	5300	4300
Mean of Detected Data	2241	2747
Median of Detected Data	2300	2750
SD of Detected Data	866.6	811.2

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	7
Approximate K Value (0.043)	7
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0598

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:23:44 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1181	59
Number of Non-Detects	1165	52
Number of Detects	16	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	5.5	5
Percent Non-detects	98.65%	88.14%
Minimum Detect	1.1	0.738
Maximum Detect	9.1	2.7
Mean of Detects	2.494	1.566
Median of Detects	1.6	1.6
SD of Detects	2.159	0.678
KM Mean	1.02	0.898
KM SD	0.299	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-4.425
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:23:12 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1181	59
Number of Non-Detects	1165	52
Number of Detect Data	16	7
Minimum Non-Detect	1	0.911
Maximum Non-Detect	5.5	5
Percent Non-detects	98.65%	88.14%
Minimum Detect	1.1	0.738
Maximum Detect	9.1	2.7
Mean of Detects	2.494	1.566
Median of Detects	1.6	1.6
SD of Detects	2.159	0.678
KM Mean	1.02	0.898
KM SD	0.299	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-4.215
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:34:57 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	113	55
Number of Non-Detects	13	4
Number of Detects	100	51
Minimum Non-Detect	210	240
Maximum Non-Detect	1000	1100
Percent Non-detects	11.50%	7.27%
Minimum Detect	140	170
Maximum Detect	6590	4500
Mean of Detects	622.1	636.9
Median of Detects	345	280
SD of Detects	876.8	744.4
KM Mean	578.4	610.9
KM SD	830.3	717.3

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.518
TW Critical Value (0.05)	1.645
P-Value	0.302

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:34:03 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	113	55
Number of Non-Detects	13	4
Number of Detect Data	100	51
Minimum Non-Detect	210	240
Maximum Non-Detect	1000	1100
Percent Non-detects	11.50%	7.27%
Minimum Detect	140	170
Maximum Detect	6590	4500
Mean of Detects	622.1	636.9
Median of Detects	345	280
SD of Detects	876.8	744.4
KM Mean	578.4	610.9
KM SD	830.3	717.3

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.0999
Critical z (0.05)	1.645
P-Value	0.46

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_OCS.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(ocs_sodium)

Background Data: Res(bkgd_sodium)

Raw Statistics

	Site	Background
Number of Valid Data	113	55
Number of Non-Detect Data	13	4
Number of Detect Data	100	51
Minimum Non-Detect	210	240
Maximum Non-Detect	1000	1100
Percent Non detects	11.50%	7.27%
Minimum Detected	140	170
Maximum Detected	6590	4500
Mean of Detected Data	622.1	636.9
Median of Detected Data	345	280
SD of Detected Data	876.8	744.4

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	7
Approximate K Value (0.043)	7
Number of Site Observations in 'R' Largest	5
Calculated Alpha	0.0585

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:38:29 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_vanadium)

Sample 2 Data: Res(bkgd_vanadium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1194	60
Number of Non-Detects	0	0
Number of Detect Data	1194	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	9.2	9.4
Maximum Detect	100	59
Mean of Detects	31.09	34.05
Median of Detects	31	34.1
SD of Detects	9.732	8.997

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	740092
Standardized WMW U-Stat	-3.343
Mean (U)	35820
SD(U) - Adj ties	2735
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:41:38 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1306	70
Number of Non-Detects	1	0
Number of Detects	1305	70
Minimum Non-Detect	11	N/A
Maximum Non-Detect	11	N/A
Percent Non-detects	0.08%	0.00%
Minimum Detect	1.9	8.4
Maximum Detect	2000	66.1
Mean of Detects	61.87	36.82
Median of Detects	40	35.5
SD of Detects	104.7	10.14
KM Mean	61.83	36.82
KM SD	104.6	10.14

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.6
TW Critical Value (0.05)	1.645
P-Value	0.00466

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:41:20 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1306	70
Number of Non-Detects	1	0
Number of Detect Data	1305	70
Minimum Non-Detect	11	N/A
Maximum Non-Detect	11	N/A
Percent Non-detects	0.08%	0.00%
Minimum Detect	1.9	8.4
Maximum Detect	2000	66.1
Mean of Detects	61.87	36.82
Median of Detects	40	35.5
SD of Detects	104.7	10.14
KM Mean	61.83	36.82
KM SD	104.6	10.14

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.985
Critical z (0.05)	1.645
P-Value	0.00142

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 6:47:34 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1059	42
Number of Non-Detects	0	28
Number of Detects	1059	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	32900	267.4
Mean of Detects	328.1	86.74
Median of Detects	0	46.9
SD of Detects	1857	82.16
KM Mean	328.1	28.91
KM SD	1857	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.588
TW Critical Value (0.05)	1.645
P-Value	2.231E-11

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 6:36:35 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1059	42
Number of Non-Detects	0	28
Number of Detect Data	1059	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	32900	267.4
Mean of Detects	328.1	86.74
Median of Detects	0	46.9
SD of Detects	1857	82.16
KM Mean	328.1	28.91
KM SD	1857	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.654
Critical z (0.05)	1.645
P-Value	7.8561E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 8:38:16 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1059	42
Number of Non-Detects	0	36
Number of Detects	1059	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	3880	37.6
Mean of Detects	23.31	18.9
Median of Detects	0	12.6
SD of Detects	158.6	14.24
KM Mean	23.31	2.7
KM SD	158.6	8.239

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	10.82
TW Critical Value (0.05)	1.645
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/22/2018 8:36:09 PM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1059	42
Number of Non-Detects	0	36
Number of Detect Data	1059	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	3880	37.6
Mean of Detects	23.31	18.9
Median of Detects	0	12.6
SD of Detects	158.6	14.24
KM Mean	23.31	2.7
KM SD	158.6	8.239

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	8.305
Critical z (0.05)	1.645
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:50:25 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1053	42
Number of Non-Detects	660	28
Number of Detects	393	14
Minimum Non-Detect	0	5.8
Maximum Non-Detect	400	6.1
Percent Non-detects	62.68%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	8200	55
Mean of Detects	127.5	13.75
Median of Detects	23	8.7
SD of Detects	508.3	12.99
KM Mean	47.94	8.45
KM SD	316.2	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.227
TW Critical Value (0.05)	1.645
P-Value	0.11

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:50:01 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	1053	42
Number of Non-Detects	660	28
Number of Detect Data	393	14
Minimum Non-Detect	0	5.8
Maximum Non-Detect	400	6.1
Percent Non-detects	62.68%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	8200	55
Mean of Detects	127.5	13.75
Median of Detects	23	8.7
SD of Detects	508.3	12.99
KM Mean	47.94	8.45
KM SD	316.2	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.466
Critical z (0.05)	1.645
P-Value	0.0714

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:44:44 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	545	35
Number of Non-Detects	21	2
Number of Detects	524	33
Minimum Non-Detect	0.079	0.12
Maximum Non-Detect	3.4	0.27
Percent Non-detects	3.85%	5.71%
Minimum Detect	0.025	0.13
Maximum Detect	11000	3
Mean of Detects	56.27	0.693
Median of Detects	4	0.37
SD of Detects	490.9	0.737
KM Mean	54.11	0.662
KM SD	481	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.336
TW Critical Value (0.05)	1.645
P-Value	4.7617E-8

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:44:06 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	545	35
Number of Non-Detects	21	2
Number of Detect Data	524	33
Minimum Non-Detect	0.079	0.12
Maximum Non-Detect	3.4	0.27
Percent Non-detects	3.85%	5.71%
Minimum Detect	0.025	0.13
Maximum Detect	11000	3
Mean of Detects	56.27	0.693
Median of Detects	4	0.37
SD of Detects	490.9	0.737
KM Mean	54.11	0.662
KM SD	481	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.321
Critical z (0.05)	1.645
P-Value	1.302E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:47:51 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	545	35
Number of Non-Detects	21	2
Number of Detects	524	33
Minimum Non-Detect	0.062	0.086
Maximum Non-Detect	2.3	0.17
Percent Non-detects	3.85%	5.71%
Minimum Detect	0.021	0.096
Maximum Detect	12000	3.6
Mean of Detects	73.39	0.727
Median of Detects	5.8	0.43
SD of Detects	545.2	0.81
KM Mean	70.56	0.691
KM SD	534.3	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.936
TW Critical Value (0.05)	1.645
P-Value	3.9923E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/23/2018 10:47:21 AM
From File	ProUCL_COPCSelect_AllData_input_OCS.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	545	35
Number of Non-Detects	21	2
Number of Detect Data	524	33
Minimum Non-Detect	0.062	0.086
Maximum Non-Detect	2.3	0.17
Percent Non-detects	3.85%	5.71%
Minimum Detect	0.021	0.096
Maximum Detect	12000	3.6
Mean of Detects	73.39	0.727
Median of Detects	5.8	0.43
SD of Detects	545.2	0.81
KM Mean	70.56	0.691
KM SD	534.3	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.087
Critical z (0.05)	1.645
P-Value	5.747E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 3:15:58 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_teq mammals)

Sample 2 Data: Res(bkgd_teqmammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	545	35
Number of Non-Detects	22	2
Number of Detects	523	33
Minimum Non-Detect	0.062	0.17
Maximum Non-Detect	130	0.34
Percent Non-detects	4.04%	5.71%
Minimum Detect	0.021	0.19
Maximum Detect	12000	4.4
Mean of Detects	73.28	1.066
Median of Detects	5.8	0.64
SD of Detects	545.7	1.039
KM Mean	70.35	1.017
KM SD	534.3	1.014

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.769
TW Critical Value (0.05)	1.645
P-Value	8.2003E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 3:14:21 PM
From File	ProUCL_COPCSelect_AllData_input_15ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(ocs_teq mammals)

Sample 2 Data: Res(bkgd_teqmammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	545	35
Number of Non-Detects	22	2
Number of Detect Data	523	33
Minimum Non-Detect	0.062	0.17
Maximum Non-Detect	130	0.34
Percent Non-detects	4.04%	5.71%
Minimum Detect	0.021	0.19
Maximum Detect	12000	4.4
Mean of Detects	73.28	1.066
Median of Detects	5.8	0.64
SD of Detects	545.7	1.039
KM Mean	70.35	1.017
KM SD	534.3	1.014

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.041
Critical z (0.05)	1.645
P-Value	2.3152E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:32:19 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	59
Number of Non-Detects	0	1
Number of Detects	10	58
Minimum Non-Detect	N/A	1
Maximum Non-Detect	N/A	1
Percent Non-detects	0.00%	1.69%
Minimum Detect	3.5	0.884
Maximum Detect	17	12
Mean of Detects	8.73	4.006
Median of Detects	9.55	3.5
SD of Detects	4.439	2.357
KM Mean	8.73	3.953
KM SD	4.439	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.422
TW Critical Value (0.05)	1.645
P-Value	4.8809E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:27:27 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	59
Number of Non-Detects	0	1
Number of Detect Data	10	58
Minimum Non-Detect	N/A	1
Maximum Non-Detect	N/A	1
Percent Non-detects	0.00%	1.69%
Minimum Detect	3.5	0.884
Maximum Detect	17	12
Mean of Detects	8.73	4.006
Median of Detects	9.55	3.5
SD of Detects	4.439	2.357
KM Mean	8.73	3.953
KM SD	4.439	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.324
Critical z (0.05)	1.645
P-Value	4.4376E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:22:36 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	60
Number of Non-Detects	0	0
Number of Detect Data	10	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	110	48.4
Maximum Detect	500	660
Mean of Detects	226	164.6
Median of Detects	215	135
SD of Detects	111.3	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	496
Standardized WMW U-Stat	2.36
Mean (U)	300
SD(U) - Adj ties	59.52
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.00913

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:24:02 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	69
Number of Non-Detects	0	0
Number of Detect Data	10	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	3	2.1
Maximum Detect	44	18
Mean of Detects	19.01	10.32
Median of Detects	16.5	10
SD of Detects	14.51	3.255

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	498
Standardized WMW U-Stat	1.439
Mean (U)	345
SD(U) - Adj ties	67.74
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.075

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc10 riparian_copper)

Background Data: Res(bkgd_copper)

Raw Statistics

	Site	Background
Number of Valid Data	10	69
Number of Non-Detect Data	0	0
Number of Detect Data	10	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	3	2.1
Maximum Detected	44	18
Mean of Detected Data	19.01	10.32
Median of Detected Data	16.5	10
SD of Detected Data	14.51	3.255

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.057)	8
Approximate K Value (0.057)	3
R Value Adjusted for Ties in Data	9
K Value Adjusted for Ties in Data	4
Number of Site Observations in 'R' Largest	5
Calculated Alpha	0.0592

Conclusion with Alpha = 0.057

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:35:18 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	60
Number of Non-Detects	0	1
Number of Detects	10	59
Minimum Non-Detect	N/A	5.4
Maximum Non-Detect	N/A	5.4
Percent Non-detects	0.00%	1.67%
Minimum Detect	4.9	1.9
Maximum Detect	39	10
Mean of Detects	19.19	4.377
Median of Detects	17.5	3.5
SD of Detects	12.41	2.012
KM Mean	19.19	4.361
KM SD	12.41	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.615
TW Critical Value (0.05)	1.645
P-Value	1.861E-11

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:29:26 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	60
Number of Non-Detects	0	1
Number of Detect Data	10	59
Minimum Non-Detect	N/A	5.4
Maximum Non-Detect	N/A	5.4
Percent Non-detects	0.00%	1.67%
Minimum Detect	4.9	1.9
Maximum Detect	39	10
Mean of Detects	19.19	4.377
Median of Detects	17.5	3.5
SD of Detects	12.41	2.012
KM Mean	19.19	4.361
KM SD	12.41	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.255
Critical z (0.05)	1.645
P-Value	1.0458E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:36:03 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	59
Number of Non-Detects	9	52
Number of Detects	1	7
Minimum Non-Detect	1.3	0.911
Maximum Non-Detect	3.9	5
Percent Non-detects	90.00%	88.14%
Minimum Detect	4.3	0.738
Maximum Detect	4.3	2.7
Mean of Detects	4.3	1.566
Median of Detects	4.3	1.6
SD of Detects	N/A	0.678
KM Mean	1.6	0.898
KM SD	0.9	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.77
TW Critical Value (0.05)	1.645
P-Value	0.221

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:30:11 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	59
Number of Non-Detects	9	52
Number of Detect Data	1	7
Minimum Non-Detect	1.3	0.911
Maximum Non-Detect	3.9	5
Percent Non-detects	90.00%	88.14%
Minimum Detect	4.3	0.738
Maximum Detect	4.3	2.7
Mean of Detects	4.3	1.566
Median of Detects	4.3	1.6
SD of Detects	N/A	0.678
KM Mean	1.6	0.898
KM SD	0.9	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.694
Critical z (0.05)	1.645
P-Value	0.244

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:26:09 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_vanadium)

Sample 2 Data: Res(bkgd_vanadium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	60
Number of Non-Detects	0	0
Number of Detect Data	10	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	7.5	9.4
Maximum Detect	53	59
Mean of Detects	28.85	34.05
Median of Detects	33.5	34.1
SD of Detects	15.76	8.997

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	312.5
Standardized WMW U-Stat	-0.722
Mean (U)	300
SD(U) - Adj ties	59.53
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.765

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(aoc10 riparian_vanadium)

Background Data: Res(bkgd_vanadium)

Raw Statistics

	Site	Background
Number of Valid Data	10	60
Number of Non-Detect Data	0	0
Number of Detect Data	10	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	7.5	9.4
Maximum Detected	53	59
Mean of Detected Data	28.85	34.05
Median of Detected Data	33.5	34.1
SD of Detected Data	15.76	8.997

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.052)	3
Approximate K Value (0.052)	2
Number of Site Observations in 'R' Largest	1
Calculated Alpha	0.0515

Conclusion with Alpha = 0.052

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 11:26:45 AM
From File	ProUCL_COPCSelect_AOC10_Riparian_input_05ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(aoc10 riparian_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	70
Number of Non-Detects	0	0
Number of Detect Data	10	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	15	8.4
Maximum Detect	240	66.1
Mean of Detects	92.7	36.82
Median of Detects	101	35.5
SD of Detects	70.28	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	546.5
Standardized WMW U-Stat	2.053
Mean (U)	350
SD(U) - Adj ties	68.67
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.02

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:23:25 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	59
Number of Non-Detects	6	1
Number of Detects	77	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	1
Percent Non-detects	7.23%	1.69%
Minimum Detect	1.3	0.884
Maximum Detect	13	12
Mean of Detects	3.565	4.006
Median of Detects	3.4	3.5
SD of Detects	1.748	2.357
KM Mean	3.38	3.953
KM SD	1.8	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.084
TW Critical Value (0.05)	1.645
P-Value	0.861

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:23:55 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	59
Number of Non-Detects	6	1
Number of Detect Data	77	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	1
Percent Non-detects	7.23%	1.69%
Minimum Detect	1.3	0.884
Maximum Detect	13	12
Mean of Detects	3.565	4.006
Median of Detects	3.4	3.5
SD of Detects	1.748	2.357
KM Mean	3.38	3.953
KM SD	1.8	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.43
Critical z (0.05)	1.645
P-Value	0.924

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_6ft.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(tamarisk thicket_arsenic)

Background Data: Res(bkgd_arsenic)

Raw Statistics

	Site	Background
Number of Valid Data	83	59
Number of Non-Detect Data	6	1
Number of Detect Data	77	58
Minimum Non-Detect	1	1
Maximum Non-Detect	1.1	1
Percent Non detects	7.23%	1.69%
Minimum Detected	1.3	0.884
Maximum Detected	13	12
Mean of Detected Data	3.565	4.006
Median of Detected Data	3.4	3.5
SD of Detected Data	1.748	2.357

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.054)	9
Approximate K Value (0.054)	8
R Value Adjusted for Ties in Data	10
K Value Adjusted for Ties in Data	9
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0532

Conclusion with Alpha = 0.054

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:26:21 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	60
Number of Non-Detects	0	0
Number of Detect Data	83	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	53	48.4
Maximum Detect	420	660
Mean of Detects	150.4	164.6
Median of Detects	150	135
SD of Detects	69.48	109.9

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	5996
Standardized WMW U-Stat	0.0799
Mean (U)	2490
SD(U) - Adj ties	244.2
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.468

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_6ft.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(tamarisk thicket_barium)

Background Data: Res(bkgd_barium)

Raw Statistics

	Site	Background
Number of Valid Data	83	60
Number of Non-Detect Data	0	0
Number of Detect Data	83	60
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	53	48.4
Maximum Detected	420	660
Mean of Detected Data	150.4	164.6
Median of Detected Data	150	135
SD of Detected Data	69.48	109.9

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.054)	9
Approximate K Value (0.054)	8
Number of Site Observations in 'R' Largest	3
Calculated Alpha	0.0506

Conclusion with Alpha = 0.054

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:29:48 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	85	70
Number of Non-Detects	66	67
Number of Detects	19	3
Minimum Non-Detect	0.05	0.05
Maximum Non-Detect	0.61	4.3
Percent Non-detects	77.65%	95.71%
Minimum Detect	0.22	0.504
Maximum Detect	2.6	0.83
Mean of Detects	0.648	0.68
Median of Detects	0.42	0.707
SD of Detects	0.598	0.165
KM Mean	0.19	0.0808
KM SD	0.371	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.739
TW Critical Value (0.05)	1.645
P-Value	0.041

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:30:09 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	85	70
Number of Non-Detects	66	67
Number of Detect Data	19	3
Minimum Non-Detect	0.05	0.05
Maximum Non-Detect	0.61	4.3
Percent Non-detects	77.65%	95.71%
Minimum Detect	0.22	0.504
Maximum Detect	2.6	0.83
Mean of Detects	0.648	0.68
Median of Detects	0.42	0.707
SD of Detects	0.598	0.165
KM Mean	0.19	0.0808
KM SD	0.371	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.624
Critical z (0.05)	1.645
P-Value	0.0522

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:31:50 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	85	70
Number of Non-Detects	0	0
Number of Detect Data	85	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	9.6	4.2
Maximum Detect	71	53
Mean of Detects	26.41	22.35
Median of Detects	22	21.9
SD of Detects	14.22	8.814

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	6915
Standardized WMW U-Stat	1.024
Mean (U)	2975
SD(U) - Adj ties	278
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.153

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_6ft.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(tamarisk thicket_chromium, total)

Background Data: Res(bkgd_chromium, total)

Raw Statistics

	Site	Background
Number of Valid Data	85	70
Number of Non-Detect Data	0	0
Number of Detect Data	85	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	9.6	4.2
Maximum Detected	71	53
Mean of Detected Data	26.41	22.35
Median of Detected Data	22	21.9
SD of Detected Data	14.22	8.814

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.047)	5
Approximate K Value (0.047)	5
Number of Site Observations in 'R' Largest	5
Calculated Alpha	0.047

Conclusion with Alpha = 0.047

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:34:18 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	59
Number of Non-Detects	0	1
Number of Detects	83	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	4.6	2.3
Maximum Detect	14	14
Mean of Detects	7.939	7.854
Median of Detects	7.8	7.605
SD of Detects	1.481	2.317
KM Mean	7.939	7.788
KM SD	1.481	2.336

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.172
TW Critical Value (0.05)	1.645
P-Value	0.121

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:34:39 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	59
Number of Non-Detects	0	1
Number of Detect Data	83	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non-detects	0.00%	1.69%
Minimum Detect	4.6	2.3
Maximum Detect	14	14
Mean of Detects	7.939	7.854
Median of Detects	7.8	7.605
SD of Detects	1.481	2.317
KM Mean	7.939	7.788
KM SD	1.481	2.336

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.41
Critical z (0.05)	1.645
P-Value	0.341

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_6ft.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(tamarisk thicket_cobalt)

Background Data: Res(bkgd_cobalt)

Raw Statistics

	Site	Background
Number of Valid Data	83	59
Number of Non-Detect Data	0	1
Number of Detect Data	83	58
Minimum Non-Detect	N/A	5.1
Maximum Non-Detect	N/A	5.1
Percent Non detects	0.00%	1.69%
Minimum Detected	4.6	2.3
Maximum Detected	14	14
Mean of Detected Data	7.939	7.854
Median of Detected Data	7.8	7.605
SD of Detected Data	1.481	2.317

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.054)	9
Approximate K Value (0.054)	8
R Value Adjusted for Ties in Data	12
K Value Adjusted for Ties in Data	11
Number of Site Observations in 'R' Largest	3
Calculated Alpha	0.0532

Conclusion with Alpha = 0.054

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:35:36 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	85	69
Number of Non-Detects	0	0
Number of Detect Data	85	69
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	5.7	2.1
Maximum Detect	23	18
Mean of Detects	12.27	10.32
Median of Detects	12	10
SD of Detects	4.198	3.255

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	7215
Standardized WMW U-Stat	2.278
Mean (U)	2933
SD(U) - Adj ties	275
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0114

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:37:41 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	60
Number of Non-Detects	1	1
Number of Detects	82	59
Minimum Non-Detect	1.1	5.4
Maximum Non-Detect	1.1	5.4
Percent Non-detects	1.20%	1.67%
Minimum Detect	1	1.9
Maximum Detect	23	10
Mean of Detects	6.362	4.377
Median of Detects	4.9	3.5
SD of Detects	4.81	2.012
KM Mean	6.298	4.361
KM SD	4.788	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.421
TW Critical Value (0.05)	1.645
P-Value	0.337

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:38:09 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	60
Number of Non-Detects	1	1
Number of Detect Data	82	59
Minimum Non-Detect	1.1	5.4
Maximum Non-Detect	1.1	5.4
Percent Non-detects	1.20%	1.67%
Minimum Detect	1	1.9
Maximum Detect	23	10
Mean of Detects	6.362	4.377
Median of Detects	4.9	3.5
SD of Detects	4.81	2.012
KM Mean	6.298	4.361
KM SD	4.788	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.438
Critical z (0.05)	1.645
P-Value	0.0753

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	qrySoil_COPCSelect_ProUCL_6ft.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(tamarisk thicket_lead)

Background Data: Res(bkgd_lead)

Raw Statistics

	Site	Background
Number of Valid Data	83	60
Number of Non-Detect Data	1	1
Number of Detect Data	82	59
Minimum Non-Detect	1.1	5.4
Maximum Non-Detect	1.1	5.4
Percent Non detects	1.20%	1.67%
Minimum Detected	1	1.9
Maximum Detected	23	10
Mean of Detected Data	6.362	4.377
Median of Detected Data	4.9	3.5
SD of Detected Data	4.81	2.012

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.054)	9
Approximate K Value (0.054)	8
Number of Site Observations in 'R' Largest	9
Calculated Alpha	0.0506

Conclusion with Alpha = 0.054

Reject H0, Conclude Site Concentration > Background Concentration

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:40:11 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	60
Number of Non-Detects	82	49
Number of Detects	1	11
Minimum Non-Detect	1	1
Maximum Non-Detect	2.9	5.4
Percent Non-detects	98.80%	81.67%
Minimum Detect	1.5	0.383
Maximum Detect	1.5	2.8
Mean of Detects	1.5	1.027
Median of Detects	1.5	1
SD of Detects	N/A	0.703
KM Mean	1.006	0.682
KM SD	0.0556	0.433

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-3.453
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:40:29 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	83	60
Number of Non-Detects	82	49
Number of Detect Data	1	11
Minimum Non-Detect	1	1
Maximum Non-Detect	2.9	5.4
Percent Non-detects	98.80%	81.67%
Minimum Detect	1.5	0.383
Maximum Detect	1.5	2.8
Mean of Detects	1.5	1.027
Median of Detects	1.5	1
SD of Detects	N/A	0.703
KM Mean	1.006	0.682
KM SD	0.0556	0.433

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-2.987
Critical z (0.05)	1.645
P-Value	0.999

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:41:41 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	85	70
Number of Non-Detects	0	0
Number of Detect Data	85	70
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	24	8.4
Maximum Detect	84	66.1
Mean of Detects	45.75	36.82
Median of Detects	43	35.5
SD of Detects	13.72	10.14

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	7658
Standardized WMW U-Stat	3.695
Mean (U)	2975
SD(U) - Adj ties	278
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1.1005E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:50:05 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	22	42
Number of Non-Detects	13	28
Number of Detects	9	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	21	6.1
Percent Non-detects	59.09%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	72	55
Mean of Detects	21.21	13.75
Median of Detects	12	8.7
SD of Detects	21.39	12.99
KM Mean	12.21	8.45
KM SD	14.94	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.081
TW Critical Value (0.05)	1.645
P-Value	0.14

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/12/2018 1:50:32 AM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	22	42
Number of Non-Detects	13	28
Number of Detect Data	9	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	21	6.1
Percent Non-detects	59.09%	66.67%
Minimum Detect	5.8	6.1
Maximum Detect	72	55
Mean of Detects	21.21	13.75
Median of Detects	12	8.7
SD of Detects	21.39	12.99
KM Mean	12.21	8.45
KM SD	14.94	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.979
Critical z (0.05)	1.645
P-Value	0.164

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/14/2018 2:57:47 PM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	35
Number of Non-Detects	2	2
Number of Detects	51	33
Minimum Non-Detect	0.19	0.12
Maximum Non-Detect	0.3	0.27
Percent Non-detects	3.77%	5.71%
Minimum Detect	0.17	0.13
Maximum Detect	110	3
Mean of Detects	16.24	0.693
Median of Detects	5	0.37
SD of Detects	24.82	0.737
KM Mean	15.63	0.662
KM SD	24.3	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.678
TW Critical Value (0.05)	1.645
P-Value	1.4482E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/14/2018 2:58:10 PM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	35
Number of Non-Detects	2	2
Number of Detect Data	51	33
Minimum Non-Detect	0.19	0.12
Maximum Non-Detect	0.3	0.27
Percent Non-detects	3.77%	5.71%
Minimum Detect	0.17	0.13
Maximum Detect	110	3
Mean of Detects	16.24	0.693
Median of Detects	5	0.37
SD of Detects	24.82	0.737
KM Mean	15.63	0.662
KM SD	24.3	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.896
Critical z (0.05)	1.645
P-Value	4.8786E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/14/2018 2:59:08 PM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	35
Number of Non-Detects	2	2
Number of Detects	51	33
Minimum Non-Detect	0.12	0.086
Maximum Non-Detect	0.13	0.17
Percent Non-detects	3.77%	5.71%
Minimum Detect	0.12	0.096
Maximum Detect	180	3.6
Mean of Detects	26.16	0.727
Median of Detects	10	0.43
SD of Detects	39.74	0.81
KM Mean	25.18	0.691
KM SD	38.92	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.9
TW Critical Value (0.05)	1.645
P-Value	4.8130E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/14/2018 2:59:26 PM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	35
Number of Non-Detects	2	2
Number of Detect Data	51	33
Minimum Non-Detect	0.12	0.086
Maximum Non-Detect	0.13	0.17
Percent Non-detects	3.77%	5.71%
Minimum Detect	0.12	0.096
Maximum Detect	180	3.6
Mean of Detects	26.16	0.727
Median of Detects	10	0.43
SD of Detects	39.74	0.81
KM Mean	25.18	0.691
KM SD	38.92	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.299
Critical z (0.05)	1.645
P-Value	8.5781E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/14/2018 3:18:01 PM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_teq mammals)

Sample 2 Data: Res(bkgd_teq mammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	35
Number of Non-Detects	2	2
Number of Detects	51	33
Minimum Non-Detect	0.12	0.086
Maximum Non-Detect	0.13	0.17
Percent Non-detects	3.77%	5.71%
Minimum Detect	0.12	0.096
Maximum Detect	180	3.6
Mean of Detects	26.16	0.727
Median of Detects	10	0.43
SD of Detects	39.74	0.81
KM Mean	25.18	0.691
KM SD	38.92	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.9
TW Critical Value (0.05)	1.645
P-Value	4.8130E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.13/14/2018 3:18:21 PM
From File	ProUCL_COPCSelect_TT_input_6ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(tamarisk thicket_teq mammals)

Sample 2 Data: Res(bkgd_teq mammals)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	53	35
Number of Non-Detects	2	2
Number of Detect Data	51	33
Minimum Non-Detect	0.12	0.086
Maximum Non-Detect	0.13	0.17
Percent Non-detects	3.77%	5.71%
Minimum Detect	0.12	0.096
Maximum Detect	180	3.6
Mean of Detects	26.16	0.727
Median of Detects	10	0.43
SD of Detects	39.74	0.81
KM Mean	25.18	0.691
KM SD	38.92	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.299
Critical z (0.05)	1.645
P-Value	8.5781E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 1:08:13 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_aluminum)

Sample 2 Data: Res(bkgd_aluminum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	82	55
Number of Non-Detects	0	0
Number of Detect Data	82	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	670	2600
Maximum Detect	20000	18000
Mean of Detects	7789	10445
Median of Detects	7200	10000
SD of Detects	4042	2908

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	4562
Standardized WMW U-Stat	-4.818
Mean (U)	2255
SD(U) - Adj ties	227.6
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(inside the compressor station_aluminum)

Background Data: Res(bkgd_aluminum)

Raw Statistics

	Site	Background
Number of Valid Data	82	55
Number of Non-Detect Data	0	0
Number of Detect Data	82	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	670	2600
Maximum Detected	20000	18000
Mean of Detected Data	7789	10445
Median of Detected Data	7200	10000
SD of Detected Data	4042	2908

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.04)	6
Approximate K Value (0.04)	6
Number of Site Observations in 'R' Largest	4
Calculated Alpha	0.0426

Conclusion with Alpha = 0.04

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:00:24 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	644	59
Number of Non-Detects	33	1
Number of Detects	611	58
Minimum Non-Detect	1	1
Maximum Non-Detect	2	1
Percent Non-detects	5.12%	1.69%
Minimum Detect	1.2	0.884
Maximum Detect	18	12
Mean of Detects	3.694	4.006
Median of Detects	3.5	3.5
SD of Detects	1.354	2.357
KM Mean	3.556	3.953
KM SD	1.445	2.351

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.425
TW Critical Value (0.05)	1.645
P-Value	0.335

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:08:54 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_arsenic)

Sample 2 Data: Res(bkgd_arsenic)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	644	59
Number of Non-Detects	33	1
Number of Detect Data	611	58
Minimum Non-Detect	1	1
Maximum Non-Detect	2	1
Percent Non-detects	5.12%	1.69%
Minimum Detect	1.2	0.884
Maximum Detect	18	12
Mean of Detects	3.694	4.006
Median of Detects	3.5	3.5
SD of Detects	1.354	2.357
KM Mean	3.556	3.953
KM SD	1.445	2.351

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.464
Critical z (0.05)	1.645
P-Value	0.679

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:01:18 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	644	60
Number of Non-Detects	1	0
Number of Detects	643	60
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.16%	0.00%
Minimum Detect	17	48.4
Maximum Detect	1100	660
Mean of Detects	134.9	164.6
Median of Detects	120	135
SD of Detects	88.17	109.9
KM Mean	134.7	164.6
KM SD	88.19	109.9

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-2.324
TW Critical Value (0.05)	1.645
P-Value	0.99

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:13:02 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_barium)

Sample 2 Data: Res(bkgd_barium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	644	60
Number of Non-Detects	1	0
Number of Detect Data	643	60
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.16%	0.00%
Minimum Detect	17	48.4
Maximum Detect	1100	660
Mean of Detects	134.9	164.6
Median of Detects	120	135
SD of Detects	88.17	109.9
KM Mean	134.7	164.6
KM SD	88.19	109.9

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-2.685
Critical z (0.05)	1.645
P-Value	0.996

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:02:13 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	644	55
Number of Non-Detects	609	54
Number of Detects	35	1
Minimum Non-Detect	0.1	1
Maximum Non-Detect	1.4	5
Percent Non-detects	94.57%	98.18%
Minimum Detect	0.23	1.1
Maximum Detect	10	1.1
Mean of Detects	1.937	1.1
Median of Detects	1.4	1.1
SD of Detects	1.883	N/A
KM Mean	0.262	1.002
KM SD	0.602	0.0141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.952
TW Critical Value (0.05)	1.645
P-Value	0.171

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:17:15 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_cadmium)

Sample 2 Data: Res(bkgd_cadmium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	644	55
Number of Non-Detects	609	54
Number of Detect Data	35	1
Minimum Non-Detect	0.1	1
Maximum Non-Detect	1.4	5
Percent Non-detects	94.57%	98.18%
Minimum Detect	0.23	1.1
Maximum Detect	10	1.1
Mean of Detects	1.937	1.1
Median of Detects	1.4	1.1
SD of Detects	1.883	N/A
KM Mean	0.262	1.002
KM SD	0.602	0.0141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.93
Critical z (0.05)	1.645
P-Value	0.176

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 12:02:04 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_calcium)

Sample 2 Data: Res(bkgd_calcium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	55
Number of Non-Detects	0	0
Number of Detect Data	95	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	6900	4100
Maximum Detect	310000	67000
Mean of Detects	34639	24293
Median of Detects	23000	20000
SD of Detects	45610	13273

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	7575
Standardized WMW U-Stat	1.569
Mean (U)	2613
SD(U) - Adj ties	256.2
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0583

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(inside the compressor station_calcium)

Background Data: Res(bkgd_calcium)

Raw Statistics

	Site	Background
Number of Valid Data	95	55
Number of Non-Detect Data	0	0
Number of Detect Data	95	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	6900	4100
Maximum Detected	310000	67000
Mean of Detected Data	34639	24293
Median of Detected Data	23000	20000
SD of Detected Data	45610	13273

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	11
Approximate K Value (0.043)	10
Number of Site Observations in 'R' Largest	8
Calculated Alpha	0.0426

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:02:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	665	70
Number of Non-Detects	348	67
Number of Detects	317	3
Minimum Non-Detect	0.16	0.05
Maximum Non-Detect	4.2	4.3
Percent Non-detects	52.33%	95.71%
Minimum Detect	0.21	0.504
Maximum Detect	170	0.83
Mean of Detects	4.211	0.68
Median of Detects	0.98	0.707
SD of Detects	12.61	0.165
KM Mean	2.098	0.0808
KM SD	8.925	0.139

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	4.952
TW Critical Value (0.05)	1.645
P-Value	3.6776E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:18:07 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_chromium, hexavalent)

Sample 2 Data: Res(bkgd_chromium, hexavalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	665	70
Number of Non-Detects	348	67
Number of Detect Data	317	3
Minimum Non-Detect	0.16	0.05
Maximum Non-Detect	4.2	4.3
Percent Non-detects	52.33%	95.71%
Minimum Detect	0.21	0.504
Maximum Detect	170	0.83
Mean of Detects	4.211	0.68
Median of Detects	0.98	0.707
SD of Detects	12.61	0.165
KM Mean	2.098	0.0808
KM SD	8.925	0.139

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	5.007
Critical z (0.05)	1.645
P-Value	2.7574E-7

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:03:44 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	690	70
Number of Non-Detects	1	0
Number of Detects	689	70
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.14%	0.00%
Minimum Detect	2.5	4.2
Maximum Detect	2100	53
Mean of Detects	60.94	22.35
Median of Detects	21	21.9
SD of Detects	170.5	8.814
KM Mean	60.85	22.35
KM SD	170.2	8.814

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.516
TW Critical Value (0.05)	1.645
P-Value	0.697

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:19:53 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_chromium, total)

Sample 2 Data: Res(bkgd_chromium, total)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	690	70
Number of Non-Detects	1	0
Number of Detect Data	689	70
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.14%	0.00%
Minimum Detect	2.5	4.2
Maximum Detect	2100	53
Mean of Detects	60.94	22.35
Median of Detects	21	21.9
SD of Detects	170.5	8.814
KM Mean	60.85	22.35
KM SD	170.2	8.814

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.02
Critical z (0.05)	1.645
P-Value	0.492

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:04:45 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	642	59
Number of Non-Detects	8	1
Number of Detects	634	58
Minimum Non-Detect	1	5.1
Maximum Non-Detect	5.1	5.1
Percent Non-detects	1.25%	1.69%
Minimum Detect	1.1	2.3
Maximum Detect	28	14
Mean of Detects	5.834	7.854
Median of Detects	5.5	7.605
SD of Detects	2.937	2.317
KM Mean	5.789	7.788
KM SD	2.947	2.336

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-7.51
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:20:31 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_cobalt)

Sample 2 Data: Res(bkgd_cobalt)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	642	59
Number of Non-Detects	8	1
Number of Detect Data	634	58
Minimum Non-Detect	1	5.1
Maximum Non-Detect	5.1	5.1
Percent Non-detects	1.25%	1.69%
Minimum Detect	1.1	2.3
Maximum Detect	28	14
Mean of Detects	5.834	7.854
Median of Detects	5.5	7.605
SD of Detects	2.937	2.317
KM Mean	5.789	7.788
KM SD	2.947	2.336

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-6.283
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:05:28 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	681	69
Number of Non-Detects	11	0
Number of Detects	670	69
Minimum Non-Detect	2	N/A
Maximum Non-Detect	4.1	N/A
Percent Non-detects	1.62%	0.00%
Minimum Detect	1.7	2.1
Maximum Detect	1500	18
Mean of Detects	25.85	10.32
Median of Detects	11	10
SD of Detects	85.76	3.255
KM Mean	25.47	10.32
KM SD	85.06	3.255

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.895
TW Critical Value (0.05)	1.645
P-Value	0.185

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:21:00 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_copper)

Sample 2 Data: Res(bkgd_copper)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	681	69
Number of Non-Detects	11	0
Number of Detect Data	670	69
Minimum Non-Detect	2	N/A
Maximum Non-Detect	4.1	N/A
Percent Non-detects	1.62%	0.00%
Minimum Detect	1.7	2.1
Maximum Detect	1500	18
Mean of Detects	25.85	10.32
Median of Detects	11	10
SD of Detects	85.76	3.255
KM Mean	25.47	10.32
KM SD	85.06	3.255

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.421
Critical z (0.05)	1.645
P-Value	0.0777

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 1:19:48 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_iron)

Sample 2 Data: Res(bkgd_iron)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	84	59
Number of Non-Detects	0	0
Number of Detect Data	84	59
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	2400	5570
Maximum Detect	38000	34000
Mean of Detects	14474	18444
Median of Detects	14000	18000
SD of Detects	6766	5375

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	4998
Standardized WMW U-Stat	-4.315
Mean (U)	2478
SD(U) - Adj ties	243.4
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(inside the compressor station_iron)

Background Data: Res(bkgd_iron)

Raw Statistics

	Site	Background
Number of Valid Data	84	59
Number of Non-Detect Data	0	0
Number of Detect Data	84	59
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	2400	5570
Maximum Detected	38000	34000
Mean of Detected Data	14474	18444
Median of Detected Data	14000	18000
SD of Detected Data	6766	5375

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.054)	9
Approximate K Value (0.054)	8
R Value Adjusted for Ties in Data	11
K Value Adjusted for Ties in Data	10
Number of Site Observations in 'R' Largest	6
Calculated Alpha	0.0552

Conclusion with Alpha = 0.054

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:06:03 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	654	60
Number of Non-Detects	7	1
Number of Detects	647	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	1.4	5.4
Percent Non-detects	1.07%	1.67%
Minimum Detect	1.1	1.9
Maximum Detect	1100	10
Mean of Detects	21.12	4.377
Median of Detects	5.6	3.5
SD of Detects	74.93	2.012
KM Mean	20.9	4.361
KM SD	74.5	1.986

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.342
TW Critical Value (0.05)	1.645
P-Value	4.1523E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:27:20 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_lead)

Sample 2 Data: Res(bkgd_lead)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	654	60
Number of Non-Detects	7	1
Number of Detect Data	647	59
Minimum Non-Detect	1	5.4
Maximum Non-Detect	1.4	5.4
Percent Non-detects	1.07%	1.67%
Minimum Detect	1.1	1.9
Maximum Detect	1100	10
Mean of Detects	21.12	4.377
Median of Detects	5.6	3.5
SD of Detects	74.93	2.012
KM Mean	20.9	4.361
KM SD	74.5	1.986

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.261
Critical z (0.05)	1.645
P-Value	1.0186E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 12:05:11 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_magnesium)

Sample 2 Data: Res(bkgd_magnesium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	81	55
Number of Non-Detects	0	0
Number of Detect Data	81	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	2600	2500
Maximum Detect	17000	13000
Mean of Detects	6356	7945
Median of Detects	5700	8100
SD of Detects	3233	2049

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	4446
Standardized WMW U-Stat	-4.894
Mean (U)	2228
SD(U) - Adj ties	225.5
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(inside the compressor station_magnesium)

Background Data: Res(bkgd_magnesium)

Raw Statistics

	Site	Background
Number of Valid Data	81	55
Number of Non-Detect Data	0	0
Number of Detect Data	81	55
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	2600	2500
Maximum Detected	17000	13000
Mean of Detected Data	6356	7945
Median of Detected Data	5700	8100
SD of Detected Data	3233	2049

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.04)	6
Approximate K Value (0.04)	6
R Value Adjusted for Ties in Data	7
K Value Adjusted for Ties in Data	7
Number of Site Observations in 'R' Largest	6
Calculated Alpha	0.0413

Conclusion with Alpha = 0.04

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2018 1:23:38 AM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_manganese)

Sample 2 Data: Res(bkgd_manganese)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	84	57
Number of Non-Detects	0	0
Number of Detect Data	84	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	64	140
Maximum Detect	520	450
Mean of Detects	213.1	279.5
Median of Detects	210	280
SD of Detects	78.53	61.51

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	4670
Standardized WMW U-Stat	-5.447
Mean (U)	2394
SD(U) - Adj ties	237.7
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(inside the compressor station_manganese)

Background Data: Res(bkgd_manganese)

Raw Statistics

	Site	Background
Number of Valid Data	84	57
Number of Non-Detect Data	0	0
Number of Detect Data	84	57
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	64	140
Maximum Detected	520	450
Mean of Detected Data	213.1	279.5
Median of Detected Data	210	280
SD of Detected Data	78.53	61.51

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.047)	6
Approximate K Value (0.047)	6
R Value Adjusted for Ties in Data	7
K Value Adjusted for Ties in Data	7
Number of Site Observations in 'R' Largest	2
Calculated Alpha	0.0415

Conclusion with Alpha = 0.047

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:06:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	654	60
Number of Non-Detects	501	49
Number of Detects	153	11
Minimum Non-Detect	0.27	1
Maximum Non-Detect	4.2	5.4
Percent Non-detects	76.61%	81.67%
Minimum Detect	0.57	0.383
Maximum Detect	1300	2.8
Mean of Detects	75.26	1.027
Median of Detects	3.8	1
SD of Detects	200.1	0.703
KM Mean	18.01	0.682
KM SD	101.5	0.433

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.793
TW Critical Value (0.05)	1.645
P-Value	0.0365

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:29:07 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_molybdenum)

Sample 2 Data: Res(bkgd_molybdenum)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	654	60
Number of Non-Detects	501	49
Number of Detect Data	153	11
Minimum Non-Detect	0.27	1
Maximum Non-Detect	4.2	5.4
Percent Non-detects	76.61%	81.67%
Minimum Detect	0.57	0.383
Maximum Detect	1300	2.8
Mean of Detects	75.26	1.027
Median of Detects	3.8	1
SD of Detects	200.1	0.703
KM Mean	18.01	0.682
KM SD	101.5	0.433

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.844
Critical z (0.05)	1.645
P-Value	0.0326

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:07:51 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	679	70
Number of Non-Detects	1	0
Number of Detects	678	70
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.15%	0.00%
Minimum Detect	1.7	2.6
Maximum Detect	210	31
Mean of Detects	13.36	15.42
Median of Detects	11	15
SD of Detects	11.34	5.975
KM Mean	13.34	15.42
KM SD	11.34	5.975

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-4.784
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:30:07 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_nickel)

Sample 2 Data: Res(bkgd_nickel)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	679	70
Number of Non-Detects	1	0
Number of Detect Data	678	70
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.15%	0.00%
Minimum Detect	1.7	2.6
Maximum Detect	210	31
Mean of Detects	13.36	15.42
Median of Detects	11	15
SD of Detects	11.34	5.975
KM Mean	13.34	15.42
KM SD	11.34	5.975

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-4.584
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:08:28 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	644	59
Number of Non-Detects	634	52
Number of Detects	10	7
Minimum Non-Detect	0.26	0.911
Maximum Non-Detect	1.4	5
Percent Non-detects	98.45%	88.14%
Minimum Detect	0.52	0.738
Maximum Detect	3	2.7
Mean of Detects	1.698	1.566
Median of Detects	1.3	1.6
SD of Detects	0.91	0.678
KM Mean	0.317	0.898
KM SD	0.24	0.348

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-4.579
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:30:49 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_selenium)

Sample 2 Data: Res(bkgd_selenium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	644	59
Number of Non-Detects	634	52
Number of Detect Data	10	7
Minimum Non-Detect	0.26	0.911
Maximum Non-Detect	1.4	5
Percent Non-detects	98.45%	88.14%
Minimum Detect	0.52	0.738
Maximum Detect	3	2.7
Mean of Detects	1.698	1.566
Median of Detects	1.3	1.6
SD of Detects	0.91	0.678
KM Mean	0.317	0.898
KM SD	0.24	0.348

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-4.1
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 12:10:32 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	55
Number of Non-Detects	1	4
Number of Detects	94	51
Minimum Non-Detect	10	240
Maximum Non-Detect	10	1100
Percent Non-detects	1.05%	7.27%
Minimum Detect	58	170
Maximum Detect	3400	4500
Mean of Detects	666.1	636.9
Median of Detects	450	280
SD of Detects	642.6	744.4
KM Mean	659.2	610.9
KM SD	639.3	717.3

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.165
TW Critical Value (0.05)	1.645
P-Value	0.122

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/9/2018 12:10:48 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_sodium)

Sample 2 Data: Res(bkgd_sodium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	95	55
Number of Non-Detects	1	4
Number of Detect Data	94	51
Minimum Non-Detect	10	240
Maximum Non-Detect	10	1100
Percent Non-detects	1.05%	7.27%
Minimum Detect	58	170
Maximum Detect	3400	4500
Mean of Detects	666.1	636.9
Median of Detects	450	280
SD of Detects	642.6	744.4
KM Mean	659.2	610.9
KM SD	639.3	717.3

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.228
Critical z (0.05)	1.645
P-Value	0.11

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Res(inside the compressor station_sodium)

Background Data: Res(bkgd_sodium)

Raw Statistics

	Site	Background
Number of Valid Data	95	55
Number of Non-Detect Data	1	4
Number of Detect Data	94	51
Minimum Non-Detect	10	240
Maximum Non-Detect	10	1100
Percent Non detects	1.05%	7.27%
Minimum Detected	58	170
Maximum Detected	3400	4500
Mean of Detected Data	666.1	636.9
Median of Detected Data	450	280
SD of Detected Data	642.6	744.4

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.043)	11
Approximate K Value (0.043)	10
R Value Adjusted for Ties in Data	15
K Value Adjusted for Ties in Data	14
Number of Site Observations in 'R' Largest	11
Calculated Alpha	0.0426

Conclusion with Alpha = 0.043

Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:09:06 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_vanadium)

Sample 2 Data: Res(bkgd_vanadium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	642	60
Number of Non-Detects	1	0
Number of Detects	641	60
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.16%	0.00%
Minimum Detect	4.4	9.4
Maximum Detect	82	59
Mean of Detects	25.36	34.05
Median of Detects	24	34.1
SD of Detects	10.78	8.997
KM Mean	25.32	34.05
KM SD	10.81	8.997

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-8.163
TW Critical Value (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:31:55 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_vanadium)

Sample 2 Data: Res(bkgd_vanadium)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	642	60
Number of Non-Detects	1	0
Number of Detect Data	641	60
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.16%	0.00%
Minimum Detect	4.4	9.4
Maximum Detect	82	59
Mean of Detects	25.36	34.05
Median of Detects	24	34.1
SD of Detects	10.78	8.997
KM Mean	25.32	34.05
KM SD	10.81	8.997

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-6.861
Critical z (0.05)	1.645
P-Value	1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:09:44 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	690	70
Number of Non-Detects	1	0
Number of Detects	689	70
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.14%	0.00%
Minimum Detect	3.4	8.4
Maximum Detect	1900	66.1
Mean of Detects	67.79	36.82
Median of Detects	34	35.5
SD of Detects	149.4	10.14
KM Mean	67.69	36.82
KM SD	149.2	10.14

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.782
TW Critical Value (0.05)	1.645
P-Value	0.963

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:33:01 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_zinc)

Sample 2 Data: Res(bkgd_zinc)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	690	70
Number of Non-Detects	1	0
Number of Detect Data	689	70
Minimum Non-Detect	1	N/A
Maximum Non-Detect	1	N/A
Percent Non-detects	0.14%	0.00%
Minimum Detect	3.4	8.4
Maximum Detect	1900	66.1
Mean of Detects	67.79	36.82
Median of Detects	34	35.5
SD of Detects	149.4	10.14
KM Mean	67.69	36.82
KM SD	149.2	10.14

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.297
Critical z (0.05)	1.645
P-Value	0.903

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:58:51 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	535	42
Number of Non-Detects	0	28
Number of Detects	535	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	34400	267.4
Mean of Detects	629.7	86.74
Median of Detects	22.8	46.9
SD of Detects	2997	82.16
KM Mean	629.7	28.91
KM SD	2997	61.33

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.786
TW Critical Value (0.05)	1.645
P-Value	5.771E-12

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:07:48 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_pah high molecular weight)

Sample 2 Data: Res(bkgd_pah high molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	535	42
Number of Non-Detects	0	28
Number of Detect Data	535	14
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	66.67%
Minimum Detect	0	5.1
Maximum Detect	34400	267.4
Mean of Detects	629.7	86.74
Median of Detects	22.8	46.9
SD of Detects	2997	82.16
KM Mean	629.7	28.91
KM SD	2997	61.33

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.445
Critical z (0.05)	1.645
P-Value	5.765E-11

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:59:54 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	537	42
Number of Non-Detects	0	36
Number of Detects	537	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	33000	37.6
Mean of Detects	135.2	18.9
Median of Detects	0	12.6
SD of Detects	1564	14.24
KM Mean	135.2	2.7
KM SD	1564	8.239

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	9.567
TW Critical Value (0.05)	1.645
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:08:22 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_pah low molecular weight)

Sample 2 Data: Res(bkgd_pah low molecular weight)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	537	42
Number of Non-Detects	0	36
Number of Detect Data	537	6
Minimum Non-Detect	N/A	0
Maximum Non-Detect	N/A	0
Percent Non-detects	0.00%	85.71%
Minimum Detect	0	6.9
Maximum Detect	33000	37.6
Mean of Detects	135.2	18.9
Median of Detects	0	12.6
SD of Detects	1564	14.24
KM Mean	135.2	2.7
KM SD	1564	8.239

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	8.338
Critical z (0.05)	1.645
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 4:10:25 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	534	42
Number of Non-Detects	248	28
Number of Detects	286	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	5800	6.1
Percent Non-detects	46.44%	66.67%
Minimum Detect	6.1	6.1
Maximum Detect	2900	55
Mean of Detects	145.2	13.75
Median of Detects	40	8.7
SD of Detects	394.3	12.99
KM Mean	82.06	8.45
KM SD	296.4	8.141

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	3.874
TW Critical Value (0.05)	1.645
P-Value	5.3484E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/17/2018 3:33:42 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_b(a)p equivalent)

Sample 2 Data: Res(bkgd_b(a)p equivalent)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	534	42
Number of Non-Detects	248	28
Number of Detect Data	286	14
Minimum Non-Detect	5.8	5.8
Maximum Non-Detect	5800	6.1
Percent Non-detects	46.44%	66.67%
Minimum Detect	6.1	6.1
Maximum Detect	2900	55
Mean of Detects	145.2	13.75
Median of Detects	40	8.7
SD of Detects	394.3	12.99
KM Mean	82.06	8.45
KM SD	296.4	8.141

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	4.57
Critical z (0.05)	1.645
P-Value	2.4429E-6

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 2:16:07 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	179	35
Number of Non-Detects	8	2
Number of Detects	171	33
Minimum Non-Detect	0.17	0.12
Maximum Non-Detect	21	0.27
Percent Non-detects	4.47%	5.71%
Minimum Detect	0.18	0.13
Maximum Detect	1500	3
Mean of Detects	50.93	0.693
Median of Detects	3.9	0.37
SD of Detects	166.5	0.737
KM Mean	48.69	0.662
KM SD	162.6	0.716

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	6.098
TW Critical Value (0.05)	1.645
P-Value	5.356E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:46:15 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_teq avian)

Sample 2 Data: Res(bkgd_teq avian)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	179	35
Number of Non-Detects	8	2
Number of Detect Data	171	33
Minimum Non-Detect	0.17	0.12
Maximum Non-Detect	21	0.27
Percent Non-detects	4.47%	5.71%
Minimum Detect	0.18	0.13
Maximum Detect	1500	3
Mean of Detects	50.93	0.693
Median of Detects	3.9	0.37
SD of Detects	166.5	0.737
KM Mean	48.69	0.662
KM SD	162.6	0.716

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.65
Critical z (0.05)	1.645
P-Value	1.467E-11

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 2:17:14 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	179	35
Number of Non-Detects	8	2
Number of Detects	171	33
Minimum Non-Detect	0.13	0.086
Maximum Non-Detect	16	0.17
Percent Non-detects	4.47%	5.71%
Minimum Detect	0.1	0.096
Maximum Detect	2200	3.6
Mean of Detects	77.56	0.727
Median of Detects	4.6	0.43
SD of Detects	263.7	0.81
KM Mean	74.12	0.691
KM SD	257.5	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.704
TW Critical Value (0.05)	1.645
P-Value	5.8526E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:45:13 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_teq human)

Sample 2 Data: Res(bkgd_teq human)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	179	35
Number of Non-Detects	8	2
Number of Detect Data	171	33
Minimum Non-Detect	0.13	0.086
Maximum Non-Detect	16	0.17
Percent Non-detects	4.47%	5.71%
Minimum Detect	0.1	0.096
Maximum Detect	2200	3.6
Mean of Detects	77.56	0.727
Median of Detects	4.6	0.43
SD of Detects	263.7	0.81
KM Mean	74.12	0.691
KM SD	257.5	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.36
Critical z (0.05)	1.645
P-Value	1.012E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2018 2:17:14 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_teq mammal)

Sample 2 Data: Res(bkgd_teq mammal)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	179	35
Number of Non-Detects	8	2
Number of Detects	171	33
Minimum Non-Detect	0.13	0.086
Maximum Non-Detect	16	0.17
Percent Non-detects	4.47%	5.71%
Minimum Detect	0.1	0.096
Maximum Detect	2200	3.6
Mean of Detects	77.56	0.727
Median of Detects	4.6	0.43
SD of Detects	263.7	0.81
KM Mean	74.12	0.691
KM SD	257.5	0.788

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	5.704
TW Critical Value (0.05)	1.645
P-Value	5.8526E-9

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.14/8/2018 11:45:13 PM
From File	ProUCL_COPCSelect_AllData_input_10ft.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Res(inside the compressor station_teq mammal)

Sample 2 Data: Res(bkgd_teq mammal)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	179	35
Number of Non-Detects	8	2
Number of Detect Data	171	33
Minimum Non-Detect	0.13	0.086
Maximum Non-Detect	16	0.17
Percent Non-detects	4.47%	5.71%
Minimum Detect	0.1	0.096
Maximum Detect	2200	3.6
Mean of Detects	77.56	0.727
Median of Detects	4.6	0.43
SD of Detects	263.7	0.81
KM Mean	74.12	0.691
KM SD	257.5	0.788

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	6.36
Critical z (0.05)	1.645
P-Value	1.012E-10

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

ATTACHMENT F

Background Screening Evaluation: R Sample Programs and Outputs for Quantile Tests and Test of Proportions

Quantile Test: Call Function

---

title: "Area of concern: Quantile Test"

output:

  html_notebook: default

  html_document:

    df_print: paged

  pdf_document: default

---

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

```{r}

if(!require("readxl")) { install.packages("readxl") }

```

Read in the scripts and data:

```{r}

setwd("//File Path")

source("quantile.test.r")

library(readxl)

data <- read_excel("Input File Name.xlsx")

#data <- read_excel("Input File Name.xlsx")

```

Extract the background and AOC data from the dataset:

```{r}

data <- data[!is.na(data$Res),]

data.bkgd <- data[which(data$ExposureArea == "Bkgd"),]

data.aoc <- data[which(data$ExposureArea != "Bkgd"),]
```

```

Calculate p-values for testing the null hypothesis (H~0~) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H~A~) is that the proportion of detects in the sampling area is greater than that of the background dataset.

```{r}

#Get a list of the analytes

analytes <- unique(data.aoc$AnalyteLC)

```

To use the Quantile Test:

```{r}

lapply(analytes, function(a) {

  #This function expects NDs to be coded as negative values, e.g., <6 or 6U becomes -6

  subdata <- data[data$AnalyteLC == a,]

  subdata[which(subdata$D_Res == 0), "Res"] <- -subdata[which(subdata$D_Res == 0),]$Res


#Split the background and site data

  bkgd <- subdata[which(subdata$ExposureArea == "Bkgd"),]

  aoc <- subdata[which(subdata$ExposureArea != "Bkgd"),]


# Prepend the analyte name and run the Quantile Test for 95th quantile (change as needed)

  c("analyte" = a, quantile.test(bkgd$Res, aoc$Res, 0.95))

})

```
```

Quantile Test Function

```
### R function for Quantile Test

quantile.test <-

 function(x, y, b1 = 0.8, test.format = T, warn = F, ddig = 4)

 {

  # Quantile Test (nonparametric) developed by Johnson et al (1987) Biometrics,43:641-655.

  # purpose: to detect changes (eg: increased contamination) in a small proportion (ie: above a given

  # quantile) of a population;

  # detects a "partial shift" in location or a mixture distribution (fraction of higher concentrations)

  # Proposed use as two sample test to see whether a site has attained a reference-based (background)

  # clean-up level was described in:

  # Gilbert & Simpson(1992), Statistical Methods for Evaluation of Cleanup Standards,

  # Vol 3, section 7, Prepared for U.S. EPA by Pacific Northwest Laboratory

  #

  # program input: x=background data, y=site data

  #       b1=tested quantile (default: b1=0.8, the 80th quantile); upper tail: use 0.5<=b<1.0

  #        when b1=0.5 this is the Median test described in Conover, 1980,

  #                    Practical Nonparametric Statistics. 2nd ed. Wiley, New York.

  #       test.format=T returns output in R htest format

  #                    =F returns p-value only

  #This code is set up as a one-sided test, ie:

  #Null hypothesis: site is not elevated (same as background), equal proportions above tested quantile

  #Alternative hypothesis: site is elevated, there is a statistically greater proportion above tested
quantile

  #

  # NOTE: assumes non-detects(censored data) are coded by negative values (eg: 6 U or <6 is coded as -
6)

  # program assumes all non-detects are in the lower 100*b1% of the combined data;

  # if not, program stops with error message; suggested: adjust b1 to a value larger,
```

```
  # ie: make b1>proportion of non-detects in combined data set
  # program assumes detection limits of all non-detects are small, in lower 100*b1% of data;
  # if not, program issues warning
  # suggested: for (only) the large non-detects, consider treating non-detects as detects at
0.5*detection limit
  # (eg: code <6 as 3 instead of -6)
  # programmed by Wendy Swanson of Neptune & Company, Inc
  # modifications made by Drew Stevens for RPS Group on January 21, 2018
  x <- x[!is.na(x)]
  #remove missing values
  y <- y[!is.na(y)]
  #remove missing values
  m <- length(x)
  n <- length(y)
  yx <- c(y, x)
  #combined data (site plus background)
  lo <- length(yx[yx < 0])
  #number of nondetects
  if((lo/(n + m + 1)) > b1) {
    return("TEST NOT VALID!! too many nondetects. Adjust argument b1 in function call.")
  }
  yx.rank <- rank(yx)/(m + n + 1)
  #adjusted ranks of the combined dataset for comparison to b1
  ind <- yx < 0 & rank(abs(yx))/(m + n + 1) > b1
  if(length(yx[ind]) >= 1)
    warning(paste("There were nondetects with detection limits (DL) above the ", b1 * 100, "th
combined sample quantile\n", sep = ""))
  w <- yx.rank > b1
  # indicates which adjusted ranks are larger than the tested quantile
```

```
  r <- length(yx.rank[w])
  # number of combined ranks larger than the tested quantile
  k <- length(yx.rank[1:n][w[1:n]])
  # number of site ranks larger than the tested quantile
  p.value <- sum(dhyper(k:r, n, m, r))
  if(test.format) {
   names(k) <- paste("No. of site samples [out of ", r, " above the ", b1 * 100, "th (combined sample) quantile]", sep = "")
   parameter <- c(b1, m, n, r, k)
   names(parameter) <- c("q", "m (n.bkg)", "n (n.site)", "r (n.above.q)", "k (n.site.above.q)")
   ret.val <- list(statistic = k, parameters = parameter, p.value = as.double(p.value), method = "Quantile test")
   attr(ret.val, "class") <- "htest"
   return(ret.val)
  }
  p.value = signif(p.value, digits = ddig)
  if(length(yx[ind]) >= 1 & warn)
   p.value = paste(p.value, "err.q", sep = ";")
  p.value
 }

quantile.pvalue <-
 function(no.bkgd, no.site, k, r = NA, quantil = 0.8)
 {
  # extra tool: used to understand properties of quantile test when adjusting input quantile upwards
  # quantile.pvalue inputs:
  # no.bkgd=number of samples from background or reference area
  # no.site=number of samples from the site being investigated
  # k=number of site samples that are in the largest samples (above the tested quantile)
```

```
  # r=number of samples above the quantile (helps define the tested quantile; small diff if "ties")
  # can input r or quantil to run test
  m <- no.bkgd
  n <- no.site
  if(is.na(r)) {
    r <- 1.:(m + n)
    r <- max(r[quantil <= (1. - (r/(m + n + 1.)))])
  }
  p.value <- as.double(sum(dhyper(k:r, n, m, r)))
  p.value
}
```

BCW: Quantile Test

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

```
Loading required package: readxl
```

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

To use the Quantile Test:

Code

```
There were nondetects with detection limits (DL) above the 95th combined sample quantile
There were nondetects with detection limits (DL) above the 95th combined sample quantile
```

```
[[1]]
[[1]]$analyte
[1] "Arsenic"

[[1]]$statistic
No. of site samples [out of 28 above the 95th (combined sample) quantile]
                                                                        22

[[1]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95               59.00             506.00              28.00
k (n.site.above.q)
             22.00

[[1]]$p.value
[1] 0.9807167

[[1]]$method
[1] "Quantile test"


[[2]]
[[2]]$analyte
[1] "B(a)P Equivalent"

[[2]]$statistic
No. of site samples [out of 20 above the 95th (combined sample) quantile]
                                                                        19

[[2]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95               42.00             370.00              20.00
k (n.site.above.q)
             19.00

[[2]]$p.value
[1] 0.3742592

[[2]]$method
[1] "Quantile test"


[[3]]
[[3]]$analyte
```

```
[1] "Barium"

[[3]]$statistic
No. of site samples [out of 27 above the 95th (combined sample) quantile]
                                                                      20

[[3]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00             519.00             27.00
k (n.site.above.q)
             20.00

[[3]]$p.value
[1] 0.9961908

[[3]]$method
[1] "Quantile test"


[[4]]
[[4]]$analyte
[1] "Copper"

[[4]]$statistic
No. of site samples [out of 27 above the 95th (combined sample) quantile]
                                                                      27

[[4]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              69.00             579.00             27.00
k (n.site.above.q)
             27.00

[[4]]$p.value
[1] 0.04476358

[[4]]$method
[1] "Quantile test"


[[5]]
[[5]]$analyte
[1] "Lead"

[[5]]$statistic
No. of site samples [out of 27 above the 95th (combined sample) quantile]
                                                                      27

[[5]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00             519.00             27.00
k (n.site.above.q)
             27.00

[[5]]$p.value
[1] 0.04849995

[[5]]$method
[1] "Quantile test"


[[6]]
[[6]]$analyte
[1] "Molybdenum"

[[6]]$statistic
No. of site samples [out of 28 above the 95th (combined sample) quantile]
                                                                      27

[[6]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00             519.00             28.00
k (n.site.above.q)
             27.00

[[6]]$p.value
```

```
[1] 0.1908368

[[6]]$method
[1] "Quantile test"


[[7]]
[[7]]$analyte
[1] "Nickel"

[[7]]$statistic
No. of site samples [out of 31 above the 95th (combined sample) quantile]
                                                                        26

[[7]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              70.00             579.00             31.00
k (n.site.above.q)
             26.00

[[7]]$p.value
[1] 0.8947068

[[7]]$method
[1] "Quantile test"


[[8]]
[[8]]$analyte
[1] "Vanadium"

[[8]]$statistic
No. of site samples [out of 28 above the 95th (combined sample) quantile]
                                                                        22

[[8]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00             519.00             28.00
k (n.site.above.q)
             22.00

[[8]]$p.value
[1] 0.9814181

[[8]]$method
[1] "Quantile test"
```

AOC 9: Quantile Test

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

To use the Quantile Test:

Code

```
[[1]]
[[1]]$analyte
[1] "Nickel"

[[1]]$statistic
No. of site samples [out of 8 above the 95th (combined sample) quantile]
                                                                       8

[[1]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95               70.00             105.00               8.00
k (n.site.above.q)
              8.00

[[1]]$p.value
[1] 0.0150328

[[1]]$method
[1] "Quantile test"
```

AOC 10: Quantile Test

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

```
Loading required package: readxl
```

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

To use the Quantile Test:

Code

```
[[1]]
[[1]]$analyte
[1] "Barium"

[[1]]$statistic
No. of site samples [out of 8 above the 95th (combined sample) quantile]
                                                                       4

[[1]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00             124.00               8.00
k (n.site.above.q)
              4.00

[[1]]$p.value
[1] 0.9238724

[[1]]$method
[1] "Quantile test"


[[2]]
[[2]]$analyte
[1] "Nickel"

[[2]]$statistic
No. of site samples [out of 12 above the 95th (combined sample) quantile]
                                                                        7

[[2]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              70.00             137.00              12.00
k (n.site.above.q)
              7.00

[[2]]$p.value
[1] 0.8190773

[[2]]$method
[1] "Quantile test"
```

AOC 11: Quantile Test

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

To use the Quantile Test:

Code

```
There were nondetects with detection limits (DL) above the 95th combined sample quantile
```

```
[[1]]
[[1]]$analyte
[1] "Barium"

[[1]]$statistic
No. of site samples [out of 10 above the 95th (combined sample) quantile]
                                                                        7

[[1]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00             159.00             10.00
k (n.site.above.q)
              7.00

[[1]]$p.value
[1] 0.7206374

[[1]]$method
[1] "Quantile test"


[[2]]
[[2]]$analyte
[1] "Chromium, total"

[[2]]$statistic
No. of site samples [out of 11 above the 95th (combined sample) quantile]
                                                                       11

[[2]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              70.00             159.00             11.00
k (n.site.above.q)
             11.00

[[2]]$p.value
[1] 0.01619826

[[2]]$method
[1] "Quantile test"


[[3]]
[[3]]$analyte
[1] "Copper"

[[3]]$statistic
```

```
No. of site samples [out of 11 above the 95th (combined sample) quantile]
                                                                      11

[[3]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95               69.00             159.00             11.00
k (n.site.above.q)
             11.00

[[3]]$p.value
[1] 0.0170156

[[3]]$method
[1] "Quantile test"


[[4]]
[[4]]$analyte
[1] "Molybdenum"

[[4]]$statistic
No. of site samples [out of 11 above the 95th (combined sample) quantile]
                                                                      10

[[4]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95               60.00             159.00             11.00
k (n.site.above.q)
             10.00

[[4]]$p.value
[1] 0.1453626

[[4]]$method
[1] "Quantile test"


[[5]]
[[5]]$analyte
[1] "Vanadium"

[[5]]$statistic
No. of site samples [out of 12 above the 95th (combined sample) quantile]
                                                                       4

[[5]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95               60.00             159.00             12.00
k (n.site.above.q)
              4.00

[[5]]$p.value
[1] 0.9994266

[[5]]$method
[1] "Quantile test"
```

AOC 14: Quantile Test

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

To use the Quantile Test:

Code

```
There were nondetects with detection limits (DL) above the 95th combined sample quantile
```

```
[[1]]
[[1]]$analyte
[1] "Chromium, total"

[[1]]$statistic
No. of site samples [out of 10 above the 95th (combined sample) quantile]
                                                                        7

[[1]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              70.00             136.00             10.00
k (n.site.above.q)
              7.00

[[1]]$p.value
[1] 0.5412071

[[1]]$method
[1] "Quantile test"


[[2]]
[[2]]$analyte
[1] "Copper"

[[2]]$statistic
No. of site samples [out of 10 above the 95th (combined sample) quantile]
                                                                       10

[[2]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              69.00             136.00             10.00
k (n.site.above.q)
             10.00

[[2]]$p.value
[1] 0.01470696

[[2]]$method
[1] "Quantile test"


[[3]]
[[3]]$analyte
[1] "Nickel"

[[3]]$statistic
```

```
No. of site samples [out of 8 above the 95th (combined sample) quantile]
                                                                        3

[[3]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95               70.00             136.00              8.00
k (n.site.above.q)
              3.00

[[3]]$p.value
[1] 0.9803665

[[3]]$method
[1] "Quantile test"


[[4]]
[[4]]$analyte
[1] "Zinc"

[[4]]$statistic
No. of site samples [out of 10 above the 95th (combined sample) quantile]
                                                                         9

[[4]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95               70.00             136.00             10.00
k (n.site.above.q)
              9.00

[[4]]$p.value
[1] 0.09111999

[[4]]$method
[1] "Quantile test"
```

OCS: Quantile Test

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

To use the Quantile Test:

Code

```
There were nondetects with detection limits (DL) above the 95th combined sample quantile
There were nondetects with detection limits (DL) above the 95th combined sample quantile
```

```
[[1]]
[[1]]$analyte
[1] "Arsenic"

[[1]]$statistic
No. of site samples [out of 62 above the 95th (combined sample) quantile]
                                                                        58

[[1]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              59.00            1206.00              62.00
k (n.site.above.q)
             58.00

[[1]]$p.value
[1] 0.8422657

[[1]]$method
[1] "Quantile test"


[[2]]
[[2]]$analyte
[1] "B(a)P Equivalent"

[[2]]$statistic
No. of site samples [out of 57 above the 95th (combined sample) quantile]
                                                                        57

[[2]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              42.00            1078.00              57.00
k (n.site.above.q)
             57.00

[[2]]$p.value
[1] 0.1068736

[[2]]$method
[1] "Quantile test"


[[3]]
[[3]]$analyte
[1] "Barium"
```

```
[[3]]$statistic
No. of site samples [out of 62 above the 95th (combined sample) quantile]
                                                                        57

[[3]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00            1219.00             62.00
k (n.site.above.q)
             57.00

[[3]]$p.value
[1] 0.9346626

[[3]]$method
[1] "Quantile test"


[[4]]
[[4]]$analyte
[1] "Cobalt"

[[4]]$statistic
No. of site samples [out of 65 above the 95th (combined sample) quantile]
                                                                        62

[[4]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              59.00            1205.00             65.00
k (n.site.above.q)
             62.00

[[4]]$p.value
[1] 0.639594

[[4]]$method
[1] "Quantile test"


[[5]]
[[5]]$analyte
[1] "Iron"

[[5]]$statistic
No. of site samples [out of 8 above the 95th (combined sample) quantile]
                                                                        5

[[5]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              59.00             126.00              8.00
k (n.site.above.q)
              5.00

[[5]]$p.value
[1] 0.7743987

[[5]]$method
[1] "Quantile test"


[[6]]
[[6]]$analyte
[1] "Lead"

[[6]]$statistic
No. of site samples [out of 65 above the 95th (combined sample) quantile]
                                                                        65

[[6]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00            1223.00             65.00
k (n.site.above.q)
             65.00

[[6]]$p.value
[1] 0.04094598
```

```
[[6]]$method
[1] "Quantile test"


[[7]]
[[7]]$analyte
[1] "Manganese"

[[7]]$statistic
No. of site samples [out of 8 above the 95th (combined sample) quantile]
                                                                       7

[[7]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              57.00             120.00               8.00
k (n.site.above.q)
              7.00

[[7]]$p.value
[1] 0.2079104

[[7]]$method
[1] "Quantile test"


[[8]]
[[8]]$analyte
[1] "Molybdenum"

[[8]]$statistic
No. of site samples [out of 63 above the 95th (combined sample) quantile]
                                                                      62

[[8]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00            1223.00              63.00
k (n.site.above.q)
             62.00

[[8]]$p.value
[1] 0.1927596

[[8]]$method
[1] "Quantile test"


[[9]]
[[9]]$analyte
[1] "Nickel"

[[9]]$statistic
No. of site samples [out of 68 above the 95th (combined sample) quantile]
                                                                      66

[[9]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              70.00            1331.00              68.00
k (n.site.above.q)
             66.00

[[9]]$p.value
[1] 0.3266776

[[9]]$method
[1] "Quantile test"


[[10]]
[[10]]$analyte
[1] "Vanadium"

[[10]]$statistic
No. of site samples [out of 64 above the 95th (combined sample) quantile]
                                                                      61

[[10]]$parameters
```

```
                q          m (n.bkg)         n (n.site)      r (n.above.q)
             0.95               60.00            1219.00              64.00
k (n.site.above.q)
            61.00

[[10]]$p.value
[1] 0.6470481

[[10]]$method
[1] "Quantile test"
```

ICS: Quantile Test

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

To use the Quantile Test:

Code

```
There were nondetects with detection limits (DL) above the 95th combined sample quantile
```

```
[[1]]
[[1]]$analyte
[1] "Arsenic"

[[1]]$statistic
No. of site samples [out of 33 above the 95th (combined sample) quantile]
                                                                        25

[[1]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              59.00             644.00              33.00
k (n.site.above.q)
             25.00

[[1]]$p.value
[1] 0.9991255

[[1]]$method
[1] "Quantile test"


[[2]]
[[2]]$analyte
[1] "Barium"

[[2]]$statistic
No. of site samples [out of 35 above the 95th (combined sample) quantile]
                                                                        28

[[2]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00             644.00              35.00
k (n.site.above.q)
             28.00

[[2]]$p.value
[1] 0.9934942

[[2]]$method
[1] "Quantile test"


[[3]]
[[3]]$analyte
[1] "Cadmium"

[[3]]$statistic
```

```
No. of site samples [out of 34 above the 95th (combined sample) quantile]
                                                                        33

[[3]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              55.00             644.00             34.00
k (n.site.above.q)
             33.00

[[3]]$p.value
[1] 0.2331754

[[3]]$method
[1] "Quantile test"


[[4]]
[[4]]$analyte
[1] "Chromium, total"

[[4]]$statistic
No. of site samples [out of 38 above the 95th (combined sample) quantile]
                                                                        38

[[4]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              70.00             690.00             38.00
k (n.site.above.q)
             38.00

[[4]]$p.value
[1] 0.02307431

[[4]]$method
[1] "Quantile test"


[[5]]
[[5]]$analyte
[1] "Cobalt"

[[5]]$statistic
No. of site samples [out of 32 above the 95th (combined sample) quantile]
                                                                        29

[[5]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              59.00             642.00             32.00
k (n.site.above.q)
             29.00

[[5]]$p.value
[1] 0.7209138

[[5]]$method
[1] "Quantile test"


[[6]]
[[6]]$analyte
[1] "Copper"

[[6]]$statistic
No. of site samples [out of 38 above the 95th (combined sample) quantile]
                                                                        38

[[6]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              69.00             681.00             38.00
k (n.site.above.q)
             38.00

[[6]]$p.value
[1] 0.02314794

[[6]]$method
```

```
[1] "Quantile test"


[[7]]
[[7]]$analyte
[1] "Nickel"

[[7]]$statistic
No. of site samples [out of 35 above the 95th (combined sample) quantile]
                                                                        34

[[7]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              70.00             679.00             35.00
k (n.site.above.q)
             34.00

[[7]]$p.value
[1] 0.1422068

[[7]]$method
[1] "Quantile test"


[[8]]
[[8]]$analyte
[1] "Vanadium"

[[8]]$statistic
No. of site samples [out of 33 above the 95th (combined sample) quantile]
                                                                        30

[[8]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              60.00             642.00             33.00
k (n.site.above.q)
             30.00

[[8]]$p.value
[1] 0.6908929

[[8]]$method
[1] "Quantile test"


[[9]]
[[9]]$analyte
[1] "Zinc"

[[9]]$statistic
No. of site samples [out of 38 above the 95th (combined sample) quantile]
                                                                        38

[[9]]$parameters
                 q          m (n.bkg)         n (n.site)      r (n.above.q)
              0.95              70.00             690.00             38.00
k (n.site.above.q)
             38.00

[[9]]$p.value
[1] 0.02307431

[[9]]$method
[1] "Quantile test"
```

Test of Proportions: Call Function

---

title: "Area of Concern: Test of Proportions"

output:

  html_notebook: default

  html_document:

    df_print: paged

  pdf_document: default

---

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

```{r}

if(!require("readxl")) { install.packages("readxl") }

```

Read in the scripts and data:

```{r}

setwd("//File Path ")

source("proportions.test.r")

library(readxl)

data <- read_excel("Input File Name.xlsx")

#data <- read_excel("Input File Name .xlsx")

```

Extract the background and AOC data from the dataset:

```{r}

data <- data[!is.na(data$Res),]

data.bkgd <- data[which(data$ExposureArea == "Bkgd"),]

data.aoc <- data[which(data$ExposureArea != "Bkgd"),]
```

```

Calculate p-values for testing the null hypothesis (H~0~) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H~A~) is that the proportion of detects in the sampling area is greater than that of the background dataset.

```{r}

#Get a list of the analytes

analytes <- unique(data.aoc$AnalyteLC)

```

```{r}

#For each analyte we will run the proportions test

lapply(analytes, function(a) {

  #Split the data into background and site

  aoc <- data.aoc[data.aoc$AnalyteLC==a,]

  bkgd <- data.bkgd[data.bkgd$AnalyteLC==a,]

 #Get sample count

  aoc.count <- length(aoc$D_Res)

  bkgd.count <- length(bkgd$D_Res)

  #Get detect count

  aoc.det <- sum(aoc$D_Res)

  bkgd.det <- sum(bkgd$D_Res)

#Calculate detect proportions

  aoc.prop <- aoc.det / aoc.count

  bkgd.prop <- bkgd.det / bkgd.count

  #Run the Test of Proportions

  c(analyte=a, proportions.test(bkgd.prop, bkgd.count, aoc.prop, aoc.count))

})

```
```

Test of Proportions Function

```
# Test of Proportions
# R Script Authored January 21, 2018 by Drew Stevens
# Property of RPS Group, Plc
#
# This calculates the p-value (alpha) for a one-sided upper tail test.
# Note: Assumes data is normally distributed
proportions.test <-
 # bkgd.prop: the proportion of detects in the background dataset
 # bkgd.n: the background dataset sample count
 # smpl.prop: the proportion of detects in the site dataset
 # smpl.n: the site dataset sample count
 function(bkgd.prop, bkgd.n, smpl.prop, smpl.n) {
  p <- (bkgd.prop * bkgd.n + smpl.prop * smpl.n) / (bkgd.n + smpl.n)
  se <- sqrt(p*(1 - p) * (1/bkgd.n + 1/smpl.n))
 z <- (bkgd.prop - smpl.prop)/se
 alpha <- 1-pnorm(z, lower.tail=FALSE)
 list(Z.val=z, alpha=alpha)
 }
```

BCW: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Cadmium"

[[1]]$Z.val
[1] -0.9492352

[[1]]$alpha
[1] 0.1712505


[[2]]
[[2]]$analyte
[1] "Selenium"

[[2]]$Z.val
[1] 5.483427

[[2]]$alpha
[1] 1
```

AOC 4: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Cadmium"

[[1]]$Z.val
[1] -1.432257

[[1]]$alpha
[1] 0.0760352
```

AOC 9: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Cadmium"

[[1]]$Z.val
[1] -1.444962

[[1]]$alpha
[1] 0.07423432


[[2]]
[[2]]$analyte
[1] "Molybdenum"

[[2]]$Z.val
[1] 1.226604

[[2]]$alpha
[1] 0.8900143
```

AOC 10: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Cadmium"

[[1]]$Z.val
[1] 0.5941304

[[1]]$alpha
[1] 0.7237876


[[2]]
[[2]]$analyte
[1] "Molybdenum"

[[2]]$Z.val
[1] -0.01095967

[[2]]$alpha
[1] 0.4956278


[[3]]
[[3]]$analyte
[1] "Selenium"

[[3]]$Z.val
[1] 2.627506

[[3]]$alpha
[1] 0.9956993
```

AOC 11: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Cadmium"

[[1]]$Z.val
[1] 0.7900915

[[1]]$alpha
[1] 0.7852628


[[2]]
[[2]]$analyte
[1] "Selenium"

[[2]]$Z.val
[1] 3.497296

[[2]]$alpha
[1] 0.999765
```

AOC 12: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Selenium"

[[1]]$Z.val
[1] 0.5084337

[[1]]$alpha
[1] 0.6944254
```

AOC 14: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "B(a)P Equivalent"

[[1]]$Z.val
[1] 1.247636

[[1]]$alpha
[1] 0.8939178


[[2]]
[[2]]$analyte
[1] "Cadmium"

[[2]]$Z.val
[1] -0.9308869

[[2]]$alpha
[1] 0.175956


[[3]]
[[3]]$analyte
[1] "Molybdenum"

[[3]]$Z.val
[1] 0.03814481

[[3]]$alpha
[1] 0.5152139


[[4]]
[[4]]$analyte
[1] "Selenium"

[[4]]$Z.val
[1] 2.31353

[[4]]$alpha
[1] 0.9896532
```

AOC 27: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Molybdenum"

[[1]]$Z.val
[1] 1.308933

[[1]]$alpha
[1] 0.9047215


[[2]]
[[2]]$analyte
[1] "Selenium"

[[2]]$Z.val
[1] 1.759791

[[2]]$alpha
[1] 0.9607784
```

OCS: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Cadmium"

[[1]]$Z.val
[1] -0.9682934

[[1]]$alpha
[1] 0.1664489


[[2]]
[[2]]$analyte
[1] "Selenium"

[[2]]$Z.val
[1] 5.839017

[[2]]$alpha
[1] 1
```

ERSA: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Selenium"

[[1]]$Z.val
[1] 0.1702869

[[1]]$alpha
[1] 0.5676078
```

Tamarisk Thicket: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

```
Loading required package: readxl
```

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Molybdenum"

[[1]]$Z.val
[1] 3.64566

[[1]]$alpha
[1] 0.9998666
```

ICS: Test of Proportions

Code

r = number of largest measurements among the N=2*m_rc combined reference-area and cleanup-unit measurements that must be examined

k = number of measurements from the cleanup unit that are among the r largest measurements

Packages used:

Code

Read in the scripts and data:

Code

Extract the background and AOC data from the dataset:

Code

Calculate p-values for testing the null hypothesis (H_0) that the proportion of detects in the sampling area is statistically less than or equal to that of the background dataset. The alternate hypothesis (H_A) is that the proportion of detects in the sampling area is greater than that of the background dataset.

Code

Code

```
[[1]]
[[1]]$analyte
[1] "Selenium"

[[1]]$Z.val
[1] 4.934994

[[1]]$alpha
[1] 0.9999996
```

Appendix WMS
Waste Material Samples Tables and Figures

Appendix WMS

Table

Table WMS-1	Analytical Data for Waste Material Samples

Figures

Figure WMS-1a	Waste Material Sampling Locations, Inside and Outside Compressor Station Exposure Area - ICS
Figure WMS-1b	Waste Material Sampling Locations, Inside and Outside Compressor Station Exposure Area - AOC 14
Figure WMS-1c	Waste Material Sampling Locations, Inside and Outside Compressor Station Exposure Area - AOC 27

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
Asbestos											
Asbestos	percent	--	--	--	--	--	--	--	--	--	--
Dioxins/Furans											
1,2,3,4,6,7,8-HpCDD	ng/kg	--	--	--	1900	--	--	240 UJ	1600 UJ	1100000 J	4600 J
1,2,3,4,6,7,8-HpCDF	ng/kg	--	--	--	9.2 U	--	--	19.0 UJ	470 UJ	110000 J	310 UJ
1,2,3,4,7,8,9-HpCDF	ng/kg	--	--	--	10.0 U	--	--	21.0 UJ	260 J	9600 J	350 UJ
1,2,3,4,7,8-HxCDD	ng/kg	--	--	--	7.8 U	--	--	19.0 UJ	240 UJ	3400 J	170 UJ
1,2,3,4,7,8-HxCDF	ng/kg	--	--	--	12.0 U	--	--	27.0 UJ	220 UJ	7600 J	320 UJ
1,2,3,6,7,8-HxCDD	ng/kg	--	--	--	7.8 U	--	--	26.0 UJ	240 UJ	45000 J	170 UJ
1,2,3,6,7,8-HxCDF	ng/kg	--	--	--	11.0 U	--	--	25.0 UJ	350 UJ	1800 UJ	300 UJ
1,2,3,7,8,9-HxCDD	ng/kg	--	--	--	7.5 U	--	--	25.0 UJ	230 UJ	5600 J	170 UJ
1,2,3,7,8,9-HxCDF	ng/kg	--	--	--	13.0 U	--	--	30.0 UJ	240 UJ	3600 J	360 UJ
1,2,3,7,8-PeCDD	ng/kg	--	--	--	16.0 U	--	--	42.0 UJ	440 UJ	1300 J	320 UJ
1,2,3,7,8-PeCDF	ng/kg	--	--	--	7.1 U	--	--	16.0 UJ	150 UJ	1600 J	95.0 UJ
2,3,4,6,7,8-HxCDF	ng/kg	--	--	--	12.0 U	--	--	120 J	440 UJ	700000 UJ	1200 UJ
2,3,4,7,8-PeCDF	ng/kg	--	--	--	7.3 U	--	--	16.0 UJ	170 UJ	3000 J	98.0 UJ
2,3,7,8-TCDD	ng/kg	--	--	--	4.8 U	--	--	18.0 UJ	180 UJ	140 UJ	120 UJ
2,3,7,8-TCDF	ng/kg	--	--	--	6.1 U	--	--	12.0 UJ	160 UJ	730 J	78.0 UJ
OCDD	ng/kg	--	--	--	20000	--	--	2200 UJ	22000 J	550000 J	43000 J
OCDF	ng/kg	--	--	--	340	--	--	73.0 UJ	1800 UJ	250000 J	2200 UJ
TEQ Avian	ng/kg	--	--	--	24.0	--	--	63.0	570	45000	450
TEQ Human	ng/kg	--	--	--	41.0	--	--	55.0	460	56000	440
TEQ Mammals	ng/kg	--	--	--	41.0	--	--	55.0	460	56000	440
General Chemistry											
pH	PHUNITS	--	--	--	--	--	--	--	--	7.1	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
Metals											
Antimony	mg/kg	--	--	--	--	2.1 U	2.2 U	--	--	23.0	--
Arsenic	mg/kg	--	--	--	--	1.9	21.0	--	--	38.0	--
Barium	mg/kg	--	--	--	--	280	170	--	--	640	--
Beryllium	mg/kg	--	--	--	--	1.1 U	1.1 U	--	--	1.1 U	--
Cadmium	mg/kg	--	--	--	--	1.1 U	2.6	--	--	1.1 U	--
Chromium, Hexavalent	mg/kg	--	--	--	--	0.21 U	3.9	--	--	7.7 J	--
Chromium, total	mg/kg	--	--	--	--	47.0	110	--	--	3800	--
Cobalt	mg/kg	--	--	--	--	2.6	5.0	--	--	3.4	--
Copper	mg/kg	--	--	--	--	44.0	470	--	--	140	--
Lead	mg/kg	--	--	--	--	110	170	--	--	62.0	--
Mercury	mg/kg	--	--	--	--	0.11 U	0.11 U	--	--	3.7	--
Molybdenum	mg/kg	--	--	--	--	1.1 U	2.8	--	--	16.0	--
Nickel	mg/kg	--	--	--	--	4.2	19.0	--	--	11.0	--
Selenium	mg/kg	--	--	--	--	1.1 UJ	1.1 UJ	--	--	1.1 U	--
Silver	mg/kg	--	--	--	--	1.1 U	1.1 U	--	--	1.1 U	--
Thallium	mg/kg	--	--	--	--	2.1 UJ	2.2 UJ	--	--	2.1 U	--
Vanadium	mg/kg	--	--	--	--	10.0	10.0	--	--	61.0	--
Zinc	mg/kg	--	--	--	--	73.0	720	--	--	1800	--
Organics											
1,2,4-Trichlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
1,2-Dichlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
1,3-Dichlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
1,4-Dichlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2,4,5-Trichlorophenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2,4,6-Trichlorophenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
2,4-Dichlorophenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
2,4-Dimethylphenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2,4-Dinitrophenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
2,4-Dinitrotoluene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2,6-Dinitrotoluene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2-Chloro naphthalene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2-Chlorophenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2-Methylphenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2-Nitroaniline	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
2-Nitrophenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
3,3-Dichlorobenzidene	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
3/4-Methylphenol	ug/kg	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
4,6-Dinitro-2-methylphenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
4-Bromophenyl phenyl ether	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
4-Chloro-3-methylphenol	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
4-Chloroaniline	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
4-Chlorophenyl phenyl ether	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
4-Methylphenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
4-Nitroaniline	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
4-Nitrophenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
Benzoic acid	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
Benzyl alcohol	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
bis (2-chloroethoxy) methane	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
bis (2-chloroethyl) ether	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
bis (2-chloroisopropyl) ether	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
bis (2-ethylhexyl) phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Butylbenzylphthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Carbazole	ug/kg	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Diethyl phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Dimethyl phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Di-n-butyl phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Di-n-octyl phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Hexachlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Hexachlorobutadiene	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
Hexachlorocyclopentadiene	ug/kg	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Isophorone	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Nitrobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
n-Nitroso-di-n-propylamine	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
N-nitrosodiphenylamine	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Pentachlorophenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
Phenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Polycyclic Aromatic Hydrocarbons											
1-Methyl naphthalene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	5.3 U	26.0 U
2-Methyl naphthalene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	5.7	26.0 U
Acenaphthene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	40.0	26.0 U
Acenaphthylene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	6.8	26.0 U
Anthracene	ug/kg	--	--	--	27.0 U	54.0 U	25.0	25.0 U	28.0 U	150	26.0 U
B(a)P Equivalent	ug/kg	2900 U	2900 U	140000 U	31.0	76.0	150	500	740	2600	30.0
Benzo (a) anthracene	ug/kg	--	--	--	27.0 U	160 J	200 J	540 J	410 J	2200	26.0 U

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
Benzo (a) pyrene	ug/kg	--	--	--	27.0 U	54.0 U	95.0	430 J	680 J	2000 J	26.0 U
Benzo (b) fluoranthene	ug/kg	--	--	--	27.0 U	54.0 U	280	25.0 U	28.0 U	2700 J	26.0 U
Benzo (ghi) perylene	ug/kg	--	--	--	37.0 J	54.0 U	22.0 J	38.0 J	55.0 J	940 J	26.0 U
Benzo (k) fluoranthene	ug/kg	--	--	--	27.0 U	54.0 U	87.0	25.0 U	28.0 U	1000 J	26.0 U
Chrysene	ug/kg	--	--	--	27.0 U	79.0 J	200	87.0 J	28.0 U	1700	26.0 U
Dibenzo (a,h) anthracene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	5.3 U	26.0 U
Fluoranthene	ug/kg	--	--	--	27.0 U	54.0 U	790	49.0 J	28.0 U	2600	26.0 U
Fluorene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	26.0	26.0 U
Indeno (1,2,3-cd) pyrene	ug/kg	--	--	--	27.0 U	54.0 U	25.0 J	25.0 U	28.0 U	980 J	26.0 U
Naphthalene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	8.5	26.0 U
PAH High molecular weight	ug/kg	--	--	--	37.0	303	2300	1460	1220	16800	--
PAH Low molecular weight	ug/kg	--	--	--	0.0	0.0	405	64.0	0.0	1130	--
Phenanthrene	ug/kg	--	--	--	27.0 U	54.0 U	380	64.0 J	28.0 U	890	47.0 J
Pyrene	ug/kg	--	--	--	27.0 U	64.0 J	600	320 J	77.0 J	2700	26.0 U
Polychorinated Biphenyls											
Aroclor 1016	ug/kg	--	--	--	18.0 UJ	18.0 U	18.0 U	17.0 UJ	18.0 UJ	18.0 UJ	17.0 U
Aroclor 1221	ug/kg	--	--	--	35.0 UJ	35.0 U	36.0 U	33.0 UJ	36.0 UJ	35.0 U	35.0 U
Aroclor 1232	ug/kg	--	--	--	18.0 UJ	18.0 U	18.0 U	17.0 UJ	18.0 UJ	18.0 U	17.0 U
Aroclor 1242	ug/kg	--	--	--	18.0 UJ	18.0 UJ	18.0 UJ	17.0 UJ	18.0 UJ	18.0 U	17.0 U
Aroclor 1248	ug/kg	--	--	--	18.0 UJ	18.0 U	18.0 U	17.0 UJ	18.0 UJ	18.0 U	17.0 U
Aroclor 1254	ug/kg	--	--	--	30.0 J	18.0 U	150	17.0 UJ	18.0 UJ	2800	59.0
Aroclor 1260	ug/kg	--	--	--	18.0 UJ	18.0 U	120	17.0 UJ	18.0 UJ	1200	17.0 U
Total PCBs	ug/kg	--	--	--		36.0 U	288	--	--	4020	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
Total Petroleum Hydrocarbons											
TPH as diesel	mg/kg	--	--	--	--	--	--	--	--	--	--
TPH as gasoline	mg/kg	--	--	--	--	--	--	--	--	--	--
TPH as motor oil	mg/kg	--	--	--	--	--	--	--	--	--	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
Asbestos									
Asbestos	percent	--	--	--	--	--	--	--	12
Dioxins/Furans									
1,2,3,4,6,7,8-HpCDD	ng/kg	520 UJ	--	--	130 SJ	--	--	--	2400 J
1,2,3,4,6,7,8-HpCDF	ng/kg	480 UJ	--	--	15.0 SJ	--	--	--	620 U
1,2,3,4,7,8,9-HpCDF	ng/kg	240 UJ	--	--	8.2 R	--	--	--	130 J
1,2,3,4,7,8-HxCDD	ng/kg	690 UJ	--	--	6.7 R	--	--	--	120 U
1,2,3,4,7,8-HxCDF	ng/kg	760 UJ	--	--	8.7 SJ	--	--	--	160 U
1,2,3,6,7,8-HxCDD	ng/kg	690 UJ	--	--	11.0 R	--	--	--	250 J
1,2,3,6,7,8-HxCDF	ng/kg	710 UJ	--	--	8.9 R	--	--	--	220 U
1,2,3,7,8,9-HxCDD	ng/kg	670 UJ	--	--	15.0 R	--	--	--	180 J
1,2,3,7,8,9-HxCDF	ng/kg	840 UJ	--	--	9.6 R	--	--	--	91.0 U
1,2,3,7,8-PeCDD	ng/kg	1200 UJ	--	--	12.0 R	--	--	--	260 U
1,2,3,7,8-PeCDF	ng/kg	790 UJ	--	--	15.0 R	--	--	--	230 J
2,3,4,6,7,8-HxCDF	ng/kg	770 UJ	--	--	14.0 R	--	--	--	1400 U
2,3,4,7,8-PeCDF	ng/kg	820 UJ	--	--	1.8 R	--	--	--	150 U
2,3,7,8-TCDD	ng/kg	520 UJ	--	--	3.2 R	--	--	--	90.0 U
2,3,7,8-TCDF	ng/kg	990 UJ	--	--	2.2 R	--	--	--	84.0 J
OCDD	ng/kg	5000 UJ	--	--	6300 SJ	--	--	--	18000
OCDF	ng/kg	1200 UJ	--	--	200 R	--	--	--	450 U
TEQ Avian	ng/kg	2000 U	--	--	15.0 SJR	--	--	--	480
TEQ Human	ng/kg	1300 U	--	--	16.0 SJR	--	--	--	390
TEQ Mammals	ng/kg	1300 U	--	--	16.0 SJR	--	--	--	390
General Chemistry									
pH	PHUNITS	--	5.8	--	--	--	--	--	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
Metals									
Antimony	mg/kg	--	78.0	--	2.0 U	2.9 U	1.1 J	0.43 J	--
Arsenic	mg/kg	--	12.0	--	5.6	4.6	2.6	4.3	--
Barium	mg/kg	--	96.0	--	52.0	220	72.2	154	--
Beryllium	mg/kg	--	1.1 U	--	1.0 U	1.4 U	0.89 U	0.19 J	--
Cadmium	mg/kg	--	1.1 U	--	1.0 U	1.4 U	0.89 U	0.83 U	--
Chromium, Hexavalent	mg/kg	--	4.1	--	0.20 U	0.79			--
Chromium, total	mg/kg	--	9700	--	75.0	64.0	72.7	28.7	--
Cobalt	mg/kg	--	1.1 U	--	4.9	14.0	5.9	8.4	--
Copper	mg/kg	--	2400	--	7.5	16.0	22.2	14.3	--
Lead	mg/kg	--	23.0	--	19.0	5.4	7.9	12.5	--
Mercury	mg/kg	--	0.47	--	0.10 U	0.14 U	0.046 J	0.092 J	--
Molybdenum	mg/kg	--	15.0	--	1.0 U	1.4 U	0.86 J	0.42 J	--
Nickel	mg/kg	--	1.2	--	21.0	39.0	47.0	21.0	--
Selenium	mg/kg	--	1.1 U	--	1.0 UJ	1.4 UJ	0.99 J	0.59 J	--
Silver	mg/kg	--	1.1 U	--	1.0 U	1.4 U	2.2 U	2.1 U	--
Thallium	mg/kg	--	2.5	--	2.1	2.9 UJ	22.0 U	21.0 U	--
Vanadium	mg/kg	--	7.6	--	9.4	48.0	39.2	36.4	--
Zinc	mg/kg	--	630	--	35.0	48.0	29.3 U	57.0	--
Organics									
1,2,4-Trichlorobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
1,2-Dichlorobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
1,3-Dichlorobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
1,4-Dichlorobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2,4,5-Trichlorophenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2,4,6-Trichlorophenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
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Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
2,4-Dichlorophenol	ug/kg	17000 UJ	--	--	17000 U	--	550 U	21000 U	--
2,4-Dimethylphenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2,4-Dinitrophenol	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
2,4-Dinitrotoluene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2,6-Dinitrotoluene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2-Chloro naphthalene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2-Chlorophenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2-Methylphenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2-Nitroaniline	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
2-Nitrophenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
3,3-Dichlorobenzidene	ug/kg	6700 UJ	--	--	67000 U	--	1100 U	21000 U	--
3/4-Methylphenol	ug/kg	--	--	--	--	--	550 U	21000 U	--
3-Nitroaniline	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
4,6-Dinitro-2-methylphenol	ug/kg	17000 UJ	--	--	170000 U	--	2800 U	100000 U	--
4-Bromophenyl phenyl ether	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
4-Chloro-3-methylphenol	ug/kg	6700 UJ	--	--	6700 U	--	1100 U	42000 U	--
4-Chloroaniline	ug/kg	6700 UJ	--	--	6700 U	--	1100 U	42000 U	--
4-Chlorophenyl phenyl ether	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
4-Methylphenol	ug/kg	3300 UJ	--	--	3400 U	--	--	--	
4-Nitroaniline	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
4-Nitrophenol	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
Benzoic acid	ug/kg	17000 UJ	--	--	17000 U	--	--	--	--
Benzyl alcohol	ug/kg	6700 UJ	--	--	6700 U	--	--	--	--
bis (2-chloroethoxy) methane	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
bis (2-chloroethyl) ether	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
bis (2-chloroisopropyl) ether	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
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Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
bis (2-ethylhexyl) phthalate	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Butylbenzylphthalate	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Carbazole	ug/kg	--	--	--	--	--	550 U	21000 U	--
Dibenzofuran	ug/kg	3300 UJ	--	--	130000	--	550 U	21000 U	--
Diethyl phthalate	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Dimethyl phthalate	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Di-n-butyl phthalate	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Di-n-octyl phthalate	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Hexachlorobenzene	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Hexachlorobutadiene	ug/kg	6700 UJ	--	--	6700 U	--	550 U	21000 U	--
Hexachlorocyclopentadiene	ug/kg	--	--	--	--	--	550 U	21000 U	--
Hexachloroethane	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Isophorone	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Nitrobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
n-Nitroso-di-n-propylamine	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
N-nitrosodiphenylamine	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Pentachlorophenol	ug/kg	17000 UJ	--	--	170000 U	--	2800 U	100000 U	--
Phenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Polycyclic Aromatic Hydrocarbons									
1-Methyl naphthalene	ug/kg	51.0 UJ	--	--	230 J	--	--	--	--
2-Methyl naphthalene	ug/kg	51.0 UJ	--	--	250 J	--	550 U	21000 U	--
Acenaphthene	ug/kg	51.0 UJ	--	--	43000	--	550 U	21000 U	--
Acenaphthylene	ug/kg	51.0 UJ	--	--	4800	--	550 U	21000 U	--
Anthracene	ug/kg	51.0 UJ	--	--	2700000	--	550 U	21000 U	--
B(a)P Equivalent	ug/kg	98.0	--	18.0	4700000	--	640 U	24000 U	--
Benzo (a) anthracene	ug/kg	400 J	--	--	6900000	--	550 U	21000 U	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
Benzo (a) pyrene	ug/kg	51.0 UJ	--	--	3000000	--	550 U	21000 U	--
Benzo (b) fluoranthene	ug/kg	51.0 UJ	--	--	6700000	--	550 U	21000 U	--
Benzo (ghi) perylene	ug/kg	51.0 UJ	--	--	990000	--	550 U	21000 U	--
Benzo (k) fluoranthene	ug/kg	51.0 UJ	--	--	2900000	--	550 U	21000 U	--
Chrysene	ug/kg	1900 J	--	--	6900000	--	550 U	21000 U	--
Dibenzo (a,h) anthracene	ug/kg	51.0 UJ	--	--	210000 J	--	550 U	21000 U	--
Fluoranthene	ug/kg	140 J	--	--	27000000	--	550 U	21000 U	--
Fluorene	ug/kg	51.0 UJ	--	--	37000	--	550 U	21000 U	--
Indeno (1,2,3-cd) pyrene	ug/kg	51.0 UJ	--	--	1000000	--	550 U	21000 U	--
Naphthalene	ug/kg	51.0 UJ	--	--	140 J	--	550 U	21000 U	--
PAH High molecular weight	ug/kg	3350	--	--	75600000	--	0.0	0.0	--
PAH Low molecular weight	ug/kg	130	--	--	23800000	--	0.0	0.0	--
Phenanthrene	ug/kg	130 J	--	--	21000000	--	550 U	21000 U	--
Pyrene	ug/kg	910 J	--	--	20000000	--	550 U	21000 U	--
Polychorinated Biphenyls									
Aroclor 1016	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1221	ug/kg	67.0 UJ	--	--	67.0 U	--	--	--	--
Aroclor 1232	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1242	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1248	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1254	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1260	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Total PCBs	ug/kg	66.0 U	--	--	68.0 U	--	--	--	--

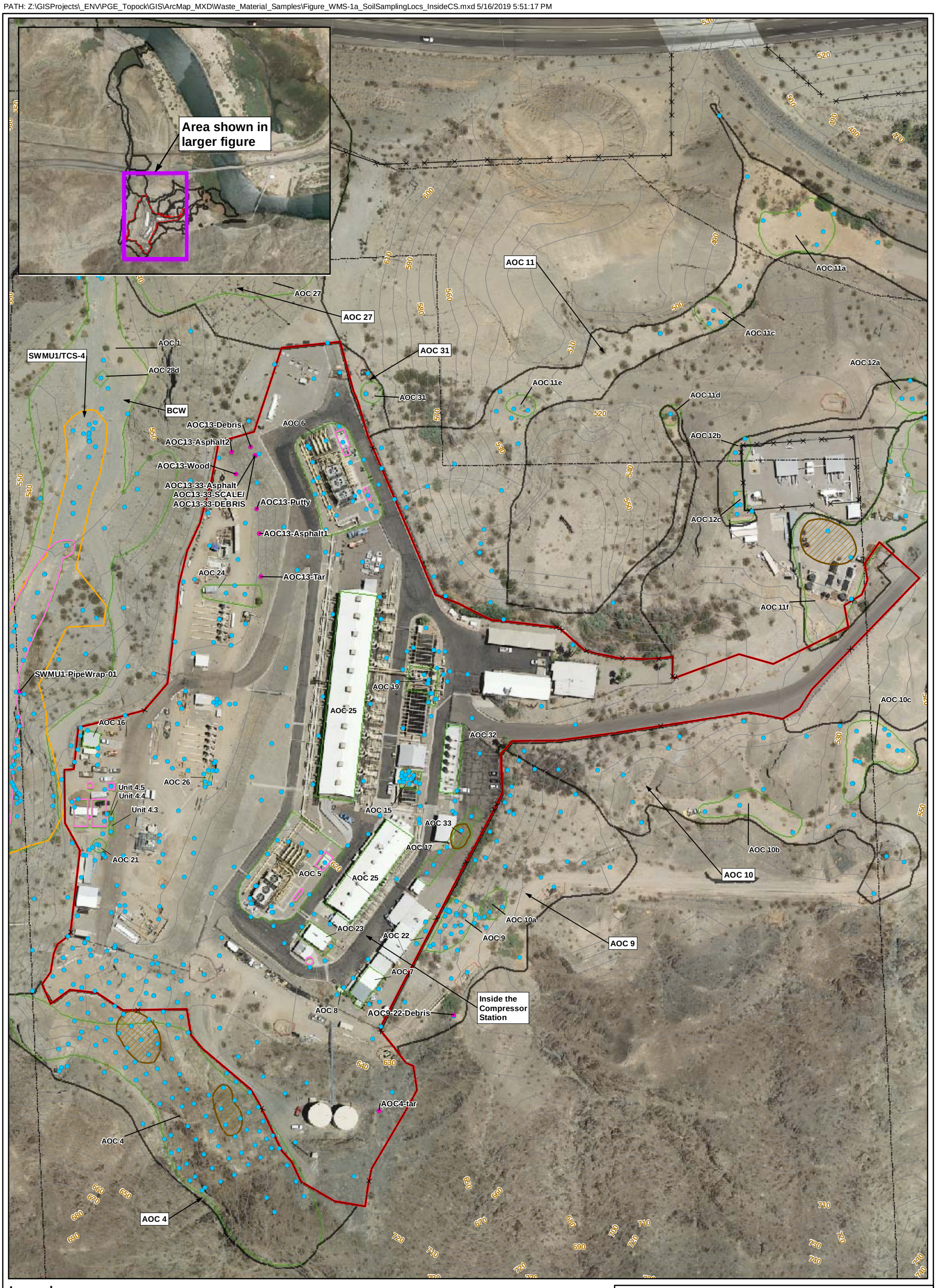
Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
Total Petroleum Hydrocarbons									
TPH as diesel	mg/kg	--	--	--	--	--	11.0 U	15000	--
TPH as gasoline	mg/kg	--	--	--	--	--	1.1 U	1.0 U	--
TPH as motor oil	mg/kg	--	--	--	--	--	2.0 J	17000	--

Notes:
-- = not applicable
% = percent
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
ug/kg = micrograms per kilogram
J = estimated value
U = not detected at specified reporting limit
UJ = not detected at specified reporting limit; reporting limit
AOC = area of concern
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyls
TPH = total petroleum hydrocarbons

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Legend:

- Soil Sampling Location
- Waste Material Sampling Location
- Area of Concern
- Exposure Area
- Solid Waste Management Unit
- SWMU1 Exposure Area
- Potential Burning Related Location
- Fencing
- Property Boundaries
- Contour Line (10 feet interval)
- Inside the Topock Compressor Station boundary, as defined by current fenceline
- AOC 4 — Label for Exposure Area
- AOC 4 — Label for Area of Concern

0 140 280

SCALE IN FEET

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

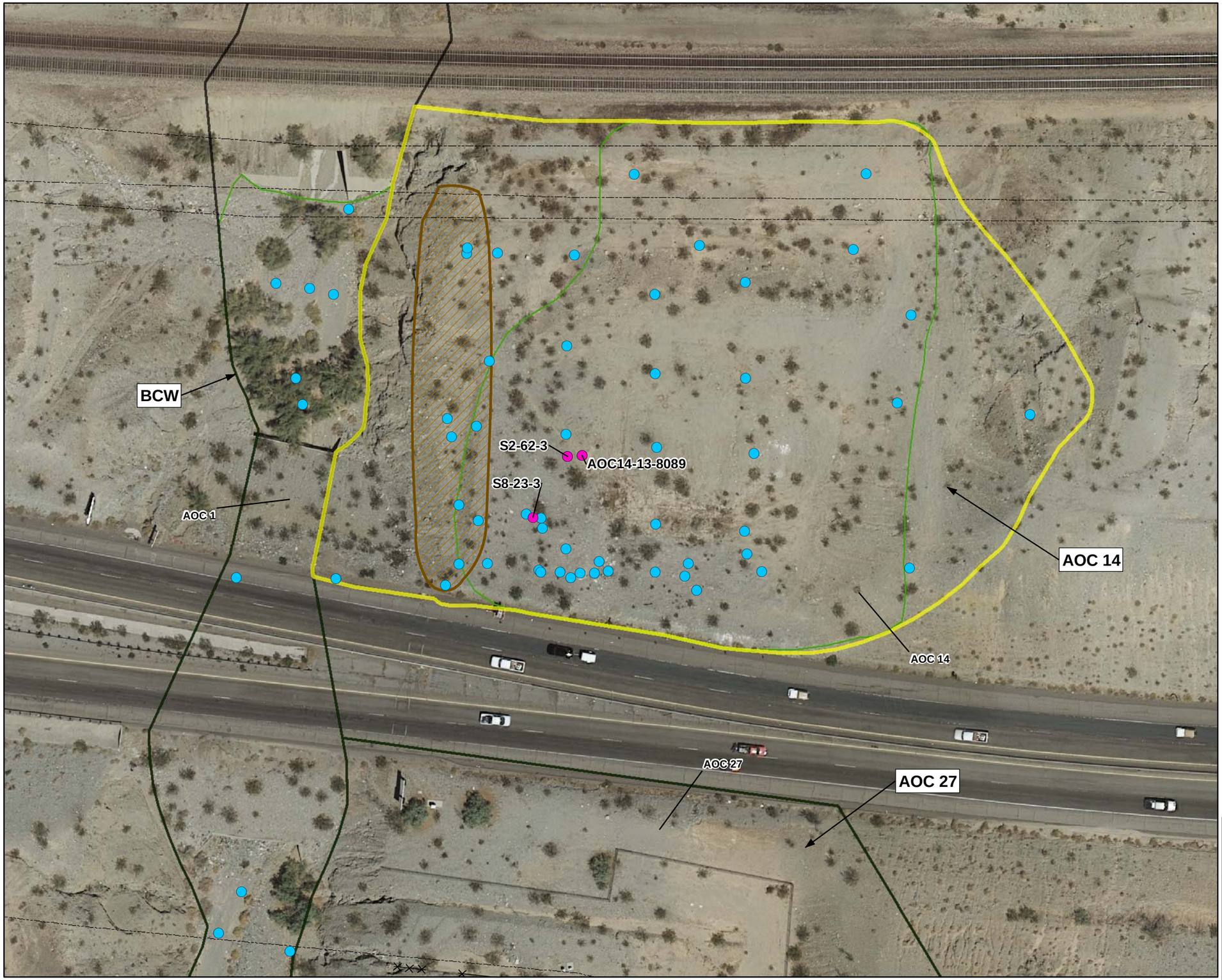
WASTE MATERIAL SAMPLING LOCATIONS INSIDE AND OUTSIDE THE COMPRESSOR STATION EXPOSURE AREA - ICS

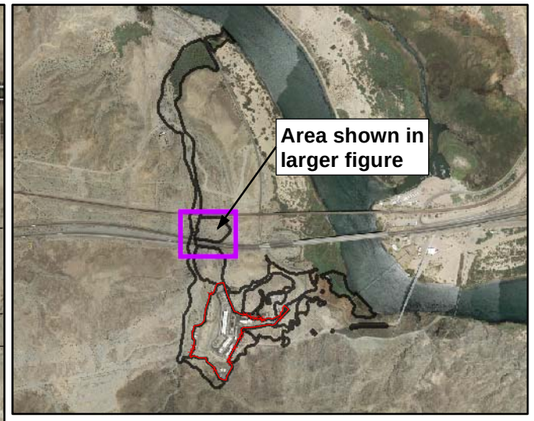
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FIGURE

WMS-1a

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Legend:

- Soil Sampling Location
- Waste Material Sampling Location
- Area of Concern
- Potential Burning Related Location
- AOC 14 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

0 60 120

SCALE IN FEET

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

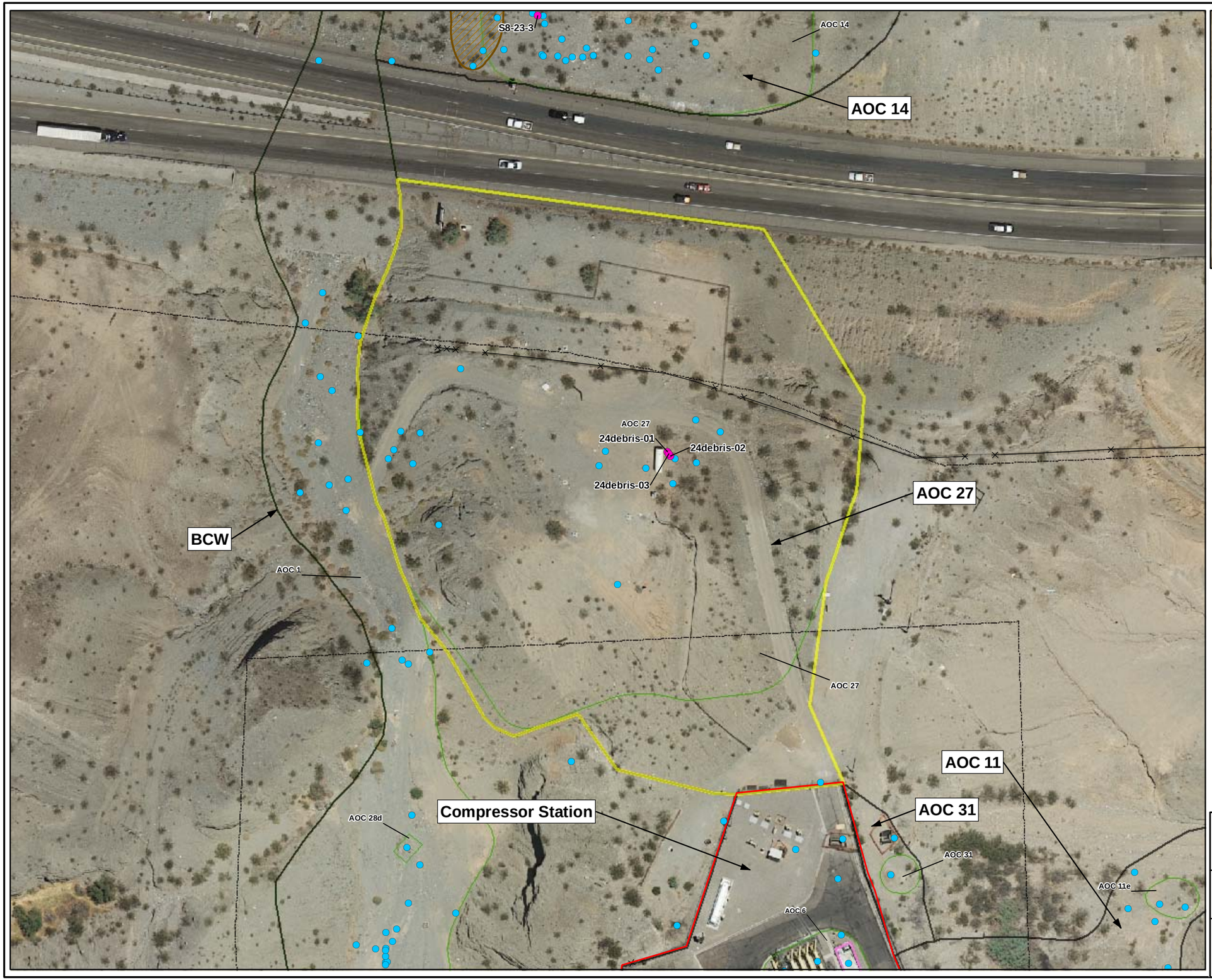
SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

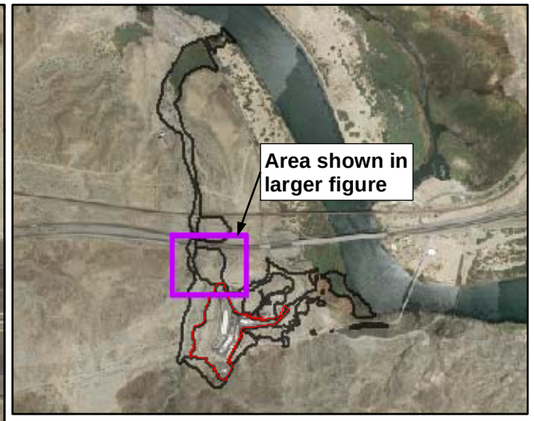
WASTE MATERIAL SAMPLING LOCATIONS INSIDE AND OUTSIDE THE COMPRESSOR STATION EXPOSURE AREA - AOC 14

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FIGURE
WMS-1b

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Legend:

- Soil Sampling Location
- Waste Material 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

0 80 160

SCALE IN FEET

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

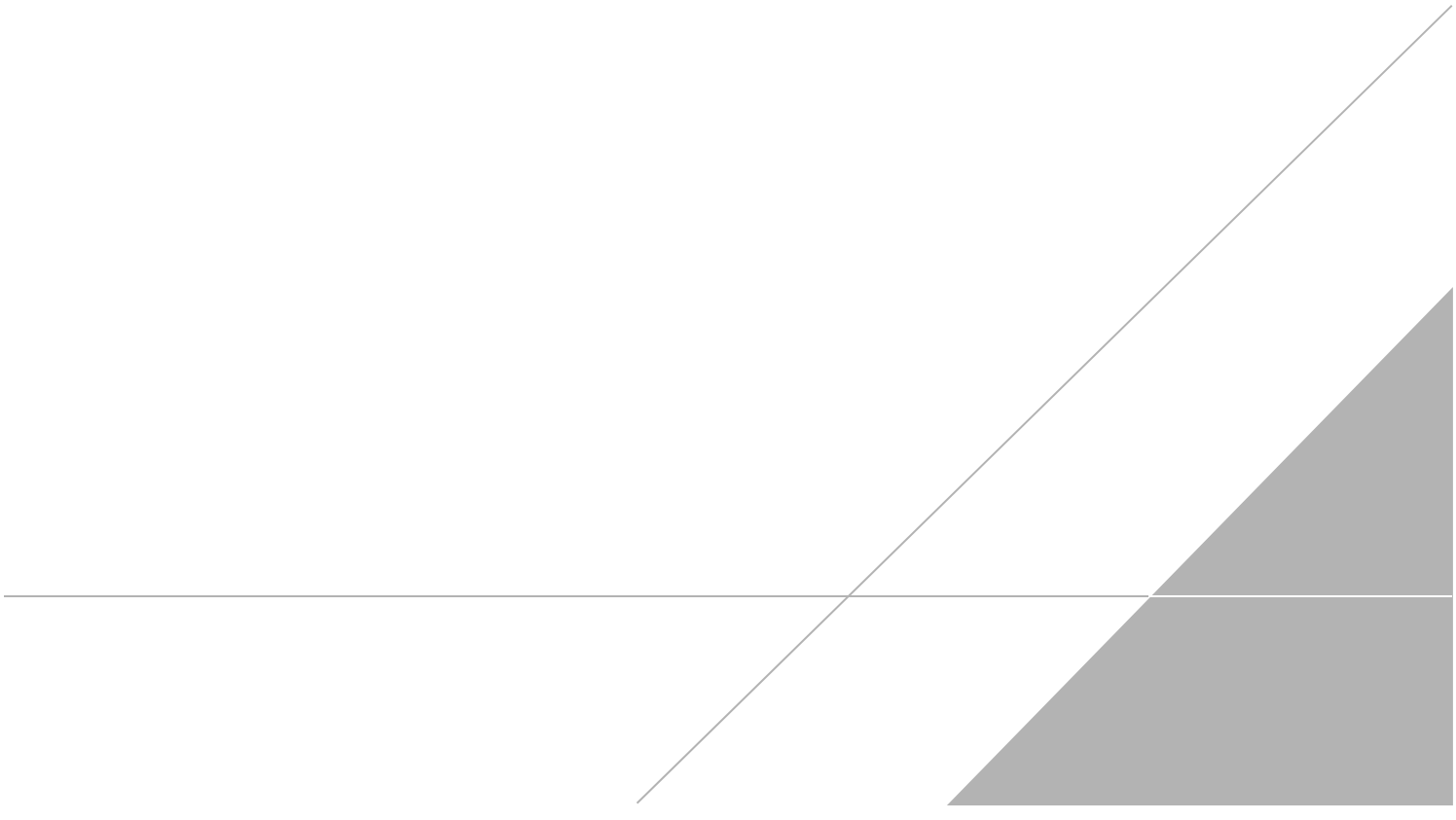
SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

WASTE MATERIAL SAMPLING LOCATIONS INSIDE AND OUTSIDE THE COMPRESSOR STATION EXPOSURE AREA - AOC 27

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FIGURE
WMS-1c

Appendix BCa
Example BCa bootstrap Output



Appendix BCa

Attachment BCa (provide separately as excel files)

Attachment BCa	Comparsion of ProUCL and R.xlsx
	Example of weighted BCa bootstrap calculations.xlsx

Appendix AM
Air Modeling for HHRA

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Pacific Gas and Electric Company

APPENDIX AM
AIR MODELING FOR HHRA

Topock Compressor Station
Needles, California

October 2019

APPENDIX AM
AIR MODELING FOR HHRA

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2 Vapor-Phase Transport from Soil Gas to Indoor Air for the ICS Potential Exposure Area 2-1
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AM-2 Johnson & Ettinger Model Input Data
AM-3 Soil Gas to Indoor Air Attenuation Factors
AM-4 Dispersion Factor Equations
AM-5 Volatilization Factor Equations
AM-6 Volatilization Factors for Volatile COPCs in Soil

ACRONYMS AND ABBREVIATIONS

µg/m^3	microgram per cubic meter
bgs	below ground surface
CalEPA	California Environmental Protection Agencycm^3 cubic centimeter
cm^2/s	square centimeter per second
COPC	constituent of potential concern
CSM	conceptual site model
DTSC	Department of Toxic Substances Control
ft	feet/foot
g/cm^3	grams per cubic centimeter
g/g	grams per gram
g/m^2-s	grams per square meter-second
HERO	Human and Ecological Risk Office
HHERA	human health and ecological risk assessment
HHRA	human health risk assessment
ICS	inside the compressor station
kg/m^3	kilogram per cubic meter
J&E	Johnson and Ettinger
m^3/kg	cubic meter per kilogram
main report	Soil Human Health and Ecological Risk Assessment Report
OCS	outside the compressor station
PG&E	Pacific Gas and Electric Companys seconds
TCS	Topock Compressor Station
TPH	total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
VF	volatilization factor
VOC	volatile organic compound

APPENDIX AM
AIR MODELING FOR HHRA

1 INTRODUCTION

This appendix presents information and calculations required to evaluate potential inhalation of volatile organic compounds (VOCs) by potential human receptors at the Topock Compressor Station (TCS), located in Needles, California (the site). This information is used in the Topock Soil Human Health and Ecological Risk Assessment (HHERA) in Section 5.3.3.6.2 for the Human Health Risk Assessment (HHRA) portion of the document.

The conceptual site model (CSM) for the TCS, includes the inhalation of vapor-phase chemicals in indoor and outdoor air as potentially complete exposure pathways to be quantitatively evaluated in the HHRA. These exposure pathways require the transport of constituents of potential concern (COPCs) from the impacted medium (soil or soil gas) to the exposure medium (indoor or outdoor air), where humans may be potentially exposed to the COPCs via the inhalation route. For the various exposure scenarios evaluated in the HHRA, two distinct transport pathways involve the movement of volatile COPCs from one medium to another:

1. Transport of vapor-phase COPCs from soil gas to indoor air in potential exposure areas inside the compressor station fenceline (ICS potential exposure area), where current and hypothetical future commercial worker populations may potentially be exposed
2. Transport of vapor-phase COPCs from soil to outdoor air in two locations: (a) the ICS potential exposure area, where current and hypothetical future onsite commercial worker and short- and long-term maintenance worker populations may potentially be exposed: and (b) from soil to outdoor air in potential exposure areas outside the compressor station fenceline (OCS potential exposure area), where long- and short-term maintenance workers, recreational users, tribal users, and hypothetical future residents may potentially be exposed.

This appendix describes the methodologies employed to model the transport of volatile chemicals from one medium to another for each of the transport pathways listed above.

The subsurface transport of vapor-phase COPCs is governed by soil and source properties, and by the physicochemical properties of the specific constituent. Constituent properties that influence vapor-phase transport include:

- Diffusivity in air
- Diffusivity in water
- Henry's Law constant
- Vapor pressure
- Solubility in water
- Organic carbon partitioning coefficient.

The values used to represent the physicochemical properties listed above and other additional values for each of the volatile COPCs in soil and soil gas, are documented in Table AM-1. Each value presented is identified with the reference source for that value.

2 VAPOR-PHASE TRANSPORT FROM SOIL GAS TO INDOOR AIR FOR THE ICS POTENTIAL EXPOSURE AREA

Volatile chemicals present in the subsurface beneath the ICS potential exposure area have the potential to migrate up through the soil column and into the indoor air space of buildings, where current and hypothetical future commercial worker populations may be potentially exposed via inhalation. This transport phenomenon is referred to as "vapor intrusion" and is discussed in Section 5.3.1.4 of the main report.

The transport of a volatile chemical from soil gas to indoor air is represented by the attenuation factor, or alpha (α) (Department of Toxic Substances Control [DTSC] 2011). By definition, the attenuation factor represents the ratio of the chemical concentration in indoor air (attributable to vapor intrusion) to the chemical concentration in soil gas beneath the building. Thus, the concentration of a volatile chemical in indoor air may be expressed as a function of the chemical concentration in soil gas and the attenuation factor:

$$C_{IA} = C_{SG} \times \alpha \qquad \text{(Eq. 1)}$$

where:

C_{IA} = chemical concentration in indoor air (micrograms per cubic meter [µg/m^3])

C_{SG} = chemical concentration in soil gas (µg/m^3)

α = attenuation factor (unitless).

To evaluate the vapor intrusion pathway for the COPCs in soil gas, COPC- and depth-specific, soil gas-to-indoor air attenuation factors were calculated using recommended approaches outlined by currently available California Environmental Protection Agency (CalEPA) DTSC guidance, specifically the Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (DTSC 2011), which included employing the use of the U.S. Environmental Protection Agency (USEPA)-recommended Johnson and Ettinger (J&E) Model for soil gas (SG-SCREEN Version 2.0), as modified by the DTSC (USEPA 2004, DTSC 2014). As recommended by DTSC (2011), soil gas, rather than soil data were used to evaluate the vapor intrusion pathway, because soil gas data represent a direct measurement of the volatile chemical that has the potential to migrate into indoor air.

Inputs to the J&E Model include: physicochemical properties of the COPCs, soil properties, building parameters, and depth of soil gas contamination. As discussed in Section 5.3.1.4 of the main report, potential vapor intrusion was evaluated for current and hypothetical future onsite commercial buildings, (i.e., chemical and depth-specific attenuation factors were calculated for commercial buildings).

Physicochemical properties of the COPCs in soil gas are presented in Table AM-1; this table also presents corrected (to soil temperature) Henry's Law constants and effective diffusivities of the COPCs, as calculated using the equations in the J&E Model.

Soil property values used in the J&E Model consist of average soil temperature, dry bulk density, total porosity, and water-filled porosity. Average soil temperature is based on the DTSC-recommended default value (24 degrees Celsius, DTSC 2014). Vadose zone soil properties for dry bulk density, total porosity,

and water-filled porosity were based on DTSC/Human and Ecological Risk Office (HERO) recommended default values (DTSC 2018).

Building parameters used in the calculation of chemical- and depth-specific attenuation factors consist of building dimensions (area [i.e., length and width] and height of enclosed space), and CalEPA default values for slab thickness (depth below grade to bottom of enclosed space floor), building air exchange rate, and volumetric soil vapor flow rate (DTSC 2014). The soil and building parameters values used as input data in the J&E Model are summarized in Table AM-2.

As indicated in Section 3.1.2 of the HHRA, the soil gas data evaluated in the HHRA consist of data from depths ranging from 2 to approximately 50 feet (ft) below ground surface (bgs). The soil gas to indoor air attenuation factors estimated from the J&E Model for the current and hypothetical future commercial worker scenario are presented in Table AM-3. Predicted indoor air concentrations for the COPCs in soil gas using the estimated attenuation factors are presented on a sample-by-sample basis in Appendix ICS, Table ICS-B1.5.

3 VAPOR-PHASE TRANSPORT FROM SITE SOIL TO SITE OUTDOOR AIR

The transport of volatile COPCs from soil to outdoor air is modeled as two distinct processes: the volatilization of chemicals from soil to the ground surface, and the dispersion of the chemicals from the ground surface into the ambient air. These two processes are accounted for using volatilization factors. The methodology for the development of soil-to-outdoor air volatilization factors is described further below.

The transport of volatile COPCs from soil into outdoor air is modeled using the approach recommended in the USEPA soil screening guidance (1996) for infinite sources:

$$VF = \frac{Q/C_{vol} \times (3.14 \times D_A \times T)^{\frac{1}{2}} \times 10^{-4}\ (m^2/cm^2)}{2 \times \rho_b \times D_A} \quad \text{(Eq. 2)}$$

where:

$$D_A = \frac{\left[\left(\theta_a^{10/3} \times D_i \times H'_{TS}\right) + \left(\theta_w^{10/3} \times D_w\right)\right]/\eta^2}{\rho_b K d + \theta_w \times \theta_a H'_{TS}} \quad \text{(Eq. 3)}$$

And where:

VF = volatilization factor (cubic meters per kilogram [m^3/kg])

Q/C_{vol} = dispersion factor (grams per square meter-second [g/m^2-s] per kilograms per cubic meter [kg/m^3])

D_A = apparent diffusivity (chemical-specific, square centimeters per second [cm^2/s])

T = exposure interval (based on exposure duration) (seconds [s])

ρ_b = dry soil bulk density (grams per cubic meter [g/cm^3])

η = total soil porosity (cubic centimeters [cm^3] $_{pore}/cm^3_{soil}$)

θ_a = air-filled soil porosity (cm^3_{air}/cm^3_{soil} - calculated, η-θ_w)

D_i = diffusivity in air (chemical-specific, cm^2/s)

θ_w = water-filled soil porosity (cm^3_{water}/cm^3_{soil})

D_w = diffusivity in water (chemical-specific, cm^2/s)

K_d = soil-water partition coefficient (chemical specific, g/cm^3)

H'_{TS} = Henry's Law Constant (chemical-specific at a specific temperature, unitless).

where:

$$K_d = K_{oc} \times f_{oc} \quad \text{(Eq. 4)}$$

And where:

K_{oc} = soil organic carbon partition coefficient (chemical-specific, g/cm^3)

f_{oc} = fraction organic carbon in soil (grams per gram [g/g]).

The dispersion factor $[(Q/C)_{vol}]$ represents the reciprocal of the ratio of the annual-average geometric mean air concentration at the center of a square source area to the emission flux from that source area. The dispersion factor is estimated as recommended in the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002) as a function of the source area and of empirical coefficients which are based on air dispersion modeling for specific climate zones. Calculation of the site-specific dispersion factor is documented in Table AM-4. The dispersion factor estimated for a source area of 0.5 acre is 83.09 g/m^2-s per kg/m^3 (Table AM-4), and this value for Q/C_{vol} was used to calculate the constituent-specific VFs. Constituent-specific physicochemical properties and default soil properties for vadose zone soil are used in calculating the VFs with the assumption of infinite source. The constituent-specific physicochemical properties for the volatile COPCs in soil are presented in Table AM-1. The default soil properties for vadose zone soil are presented in Table AM-5 as part of a sample VF calculation for total petroleum hydrocarbon as diesel (TPH as diesel) for short-term maintenance workers. Table AM-6 presents the scenario-specific calculated VFs for all volatile COPCs in site soil used in the HHRA evaluation.

4 REFERENCES

DTSC. 2011. Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance).

DTSC. 2014. Johnson and Ettinger SG-SCREEN Model, USEPA Version 2.0, dated April 2003, as modified by DTSC/Office of Human and Ecological Risk (HERO). December.

DTSC. 2018. Human and Ecological Risk Office (HERO) Human Health Risk Assessment (HHRA) Note Number 3. DTSC-modified Screening Levels (DTSC-SLs). June.

USEPA. 1996. Soil Screening Guidance: User's Guide. Office of Solid Waste and Emergency Response. Washington, D.C. EPA/540/R-96/018. July.

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. Washington, D.C. OSWER/9355.4 24. December.

USEPA. 2004. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Response Washington, D.C. February 22.

TABLES

Table AM-1
Chemical Properties for Volatile COPCs in Soil and Soil Gas

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

COPC	Diffusivity in air, D_a (cm^2/s)		Diffusivity in water, D_w (cm^2/s)		Henry's Law Constant at Reference Temperature (25° C), H ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Reference Temperature (25° C), H' (unitless)		Enthalpy of Vaporization at the Normal Boiling Point, $DH_{v,b}$ (cal/mol)		Normal Boiling Point, T_B (K)		Critical Temperature, T_C (K)		Enthalpy of Vaporization at Average Soil Temperature, $DH_{v,TS}$ (cal/mol)		Henry's Law Constant at Average Soil Temperature, H_{TS} ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Average Soil Temperature, H'_{TS} (unitless)		Vadose Zone Effective Diffusion Coefficient, $D_{eff,v}$ (cm^2/s)		Organic Carbon Partition Coefficient, K_{oc} (cm^3/g)		Pure Component Water Solubility, S (mg/L)		Vapor Pressure, VP (mmHg)	
Volatile Organic Compounds																														
1,1-Dichloroethene	8.6E-02	1	1.1E-05	1	2.6E-02	1	1.1E+00	1	6.2E+03	1	3.0E+02	1	5.8E+02	1	6.3E+03	J&E	6.6E-03	J&E	2.7E-01	J&E	6.7E-03	J&E	3.2E+01	1	2.4E+03	1	5.0E+02	1
1,3-Dichlorobenzene	5.6E-02	1	8.8E-06	1	2.2E-03	1	8.9E-02	1	9.2E+03	1	4.5E+02	1	6.8E+02	1	1.1E+04	J&E	9.4E-05	J&E	3.9E-03	J&E	4.4E-03	J&E	3.8E+02	1	1.2E+02	1	2.3E+00	4
Acetone	1.1E-01	1	1.2E-05	1	3.5E-05	1	1.4E-03	1	7.0E+03	1	3.3E+02	1	5.1E+02	1	7.4E+03	J&E	2.7E-06	J&E	1.1E-04	J&E	9.3E-03	J&E	2.4E+00	1	1.0E+06	1	4.6E+02	1
Benzene	9.0E-02	1	1.0E-05	1	5.6E-03	1	2.3E-01	1	7.3E+03	1	3.5E+02	1	5.6E+02	1	8.0E+03	J&E	3.3E-04	J&E	1.3E-02	J&E	7.0E-03	J&E	1.5E+02	1	1.8E+03	1	9.7E+01	1
Bromomethane	1.0E-01	1	1.4E-05	1	7.3E-03	1	3.0E-01	1	5.7E+03	1	2.8E+02	1	4.7E+02	1	5.5E+03	J&E	8.9E-04	J&E	3.6E-02	J&E	7.8E-03	J&E	1.3E+01	1	1.5E+04	1	8.9E+02	1
Carbon disulfide	1.1E-01	1	1.3E-05	1	1.4E-02	1	5.9E-01	1	6.4E+03	1	3.2E+02	1	5.5E+02	1	6.6E+03	J&E	1.1E-03	J&E	4.5E-02	J&E	8.3E-03	J&E	2.2E+01	1	2.2E+03	1	3.1E+02	1
Carbon tetrachloride	5.7E-02	1	9.8E-06	1	2.8E-02	1	1.1E+00	1	7.1E+03	1	3.5E+02	1	5.6E+02	1	7.7E+03	J&E	1.3E-03	J&E	5.4E-02	J&E	4.5E-03	J&E	4.4E+01	1	7.9E+02	1	1.1E+02	1
Chloro methane	1.2E-01	1	1.4E-05	1	8.8E-03	1	3.6E-01	1	5.1E+03	1	2.5E+02	1	4.2E+02	1	4.6E+03	J&E	1.4E-03	J&E	5.9E-02	J&E	9.7E-03	J&E	1.3E+01	1	5.3E+03	1	7.1E+02	1
Chloroform	7.7E-02	1	1.1E-05	1	3.7E-03	1	1.5E-01	1	7.0E+03	1	3.3E+02	1	5.4E+02	1	7.4E+03	J&E	1.8E-04	J&E	7.2E-03	J&E	6.0E-03	J&E	3.2E+01	1	8.0E+03	1	1.9E+02	1
Ethyl-benzene	6.8E-02	1	8.5E-06	1	7.9E-03	1	3.2E-01	1	8.5E+03	1	4.1E+02	1	6.2E+02	1	1.0E+04	J&E	9.5E-05	J&E	3.9E-03	J&E	5.4E-03	J&E	4.5E+02	1	1.7E+02	1	9.5E+00	1
Isophorone [a]	5.3E-02	2	7.5E-06	2	6.6E-06	2	2.7E-04	2	NA		NA		NA		NA		6.6E-06	J&E	2.7E-04	J&E	4.4E-03	J&E	6.5E+01	2	1.2E+04	2	4.4E-01	2
Methyl acetate	9.6E-02	1	1.1E-05	1	1.2E-04	1	4.7E-03	1	7.3E+03	1	3.3E+02	1	5.1E+02	1	7.7E+03	J&E	2.8E-06	J&E	1.1E-04	J&E	8.4E-03	J&E	3.1E+00	1	2.4E+05	1	2.9E+02	1
Methyl ethyl ketone	9.1E-02	1	1.0E-05	1	5.7E-05	1	2.3E-03	1	7.5E+03	1	3.5E+02	1	5.4E+02	1	8.2E+03	J&E	1.1E-06	J&E	4.3E-05	J&E	9.4E-03	J&E	4.5E+00	1	2.2E+05	1	1.3E+02	1
Methylene chloride	1.0E-01	1	1.3E-05	1	3.3E-03	1	1.3E-01	1	6.7E+03	1	3.1E+02	1	5.1E+02	1	6.9E+03	J&E	1.1E-04	J&E	4.4E-03	J&E	7.8E-03	J&E	2.2E+01	1	1.3E+04	1	3.8E+02	1
Tetrachloroethene	5.0E-02	1	9.5E-06	1	1.8E-02	1	7.2E-01	1	8.3E+03	1	3.9E+02	1	6.2E+02	1	9.4E+03	J&E	1.1E-04	J&E	4.6E-03	J&E	4.0E-03	J&E	9.5E+01	1	2.1E+02	1	1.7E+01	1
Toluene	7.8E-02	1	9.2E-06	1	6.6E-03	1	2.7E-01	1	7.9E+03	1	3.8E+02	1	5.9E+02	1	9.0E+03	J&E	5.0E-05	J&E	2.1E-03	J&E	6.1E-03	J&E	2.3E+02	1	5.3E+02	1	2.9E+01	1
Trichloroethene	6.9E-02	1	1.0E-05	1	9.9E-03	1	4.0E-01	1	7.5E+03	1	3.6E+02	1	5.4E+02	1	8.4E+03	J&E	9.8E-05	J&E	4.0E-03	J&E	5.4E-03	J&E	6.1E+01	1	1.3E+03	1	7.3E+01	1
Xylenes, total	6.9E-02	2	8.5E-06	2	6.6E-03	2	2.7E-01	2	8.7E+03	1	4.2E+02	1	6.3E+02	1	1.0E+04	J&E	2.1E-05	J&E	8.7E-04	J&E	5.4E-03	J&E	3.8E+02	2	1.1E+02	2	8.0E+00	2
Polycyclic Aromatic Hydrocarbons																														
1-Methyl naphthalene	5.3E-02	2	7.8E-06	2	5.1E-04	2	2.1E-02	2	NA		5.2E+02	3	NA		NA		5.1E-04	J&E	2.1E-02	J&E	4.1E-03	J&E	2.5E+03	2	2.6E+01	2	6.7E-02	2
2-Methyl naphthalene	5.2E-02	1	7.8E-06	1	5.2E-04	1	2.1E-02	1	1.3E+04	1	5.1E+02	1	7.6E+02	1	1.6E+04	J&E	1.2E-08	J&E	4.9E-07	J&E	1.6E-01	J&E	2.5E+03	1	2.5E+01	1	6.8E-02	1
Acenaphthene	5.1E-02	1	8.3E-06	1	1.8E-04	1	7.5E-03	1	1.2E+04	1	5.5E+02	1	8.0E+02	1	1.6E+04	J&E	4.6E-09	J&E	1.9E-07	J&E	4.4E-01	J&E	5.0E+03	1	3.9E+00	1	3.5E-03	1
Anthracene	3.9E-02	2	7.9E-06	2	5.6E-05	2	2.3E-03	2	NA		6.1E+02	3	NA		NA		5.6E-05	J&E	2.3E-03	J&E	3.1E-03	J&E	1.6E+04	2	4.3E-02	2	6.5E-06	2
Benzo (a) anthracene	2.6E-02	2	6.7E-06	2	1.2E-05	2	4.9E-04	2	NA		7.1E+02	3	NA		NA		1.2E-05	J&E	4.9E-04	J&E	2.2E-03	J&E	1.8E+05	2	9.4E-03	2	2.1E-07	2
Fluorene	4.4E-02	1	7.9E-06	1	9.6E-05	1	3.9E-03	1	1.3E+04	1	5.7E+02	1	8.7E+02	1	1.6E+04	J&E	2.2E-09	J&E	8.9E-08	J&E	8.7E-01	J&E	9.2E+03	1	1.7E+00	1	7.4E-04	1
Naphthalene	6.0E-02	1	8.4E-06	1	4.4E-04	1	1.8E-02	1	1.0E+04	1	4.9E+02	1	7.5E+02	1	1.3E+04	J&E	9.1E-08	J&E	3.7E-06	J&E	2.7E-02	J&E	1.5E+03	1	3.1E+01	1	8.1E-02	1
Pyrene	2.8E-02	1	7.2E-06	1	1.2E-05	1	4.9E-04	1	1.4E+04	1	6.7E+02	1	9.4E+02	1	2.1E+04	J&E	1.4E-11	J&E	5.8E-10	J&E	1.2E+02	J&E	5.4E+04	1	1.4E-01	1	6.0E-06	1
Pesticides																														
4,4-DDE	4.1E-02	1	4.8E-06	1	4.2E-05	1	1.7E-03	1	1.5E+04	1	6.4E+02	1	8.6E+02	1	2.2E+04	J&E	2.0E-11	J&E	8.2E-10	J&E	5.7E+01	J&E	1.2E+05	1	4.0E-02	1	4.0E-06	1
Polychlorinated Biphenyls																														
Total PCBs	2.4E-02	2	6.3E-06	2	4.2E-04	2	1.7E-02	2	NA		NA		NA		NA		4.2E-04	J&E	1.7E-02	J&E	1.9E-03	J&E	7.8E+04	2	7.0E-01	2	4.9E-04	2
Total Petroleum Hydrocarbons																														
TPH as diesel	7.0E-02	4	1.0E-05	4	7.8E-01	4	3.2E+01	4	NA		NA		NA		NA		7.8E-01	J&E	3.2E+01	J&E	5.5E-03	J&E	5.0E+03	4	5.0E+00	4	5.0E-01	4
Dioxins/Furans																														
TEQ Human	4.7E-02	2	6.8E-06	2	5.0E-05	2	2.0E-03	2	NA		NA		NA		NA		5.0E-05	J&E	2.1E-03	J&E	3.7E-03	J&E	2.5E+05	2	2.0E-04	2	1.5E-09	2

Notes:
[a] Although isophorone is listed under volatile organic compounds, the chemical properties for isophorone do not meet the USEPA criteria to be evaluated as a volatile for purposes of the HHRA.
J&E Calculated using Johnson and Ettinger model (DSTC 2014).

Abbreviations:
NA = Chemical property not applicable.

Sources:

1. Department of Toxic Substances Control (DTSC). 2014. Human and Ecological Risk Division (HERD). Johnson and Ettinger screening-level soil gas model contained in Excel spreadsheet "HERD_Soil_Gas_Screening_Model_March2014.xls". Updated December.
2. United States Environmental Protection Agency (USEPA). 2017. Regional Screening Levels (RSLs). November. Available at: https://www.epa.gov/risk/regional-screening-levels-rsls.
3. SRC PhysProp Database. 2002. Found at http://esc.syrres.com/interkow/physdemo.htm and methods from Schwarzenback R. P. et al. 1993. Environmental Organic Chemistry. John Wiley and Sons, Inc., New York, NY.
4. California Regional Water Quality Control Board, San Francisco Bay Region (SFRWQCB). 2016. Environmental Screening Levels. Table IP-1. Physical-Chemical Values. February. Available at: http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/esl.shtml.

References:

DTSC. 2014. Johnson and Ettinger SG-SCREEN Model, EPA Version 2.0, dated April 2003, as modified by DTSC/Office of Human and Ecological Risk (HERO). December.
United States Environmental Protection Agency (USEPA). 2018. Regional Screening Levels (RSLs) - User's Guide (May 2018). Available at: https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide.

Table AM-2
Johnson & Ettinger Model Input Data

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

Parameter	Symbol	Commercial	Units	Reference
Building Properties				
Depth below grade to bottom of enclosed space floor	L_F	15	cm	DTSC/HERO default (DTSC 2014)
Building ventilation rate[a]	Q_b	6.8E+04	cm^3/s	Calculated: $A_{b,sg}$ x AXR_b x H
Area of enclosed space below grade[b]	$A_{b,sg}$	1.0E+06	cm^2	DTSC/HERO default (DTSC 2014)
Building air exchange rate[b]	AXR_b	1.0	hr^{-1}	DTSC/HERO default (DTSC 2014)
Building height[b]	H	244	cm	DTSC/HERO default (DTSC 2014)
Vapor flow rate into building	Q_{soil}	5	L/min	DTSC/HERO default (DTSC 2014)
Soil Properties				
Average soil temperature	T_s	24.0	°C	DTSC/HERO default (DTSC 2014)
Dry bulk density	ρ_b	1.50	g/cm^3	DTSC/HERO default (DTSC 2018)
Total porosity	η	0.430	cm^3/cm^3	DTSC/HERO default (DTSC 2018)
Water-filled porosity	θ_w	0.150	cm^3/cm^3	DTSC/HERO default (DTSC 2018)

Notes:

[a] Building ventilation rate is provided as input to the Johnson & Ettinger model in the 'Intermediate Calculations Sheet.' All other input parameters are provided as input in the 'Data Entry Sheet.'

[b] Area of enclosed space below grade, building exchange rate, and building height are not provided as input to the Johnson & Ettinger model. These parameters are used to calculate building ventilation rate, which is provided as input to the Johnson & Ettinger model.

References:

Department of Toxic Substances Control (DTSC). 2014. Johnson and Ettinger SG-SCREEN Model, EPA Version 2.0, dated April 2003, as modified by DTSC/Office of Human and Ecological Risk (HERO). December.

DTSC. 2018. Human and Ecological Risk Office (HERO) Human Health Risk Assessment (HHRA) Note Number 3. DTSC-modified Screening Levels (DTSC-SLs). June.

Table AM-3
Soil Gas to Indoor Air Attenuation Factors

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

COPC	Depth-Specific Attenuation Factor [a]			
	2 ft bgs	5 ft bgs	24 ft bgs	49 ft bgs
Volatile Organic Compounds				
1,1-Dichloroethene	7.8E-04	4.6E-04	1.2E-04	6.4E-05
1,3-Dichlorobenzene	6.5E-04	3.4E-04	8.3E-05	4.2E-05
Methyl ethyl ketone	8.0E-04	4.7E-04	1.3E-04	6.8E-05
Acetone	8.4E-04	5.2E-04	1.5E-04	7.8E-05
Benzene	7.9E-04	4.7E-04	1.3E-04	6.6E-05
Carbon disulfide	8.4E-04	5.2E-04	1.5E-04	7.8E-05
Carbon tetrachloride	6.6E-04	3.4E-04	8.5E-05	4.3E-05
Chloroform	7.5E-04	4.2E-04	1.1E-04	5.7E-05
Chloro methane	8.8E-04	5.6E-04	1.7E-04	8.9E-05
Ethyl-benzene	7.2E-04	3.9E-04	1.0E-04	5.1E-05
m,p-Xylenes	7.2E-04	3.9E-04	1.0E-04	5.1E-05
Methylene chloride	8.2E-04	5.0E-04	1.4E-04	7.3E-05
o-Xylene	7.2E-04	3.9E-04	1.0E-04	5.1E-05
Tetrachloroethene	6.2E-04	3.1E-04	7.6E-05	3.8E-05
Toluene	7.5E-04	4.3E-04	1.1E-04	5.8E-05
Trichloroethene	7.2E-04	3.9E-04	1.0E-04	5.1E-05

Notes:

[a] By definition, the attenuation factor (α) is the ratio of the chemical concentration in indoor air to the chemical concentration in soil gas beneath the building:

$\alpha = C_{IA} / C_{SG}$

where C_{IA} is the chemical concentration in indoor air and C_{SG} is the chemical concentration in soil gas. Attenuation factors at depth are calculated with the USEPA-recommended Johnson & Ettinger Model for soil gas (SG-SCREEN Version 2.0), as modified by DTSC/HERO (DTSC 2014).

References:

Department of Toxic Substances Control (DTSC). 2014. Johnson and Ettinger SG-SCREEN Model, EPA Version 2.0, dated April 2003, as modified by DTSC/Office of Human and Ecological Risk (HERO). Updated December.

Table AM-4
Dispersion Factor Equations

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

Site-Specific Dispersion Factor for Volatiles (USEPA 2002, Equation D-1)

$Q/C_{vol} = A \exp[(\ln A_{site} - B)^2 (1/C)]$ = **83.10** $(g/m^2\text{-}s) / (kg/m^3)$

where:

A_{site}	0.5	acres	site area
Location	LV	--	general location (USEPA 2002)
A	13.3093	--	constant, default value presented in Exhibit D-3 (USEPA 2002)
B	19.8387	--	constant, default value presented in Exhibit D-3 (USEPA 2002)
C	230.1652	--	constant, default value presented in Exhibit D-3 (USEPA 2002)

References:

United States Environmental Protection Agency (USEPA). 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. Washington, D.C., December.

Table AM-5
Volatilization Factor Equations

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

Outdoor Air Infinite Source Volatilization Factor (VF) Calculated for TPH-diesel, (USEPA 2002, Equation 4-8)
Short Term Maintenance Worker

$$VF = \frac{Q/C_{vol} \times (3.14 \times D_A \times T)^{1/2} \times 10^{-4}\ (m^2/cm^2)}{2 \times \rho_b \times D_A} = \mathbf{4.85E+02}\ m^3/kg$$

where:

$$D_A = \frac{[(\theta_a^{3.33} D_i H') + (\theta_w^{3.33} D_w)]/\eta^2}{\rho_b K_d + \theta_w + \theta_a H'_{TS}}$$

and:

Q/C_{vol}	83.10	$(g/m^2\text{-}s) / (kg/m^3)$	dispersion factor (calculated, see Table AM-4)
D_A	3.2E-03	cm^2/s	apparent diffusivity (calculated using equation cited above)
T	3.2E+07	s	exposure interval (based on short-term maintenance worker exposure duration of 1 year)
ρ_b	1.50	g/cm^3	dry soil bulk density, DTSC/HERO default (DTSC 2018)
η	0.430	cm^3_{pore}/cm^3_{soil}	total soil porosity DTSC/HERO default (DTSC 2018)
θ_a	0.28	cm^3_{air}/cm^3_{soil}	air-filled soil porosity (calculated, n-θ_w)
D_i	7.0E-02	cm^2/s	diffusivity in air (chemical-specific, see Table AM-1)
θ_w	0.150	cm^3_{water}/cm^3_{soil}	water-filled soil porosity DTSC/HERO default (DTSC 2018)
D_w	1.0E-05	cm^2/s	diffusivity in water (chemical-specific, see Table AM-1)
$K_d = K_{oc} \times f_{oc}$	30	cm^3/g	soil-water partition coefficient (calculated using equation provided)
K_{oc}	5000	cm^3/g	soil organic carbon partition coefficient (chemical-specific, see Table AM-1)
f_{oc}	0.006	g/g	fraction organic carbon in soil (default; USEPA 2002)
H'_{TS}	3.20E+01	unitless	Henry's Law Constant (chemical-specific, see Table AM-1)

References:

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. Washington, D.C., December.

DTSC. 2018. Human and Ecological Risk Office (HERO) Human Health Risk Assessment (HHRA) Note Number 3. DTSC-modified Screening Levels (DTSC-SLs). June.

Table AM-6
Volatilization Factors for Volatile COPCs in Soil

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

COPC	Volatilzation Factor (m^3/kg) for Potential Receptor															
	Short-Term Maintenance Worker	Long-Term Maintenance Worker	Child Camper	Adult Camper	Age-Adjusted Adult Camper	Child Hiker	Adult Hiker	Age-Adjusted Adult Hiker	Hunter	Child OHV Rider	Adult OHV Rider	Age-Adjusted Adult OHV Rider	Tribal User	Hypothetical Future Child Resident	Hypothetical Future Adult Resident	Hypothetical Future Age-Adjusted Adult Resident
Volatile Organic Compounds																
Acetone	3.4E+03	1.8E+04	1.7E+04	1.7E+04	1.7E+04	1.7E+04	1.7E+04	1.7E+04	1.7E+04	1.7E+04	1.7E+04	1.7E+04	2.6E+04	1.7E+04	1.7E+04	1.7E+04
Bromomethane	3.4E+02	1.9E+03	1.7E+03	1.7E+03	1.7E+03	1.7E+03	1.7E+03	1.7E+03	1.7E+03	1.7E+03	1.7E+03	1.7E+03	2.6E+03	1.7E+03	1.7E+03	1.7E+03
Chloro methane	2.9E+02	1.6E+03	1.5E+03	1.5E+03	1.5E+03	1.5E+03	1.5E+03	1.5E+03	1.5E+03	1.5E+03	1.5E+03	1.5E+03	2.2E+03	1.5E+03	1.5E+03	1.5E+03
Chloroform	6.5E+02	3.5E+03	3.3E+03	3.3E+03	3.3E+03	3.3E+03	3.3E+03	3.3E+03	3.3E+03	3.3E+03	3.3E+03	3.3E+03	5.0E+03	3.3E+03	3.3E+03	3.3E+03
Methyl acetate	2.0E+03	1.1E+04	1.0E+04	1.0E+04	1.0E+04	1.0E+04	1.0E+04	1.0E+04	1.0E+04	1.0E+04	1.0E+04	1.0E+04	1.6E+04	1.0E+04	1.0E+04	1.0E+04
Methylene chloride	5.4E+02	3.0E+03	2.7E+03	2.7E+03	2.7E+03	2.7E+03	2.7E+03	2.7E+03	2.7E+03	2.7E+03	2.7E+03	2.7E+03	4.2E+03	2.7E+03	2.7E+03	2.7E+03
Toluene	1.1E+03	5.8E+03	5.4E+03	5.4E+03	5.4E+03	5.4E+03	5.4E+03	5.4E+03	5.4E+03	5.4E+03	5.4E+03	5.4E+03	8.2E+03	5.4E+03	5.4E+03	5.4E+03
Xylenes, total	1.4E+03	7.8E+03	7.3E+03	7.3E+03	7.3E+03	7.3E+03	7.3E+03	7.3E+03	7.3E+03	7.3E+03	7.3E+03	7.3E+03	1.1E+04	7.3E+03	7.3E+03	7.3E+03
Polycyclic Aromatic Hydrocarbons																
1-Methyl naphthalene	1.4E+04	7.8E+04	7.2E+04	7.2E+04	7.2E+04	7.2E+04	7.2E+04	7.2E+04	7.2E+04	7.2E+04	7.2E+04	7.2E+04	1.1E+05	7.2E+04	7.2E+04	7.2E+04
2-Methyl naphthalene	1.5E+04	8.0E+04	7.5E+04	7.5E+04	7.5E+04	7.5E+04	7.5E+04	7.5E+04	7.5E+04	7.5E+04	7.5E+04	7.5E+04	1.1E+05	7.5E+04	7.5E+04	7.5E+04
Acenaphthene	3.6E+04	1.9E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	2.8E+05	1.8E+05	1.8E+05	1.8E+05
Anthracene	1.3E+05	6.9E+05	6.4E+05	6.4E+05	6.4E+05	6.4E+05	6.4E+05	6.4E+05	6.4E+05	6.4E+05	6.4E+05	6.4E+05	9.8E+05	6.4E+05	6.4E+05	6.4E+05
Benzo (a) anthracene	1.1E+06	5.8E+06	5.4E+06	5.4E+06	5.4E+06	5.4E+06	5.4E+06	5.4E+06	5.4E+06	5.4E+06	5.4E+06	5.4E+06	8.2E+06	5.4E+06	5.4E+06	5.4E+06
Fluorene	7.1E+04	3.9E+05	3.6E+05	3.6E+05	3.6E+05	3.6E+05	3.6E+05	3.6E+05	3.6E+05	3.6E+05	3.6E+05	3.6E+05	5.5E+05	3.6E+05	3.6E+05	3.6E+05
Naphthalene	1.2E+04	6.4E+04	5.9E+04	5.9E+04	5.9E+04	5.9E+04	5.9E+04	5.9E+04	5.9E+04	5.9E+04	5.9E+04	5.9E+04	9.0E+04	5.9E+04	5.9E+04	5.9E+04
Pyrene	6.1E+05	3.3E+06	3.1E+06	3.1E+06	3.1E+06	3.1E+06	3.1E+06	3.1E+06	3.1E+06	3.1E+06	3.1E+06	3.1E+06	4.7E+06	3.1E+06	3.1E+06	3.1E+06
Pesticides																
4,4-DDE	4.1E+05	2.2E+06	2.1E+06	2.1E+06	2.1E+06	2.1E+06	2.1E+06	2.1E+06	2.1E+06	2.1E+06	2.1E+06	2.1E+06	3.2E+06	2.1E+06	2.1E+06	2.1E+06
Polychlorinated Biphenyls																
Total PCBs	1.3E+05	7.0E+05	6.6E+05	6.6E+05	6.6E+05	6.6E+05	6.6E+05	6.6E+05	6.6E+05	6.6E+05	6.6E+05	6.6E+05	1.0E+06	6.6E+05	6.6E+05	6.6E+05
Total Petroleum Hydrocarbons																
TPH as diesel	4.9E+02	2.7E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	3.8E+03	2.5E+03	2.5E+03	2.5E+03
Dioxins/Furans																
TEQ Human	4.7E+05	2.6E+06	2.4E+06	2.4E+06	2.4E+06	2.4E+06	2.4E+06	2.4E+06	2.4E+06	2.4E+06	2.4E+06	2.4E+06	3.7E+06	2.4E+06	2.4E+06	2.4E+06

Abbreviations:
COPC = Constituent of Potential Concern.
m^3/kg = cubic meters per kilogram.
PCB = Polychlorinated biphenyls.
TPH = Total Petroleum Hydrocarbons.
TEQ = Toxic Equivalent.

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Appendix RBC
Soil Management Plan Risk-Based Concentrations for Groundwater Remedy

ARCADIS Design & Consultancy for natural and built assets

Pacific Gas and Electric Company

APPENDIX RBC
SOIL MANAGEMENT PLAN
RISK-BASED CONCENTRATIONS FOR GROUNDWATER REMEDY

Topock Compressor Station
Needles, California

October 2019

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ATTACHMENTS

A Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

ACRONYMS AND ABBREVIATIONS

µg/dL	microgram per deciliter
ALM	adult lead model
B(a)PEQ	benzo(a)pyrene equivalent
BAF	bioaccumulation factor
CalEPA	California Environmental Protection Agency
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
DOI	Department of the Interior
DTSC	Department of Toxic Substances Control (California)
EcoSSL	ecological soil screening level
ERA	ecological risk assessment
HHRA	human health risk assessment
HMW	high molecular weight
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
LMW	low molecular weight
LOAEL	lowest observed adverse effect level
m^3/day	cubic meters per day
main report	Soil Human Health and Ecological Risk Assessment Report
mg/day	milligrams per day
mg/kg	milligrams per kilogram
ng.kg	nanograms per kilogram
NOAEL	no observed adverse effect level
OEHHA	Office of Environmental Health Hazard Assessment
OHV	off-highway vehicle
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company

RBC	risk-based concentration
RBRG	risk-based remedial goal
SMP	Site Management Plan
SUF	site use factor
SVOC	semi-volatile organic compound
T&E	threatened and endangered
TCDD	tetrachlorodibenzo-p-dioxin
TCS	Topock Compressor Station
TEQ	toxicity equivalent
TPH	total petroleum hydrocarbon
TRV	toxicity reference value
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

1 INTRODUCTION

This Soil Management Plan (SMP) Risk-Based Concentrations (RBCs) for Groundwater Remedy appendix presents the RBCs that will be used to support decisions for the handling, management, and storage of potentially contaminated and displaced soil at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station (TCS) in Needles, California (the site). PG&E is implementing a groundwater remedy at the site to address chromium contamination in groundwater. The SMP for the groundwater remedy provides the procedures and protocols for the management and disposal of soil displaced during drilling, construction, operation, and maintenance of the remedy.

This appendix presents the RBCs that were developed for the list of constituents of potential concern (COPCs) identified in the human health risk assessment (HHRA) and constituents of potential ecological concern (COPECs) identified in the ecological risk assessment (ERA) for the site. These COPCs/COPECs are presented in Table 3-7 of the HHERA main report, and include inorganics, polycyclic aromatic hydrocarbons (PAHs) (i.e., individual PAHs, low molecular weight (LMW) PAHs, high molecular weight (HMW) PAHs, and/or benzo(a)pyrene equivalent (B(a)PEQ)), total polychlorinated biphenyls (PCBs), pesticides, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), total petroleum hydrocarbons (TPHs), and dioxin toxicity equivalent (TEQ) (Tables RBC-1.1 and RBC-1.2). The approaches for the derivation of human health and ecological RBCs are discussed in Sections 2 and 3, respectively, of this appendix.

2 HUMAN HEALTH RISK-BASED CONCENTRATION APPROACH

Human health RBCs were developed for potential human receptors using the same approach and equations as those used in the development of the human health risk-based remedial goals (RBRGs), discussed in Section 8.2 of the Soil Human Health and Ecological Risk Assessment Report for the site (main report). Human health RBCs for COPCs in soil are developed by combining information regarding the level of intake of the constituent, the levels of acceptable risk, and the relationship between the intake of constituent and the incidence of an adverse health effect as a function of human exposure to the constituent. The methodology used to develop the human health RBCs for the COPCs in soil at the site is based on United States Environmental Protection Agency (USEPA) and California Environmental Protection Agency (CalEPA), Department of Toxic Substances Control (DTSC) guidance, as well as the specific equations provided in the guidance documents below:

- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A) (USEPA 1989)
- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B: Development of Risk-Based Preliminary Concentrations) (USEPA 1991)
- Preliminary Endangerment Assessment Guidance Manual (DTSC 2015).

Section 5.5 of the HHERA main report presented the incremental lifetime cancer risks (ILCRs) and noncancer hazards posed by a given concentration of constituent present at the site for worker, recreational user, tribal user, and hypothetical future residential scenarios. Rearranging the equations used to estimate the ILCRs and noncancer hazards and using the target ILCR of 1×10^{-6} and the target noncancer hazard quotient (HQ) of 1, the concentration of each constituent associated with the target ILCR and HQ levels can be determined. The human health soil RBCs for worker, recreational user, tribal user, and hypothetical future residential scenarios presented in Table RBC-2.1 were developed using the same equations presented in Section8.8.1 of the HHERA[1], and are re-iterated below.

2.1 RBCs for Carcinogenic Effects

For carcinogenic effects, the following equation is used to derive the human health soil RBC for potential exposure including incidental ingestion of soil, dermal contact with soil, inhalation of particulates and VOC vapors in ambient outdoor air from soil:

$$RBC_{a,carcinogen} = \frac{Target\ Risk\ Level}{\left[\frac{Risk_{a,inhv}}{Conc_{a,inhv}}\right] + \left[\frac{Risk_{a,inhp}}{Conc_{a,inhp}}\right] + \left[\frac{Risk_{a,ing}}{Conc_{a,ing}}\right] + \left[\frac{Risk_{a,der}}{Conc_{a,der}}\right]}$$

[1] The equations for soil RBCs for potential exposure to COPCs in soil by ingestion of onsite home-produced food were not presented Section 8.8.1 of the HHERA because risk-based remedial goals were not presented for this exposure pathway in the HHERA.

Where:

$RBC_{a,carcinogen}$	=	Risk-based Concentration for Constituent a, for carcinogenic effects, (milligrams per kilograms [mg/kg])
Target Risk Level	=	Target Cancer Risk Level of 1 x 10^{-6} (unitless)
$Risk_{a,inhv}$	=	Calculated Cancer Risk for Constituent a for the vapor inhalation pathway, developed as described above (unitless)
$Risk_{a,inhp}$	=	Calculated Cancer Risk for Constituent a for the particulate inhalation pathway, developed as described above (unitless)
$Risk_{a,ing}$	=	Calculated Cancer Risk for Constituent a for the soil ingestion pathway, developed as described above (unitless)
$Risk_{a,der}$	=	Calculated Cancer Risk for Constituent a for the dermal contact pathway, developed as described above (unitless)
$Conc_{a,inhv}$	=	Representative Exposure Concentration of Constituent a for the vapor inhalation pathway; mg/kg
$Conc_{a,inhp}$	=	Representative Exposure Concentration of Constituent a for the particulate inhalation pathway; mg/kg
$Conc_{a,ing}$	=	Representative Exposure Concentration of Constituent a for the soil ingestion pathway; mg/kg
$Conc_{a,der}$	=	Representative Exposure Concentration of Constituent a for the dermal contact pathway; mg/kg

For carcinogenic effects, the following equation is used to derive the human health soil RBC for potential exposure to COPCs in soil by ingestion of onsite home-produced food including plants and poultry (meat and eggs). This pathway was included in the HHERA, at the request of United States Department of the Interior (DOI), in the evaluation of future hypothetical residential use of the area North of the Railroad (NORR):

$$RBC_{a,carcinogen} = \frac{Target\ Risk\ Level}{\left[\frac{Risk_{a,food}}{Conc_{a,soil}}\right] + \left[\frac{Risk_{a,food/vol}}{Conc_{a,soil/vol}}\right]}$$

Where:

$RBC_{a,carcinogen}$	=	Risk-based Concentration for Constituent a, for carcinogenic effects; (mg/kg)
Target Risk Level	=	Target Cancer Risk Level of 1 x 10^{-6} (unitless)
$Risk_{a,food}$	=	Calculated Cancer Risk for Constituent a for exposure to COPCs in home-produced food, developed as described in Appendix NORR (unitless)
$Risk_{a,food/vol}$	=	Calculated Cancer Risk for Constituent a for exposure to volatile COPCs in home-produced food, developed as described in Appendix NORR (unitless)

$Conc_{a,soil}$	=	Representative Exposure Concentration of Constituent a in soil for the exposure to COPCs in home-produced food; mg/kg
$Conc_{a,soil/vol}$	=	Representative Exposure Concentration of Constituent a in soil for exposure to volatile COPCs in home-produced food; mg/kg

2.2 RBCs for Noncarcinogenic Effects

For noncarcinogenic effects, the following equation was used to derive the human health soil RBC for potential exposure including incidental ingestion of soil, dermal contact with soil, inhalation of particulates and VOC vapors in ambient outdoor air from soil:

$$RBC_{a,noncarcinogen} = \frac{Target\ HQ}{\left[\frac{HQ_{a,inhv}}{Conc_{a,inhv}}\right] + \left[\frac{HQ_{a,inhp}}{Conc_{a,inhp}}\right] + \left[\frac{HQ_{a,ing}}{Conc_{a,ing}}\right] + \left[\frac{HQ_{a,der}}{Conc_{a,der}}\right]}$$

Where:

$RBC_{a,noncarcinogen}$	=	Risk-based Concentration for Constituent a, for noncarcinogenic effects, (mg/kg)
Target HQ	=	Target Hazard Quotient Level of 1 (unitless)
$HQ_{a,inhv}$	=	Calculated Hazard Quotient for Constituent a for the vapor inhalation pathway, developed as described above (unitless)
$HQ_{a,inhp}$	=	Calculated Hazard Quotient for Constituent a for the particulate inhalation pathway, developed as described above (unitless)
$HQ_{a,ing}$	=	Calculated Hazard Quotient for Constituent a for the soil ingestion pathway, developed as described above (unitless)
$HQ_{a,der}$	=	Calculated Hazard Quotient for Constituent a for the dermal contact pathway, developed as described above (unitless)
$Conc_{a,inhv}$	=	Representative Exposure Concentration of Constituent a for the vapor inhalation pathway; mg/kg
$Conc_{a,inhp}$	=	Representative Exposure Concentration of Constituent a for particulate inhalation pathway; mg/kg
$Conc_{a,ing}$	=	Representative Exposure Concentration of Constituent a for soil ingestion pathway; mg/kg
$Conc_{a,der}$	=	Representative Exposure Concentration of Constituent a for dermal contact pathway; mg/kg

For noncarcinogenic effects, the following equation was used to derive the human health soil RBC for potential exposure to COPCs in soil by ingestion of onsite home-produced food including plants and poultry (meat and eggs). This pathway was included in the HHERA, at the request of United States Department of the Interior (DOI), in the evaluation of future hypothetical residential use of the NORR area:

$$RBC_{a,noncarcinogen} = \frac{Target\ HQ}{\left[\frac{HQ_{a,food}}{Conc_{a,soil}}\right] + \left[\frac{HQ_{a,food/vol}}{Conc_{a,soil/vol}}\right]}$$

Where:

$RBC_{a,noncarcinogen}$	=	Risk-based Concentration for Constituent a, for noncarcinogenic effects, (mg/kg)
Target HQ=		Target Hazard Quotient Level of 1 (unitless)
$HQ_{a,food}$	=	Calculated Hazard Quotient for Constituent a for exposure to COPCs in home-produced food, developed as described in Appendix NORR (unitless)
$HQ_{a,food/vol}$	=	Calculated Hazard Quotient for Constituent a exposure to volatile COPCs in home-produced food, developed as described in Appendix NORR (unitless)
$Conc_{a,soil}$	=	Representative Exposure Concentration of Constituent a in soil for the exposure to COPCs in home-produced food; mg/kg
$Conc_{a,soil/vol}$	=	Representative Exposure Concentration of Constituent a in soil for the exposure to volatile COPCs in home-produced food; mg/kg

2.3 RBCs for Lead

For lead, the CalEPA Office of Environmental Health Hazard Assessment (OEHHA) has established 1 microgram per deciliter (µg/dL) as a benchmark for source-specific incremental change in blood lead levels for the protection of school children and fetuses (OEHHA 2007). Using the latest version of DTSC's LeadSpread (DTSC 2011a, b), Version 8, the CalEPA OEHHA developed a health-based screening level for lead in residential soil, 80 mg/kg, by querying the model for the soil concentration that would give rise to the 90th percentile estimate of change in blood lead of 1 µg/dL of a resident child assumed to be regularly exposed to lead in soil via incidental soil ingestion, dermal contact, and dust inhalation (DTSC 2009). In this HHRA, the methodology on which the residential health-based screening level (referred to by the DTSC as the residential DTSC-SL [DTSC 2018]) was used to develop a screening value for lead for recreational users where a child receptor was evaluated (i.e., camper, hiker, and off-highway vehicle [OHV] rider) and hypothetical future residential scenarios.

The residential DTSC-SL of 80 mg/kg was used as the human health RBC for the hypothetical future residential scenario. The human health lead RBC for the hypothetical future resident exposure to home-produced food of 8.7 mg/kg was developed using the methodology presented in Appendix NORR.

To calculate the lead health-based screening criterion for the child camper, hiker, and OHV rider recreational user exposure scenarios, inputs used in the derivation of the residential DTSC-SL were replaced, as necessary, with exposure parameters consistent with those used in the HHRA to evaluate potential exposures to other COPCs at the site for these recreational users. Specifically, the LeadSpread default parameters were updated for each receptor with site-specific exposure parameters presented in Table 5-1 of the main report as follows:

- **Camper –** Exposure frequency was updated to 0.25 day per week based on the site-specific assumption of 1 day per month (1 day/4 weeks = 0.25 day/week).
- **Hiker –** Exposure frequency was updated to 0.5 day per week based on the site-specific assumption of 2 days per month (2 day/4 weeks = 0.5 day/week).
- **OHV Rider –** Exposure frequency was updated to 0.5 day per week based on the site-specific assumption of 2 days per month (2 days/4 weeks = 0.5 day/week). The daily soil ingestion rate of 330 milligrams per day (mg/day) was modified by site-specific exposure time (1.5 hours riding at site per 16 awake hours, or 0.09) to equal an ingestion rate of 31 mg/day. Default inhalation breathing rate of 6.8 cubic meters per day (m^3/day) was modified to account for site-specific exposure time (i.e., 1.5 hours riding at site per 24 hours, or 0.06) to equal an inhalation rate of 0.425 m^3/day.

Querying the LeadSpread model for the soil concentration that would give rise to a 90th percentile estimate of increase in child receptor blood lead of 1 µg/dL based on this exposure parameter adjustment results in a health-based screening level of 2,200 mg/kg, 1,100 mg/kg, and 3,200 mg/kg for the camper, hiker, and OHV rider exposure scenarios, respectively.

For exposure scenarios where potential adult receptors are evaluated (i.e., the short- and long-term maintenance worker and hunter scenarios), the methodology upon which the commercial/industrial DTSC-SL is based, the Adult Lead Model (ALM; USEPA 2003), was used to develop a lead soil screening criterion. To calculate the health-based screening criterion, inputs used in the derivation of the commercial/industrial DTSC-SL were replaced, as necessary, with values consistent with those used to evaluate potential exposures to other COPCs at the site for short- and long-term maintenance workers and hunter scenarios. Specifically, the ALM default parameters were updated for each receptor with site-specific exposure parameters presented in Table 5-1 of the main report, and as follows:

- **Short-Term Maintenance Worker** – Default incidental soil ingestion rate of 50 mg/day was increased to 100 mg/day per USEPA recommendations for evaluating construction (i.e., soil-contact intensive) scenarios with the ALM (USEPA 2015). The exposure frequency (days per year) was updated to 40 days per year.
- **Long-Term Maintenance Worker** – Default incidental soil ingestion rate of 50 mg/day was increased to 100 mg/day per USEPA recommendations for evaluating construction (i.e., soil-contact intensive) scenarios with the ALM (USEPA 2015). Exposure frequency was updated to 10 days per year (4 hours per 8-hour work day for 20 days per year).
- **Hunter** –Exposure frequency was updated to 8 days per year.

Querying the ALM for the soil concentration that would give rise to a 90th percentile estimate of increase in fetal blood lead of 1 µg/dL based on these exposure parameter adjustment results in health-based screening levels of 990 mg/kg for short-term maintenance workers, 4,000 mg/kg for long-term maintenance workers, and 9,900 mg/kg for hunters.

The derivation of the LeadSpread and ALM health-based screening levels for lead are shown in the lead risk assessment tables (Tables 5a through 5i) in Attachments B or Attachments B1 and B2 of the exposure area-specific appendices.

3 ECOLOGICAL RISK-BASED CONCENTRATION APPROACH

Ecological RBCs were developed for ecological communities (plants and soil invertebrates) and wildlife receptors (mammals and birds) using the same approach and equations as those used in the development of ecological RBRGs discussed in Section 8.2 of the main report. Ecological RBCs were developed for the site and were not developed for individual potential exposure areas (see Figures 3-3 and 3-4b of the main report). A summary of the ecological RBCs for terrestrial ecological receptors is presented in Table RBC-3.1.

For ecological communities of plants and soil invertebrates, the ecological RBCs are equivalent to the selected media-based screening levels (Table RBC-3.1). As noted in Sections 6.7.5 and 8.2 of the main report, screening levels for the risk-driving COPECs are generic, often below background threshold values, and there is low confidence in their ability to predict risk. Therefore, ecological RBCs for plants and soil invertebrates are not recommended for soil-management decisions at the site.

For potential wildlife receptors (birds and mammals), ecological RBCs based on the protection of populations (i.e., based on the lowest observed adverse effect level [LOAEL]-based toxicity reference values [TRVs]; Table RBC-3.1 and Attachment RBC-A) were derived for small home-range potential receptors (Merriam's kangaroo rat, desert shrew, Gambel's quail, and cactus wren) and large home-range potential receptors (desert kit fox, Nelson's desert bighorn sheep, and red-tailed hawk). Based on the conclusion of no unacceptable risk for threatened and endangered (T&E) species potentially present at the site, ecological RBCs based on the protection of individual receptors (i.e., based on the no observed adverse effect level [NOAEL]-based TRVs are not warranted and not provided in this appendix. Ecological RBCs were derived for wildlife populations following USEPA guidance (USEPA 1997; 2008) using the dietary dose model integrating exposure assumptions and LOAEL-based TRVs used to estimate HQs in the predictive ERA, as described in Sections 6.2 and 6.3 of the main report, respectively. For the calculation of the ecological RBCs, a site use factor (SUF) of 1 was conservatively assumed for all receptors. A SUF of 1 was used to account for the difference in size of each potential exposure area, because not all receptors have a home range greater than each of the potential exposure areas.

Ecological RBCs were developed by re-arranging the standard USEPA (1997) HQ model (i.e., Equation 8-3 presented in Section 8.2 of the main report) to solve for a target HQ of 1:

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

Where:

Target HQ	=	Target Hazard Quotient of 1 (unitless)
TRV	=	Toxicity Reference Value (mg/kg bw/day])
Csoil	=	Concentration of Constituent in Soil (mg/kg soil) = RBC
SIR	=	Soil Ingestion Rate (kg soil/day)

FIR	=	Food or Biota Ingestion Rate (kg tissue/day)
SUF	=	Site-Use Factor (unitless) = 1
BW	=	Body Weight of Potential Receptor (kg bw)
BAF	=	Bioaccumulation Factor or Regression for Media-to-Biota Uptake (kg soil/kg tissue)

Incorporating uptake regressions in lieu of a simple BAF in the dose equation significantly complicates the overall dose calculation and, therefore, the ecological RBCs were calculated using Microsoft® Excel Solver™ software that determines the soil concentration for a target HQ equal to 1, same as the approach used to calculated ecological RBRGs in Section 8.2 of the main report.

For dioxin TEQ, as discussed in detail in Section 6.7.6 of the main report, the uncertainties associated with the baseline risk estimates for the shrew are mainly driven by use of conservative uptake and toxicity assumptions. For shrew populations, these uncertainties together can overestimate risk by at least 10 times. Therefore, for remediation and risk-management considerations including soil management, alternate and more robust uptake models and TRVs were developed for dioxin TEQ. The congener-specific BAFs (USEPA 1999, Fagervold et al. 2010) were used to calculate the ecological RBCs protective of small mammals and birds, as applicable (i.e., desert shrew and Merriam's kangaroo rat)[2]. As noted in Section 6.7.4, the congener-specific BAF approach is based on the current understanding of uptake for dioxin TEQ mixtures and is more scientifically defensible than assuming all congener uptake is the same as 2,3,7,8- tetrachlorodibenzo-p-dioxin (TCDD).

For small mammals, a recommended mammalian dioxin TEQ LOAEL TRV of 30 nanograms per kilogram (ng/kg) bw-day was used. The recommended TRV is based on the geometric mean of reproduction and growth LOAELs for rodents (discussed in Section 6.7.5 of the main report). This approach, used by USEPA (2008) for development of the ecological soil screening levels (EcoSSLs), is widely accepted as it accounts for a range of values and reduces the uncertainty associated with using toxicity data from a single study. The dioxin LOAEL-based TRV of 10 ng/kg bw-day used in the ERA (cited in Sample et al [1996] and based on a study by Murray et al. [1979]) is included in the toxicity dataset used to derive the alternate TRV of 30 ng/kg bw-day.

An ecological RBC for dioxin TEQ based on the 2,3,7,8-TCDD uptake regression and the TRV used in the ERA (10 ng/kg; lowest available LOAEL-based TRV) was not calculated. The BAF approach based on the 2,3,7,8-TCDD regression is not supported by available science related to the uptake and toxicity of dioxin/furans (i.e., dioxin TEQ mixtures), and the TRV does not account for variability in species sensitivity to dioxin TEQ. A summary of the ecological RBCs is presented in Table RBC-3.1 and calculations provided in Attachment RBC-A.

[2] For herbivorous species, the congener-specific BAFs (USEPA 1999) were used. Soil-to-plant BAFs are not available from Fagervold et al. (2010).

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TABLES

Table RBC-1.1
Summary of Constituents Evaluated in the HHRA for Soil Management Plan

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

Constituent [a]	Risk-Based Concentration Calculated?
Inorganics	
Antimony	X
Arsenic	X
Barium	X
Cadmium	X
Chromium, Hexavalent	X
Chromium, total	X
Cobalt	X
Copper	X
Cyanide	X
Lead	X
Manganese	X
Mercury (inorganic)	X
Molybdenum	X
Nickel	X
Nitrate	X
Orthophosphate	X
Phosphate	X
Silver	X
Thallium	X
Vanadium	X
Zinc	X
Volatile Organic Compounds	
Acetone	X
Bromomethane	X
Chloro methane	X
Chloroform	X
Isophorone	X
Methyl acetate	X
Methylene chloride	X
Toluene	X
Xylenes, total	X
Semi-Volatile Organic Compounds	
4-Methylphenol	X
bis (2-ethylhexyl) phthalate	X
Butylbenzylphthalate	X
Polycyclic Aromatic Hydrocarbons	
1-Methyl naphthalene	X
2-Methyl naphthalene	X
Acenaphthene	X
Acenaphthylene	X
Anthracene	X
Benzo (a) anthracene	X

Table RBC-1.1
Summary of Constituents Evaluated in the HHRA for Soil Management Plan

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

Constituent [a]	Risk-Based Concentration Calculated?
Benzo (a) pyrene	X
Benzo (b) fluoranthene	X
Benzo (ghi) perylene	X
Benzo (k) fluoranthene	X
Chrysene	X
Dibenzo (a,h) anthracene	X
Fluoranthene	X
Fluorene	X
Indeno (1,2,3-cd) pyrene	X
Naphthalene	X
Phenanthrene	X
Pyrene	X
B(a)P Equivalent	X
Pesticides	
4,4-DDE	X
4,4-DDT	X
alpha-Chlordane	X
Dieldrin	X
gamma-Chlordane	X
Polychlorinated Biphenyls	
Total PCBs	X
Total Petroleum Hydrocarbons	
TPH as diesel	X
TPH as motor oil	X
Dioxins/Furans	
TEQ Human	X

Notes:

[a] Constituents with estimated risk-based concentrations include inorganics, VOCs, SVOCs, PAHs, pesticides, PCBs, TPH, and dioxins.

Abbreviations:
HHRA = Human Health Risk Assessment
PAH = Polycyclic Aromatic Hydrocarbons
PCB = Polychlorinated Biphenyl
RBC = Risk-based Concentration
SVOC = Semi-volatile Organic Compounds
TPH = Total Petroleum Hydrocarbons
VOC = Volatile Organic Compounds
X = COPC with risk-based concentration

Table RBC-1.2
Summary of Constituents Evaluated in the ERA for Soil Management Plan

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

Constituent[a]	BTV (mg/kg)	Risk-Based Concentration Calculated?
Inorganics		
Aluminum	16400	X
Antimony	NC	X
Arsenic	11	X
Barium	410	X
Beryllium	0.672	X
Cadmium	1.1	X
Calcium	66500	X
Chromium, hexavalent	0.83	X
Chromium, total	39.8	X
Cobalt	12.7	X
Copper	16.8	X
Cyanide	NC	X
Iron	29303	X
Lead	8.39	X
Magnesium	12100	X
Manganese	402	X
Mercury	NC	X
Molybdenum	1.37	X
Nickel	27.3	X
Potassium	4400	X
Selenium	1.47	X
Silver	NC	X
Sodium	2070	X
Thallium	NC	X
Vanadium	52.2	X
Zinc	58	X
Volatile Organic Compounds		
1,2,4-Trimethylbenzene	NC	X
1,3,5-Trimethylbenzene	NC	X
Acetone	NC	X
Bromomethane	NC	X
Chloro methane	NC	X
Chloroform	NC	X
Ethyl- benzene	NC	X
Isopropylbenzene	NC	X
Methyl acetate	NC	X
Methyl ethyl ketone	NC	X
Methylene chloride	NC	X
N-Butylbenzene	NC	X
N-Propylbenzene	NC	X
sec-Butylbenzene	NC	X
Toluene	NC	X
Xylene, m,p-	NC	X
Xylene, o-	NC	X
Xylenes, total	NC	X
Semi-Volatile Organic Compounds		
2,4-Dimethylphenol	NC	X
4-Methylphenol	NC	X
Bis (2-ethylhexyl) phthalate	NC	X
Butylbenzylphthalate	NC	X
Carbazole	NC	X
Dibenzofuran	NC	X
Di-n-butyl phthalate	NC	X
Isophorone	NC	X
Pentachlorophenol	NC	X

Table RBC-1.2
Summary of Constituents Evaluated in the ERA for Soil Management Plan

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

Constituent[a]	BTV (mg/kg)	Risk-Based Concentration Calculated?
Polycyclic Aromatic Hydrocarbons		
PAH Low molecular weight	0.2674	X
PAH High molecular weight	0.0376	X
Pesticides		
4,4-DDT	NC	X
4,4-DDE	NC	X
Alpha-Chlordane	NC	X
Dieldrin	NC	X
Gamma-Chlordane	NC	X
Polychlorinated Biphenyls		
Total PCBs	NC	X
Dioxins (ng/kg)[b]		
TEQ Avian	5.98	X
TEQ Mammals	5.58	X
2,3,7,8-TCDD	NC	X

Notes:
[a] Constituents with estimated risk-based concentrations include inorganics, PAHs, PCBs, and dioxins.
[b] Dioxins BTVs presented in ng/kg.

Abbreviations:
BTV = background threshold value
ERA = ecological risk assessment
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
NC = not calculated
ng/kg = nanograms per kilogram
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
RBC = risk-based concentration
X = COPEC with risk-based concentration

Table RBC-2.1
Human Health Risk-Based Concentrations

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

COPC	Short-Term Maintenance Worker		Long-Term Maintenance Worker		Camper		Hiker		Hunter		OHV Rider		Tribal		Hypothetical Future Resident		Hypothetical Future Resident Consumer of Home-Produced Food	
	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]
Inorganics																		
Antimony	--	76	--	2,700	--	1,300	--	670	--	14,000	--	5,500	--	SC(790,000,000)	--	30	--	27,000
Arsenic	11	220	1.1	16	2.9	11	1.5	5.5	9.2	110	2.7	26	SC(180,000)	SC(7,400,000)	0.067	0.25	0.00089	0.0091
Barium	--	SC(100,000)	--	53,000	--	SC(650,000)	--	SC(330,000)	--	SC(5,700,000)	--	SC(150,000)	--	SC(250,000,000)	--	15,000	--	SC(13,000,000)
Cadmium [c]	460	1,000	61	52	40,000	230	20,000	110	40,000	230	200	290	SC(140,000)	SC(5,000,000)	910	5.2	--	0.033
Chromium, Hexavalent	12	1,900	1.6	7,800	13	10,000	6.5	5,100	170	SC(110,000)	3.1	22,000	3,900	SC(50,000,000)	0.30	230	0.00017	0.32
Chromium, total	--	SC(2,800,000)	--	SC(10,000,000)	--	SC(5,000,000)	--	SC(2,500,000)	--	SC(53,000,000)	--	SC(21,000,000)	--	SC(3,000,000,000,000)	--	SC(110,000)	--	SC(100,000,000)
Cobalt	210	500	28	500	19,000	990	9,300	500	19,000	10,000	92	1,300	64,000	SC(3,000,000)	420	23	--	20,000
Copper	--	76,000	--	SC(270,000)	--	SC(130,000)	--	67,000	--	SC(1,400,000)	--	SC(550,000)	--	SC(79,000,000,000)	--	3,000	--	SC(2,700,000)
Cyanide	--	14,000	--	4,100	--	2,100	--	1,000	--	22,000	--	8,500	--	SC(400,000,000)	--	48	--	42,000
Lead [d]	--	990	--	4,000	--	2,200	--	1,100	--	9,900	--	3,200	--	--	--	80	--	8.7
Manganese	--	2,300	--	9,300	--	79,000	--	39,000	--	SC(730,000)	--	26,000	--	SC(45,000,000)	--	1,800	--	SC(1,600,000)
Mercury (inorganic)	--	220	--	820	--	530	--	270	--	5,600	--	1,800	--	SC(15,000,000)	--	12	--	0.9
Molybdenum	--	9,500	--	34,000	--	17,000	--	8,300	--	SC(180,000)	--	69,000	--	SC(9,900,000,000)	--	380	--	SC(330,000)
Nickel	7,400	4,400	980	1,500	SC(640,000)	35,000	SC(320,000)	18,000	SC(640,000)	SC(270,000)	3,200	4,200	SC(2,200,000)	SC(6,900,000)	15,000	800	--	72
Nitrate	--	SC(3,000,000)	--	SC(11,000,000)	--	SC(5,300,000)	--	SC(2,700,000)	--	SC(56,000,000)	--	SC(22,000,000)	--	SC(3,200,000,000,000)	--	SC(120,000)	--	SC(110,000,000)
Orthophosphate	--	SC(93,000,000)	--	SC(330,000,000)	--	SC(160,000,000)	--	SC(81,000,000)	--	SC(1,700,000,000)	--	SC(670,000,000)	--	SC(97,000,000,000,000)	--	SC(3,700,000)	--	SC(3,300,000,000)
Phosphate	--	SC(93,000,000)	--	SC(330,000,000)	--	SC(160,000,000)	--	SC(81,000,000)	--	SC(1,700,000,000)	--	SC(670,000,000)	--	SC(97,000,000,000,000)	--	SC(3,700,000)	--	--
Silver	--	9,500	--	34,000	--	17,000	--	8,300	--	SC(180,000)	--	69,000	--	SC(9,900,000,000)	--	380	--	SC(330,000)
Thallium	--	19	--	67	--	33	--	17	--	350	--	140	--	SC(20,000,000)	--	0.76	--	660
Vanadium	--	2,400	--	8,300	--	17,000	--	8,300	--	SC(170,000)	--	21,000	--	SC(50,000,000)	--	380	--	SC(330,000)
Zinc	--	SC(570,000)	--	SC(2,000,000)	--	SC(1,000,000)	--	SC(500,000)	--	SC(11,000,000)	--	SC(4,100,000)	--	SC(600,000,000,000)	--	23,000	--	SC(20,000,000)
Volatile Organic Compounds																		
Acetone	--	SC(1,100,000)	--	SC(2,000,000)	--	SC(2,200,000)	--	SC(1,100,000)	--	SC(12,000,000)	--	SC(2,500,000)	--	SC(300,000,000)	--	50,000	--	760
Bromomethane	--	1,100	--	770	--	360	--	180	--	390	--	1,800	--	SC(4,800)	--	8.2	--	0.12
Chloro methane	--	SC(3,100)	--	SC(12,000)	--	SC(5,400)	--	SC(2,700)	--	SC(5,900)	--	SC(27,000)	--	SC(73,000)	--	120	--	1.6
Chloroform	52	SC(4,100)	32	SC(14,000)	17	SC(9,500)	8.6	SC(4,700)	17	SC(14,000)	95	SC(23,000)	93	SC(180,000)	0.39	220	0.039	1.6
Isophorone	SC(66,000)	SC(2,600,000)	5,500	SC(450,000)	SC(24,000)	SC(530,000)	SC(12,000)	SC(270,000)	SC(73,000)	SC(5,100,000)	SC(9,500)	SC(570,000)	--	SC(990,000,000,000)	550	SC(12,000)	SC(520,000)	SC(13,000,000)
Methyl acetate	--	5,500	--	SC(1,500,000)	--	SC(1,100,000)	--	SC(550,000)	--	SC(1,700,000)	--	SC(2,400,000)	--	SC(23,000,000)	--	25,000	--	500
Methylene chloride	840	SC(12,000)	250	SC(12,000)	91	SC(12,000)	46	SC(6,000)	320	SC(38,000)	290	SC(16,000)	1,800	SC(610,000)	2.1	280	0.017	0.8
Toluene	--	SC(8,600)	--	SC(93,000)	--	SC(55,000)	--	SC(27,000)	--	SC(72,000)	--	SC(160,000)	--	SC(900,000)	--	SC(1,300)	--	21
Xylenes, total	--	SC(3,800)	--	SC(71,000)	--	SC(31,000)	--	SC(16,000)	--	SC(33,000)	--	SC(180,000)	--	SC(400,000)	--	SC(710)	--	71
Semi-Volatile Organic Compounds																		
4-Methylphenol	--	SC(89,000)	--	SC(220,000)	--	SC(270,000)	--	SC(130,000)	--	SC(2,600,000)	--	SC(290,000)	--	SC(300,000,000,000)	--	6,100	--	SC(6,600,000)
bis (2-ethylhexyl) phthalate	SC(4,500)	SC(86,000)	SC(370)	SC(45,000)	SC(1,600)	SC(53,000)	SC(820)	SC(27,000)	SC(4,900)	SC(510,000)	SC(650)	SC(57,000)	SC(240,000,000)	SC(40,000,000,000)	38	SC(1,200)	SC(35,000)	SC(1,300,000)
Butylbenzylphthalate	SC(33,000)	SC(1,800,000)	SC(2,800)	SC(450,000)	SC(12,000)	SC(530,000)	SC(6,100)	SC(270,000)	SC(36,000)	SC(5,100,000)	SC(4,800)	SC(570,000)	--	SC(400,000,000,000)	SC(280)	SC(12,000)	SC(260,000)	SC(13,000,000)
Polycyclic Aromatic Hydrocarbons																		
1-Methyl naphthalene	SC(1,200)	SC(33,000)	130	SC(110,000)	SC(450)	SC(140,000)	220	SC(71,000)	SC(770)	SC(580,000)	210	SC(140,000)	SC(6,400)	SC(11,000,000)	10	SC(3,200)	0.9	250
2-Methyl naphthalene	--	SC(1,900)	--	SC(6,300)	--	SC(8,100)	--	SC(4,100)	--	SC(34,000)	--	SC(7,800)	--	SC(660,000)	--	190	--	15
Acenaphthene	--	SC(350,000)	--	SC(96,000)	--	SC(130,000)	--	SC(67,000)	--	SC(800,000)	--	SC(120,000)	--	SC(24,000,000)	--	SC(3,100)	--	SC(530)
Acenaphthylene	--	SC(410,000)	--	SC(98,000)	--	SC(140,000)	--	SC(72,000)	--	SC(1,300,000)	--	SC(120,000)	--	SC(120,000,000,000)	--	SC(3,300)	--	SC(4,000,000)
Anthracene	--	SC(6,600,000)	--	SC(490,000)	--	SC(700,000)	--	SC(350,000)	--	SC(5,600,000)	--	SC(590,000)	--	SC(430,000,000)	--	SC(16,000)	--	SC(9,400)
Benzo (a) anthracene	--	SC(21,000)	--	SC(49,000)	--	SC(71,000)	--	SC(36,000)	--	SC(660,000)	--	SC(59,000)	--	SC(360,000,000)	--	SC(1,600)	--	SC(7,900)
Benzo (a) pyrene	--	SC(43)	--	SC(150)	--	SC(710)	--	SC(360)	--	SC(6,400)	--	SC(300)	--	SC(990,000)	--	SC(16)	--	SC(20,000)
Benzo (b) fluoranthene	--	SC(21,000)	--	SC(49,000)	--	SC(72,000)	--	SC(36,000)	--	SC(670,000)	--	SC(60,000)	--	SC(60,000,000,000)	--	SC(1,600)	--	SC(2,000,000)
Benzo (ghi) perylene	--	SC(21,000)	--	SC(49,000)	--	SC(72,000)	--	SC(36,000)	--	SC(670,000)	--	SC(60,000)	--	SC(60,000,000,000)	--	SC(1,600)	--	SC(2,000,000)
Benzo (k) fluoranthene	--	SC(21,000)	--	SC(49,000)	--	SC(72,000)	--	SC(36,000)	--	SC(670,000)	--	SC(60,000)	--	SC(60,000,000,000)	--	SC(1,600)	--	SC(2,000,000)
Chrysene	--	SC(21,000)	--	SC(49,000)	--	SC(72,000)	--	SC(36,000)	--	SC(670,000)	--	SC(60,000)	--	SC(60,000,000,000)	--	SC(1,600)	--	SC(2,000,000)
Dibenzo (a,h) anthracene	--	SC(43)	--	SC(150)	--	SC(710)	--	SC(360)	--	SC(6,400)	--	SC(300)	--	SC(990,000)	--	16	--	SC(20,000)
Fluoranthene	--	SC(280,000)	--	SC(65,000)	--	SC(95,000)	--	SC(48,000)	--	SC(890,000)	--	SC(79,000)	--	SC(79,000,000,000)	--	SC(2,200)	--	SC(2,700,000)
Fluorene	--	SC(250,000)	--	SC(65,000)	--	SC(92,000)	--	SC(46,000)	--	SC(670,000)	--	SC(79,000)	--	SC(32,000,000)	--	SC(2,100)	--	SC(710)
Indeno (1,2,3-cd) pyrene	--	SC(21,000)	--	SC(49,000)	--	SC(72,000)	--	SC(36,000)	--	SC(670,000)	--	SC(60,000)	--	SC(60,000,000,000)	--	SC(1,600)	--	SC(2,000,000)
Naphthalene	250	SC(940)	30	SC(12,000)	95	SC(6,900)	48	SC(3,500)	150	SC(8,000)	50	SC(24,000)	SC(1,100)	SC(98,000)	2.2	160	0.18	58
Phenanthrene	--	SC(6,900,000)	--	SC(490,000)	--	SC(720,000)	--	SC(360,000)	--	SC(6,700,000)	--	SC(600,000)	--	SC(600,000,000,000)	--	SC(16,000)	--	SC(20,000,000)
Pyrene	--	SC(200,000)	--	SC(49,000)	--	SC(71,000)	--	SC(36,000)	--	SC(640,000)	--	SC(59,000)	--	SC(200,000,000)	--	SC(1,600)	--	SC(4,500)
B(a)P Equivalent	SC(47)	--	3.8	--	4.6	--	2.3	--	SC(60)	--	3.4	--	SC(530,000)	--	0.11	--	SC(120)	--

Table RBC-2.1
Human Health Risk-Based Concentrations

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

COPC	Short-Term Maintenance Worker		Long-Term Maintenance Worker		Camper		Hiker		Hunter		OHV Rider		Tribal		Hypothetical Future Resident		Hypothetical Future Resident Consumer of Home-Produced Food	
	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]	Cancer Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [b]
Pesticides																		
4,4-DDE	SC(250)	SC(610)	24	SC(1,800)	SC(75)	SC(890)	SC(37)	SC(440)	SC(220)	SC(8,400)	SC(49)	SC(1,500)	SC(14,000)	SC(1,400,000)	1.7	20	2.2	SC(30)
4,4-DDT	SC(260)	SC(630)	SC(24)	SC(1,800)	SC(77)	SC(1,500)	SC(39)	SC(750)	SC(240)	SC(15,000)	SC(49)	SC(2,600)	SC(6,000,000)	SC(990,000,000)	1.8	SC(34)	SC(1,500)	SC(33,000)
alpha-Chlordane	68	SC(670)	6.4	SC(1,800)	20	SC(1,500)	10	SC(750)	62	SC(15,000)	13	SC(2,500)	SC(1,700,000)	SC(350,000,000)	0.46	34	SC(380)	SC(33,000)
Dieldrin	5.5	SC(130)	0.52	SC(180)	1.6	SC(150)	0.82	SC(75)	5.1	SC(1,500)	1	SC(260)	SC(130,000)	SC(99,000,000)	0.037	3.4	SC(31)	SC(3,300)
gamma-Chlordane	68	SC(620)	6.4	SC(1,800)	20	SC(1,500)	10	SC(750)	62	SC(15,000)	13	SC(2,500)	SC(1,700,000)	SC(350,000,000)	0.46	34	SC(380)	SC(33,000)
Polychlorinated Biphenyls																		
Total PCBs	23	13	1.9	33	9.6	47	4.8	23	25	SC(380)	3.1	40	SC(740)	SC(29,000)	0.22	1.1	0.11	0.62
Total Petroleum Hydrocarbons																		
TPH as diesel	--	SC(1,600)	--	SC(21,000)	--	SC(11,000)	--	SC(5,700)	--	SC(14,000)	--	SC(38,000)	--	SC(180,000)	--	SC(260)	--	2.4
TPH as motor oil	--	SC(150,000)	--	SC(380,000)	--	SC(450,000)	--	SC(230,000)	--	SC(4,400,000)	--	SC(490,000)	--	SC(340,000,000,000)	--	10,000	--	SC(11,000,000)
Dioxins/Furans																		
TEQ Human	0.00079	0.028	0.000083	0.0033	0.00021	0.0022	0.0001	0.0011	0.00062	0.023	0.0002	0.0052	0.041	SC(53)	0.0000047	0.00005	0.000015	0.00019

Notes:

[a] Cancer risk-based concentrations (RBCs) correspond to a target incremental lifetime cancer risk (ILCR) of 1×10^{-6}. RBCs corresponding to target ILCRs of 10^{-5} and 10^{-4} would be 10 times and 100 times higher, respectively, than the RBCs presented in this table.

[b] Noncancer hazard RBCs correspond to a target chemical-specific hazard quotient (HQ) of 1 for either the potential child or adult receptor as applicable for each potential exposure scenario. For hypothetical future residential and recreational user exposure scenarios where a potential child receptor is evaluated (i.e., camper, hiker, and OHV rider scenarios) the chemical-specific RBCs calculated for the potential child receptor are generally lower than the chemical-specific RBCs for the potential adult receptor; therefore the lower RBCs calculated for the potential child receptor are presented here as the most conservative RBCs for each scenario except for cadmium (see note c below).

[c] As recommended by DTSC, the potential adult receptor scenario is used to calculate the noncancer hazard RBC for cadmium (DTSC 2018).

[d] RBCs presented for lead are the health-based screening levels used to evaluate potential exposures and increases in blood lead levels for the fetus of short- or long-term maintenance workers and hunters and for child recreational users and hypothetical future residents as described in Section 5.3.3 of the main report.

Abbreviations:
-- = not calculated.
B(a)P equivalent = Benzo(a)pyrene equivalent.
COPC = Constituent of Potential Concern.
mg/kg = milligrams per kilogram.
PCB = Polychlorinated biphenyls.
RBC = Risk-Based Concentration.
SC() = The RBCs indicated in parentheses represent an RBC that is greater than the theoretical soil saturation limit for that compound or the theoretical ceiling limit of 100,000 mg/kg (United States Environmental Protection Agency [USEPA] 2018). The theoretical soil saturation limit is the contaminant concentration in soil at which the absorptive limits of the soil particles, the solubility limits of the soil pore water, and saturation of soil pore air have been reached. Calculated soil saturation limits are presented in Table 5-4 of the main report. The theoretical ceiling limit of 100,000 mg/kg is equivalent to a chemical representing 10% by weight of the soil sample. At this contaminant concentration (and higher), the assumptions for soil contact may be violated (for example, soil adherence and wind-borne dispersion assumptions) due to the presence of the foreign substance itself.

TPH = Total Petroleum Hydrocarbons.
TEQ = Toxic Equivalent.

References:
Department of Toxic Substances Control (DTSC). 2018. DTSC-modified Screening Levels (DTSC-SLs). Human Health Risk Assessment (HHRA) Note Number: 3. Human and Ecological Risk Office (HERO). June.

United States Environmental Protection Agency (USEPA). 2018. User's Guide to Regional Screening Levels for Chemical Contaminants, May. Available at: https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide

Table RBC-3.1
Ecological Risk-based Concentrations (Plants and Soil Invertebrates; Wildlife SUF = 1, Selected LOAEL TRVs)

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

Constituent	Units	BTV	Plants	Soil Invertebrates	Ecological Risk-based Concentrations										
					Gambel's Quail[b]		Cactus Wren[b]		Desert Shrew[b]		Merriam's Kangaroo Rat[b]		Red-tailed Hawk	Desert Kit Fox	Nelson's Desert Bighorn Sheep
					SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1	SUF = 1	SUF = 1
					LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL
Inorganics															
Aluminum	mg/kg	16400	pH<5.5	pH<5.5	--	--	--	--	--	--	--	--	--	--	--
Antimony	mg/kg	NC	5	78	--	--	--	--	--	**2.8**	--	135	--	594	95
Arsenic	mg/kg	11	**18**	60	--	654	--	128	--	162	--	462	2823	1561	358
Barium	mg/kg	410	500	**330**	--	--	--	--	--	3666	--	5582	--	83415	13198
Beryllium	mg/kg	0.672	**10**	40	--	--	--	--	--	48	--	29	--	636	62
Cadmium	mg/kg	1.1	32	140	--	1294	--	**5.9**	--	6.8	--	2180	4627	7106	1278
Calcium	mg/kg	66500	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium, hexavalent	mg/kg	0.83	1	**0.4**	--	4498	--	342	--	580	--	7186	9143	24846	8205
Chromium, total	mg/kg	39.8	--	**57**	--	2807	--	213	--	145	--	1800	5205	5257	2056
Cobalt	mg/kg	12.7	**13**	--	--	4281	--	464	--	652	--	7259	1795	3220	4455
Copper	mg/kg	16.8	**70**	80	--	2618	--	109	--	145	--	5262	8857	8417	2135
Cyanide	mg/kg	NC	**--**	**0.9**	--	100	--	23	--	3079	--	6335	360	12623	2135
Iron	mg/kg	29303	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	8.39	120	1700	--	716	--	**36**	--	131	--	3445	1179	7049	1508
Magnesium	mg/kg	12100	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	402	**220**	450	--	53678	--	18235	--	18065	--	17203	137680	84931	28006
Mercury	mg/kg	NC	0.3	**0.1**	--	25	--	1.0	--	589	--	1275	11	514	666
Molybdenum	mg/kg	1.37	**2**	--	--	2601	--	300	--	22	--	115	31794	2620	217
Nickel	mg/kg	27.3	38	280	--	4137	--	88	--	**16**	--	957	12275	2388	478
Potassium	mg/kg	4400	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	1.47	**0.52**	4.1	--	19	--	4.4	--	2.3	--	6.0	185	89	16
Silver	mg/kg	NC	560	--	--	4466	--	**52**	--	209	--	26890	14156	53195	13969
Sodium	mg/kg	2070	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	NC	**1**	--	--	845	--	30	--	12	--	621	350	289	250
Vanadium	mg/kg	52.2	**2**	--	--	165	--	28	--	660	--	3503	330	5831	1284
Zinc	mg/kg	58	160	**120**	--	29178	--	1050	--	4719	--	60824	141512	293694	64818

Table RBC-3.1
Ecological Risk-based Concentrations (Plants and Soil Invertebrates; Wildlife SUF = 1, Selected LOAEL TRVs)

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

Constituent	Units	BTV	Plants	Soil Invertebrates	Ecological Risk-based Concentrations										
					Gambel's Quail[b]		Cactus Wren[b]		Desert Shrew[b]		Merriam's Kangaroo Rat[b]		Red-tailed Hawk	Desert Kit Fox	Nelson's Desert Bighorn Sheep
					SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1	SUF = 1	SUF = 1
					LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL
Volatile Organic Compounds															
1,2,4-Trimethylbenzene	mg/kg	NC	--	**0.09**	--	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	mg/kg	NC	--	**0.16**	--	--	--	--	--	--	--	--	--	--	--
Acetone	mg/kg	NC	--	**0.04**	--	--	--	--	--	12315	--	25340	--	50494	8856
Bromomethane	mg/kg	NC	--	**0.002**	--	--	--	--	--	--	--	--	--	--	--
Chloro methane	mg/kg	NC	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform	mg/kg	NC	--	**0.05**	--	--	--	--	--	10098	--	20779	--	41405	7262
Ethyl- benzene	mg/kg	NC	--	**0.27**	--	--	--	--	--	71675	--	147478	--	293872	51543
Isopropylbenzene	mg/kg	NC	--	**0.04**	--	--	--	--	--	--	--	--	--	--	--
Methyl acetate	mg/kg	NC	--	--	--	--	--	--	--	88670	--	182447	--	363553	**63764**
Methyl ethyl ketone	mg/kg	NC	--	**1**	--	--	--	--	--	1125857	--	2316568	--	4616115	809625
Methylene chloride	mg/kg	NC	1600	**0.21**	--	--	--	--	--	12315	--	25340	--	50494	8856
N-Butylbenzene	mg/kg	NC	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Propylbenzene	mg/kg	NC	--	--	--	--	--	--	--	--	--	--	--	--	--
sec-Butylbenzene	mg/kg	NC	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	NC	200	**0.15**	--	--	--	--	--	64039	--	131767	--	262566	39740
Xylene, m,p-	mg/kg	NC	100	**0.1**	--	--	--	--	--	640	--	1318	--	2626	397
Xylene, o-	mg/kg	NC	100	**0.1**	--	--	--	--	--	640	--	1318	--	2626	397
Xylenes, total	mg/kg	NC	100	**0.1**	--	--	--	--	--	640	--	1318	--	2626	397
Semi-Volatile Organic Compounds															
2,4-Dimethylphenol	mg/kg	NC	--	**0.04**	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	NC	10	**0.08**	--	--	--	--	--	--	--	--	--	--	--
Bis (2-ethylhexyl) phthalate	mg/kg	NC	200	200	--	2759	--	**29**	--	447	--	92744	9911	184806	27971
Butylbenzylphthalate	mg/kg	NC	--	**0.59**	--	--	--	--	--	--	--	--	--	--	--
Carbazole	mg/kg	NC	--	**2800**	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	NC	6.1	**0.15**	--	--	--	--	--	48.9	--	21	--	30296	92
Di-n-butyl phthalate	mg/kg	NC	200	200	--	276	--	**0.47**	--	709.9	--	928959	991	1851091	280168
Isophorone	mg/kg	NC	--	--	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	NC	**5**	31	--	291	--	25	--	7.6	--	46	10592	6817	265
Polycyclic Aromatic Hydrocarbons															
PAH Low molecular weight	mg/kg	0.2674	**10**	29	--	56818	--	397	--	528	--	163626	205428	331237	79514
PAH High molecular weight	mg/kg	0.0376	**1.2**	18	--	12157	--	203	--	5.8	--	233	90100	3100	519
Pesticides															
4,4-DDE	mg/kg	NC	0.9	**0.01**	--	487	--	1.0	--	0.26	--	194	0.036	0.020	109
4,4-DDT	mg/kg	NC	0.9	**0.01**	--	487	--	1.5	--	0.38	--	194	2.7	1.6	109
Alpha-Chlordane	mg/kg	NC	0.224	**0.0043**	--	949	--	2.4	--	1.9	--	523	111	212	861
Dieldrin	mg/kg	NC	1	**0.05**	--	192	--	1.4	--	0.010	--	0.84	39	0.69	2.1
Gamma-Chlordane	mg/kg	NC	0.224	**0.0043**	--	949	--	2.4	--	1.9	--	523	111	212	861
Polychlorinated Biphenyls															
Total PCBs	mg/kg	NC	40	**1**	--	291	--	1.5	--	1.4	--	458	40	71	189

Table RBC-3.1
Ecological Risk-based Concentrations (Plants and Soil Invertebrates; Wildlife SUF = 1, Selected LOAEL TRVs)

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

Constituent	Units	BTV	Plants	Soil Invertebrates	Ecological Risk-based Concentrations										
					Gambel's Quail[b]		Cactus Wren[b]		Desert Shrew[b]		Merriam's Kangaroo Rat[b]		Red-tailed Hawk	Desert Kit Fox	Nelson's Desert Bighorn Sheep
					SUF = 1		SUF = 1		SUF = 1		SUF = 1		SUF = 1	SUF = 1	SUF = 1
					LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL	LOAEL
Dioxins															
2,3,7,8-TCDD	ng/kg	NC	--	**8800**	--	--	--	--	--	--	--	--	--	--	--
TEQ Avian	ng/kg	5.98	--	--	31441	--	**217**	721	--	--	--	--	NA	--	--
TEQ Mammals	ng/kg	5.58	--	--	--	--	--	--	**192**	358	13689	--	--	NA	NA

Notes:

[a] The lowest overall RBC (based on plants, invertebrates, and wildlife) is **bolded**. The lowest wildlife RBC is underlined.

[b] For the desert shrew, kangaroo rat, Gambel's quail, and cactus wren, alternate and more robust uptake models and TRVs were developed for dioxin TEQ (See Section 8.2 of the main report). The following assumptions were applied:

- For invertivorous/insectivorous species (cactus wren and desert shrew), the congener-specific BAFs (USEPA 1999 and Fagervold et al. 2010) were used.
- For herbivorous species (Gambel's quail and Merriam's kangaroo rat), the congener-specific BAFs (USEPA 1999) were used. Vegetation BAFs are not available from Fagervold et al. (2010).
- A recommended mammalian dioxin TRV of 30 ng/kg bw-day was used to calculate the RBC protective of small mammals, and the selected dioxin LOAEL TRV (140 ng/kg bw-day) was used to calculate the RBC protective of birds.
- The surface soil EPCs (0 to 0.5 ft bgs) calculated for Bat Cave Wash exposure area were used to develop the congener-specific dioxin TEQ tissue concentrations.

Abbreviations:

-- = no toxicity value available, RBC could not be estimated
BTV = background threshold value
HQ = hazard quotient
LOAEL = lowest observed adverse effect level
mg/kg = milligrams per kilogram
NA = not applicable
NC = not calculated
ng/kg = nanograms per kilogram
NOAEL = no-observed adverse effect level
PAH = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyls
RBC = risk-based concentration
SUF = site use factor
TRV = toxicity reference value

References:

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

ATTACHMENT A

Risk-Based Concentration Calculations for Terrestrial Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Inorganics												
Aluminum	Gambel's Quail	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00	--	--	--	4.0E-03
Antimony	Gambel's Quail	100% Plants	1.0E-01	3.9E-02	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.5E-03	--	--	4.0E-03
Arsenic	Gambel's Quail	100% Plants	1.0E-01	2.5E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	9.4E-01	--	--	2.6E+00
Barium	Gambel's Quail	100% Plants	1.0E-01	1.6E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	6.0E-03	--	--	4.0E-03
Beryllium	Gambel's Quail	100% Plants	1.0E-01	5.9E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	2.2E-02	--	--	4.0E-03
Cadmium	Gambel's Quail	100% Plants	1.0E-01	3.1E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.2E+00	--	--	5.2E+00
Calcium	Gambel's Quail	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00	--	--	--	4.0E-03
Chromium, hexavalent	Gambel's Quail	100% Plants	1.0E-01	1.8E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00	7.1E+00	--	--	1.8E+01
Chromium, total	Gambel's Quail	100% Plants	1.0E-01	1.2E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00	4.4E+00	--	--	1.1E+01
Cobalt	Gambel's Quail	100% Plants	1.0E-01	3.2E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.2E+00	--	--	1.7E+01
Copper	Gambel's Quail	100% Plants	1.0E-01	4.3E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.7E+00	--	--	1.0E+01
Cyanide	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	4.0E-01
Iron	Gambel's Quail	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00	--	--	--	4.0E-03
Lead	Gambel's Quail	100% Plants	1.0E-01	1.1E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	4.1E-01	--	--	2.9E+00
Magnesium	Gambel's Quail	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00	--	--	--	4.0E-03
Manganese	Gambel's Quail	100% Plants	1.0E-01	4.2E+03	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.6E+02	--	--	2.1E+02
Mercury	Gambel's Quail	100% Plants	1.0E-01	2.1E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	8.1E-02	--	--	9.9E-02
Molybdenum	Gambel's Quail	100% Plants	1.0E-01	6.5E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00	2.5E+01	--	--	1.0E+01
Nickel	Gambel's Quail	100% Plants	1.0E-01	5.5E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	2.1E+00	--	--	1.6E+01
Potassium	Gambel's Quail	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00	--	--	--	4.0E-03
Selenium	Gambel's Quail	100% Plants	1.0E-01	1.3E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	5.0E-01	--	--	7.6E-02
Silver	Gambel's Quail	100% Plants	1.0E-01	6.3E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	2.4E+00	--	--	1.8E+01
Sodium	Gambel's Quail	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00	--	--	--	4.0E-03
Thallium	Gambel's Quail	100% Plants	1.0E-01	3.4E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.3E-01	--	--	3.4E+00
Vanadium	Gambel's Quail	100% Plants	1.0E-01	8.0E-01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	3.1E-02	--	--	6.6E-01
Zinc	Gambel's Quail	100% Plants	1.0E-01	1.4E+03	1.7E-01	3.8E-02	4.0E-03	1.0E+00	5.5E+01	--	--	1.2E+02
Volatile Organic Compounds												
1,2,4-Trimethylbenzene	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
1,3,5-Trimethylbenzene	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Acetone	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Bromomethane	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Chloro methane	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Chloroform	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Ethyl- benzene	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Isopropylbenzene	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Methyl acetate	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Methyl ethyl ketone	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Methylene chloride	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
N-Butylbenzene	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
N-Propylbenzene	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
sec-Butylbenzene	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Toluene	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Xylene, m,p-	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Xylene, o-	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Xylenes, total	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Inorganics					
Aluminum	Gambel's Quail	4.0E-03	pH<5.5	--	--
Antimony	Gambel's Quail	5.5E-03	--	--	--
Arsenic	Gambel's Quail	3.6E+00	3.6E+00	1E+00	6.5E+02
Barium	Gambel's Quail	1.0E-02	--	--	--
Beryllium	Gambel's Quail	2.6E-02	--	--	--
Cadmium	Gambel's Quail	6.4E+00	6.4E+00	1E+00	1.3E+03
Calcium	Gambel's Quail	4.0E-03	--	--	--
Chromium, hexavalent	Gambel's Quail	2.5E+01	2.5E+01	1E+00	4.5E+03
Chromium, total	Gambel's Quail	1.6E+01	1.6E+01	1E+00	2.8E+03
Cobalt	Gambel's Quail	1.8E+01	1.8E+01	1E+00	4.3E+03
Copper	Gambel's Quail	1.2E+01	1.2E+01	1E+00	2.6E+03
Cyanide	Gambel's Quail	4.0E-01	4.0E-01	1E+00	1.0E+02
Iron	Gambel's Quail	4.0E-03	--	--	--
Lead	Gambel's Quail	3.3E+00	3.3E+00	1E+00	7.2E+02
Magnesium	Gambel's Quail	4.0E-03	--	--	--
Manganese	Gambel's Quail	3.8E+02	3.8E+02	1E+00	5.4E+04
Mercury	Gambel's Quail	1.8E-01	1.8E-01	1E+00	2.5E+01
Molybdenum	Gambel's Quail	3.5E+01	3.5E+01	1E+00	2.6E+03
Nickel	Gambel's Quail	1.9E+01	1.9E+01	1E+00	4.1E+03
Potassium	Gambel's Quail	4.0E-03	--	--	--
Selenium	Gambel's Quail	5.8E-01	5.8E-01	1E+00	1.9E+01
Silver	Gambel's Quail	2.0E+01	2.0E+01	1E+00	4.5E+03
Sodium	Gambel's Quail	4.0E-03	--	--	--
Thallium	Gambel's Quail	3.5E+00	3.5E+00	1E+00	8.5E+02
Vanadium	Gambel's Quail	6.9E-01	6.9E-01	1E+00	1.6E+02
Zinc	Gambel's Quail	1.7E+02	1.7E+02	1E+00	2.9E+04
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	Gambel's Quail	1.2E+02	--	--	--
1,3,5-Trimethylbenzene	Gambel's Quail	1.2E+02	--	--	--
Acetone	Gambel's Quail	1.2E+02	--	--	--
Bromomethane	Gambel's Quail	1.2E+02	--	--	--
Chloro methane	Gambel's Quail	1.2E+02	--	--	--
Chloroform	Gambel's Quail	1.2E+02	--	--	--
Ethyl- benzene	Gambel's Quail	1.2E+02	--	--	--
Isopropylbenzene	Gambel's Quail	1.2E+02	--	--	--
Methyl acetate	Gambel's Quail	1.2E+02	--	--	--
Methyl ethyl ketone	Gambel's Quail	1.2E+02	--	--	--
Methylene chloride	Gambel's Quail	1.2E+02	--	--	--
N-Butylbenzene	Gambel's Quail	1.2E+02	--	--	--
N-Propylbenzene	Gambel's Quail	1.2E+02	--	--	--
sec-Butylbenzene	Gambel's Quail	1.2E+02	--	--	--
Toluene	Gambel's Quail	1.2E+02	--	--	--
Xylene, m,p-	Gambel's Quail	1.2E+02	--	--	--
Xylene, o-	Gambel's Quail	1.2E+02	--	--	--
Xylenes, total	Gambel's Quail	1.2E+02	--	--	--

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Semi-Volatile Organic Compounds												
2,4-Dimethylphenol	Gambel's Quail	100% Plants	1.0E-01	7.0E+05	1.7E-01	3.8E-02	4.0E-03	1.0E+00	2.7E+04	--	--	1.2E+02
4-Methylphenol	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Bis (2-ethylhexyl) phthalate	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.1E+01
Butylbenzylphthalate	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Carbazole	Gambel's Quail	100% Plants	1.0E-01	5.3E+05	1.7E-01	3.8E-02	4.0E-03	1.0E+00	2.0E+04	--	--	1.2E+02
Dibenzofuran	Gambel's Quail	100% Plants	1.0E-01	5.0E+05	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.9E+04	--	--	1.2E+02
Di-n-butyl phthalate	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.1E+00
Isophorone	Gambel's Quail	100% Plants	1.0E-01	0.0E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Pentachlorophenol	Gambel's Quail	100% Plants	1.0E-01	1.7E+03	1.7E-01	3.8E-02	4.0E-03	1.0E+00	6.6E+01	--	--	1.2E+00
Polycyclic Aromatic Hydrocarbons												
PAH Low molecular weight	Gambel's Quail	100% Plants	1.0E-01	3.9E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.5E+00	--	--	2.3E+02
PAH High molecular weight	Gambel's Quail	100% Plants	1.0E-01	1.3E+03	1.7E-01	3.8E-02	4.0E-03	1.0E+00	5.2E+01	--	--	4.8E+01
Pesticides												
4,4-DDE	Gambel's Quail	100% Plants	1.0E-01	8.5E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	3.3E-01	--	--	1.9E+00
4,4-DDT	Gambel's Quail	100% Plants	1.0E-01	8.5E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	3.3E-01	--	--	1.9E+00
Alpha-Chlordane	Gambel's Quail	100% Plants	1.0E-01	1.8E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00	6.9E+00	--	--	3.8E+00
Dieldrin	Gambel's Quail	100% Plants	1.0E-01	7.9E+01	1.7E-01	3.8E-02	4.0E-03	1.0E+00	3.0E+00	--	--	7.6E-01
Gamma-Chlordane	Gambel's Quail	100% Plants	1.0E-01	1.8E+02	1.7E-01	3.8E-02	4.0E-03	1.0E+00	6.9E+00	--	--	3.8E+00
Polychlorinated Biphenyls												
Total PCBs	Gambel's Quail	100% Plants	1.0E-01	2.9E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	1.1E-01	--	--	1.2E+00
Dioxins (presented in ng/kg)												
TEQ Avian	Gambel's Quail	100% Plants	1.0E-01	1.3E+00	1.7E-01	3.8E-02	4.0E-03	1.0E+00	5.0E-02	--	--	4.3E-01
TEQ Avian	Gambel's Quail	100% Plants	1.0E-01	--	1.7E-01	3.8E-02	4.0E-03	1.0E+00	--	--	--	4.3E-01
Inorganics												
Aluminum	Cactus Wren	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	--	--	1.7E-02
Antimony	Cactus Wren	100% Insects	9.3E-02	1.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.8E-01	--	1.7E-02
Arsenic	Cactus Wren	100% Insects	9.3E-02	7.4E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.4E+00	--	2.2E+00
Barium	Cactus Wren	100% Insects	9.3E-02	9.1E-02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.7E-02	--	1.7E-02
Beryllium	Cactus Wren	100% Insects	9.3E-02	4.5E-02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	8.2E-03	--	1.7E-02
Cadmium	Cactus Wren	100% Insects	9.3E-02	3.4E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	6.2E+00	--	1.0E-01
Calcium	Cactus Wren	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	--	--	1.7E-02
Chromium, hexavalent	Cactus Wren	100% Insects	9.3E-02	1.0E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.9E+01	--	5.8E+00
Chromium, total	Cactus Wren	100% Insects	9.3E-02	6.5E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.2E+01	--	3.6E+00
Cobalt	Cactus Wren	100% Insects	9.3E-02	5.7E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.0E+01	--	7.9E+00
Copper	Cactus Wren	100% Insects	9.3E-02	5.6E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.0E+01	--	1.9E+00
Cyanide	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	4.0E-01
Iron	Cactus Wren	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	--	--	1.7E-02
Lead	Cactus Wren	100% Insects	9.3E-02	1.4E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	2.6E+00	--	6.1E-01
Magnesium	Cactus Wren	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	--	--	1.7E-02
Manganese	Cactus Wren	100% Insects	9.3E-02	3.6E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	6.6E+01	--	3.1E+02
Mercury	Cactus Wren	100% Insects	9.3E-02	9.2E-01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.7E-01	--	1.7E-02
Molybdenum	Cactus Wren	100% Insects	9.3E-02	1.6E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	3.0E+01	--	5.1E+00
Nickel	Cactus Wren	100% Insects	9.3E-02	9.3E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.7E+01	--	1.5E+00
Potassium	Cactus Wren	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	--	--	1.7E-02
Selenium	Cactus Wren	100% Insects	9.3E-02	2.7E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	5.0E-01	--	7.5E-02
Silver	Cactus Wren	100% Insects	9.3E-02	1.1E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.9E+01	--	8.8E-01
Sodium	Cactus Wren	100% Insects	9.3E-02	--	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	--	--	1.7E-02
Thallium	Cactus Wren	100% Insects	9.3E-02	1.6E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	3.0E+00	--	5.1E-01
Vanadium	Cactus Wren	100% Insects	9.3E-02	1.2E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	2.1E-01	--	4.7E-01
Zinc	Cactus Wren	100% Insects	9.3E-02	8.4E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.5E+02	--	1.8E+01

Table RBC-A
Risk-Based Concentration Calculations for Ecological
Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	Gambel's Quail	2.7E+04	--	--	--
4-Methylphenol	Gambel's Quail	1.2E+02	--	--	--
Bis (2-ethylhexyl) phthalate	Gambel's Quail	1.1E+01	1.1E+01	1E+00	2.8E+03
Butylbenzylphthalate	Gambel's Quail	1.2E+02	--	--	--
Carbazole	Gambel's Quail	2.0E+04	--	--	--
Dibenzofuran	Gambel's Quail	1.9E+04	--	--	--
Di-n-butyl phthalate	Gambel's Quail	1.1E+00	1.1E+00	1E+00	2.8E+02
Isophorone	Gambel's Quail	1.2E+02	--	--	--
Pentachlorophenol	Gambel's Quail	6.7E+01	6.7E+01	1E+00	2.9E+02
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	Gambel's Quail	2.3E+02	2.3E+02	1E+00	5.7E+04
PAH High molecular weight	Gambel's Quail	1.0E+02	1.0E+02	1E+00	1.2E+04
Pesticides					
4,4-DDE	Gambel's Quail	2.3E+00	2.3E+00	1E+00	4.9E+02
4,4-DDT	Gambel's Quail	2.3E+00	2.3E+00	1E+00	4.9E+02
Alpha-Chlordane	Gambel's Quail	1.1E+01	1.1E+01	1E+00	9.5E+02
Dieldrin	Gambel's Quail	3.8E+00	3.8E+00	1E+00	1.9E+02
Gamma-Chlordane	Gambel's Quail	1.1E+01	1.1E+01	1E+00	9.5E+02
Polychlorinated Biphenyls					
Total PCBs	Gambel's Quail	1.3E+00	1.3E+00	1E+00	2.9E+02
Dioxins (presented in ng/kg)					
TEQ Avian	Gambel's Quail	4.8E-01	1.4E+02	3E-03	3.1E+04
TEQ Avian	Gambel's Quail	4.3E-01	1.4E+02	3E-03	--
Inorganics					
Aluminum	Cactus Wren	1.7E-02	pH<5.5	--	--
Antimony	Cactus Wren	2.0E-01	--	--	--
Arsenic	Cactus Wren	3.6E+00	3.6E+00	1E+00	1.3E+02
Barium	Cactus Wren	3.4E-02	--	--	--
Beryllium	Cactus Wren	2.5E-02	--	--	--
Cadmium	Cactus Wren	6.4E+00	6.4E+00	1E+00	5.9E+00
Calcium	Cactus Wren	1.7E-02	--	--	--
Chromium, hexavalent	Cactus Wren	2.5E+01	2.5E+01	1E+00	3.4E+02
Chromium, total	Cactus Wren	1.6E+01	1.6E+01	1E+00	2.1E+02
Cobalt	Cactus Wren	1.8E+01	1.8E+01	1E+00	4.6E+02
Copper	Cactus Wren	1.2E+01	1.2E+01	1E+00	1.1E+02
Cyanide	Cactus Wren	4.0E-01	4.0E-01	1E+00	2.3E+01
Iron	Cactus Wren	1.7E-02	--	--	--
Lead	Cactus Wren	3.3E+00	3.3E+00	1E+00	3.6E+01
Magnesium	Cactus Wren	1.7E-02	--	--	--
Manganese	Cactus Wren	3.8E+02	3.8E+02	1E+00	1.8E+04
Mercury	Cactus Wren	1.9E-01	1.8E-01	1E+00	1.0E+00
Molybdenum	Cactus Wren	3.5E+01	3.5E+01	1E+00	3.0E+02
Nickel	Cactus Wren	1.9E+01	1.9E+01	1E+00	8.8E+01
Potassium	Cactus Wren	1.7E-02	--	--	--
Selenium	Cactus Wren	5.8E-01	5.8E-01	1E+00	4.4E+00
Silver	Cactus Wren	2.0E+01	2.0E+01	1E+00	5.2E+01
Sodium	Cactus Wren	1.7E-02	--	--	--
Thallium	Cactus Wren	3.5E+00	3.5E+00	1E+00	3.0E+01
Vanadium	Cactus Wren	6.9E-01	6.9E-01	1E+00	2.8E+01
Zinc	Cactus Wren	1.7E+02	1.7E+02	1E+00	1.0E+03

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Volatile Organic Compounds												
1,2,4-Trimethylbenzene	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
1,3,5-Trimethylbenzene	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Acetone	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Bromomethane	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Chloro methane	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Chloroform	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Ethyl- benzene	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Isopropylbenzene	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Methyl acetate	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Methyl ethyl ketone	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Methylene chloride	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
N-Butylbenzene	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
N-Propylbenzene	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
sec-Butylbenzene	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Toluene	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Xylene, m,p-	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Xylene, o-	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Xylenes, total	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Semi-Volatile Organic Compounds												
2,4-Dimethylphenol	Cactus Wren	100% Insects	9.3E-02	7.9E+04	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.4E+04	--	5.0E+02
4-Methylphenol	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Bis (2-ethylhexyl) phthalate	Cactus Wren	100% Insects	9.3E-02	5.7E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.1E+01	--	4.9E-01
Butylbenzylphthalate	Cactus Wren	100% Insects	9.3E-02	6.5E+05	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.2E+05	--	5.0E+02
Carbazole	Cactus Wren	100% Insects	9.3E-02	2.9E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	5.3E+01	--	5.0E+02
Dibenzofuran	Cactus Wren	100% Insects	9.3E-02	8.8E+04	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.6E+04	--	5.0E+02
Di-n-butyl phthalate	Cactus Wren	100% Insects	9.3E-02	6.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.1E+00	--	8.0E-03
Isophorone	Cactus Wren	100% Insects	9.3E-02	0.0E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	0.0E+00	--	5.0E+02
Pentachlorophenol	Cactus Wren	100% Insects	9.3E-02	3.6E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	6.7E+01	--	4.3E-01
Polycyclic Aromatic Hydrocarbons												
PAH Low molecular weight	Cactus Wren	100% Insects	9.3E-02	1.2E+03	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	2.2E+02	--	6.8E+00
PAH High molecular weight	Cactus Wren	100% Insects	9.3E-02	5.3E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	9.7E+01	--	3.5E+00
Pesticides												
4,4-DDE	Cactus Wren	100% Insects	9.3E-02	1.2E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	2.3E+00	--	1.8E-02
4,4-DDT	Cactus Wren	100% Insects	9.3E-02	1.2E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	2.2E+00	--	2.6E-02
Alpha-Chlordane	Cactus Wren	100% Insects	9.3E-02	5.8E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.1E+01	--	4.1E-02
Dieldrin	Cactus Wren	100% Insects	9.3E-02	2.0E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	3.8E+00	--	2.4E-02
Gamma-Chlordane	Cactus Wren	100% Insects	9.3E-02	5.8E+01	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.1E+01	--	4.1E-02
Polychlorinated Biphenyls												
Total PCBs	Cactus Wren	100% Insects	9.3E-02	6.8E+00	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.2E+00	--	2.5E-02
Dioxins (presented in ng/kg)												
TEQ Avian	Cactus Wren	100% Insects	9.3E-02	3.7E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	6.8E+01	--	1.8E+00
TEQ Avian	Cactus Wren	100% Insects	9.3E-02	1.0E+02	3.9E-02	1.8E-01	1.7E-02	1.0E+00	--	1.9E+01	--	1.8E+00

Table RBC-A
Risk-Based Concentration Calculations for Ecological
Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	Cactus Wren	5.0E+02	--	--	--
1,3,5-Trimethylbenzene	Cactus Wren	5.0E+02	--	--	--
Acetone	Cactus Wren	5.0E+02	--	--	--
Bromomethane	Cactus Wren	5.0E+02	--	--	--
Chloro methane	Cactus Wren	5.0E+02	--	--	--
Chloroform	Cactus Wren	5.0E+02	--	--	--
Ethyl- benzene	Cactus Wren	5.0E+02	--	--	--
Isopropylbenzene	Cactus Wren	5.0E+02	--	--	--
Methyl acetate	Cactus Wren	5.0E+02	--	--	--
Methyl ethyl ketone	Cactus Wren	5.0E+02	--	--	--
Methylene chloride	Cactus Wren	5.0E+02	--	--	--
N-Butylbenzene	Cactus Wren	5.0E+02	--	--	--
N-Propylbenzene	Cactus Wren	5.0E+02	--	--	--
sec-Butylbenzene	Cactus Wren	5.0E+02	--	--	--
Toluene	Cactus Wren	5.0E+02	--	--	--
Xylene, m,p-	Cactus Wren	5.0E+02	--	--	--
Xylene, o-	Cactus Wren	5.0E+02	--	--	--
Xylenes, total	Cactus Wren	5.0E+02	--	--	--
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	Cactus Wren	1.5E+04	--	--	--
4-Methylphenol	Cactus Wren	5.0E+02	--	--	--
Bis (2-ethylhexyl) phthalate	Cactus Wren	1.1E+01	1.1E+01	1E+00	2.9E+01
Butylbenzylphthalate	Cactus Wren	1.2E+05	--	--	--
Carbazole	Cactus Wren	5.5E+02	--	--	--
Dibenzofuran	Cactus Wren	1.7E+04	--	--	--
Di-n-butyl phthalate	Cactus Wren	1.1E+00	1.1E+00	1E+00	4.7E-01
Isophorone	Cactus Wren	5.0E+02	--	--	--
Pentachlorophenol	Cactus Wren	6.7E+01	6.7E+01	1E+00	2.5E+01
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	Cactus Wren	2.3E+02	2.3E+02	1E+00	4.0E+02
PAH High molecular weight	Cactus Wren	1.0E+02	1.0E+02	1E+00	2.0E+02
Pesticides					
4,4-DDE	Cactus Wren	2.3E+00	2.3E+00	1E+00	1.0E+00
4,4-DDT	Cactus Wren	2.3E+00	2.3E+00	1E+00	1.5E+00
Alpha-Chlordane	Cactus Wren	1.1E+01	1.1E+01	1E+00	2.4E+00
Dieldrin	Cactus Wren	3.8E+00	3.8E+00	1E+00	1.4E+00
Gamma-Chlordane	Cactus Wren	1.1E+01	1.1E+01	1E+00	2.4E+00
Polychlorinated Biphenyls					
Total PCBs	Cactus Wren	1.3E+00	1.3E+00	1E+00	1.5E+00
Dioxins (presented in ng/kg)					
TEQ Avian	Cactus Wren	7.0E+01	1.4E+02	5E-01	2.2E+02
TEQ Avian	Cactus Wren	2.1E+01	1.4E+02	2E-01	7.2E+02

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Inorganics												
Aluminum	Red-Tailed Hawk	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	--	1.1E-03
Antimony	Red-Tailed Hawk	100% Mammals	1.4E-02	5.0E-02	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	4.0E-03	1.1E-03
Arsenic	Red-Tailed Hawk	100% Mammals	1.4E-02	5.3E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	4.2E-01	3.1E+00
Barium	Red-Tailed Hawk	100% Mammals	1.4E-02	1.2E-03	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	9.3E-05	1.1E-03
Beryllium	Red-Tailed Hawk	100% Mammals	1.4E-02	2.3E-03	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.8E-04	1.1E-03
Cadmium	Red-Tailed Hawk	100% Mammals	1.4E-02	1.5E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.2E+00	5.1E+00
Calcium	Red-Tailed Hawk	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	--	1.1E-03
Chromium, hexavalent	Red-Tailed Hawk	100% Mammals	1.4E-02	1.9E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.5E+01	1.0E+01
Chromium, total	Red-Tailed Hawk	100% Mammals	1.4E-02	1.2E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	9.8E+00	5.8E+00
Cobalt	Red-Tailed Hawk	100% Mammals	1.4E-02	2.1E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.6E+01	2.0E+00
Copper	Red-Tailed Hawk	100% Mammals	1.4E-02	2.9E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	2.3E+00	9.8E+00
Cyanide	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	4.0E-01
Iron	Red-Tailed Hawk	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	--	1.1E-03
Lead	Red-Tailed Hawk	100% Mammals	1.4E-02	2.5E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	2.0E+00	1.3E+00
Magnesium	Red-Tailed Hawk	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	--	1.1E-03
Manganese	Red-Tailed Hawk	100% Mammals	1.4E-02	2.8E+03	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	2.2E+02	1.5E+02
Mercury	Red-Tailed Hawk	100% Mammals	1.4E-02	2.1E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.7E-01	1.2E-02
Molybdenum	Red-Tailed Hawk	100% Mammals	1.4E-02	1.7E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.3E-02	3.5E+01
Nickel	Red-Tailed Hawk	100% Mammals	1.4E-02	6.3E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	5.0E+00	1.4E+01
Potassium	Red-Tailed Hawk	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	--	1.1E-03
Selenium	Red-Tailed Hawk	100% Mammals	1.4E-02	4.7E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	3.7E-01	2.1E-01
Silver	Red-Tailed Hawk	100% Mammals	1.4E-02	5.7E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	4.5E+00	1.6E+01
Sodium	Red-Tailed Hawk	100% Mammals	1.4E-02	--	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	--	1.1E-03
Thallium	Red-Tailed Hawk	100% Mammals	1.4E-02	3.9E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	3.1E+00	3.9E-01
Vanadium	Red-Tailed Hawk	100% Mammals	1.4E-02	4.1E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	3.2E-01	3.7E-01
Zinc	Red-Tailed Hawk	100% Mammals	1.4E-02	1.8E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.4E+01	1.6E+02
Volatile Organic Compounds												
1,2,4-Trimethylbenzene	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
1,3,5-Trimethylbenzene	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Acetone	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Bromomethane	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Chloro methane	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Chloroform	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Ethyl- benzene	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Isopropylbenzene	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Methyl acetate	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Methyl ethyl ketone	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Methylene chloride	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
N-Butylbenzene	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
N-Propylbenzene	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
sec-Butylbenzene	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Toluene	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Xylene, m,p-	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Xylene, o-	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Xylenes, total	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day)	HQ (unitless)[c]	Risk-Based Concentration (mg/kg)[d,e]
			LOAEL	LOAEL	LOAEL
Inorganics					
Aluminum	Red-Tailed Hawk	1.1E-03	pH<5.5	--	--
Antimony	Red-Tailed Hawk	5.1E-03	--	--	--
Arsenic	Red-Tailed Hawk	3.6E+00	3.6E+00	1E+00	2.8E+03
Barium	Red-Tailed Hawk	1.2E-03	--	--	--
Beryllium	Red-Tailed Hawk	1.3E-03	--	--	--
Cadmium	Red-Tailed Hawk	6.4E+00	6.4E+00	1E+00	4.6E+03
Calcium	Red-Tailed Hawk	1.1E-03	--	--	--
Chromium, hexavalent	Red-Tailed Hawk	2.5E+01	2.5E+01	1E+00	9.1E+03
Chromium, total	Red-Tailed Hawk	1.6E+01	1.6E+01	1E+00	5.2E+03
Cobalt	Red-Tailed Hawk	1.8E+01	1.8E+01	1E+00	1.8E+03
Copper	Red-Tailed Hawk	1.2E+01	1.2E+01	1E+00	8.9E+03
Cyanide	Red-Tailed Hawk	4.0E-01	4.0E-01	1E+00	3.6E+02
Iron	Red-Tailed Hawk	1.1E-03	--	--	--
Lead	Red-Tailed Hawk	3.3E+00	3.3E+00	1E+00	1.2E+03
Magnesium	Red-Tailed Hawk	1.1E-03	--	--	--
Manganese	Red-Tailed Hawk	3.8E+02	3.8E+02	1E+00	1.4E+05
Mercury	Red-Tailed Hawk	1.8E-01	1.8E-01	1E+00	1.1E+01
Molybdenum	Red-Tailed Hawk	3.5E+01	3.5E+01	1E+00	3.2E+04
Nickel	Red-Tailed Hawk	1.9E+01	1.9E+01	1E+00	1.2E+04
Potassium	Red-Tailed Hawk	1.1E-03	--	--	--
Selenium	Red-Tailed Hawk	5.8E-01	5.8E-01	1E+00	1.9E+02
Silver	Red-Tailed Hawk	2.0E+01	2.0E+01	1E+00	1.4E+04
Sodium	Red-Tailed Hawk	1.1E-03	--	--	--
Thallium	Red-Tailed Hawk	3.5E+00	3.5E+00	1E+00	3.5E+02
Vanadium	Red-Tailed Hawk	6.9E-01	6.9E-01	1E+00	3.3E+02
Zinc	Red-Tailed Hawk	1.7E+02	1.7E+02	1E+00	1.4E+05
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	Red-Tailed Hawk	3.2E+01	--	--	--
1,3,5-Trimethylbenzene	Red-Tailed Hawk	3.2E+01	--	--	--
Acetone	Red-Tailed Hawk	3.2E+01	--	--	--
Bromomethane	Red-Tailed Hawk	3.2E+01	--	--	--
Chloro methane	Red-Tailed Hawk	3.2E+01	--	--	--
Chloroform	Red-Tailed Hawk	3.2E+01	--	--	--
Ethyl- benzene	Red-Tailed Hawk	3.2E+01	--	--	--
Isopropylbenzene	Red-Tailed Hawk	3.2E+01	--	--	--
Methyl acetate	Red-Tailed Hawk	3.2E+01	--	--	--
Methyl ethyl ketone	Red-Tailed Hawk	3.2E+01	--	--	--
Methylene chloride	Red-Tailed Hawk	3.2E+01	--	--	--
N-Butylbenzene	Red-Tailed Hawk	3.2E+01	--	--	--
N-Propylbenzene	Red-Tailed Hawk	3.2E+01	--	--	--
sec-Butylbenzene	Red-Tailed Hawk	3.2E+01	--	--	--
Toluene	Red-Tailed Hawk	3.2E+01	--	--	--
Xylene, m,p-	Red-Tailed Hawk	3.2E+01	--	--	--
Xylene, o-	Red-Tailed Hawk	3.2E+01	--	--	--
Xylenes, total	Red-Tailed Hawk	3.2E+01	--	--	--

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Semi-Volatile Organic Compounds												
2,4-Dimethylphenol	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
4-Methylphenol	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Bis (2-ethylhexyl) phthalate	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	1.1E+01
Butylbenzylphthalate	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Carbazole	Red-Tailed Hawk	100% Mammals	1.4E-02	3.5E-01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	2.8E-02	3.2E+01
Dibenzofuran	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Di-n-butyl phthalate	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	1.1E+00
Isophorone	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	3.2E+01
Pentachlorophenol	Red-Tailed Hawk	100% Mammals	1.4E-02	7.0E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	5.6E+01	1.2E+01
Polycyclic Aromatic Hydrocarbons												
PAH Low molecular weight	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	2.3E+02
PAH High molecular weight	Red-Tailed Hawk	100% Mammals	1.4E-02	0.0E+00	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	0.0E+00	1.0E+02
Pesticides												
4,4-DDE	Red-Tailed Hawk	100% Mammals	1.4E-02	2.9E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	2.3E+00	4.0E-05
4,4-DDT	Red-Tailed Hawk	100% Mammals	1.4E-02	2.9E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	2.3E+00	3.0E-03
Alpha-Chlordane	Red-Tailed Hawk	100% Mammals	1.4E-02	1.3E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.1E+01	1.2E-01
Dieldrin	Red-Tailed Hawk	100% Mammals	1.4E-02	4.7E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	3.7E+00	4.4E-02
Gamma-Chlordane	Red-Tailed Hawk	100% Mammals	1.4E-02	1.3E+02	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.1E+01	1.2E-01
Polychlorinated Biphenyls												
Total PCBs	Red-Tailed Hawk	100% Mammals	1.4E-02	1.5E+01	1.1E+00	7.9E-02	1.1E-03	1.0E+00	--	--	1.2E+00	4.4E-02
Inorganics												
Aluminum	Desert Shrew	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	--	--	4.1E-03
Antimony	Desert Shrew	100% Insects	2.0E-02	2.8E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	5.8E-01	--	1.2E-02
Arsenic	Desert Shrew	100% Insects	2.0E-02	8.8E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.8E+00	--	6.6E-01
Barium	Desert Shrew	100% Insects	2.0E-02	3.3E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	6.8E+01	--	1.5E+01
Beryllium	Desert Shrew	100% Insects	2.0E-02	2.1E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	4.4E-01	--	1.9E-01
Cadmium	Desert Shrew	100% Insects	2.0E-02	3.8E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	7.7E+00	--	2.7E-02
Calcium	Desert Shrew	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	--	--	4.1E-03
Chromium, hexavalent	Desert Shrew	100% Insects	2.0E-02	1.8E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	3.6E+01	--	2.4E+00
Chromium, total	Desert Shrew	100% Insects	2.0E-02	4.4E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	9.0E+00	--	5.9E-01
Cobalt	Desert Shrew	100% Insects	2.0E-02	8.0E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.6E+01	--	2.6E+00
Copper	Desert Shrew	100% Insects	2.0E-02	7.5E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.5E+01	--	5.9E-01
Cyanide	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.3E+01
Iron	Desert Shrew	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	--	--	4.1E-03
Lead	Desert Shrew	100% Insects	2.0E-02	4.1E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	8.4E+00	--	5.3E-01
Magnesium	Desert Shrew	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	--	--	4.1E-03
Manganese	Desert Shrew	100% Insects	2.0E-02	3.6E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	7.2E+01	--	7.3E+01
Mercury	Desert Shrew	100% Insects	2.0E-02	7.9E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.6E+00	--	2.4E+00
Molybdenum	Desert Shrew	100% Insects	2.0E-02	1.2E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	2.5E+00	--	9.1E-02
Nickel	Desert Shrew	100% Insects	2.0E-02	1.6E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	3.3E+00	--	6.3E-02
Potassium	Desert Shrew	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	--	--	4.1E-03
Selenium	Desert Shrew	100% Insects	2.0E-02	1.7E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	3.4E-01	--	9.2E-03
Silver	Desert Shrew	100% Insects	2.0E-02	4.3E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	8.7E+01	--	8.5E-01
Sodium	Desert Shrew	100% Insects	2.0E-02	--	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	--	--	4.1E-03
Thallium	Desert Shrew	100% Insects	2.0E-02	6.8E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.4E+00	--	5.0E-02
Vanadium	Desert Shrew	100% Insects	2.0E-02	2.8E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	5.6E+00	--	2.7E+00
Zinc	Desert Shrew	100% Insects	2.0E-02	1.4E+03	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	2.8E+02	--	1.9E+01

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	Red-Tailed Hawk	3.2E+01	--	--	--
4-Methylphenol	Red-Tailed Hawk	3.2E+01	--	--	--
Bis (2-ethylhexyl) phthalate	Red-Tailed Hawk	1.1E+01	1.1E+01	1E+00	9.9E+03
Butylbenzylphthalate	Red-Tailed Hawk	3.2E+01	--	--	--
Carbazole	Red-Tailed Hawk	3.2E+01	--	--	--
Dibenzofuran	Red-Tailed Hawk	3.2E+01	--	--	--
Di-n-butyl phthalate	Red-Tailed Hawk	1.1E+00	1.1E+00	1E+00	9.9E+02
Isophorone	Red-Tailed Hawk	3.2E+01	--	--	--
Pentachlorophenol	Red-Tailed Hawk	6.7E+01	6.7E+01	1E+00	1.1E+04
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	Red-Tailed Hawk	2.3E+02	2.3E+02	1E+00	2.1E+05
PAH High molecular weight	Red-Tailed Hawk	1.0E+02	1.0E+02	1E+00	9.0E+04
Pesticides					
4,4-DDE	Red-Tailed Hawk	2.3E+00	2.3E+00	1E+00	3.6E-02
4,4-DDT	Red-Tailed Hawk	2.3E+00	2.3E+00	1E+00	2.7E+00
Alpha-Chlordane	Red-Tailed Hawk	1.1E+01	1.1E+01	1E+00	1.1E+02
Dieldrin	Red-Tailed Hawk	3.8E+00	3.8E+00	1E+00	3.9E+01
Gamma-Chlordane	Red-Tailed Hawk	1.1E+01	1.1E+01	1E+00	1.1E+02
Polychlorinated Biphenyls					
Total PCBs	Red-Tailed Hawk	1.3E+00	1.3E+00	1E+00	4.0E+01
Inorganics					
Aluminum	Desert Shrew	4.1E-03	pH<5.5	--	--
Antimony	Desert Shrew	5.9E-01	5.9E-01	1E+00	2.8E+00
Arsenic	Desert Shrew	2.4E+00	2.4E+00	1E+00	1.6E+02
Barium	Desert Shrew	8.3E+01	8.3E+01	1E+00	3.7E+03
Beryllium	Desert Shrew	6.3E-01	6.3E-01	1E+00	4.8E+01
Cadmium	Desert Shrew	7.7E+00	7.7E+00	1E+00	6.8E+00
Calcium	Desert Shrew	4.1E-03	--	--	--
Chromium, hexavalent	Desert Shrew	3.8E+01	3.8E+01	1E+00	5.8E+02
Chromium, total	Desert Shrew	9.6E+00	9.6E+00	1E+00	1.5E+02
Cobalt	Desert Shrew	1.9E+01	1.9E+01	1E+00	6.5E+02
Copper	Desert Shrew	1.6E+01	1.6E+01	1E+00	1.4E+02
Cyanide	Desert Shrew	1.3E+01	1.3E+01	1E+00	3.1E+03
Iron	Desert Shrew	4.1E-03	--	--	--
Lead	Desert Shrew	8.9E+00	8.9E+00	1E+00	1.3E+02
Magnesium	Desert Shrew	4.1E-03	--	--	--
Manganese	Desert Shrew	1.5E+02	1.5E+02	1E+00	1.8E+04
Mercury	Desert Shrew	4.0E+00	4.0E+00	1E+00	5.9E+02
Molybdenum	Desert Shrew	2.6E+00	2.6E+00	1E+00	2.2E+01
Nickel	Desert Shrew	3.4E+00	3.4E+00	1E+00	1.6E+01
Potassium	Desert Shrew	4.1E-03	--	--	--
Selenium	Desert Shrew	3.5E-01	3.5E-01	1E+00	2.3E+00
Silver	Desert Shrew	8.8E+01	8.8E+01	1E+00	2.1E+02
Sodium	Desert Shrew	4.1E-03	--	--	--
Thallium	Desert Shrew	1.4E+00	1.4E+00	1E+00	1.2E+01
Vanadium	Desert Shrew	8.3E+00	8.3E+00	1E+00	6.6E+02
Zinc	Desert Shrew	3.0E+02	3.0E+02	1E+00	4.7E+03

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Volatile Organic Compounds												
1,2,4-Trimethylbenzene	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
1,3,5-Trimethylbenzene	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
Acetone	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	5.0E+01
Bromomethane	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
Chloro methane	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
Chloroform	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	4.1E+01
Ethyl- benzene	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	2.9E+02
Isopropylbenzene	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
Methyl acetate	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	3.6E+02
Methyl ethyl ketone	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	4.6E+03
Methylene chloride	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	5.0E+01
N-Butylbenzene	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
N-Propylbenzene	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
sec-Butylbenzene	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
Toluene	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	2.6E+02
Xylene, m,p-	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	2.6E+00
Xylene, o-	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	2.6E+00
Xylenes, total	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	2.6E+00
Semi-Volatile Organic Compounds												
2,4-Dimethylphenol	Desert Shrew	100% Insects	2.0E-02	7.9E+04	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.6E+04	--	1.2E+02
4-Methylphenol	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
Bis (2-ethylhexyl) phthalate	Desert Shrew	100% Insects	2.0E-02	8.9E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.8E+02	--	1.8E+00
Butylbenzylphthalate	Desert Shrew	100% Insects	2.0E-02	6.5E+05	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.3E+05	--	1.2E+02
Carbazole	Desert Shrew	100% Insects	2.0E-02	2.9E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	5.9E+01	--	1.2E+02
Dibenzofuran	Desert Shrew	100% Insects	2.0E-02	1.5E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	3.0E+01	--	2.0E-01
Di-n-butyl phthalate	Desert Shrew	100% Insects	2.0E-02	9.0E+03	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.8E+03	--	2.9E+00
Isophorone	Desert Shrew	100% Insects	2.0E-02	0.0E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	0.0E+00	--	1.2E+02
Pentachlorophenol	Desert Shrew	100% Insects	2.0E-02	1.1E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	2.3E+01	--	3.1E-02
Polycyclic Aromatic Hydrocarbons												
PAH Low molecular weight	Desert Shrew	100% Insects	2.0E-02	1.6E+03	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	3.3E+02	--	2.1E+00
PAH High molecular weight	Desert Shrew	100% Insects	2.0E-02	1.5E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	3.0E+00	--	2.3E-02
Pesticides												
4,4-DDE	Desert Shrew	100% Insects	2.0E-02	3.6E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	7.3E-01	--	1.0E-03
4,4-DDT	Desert Shrew	100% Insects	2.0E-02	3.6E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	7.3E-01	--	1.5E-03
Alpha-Chlordane	Desert Shrew	100% Insects	2.0E-02	4.5E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	9.2E+00	--	7.6E-03
Dieldrin	Desert Shrew	100% Insects	2.0E-02	1.5E-01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	3.0E-02	--	4.1E-05
Gamma-Chlordane	Desert Shrew	100% Insects	2.0E-02	4.5E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	9.2E+00	--	7.6E-03
Polychlorinated Biphenyls												
Total PCBs	Desert Shrew	100% Insects	2.0E-02	6.3E+00	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.3E+00	--	5.6E-03
Dioxins (presented in ng/kg)												
TEQ Mammals	Desert Shrew	100% Insects	2.0E-02	1.5E+02	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	3.1E+01	--	8.3E-01
TEQ Mammals	Desert Shrew	100% Insects	2.0E-02	8.0E+01	5.0E-03	2.0E-01	4.1E-03	1.0E+00	--	1.6E+01	--	8.3E-01

Table RBC-A
Risk-Based Concentration Calculations for Ecological
Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	Desert Shrew	1.2E+02	--	--	--
1,3,5-Trimethylbenzene	Desert Shrew	1.2E+02	--	--	--
Acetone	Desert Shrew	5.0E+01	5.0E+01	1E+00	1.2E+04
Bromomethane	Desert Shrew	1.2E+02	--	--	--
Chloro methane	Desert Shrew	1.2E+02	--	--	--
Chloroform	Desert Shrew	4.1E+01	4.1E+01	1E+00	1.0E+04
Ethyl- benzene	Desert Shrew	2.9E+02	2.9E+02	1E+00	7.2E+04
Isopropylbenzene	Desert Shrew	1.2E+02	--	--	--
Methyl acetate	Desert Shrew	3.6E+02	3.6E+02	1E+00	8.9E+04
Methyl ethyl ketone	Desert Shrew	4.6E+03	4.6E+03	1E+00	1.1E+06
Methylene chloride	Desert Shrew	5.0E+01	5.0E+01	1E+00	1.2E+04
N-Butylbenzene	Desert Shrew	1.2E+02	--	--	--
N-Propylbenzene	Desert Shrew	1.2E+02	--	--	--
sec-Butylbenzene	Desert Shrew	1.2E+02	--	--	--
Toluene	Desert Shrew	2.6E+02	2.6E+02	1E+00	6.4E+04
Xylene, m,p-	Desert Shrew	2.6E+00	2.6E+00	1E+00	6.4E+02
Xylene, o-	Desert Shrew	2.6E+00	2.6E+00	1E+00	6.4E+02
Xylenes, total	Desert Shrew	2.6E+00	2.6E+00	1E+00	6.4E+02
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	Desert Shrew	1.6E+04	--	--	--
4-Methylphenol	Desert Shrew	1.2E+02	--	--	--
Bis (2-ethylhexyl) phthalate	Desert Shrew	1.8E+02	1.8E+02	1E+00	4.5E+02
Butylbenzylphthalate	Desert Shrew	1.3E+05	--	--	--
Carbazole	Desert Shrew	1.8E+02	--	--	--
Dibenzofuran	Desert Shrew	3.0E+01	3.0E+01	1E+00	4.9E+01
Di-n-butyl phthalate	Desert Shrew	1.8E+03	1.8E+03	1E+00	7.1E+02
Isophorone	Desert Shrew	1.2E+02	--	--	--
Pentachlorophenol	Desert Shrew	2.3E+01	2.3E+01	1E+00	7.6E+00
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	Desert Shrew	3.3E+02	3.3E+02	1E+00	5.3E+02
PAH High molecular weight	Desert Shrew	3.1E+00	3.1E+00	1E+00	5.8E+00
Pesticides					
4,4-DDE	Desert Shrew	7.3E-01	7.4E-01	1E+00	2.6E-01
4,4-DDT	Desert Shrew	7.3E-01	7.4E-01	1E+00	3.8E-01
Alpha-Chlordane	Desert Shrew	9.2E+00	9.2E+00	1E+00	1.9E+00
Dieldrin	Desert Shrew	3.0E-02	3.0E-02	1E+00	1.0E-02
Gamma-Chlordane	Desert Shrew	9.2E+00	9.2E+00	1E+00	1.9E+00
Polychlorinated Biphenyls					
Total PCBs	Desert Shrew	1.3E+00	1.3E+00	1E+00	1.4E+00
Dioxins (presented in ng/kg)					
TEQ Mammals	Desert Shrew	3.2E+01	3.0E+01	1E+00	1.9E+02
TEQ Mammals	Desert Shrew	1.7E+01	3.0E+01	6E-01	3.6E+02

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Inorganics												
Aluminum	Desert Kit Fox	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	--	9.9E-04
Antimony	Desert Kit Fox	100% Mammals	2.8E-02	5.0E-02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.8E-03	5.9E-01
Arsenic	Desert Kit Fox	100% Mammals	2.8E-02	3.2E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.1E-01	1.5E+00
Barium	Desert Kit Fox	100% Mammals	2.8E-02	1.2E-03	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	4.1E-05	8.3E+01
Beryllium	Desert Kit Fox	100% Mammals	2.8E-02	2.3E-03	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	8.0E-05	6.3E-01
Cadmium	Desert Kit Fox	100% Mammals	2.8E-02	1.9E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	6.6E-01	7.0E+00
Calcium	Desert Kit Fox	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	--	9.9E-04
Chromium, hexavalent	Desert Kit Fox	100% Mammals	2.8E-02	3.9E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.4E+01	2.5E+01
Chromium, total	Desert Kit Fox	100% Mammals	2.8E-02	1.2E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	4.4E+00	5.2E+00
Cobalt	Desert Kit Fox	100% Mammals	2.8E-02	4.4E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.6E+01	3.2E+00
Copper	Desert Kit Fox	100% Mammals	2.8E-02	2.8E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.0E+00	8.3E+00
Cyanide	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	1.3E+01
Iron	Desert Kit Fox	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	--	9.9E-04
Lead	Desert Kit Fox	100% Mammals	2.8E-02	5.4E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.9E+00	7.0E+00
Magnesium	Desert Kit Fox	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	--	9.9E-04
Manganese	Desert Kit Fox	100% Mammals	2.8E-02	1.7E+03	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	6.2E+01	8.4E+01
Mercury	Desert Kit Fox	100% Mammals	2.8E-02	9.9E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	3.5E+00	5.1E-01
Molybdenum	Desert Kit Fox	100% Mammals	2.8E-02	1.7E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	5.8E-03	2.6E+00
Nickel	Desert Kit Fox	100% Mammals	2.8E-02	2.9E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.0E+00	2.4E+00
Potassium	Desert Kit Fox	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	--	9.9E-04
Selenium	Desert Kit Fox	100% Mammals	2.8E-02	3.6E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.3E-01	8.8E-02
Silver	Desert Kit Fox	100% Mammals	2.8E-02	2.1E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	7.5E+00	5.3E+01
Sodium	Desert Kit Fox	100% Mammals	2.8E-02	--	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	--	9.9E-04
Thallium	Desert Kit Fox	100% Mammals	2.8E-02	3.2E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.1E+00	2.9E-01
Vanadium	Desert Kit Fox	100% Mammals	2.8E-02	7.2E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	2.5E+00	5.8E+00
Zinc	Desert Kit Fox	100% Mammals	2.8E-02	1.9E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	6.8E+00	2.9E+02
Volatile Organic Compounds												
1,2,4-Trimethylbenzene	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
1,3,5-Trimethylbenzene	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
Acetone	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	5.0E+01
Bromomethane	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
Chloro methane	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
Chloroform	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	4.1E+01
Ethyl- benzene	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+02
Isopropylbenzene	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
Methyl acetate	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	3.6E+02
Methyl ethyl ketone	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	4.6E+03
Methylene chloride	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	5.0E+01
N-Butylbenzene	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
N-Propylbenzene	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
sec-Butylbenzene	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
Toluene	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.6E+02
Xylene, m,p-	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.6E+00
Xylene, o-	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.6E+00
Xylenes, total	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.6E+00

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Inorganics					
Aluminum	Desert Kit Fox	9.9E-04	pH<5.5	--	--
Antimony	Desert Kit Fox	5.9E-01	5.9E-01	1E+00	5.9E+02
Arsenic	Desert Kit Fox	1.7E+00	1.7E+00	1E+00	1.6E+03
Barium	Desert Kit Fox	8.3E+01	8.3E+01	1E+00	8.3E+04
Beryllium	Desert Kit Fox	6.3E-01	6.3E-01	1E+00	6.4E+02
Cadmium	Desert Kit Fox	7.7E+00	7.7E+00	1E+00	7.1E+03
Calcium	Desert Kit Fox	9.9E-04	--	--	--
Chromium, hexavalent	Desert Kit Fox	3.8E+01	3.8E+01	1E+00	2.5E+04
Chromium, total	Desert Kit Fox	9.6E+00	9.6E+00	1E+00	5.3E+03
Cobalt	Desert Kit Fox	1.9E+01	1.9E+01	1E+00	3.2E+03
Copper	Desert Kit Fox	9.3E+00	9.3E+00	1E+00	8.4E+03
Cyanide	Desert Kit Fox	1.3E+01	1.3E+01	1E+00	1.3E+04
Iron	Desert Kit Fox	9.9E-04	--	--	--
Lead	Desert Kit Fox	8.9E+00	8.9E+00	1E+00	7.0E+03
Magnesium	Desert Kit Fox	9.9E-04	--	--	--
Manganese	Desert Kit Fox	1.5E+02	1.5E+02	1E+00	8.5E+04
Mercury	Desert Kit Fox	4.0E+00	4.0E+00	1E+00	5.1E+02
Molybdenum	Desert Kit Fox	2.6E+00	2.6E+00	1E+00	2.6E+03
Nickel	Desert Kit Fox	3.4E+00	3.4E+00	1E+00	2.4E+03
Potassium	Desert Kit Fox	9.9E-04	--	--	--
Selenium	Desert Kit Fox	2.2E-01	2.2E-01	1E+00	8.9E+01
Silver	Desert Kit Fox	6.0E+01	6.0E+01	1E+00	5.3E+04
Sodium	Desert Kit Fox	9.9E-04	--	--	--
Thallium	Desert Kit Fox	1.4E+00	1.4E+00	1E+00	2.9E+02
Vanadium	Desert Kit Fox	8.3E+00	8.3E+00	1E+00	5.8E+03
Zinc	Desert Kit Fox	3.0E+02	3.0E+02	1E+00	2.9E+05
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	Desert Kit Fox	2.9E+01	--	--	--
1,3,5-Trimethylbenzene	Desert Kit Fox	2.9E+01	--	--	--
Acetone	Desert Kit Fox	5.0E+01	5.0E+01	1E+00	5.0E+04
Bromomethane	Desert Kit Fox	2.9E+01	--	--	--
Chloro methane	Desert Kit Fox	2.9E+01	--	--	--
Chloroform	Desert Kit Fox	4.1E+01	4.1E+01	1E+00	4.1E+04
Ethyl- benzene	Desert Kit Fox	2.9E+02	2.9E+02	1E+00	2.9E+05
Isopropylbenzene	Desert Kit Fox	2.9E+01	--	--	--
Methyl acetate	Desert Kit Fox	3.6E+02	3.6E+02	1E+00	3.6E+05
Methyl ethyl ketone	Desert Kit Fox	4.6E+03	4.6E+03	1E+00	4.6E+06
Methylene chloride	Desert Kit Fox	5.0E+01	5.0E+01	1E+00	5.0E+04
N-Butylbenzene	Desert Kit Fox	2.9E+01	--	--	--
N-Propylbenzene	Desert Kit Fox	2.9E+01	--	--	--
sec-Butylbenzene	Desert Kit Fox	2.9E+01	--	--	--
Toluene	Desert Kit Fox	2.6E+02	2.6E+02	1E+00	2.6E+05
Xylene, m,p-	Desert Kit Fox	2.6E+00	2.6E+00	1E+00	2.6E+03
Xylene, o-	Desert Kit Fox	2.6E+00	2.6E+00	1E+00	2.6E+03
Xylenes, total	Desert Kit Fox	2.6E+00	2.6E+00	1E+00	2.6E+03

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Semi-Volatile Organic Compounds												
2,4-Dimethylphenol	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
4-Methylphenol	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
Bis (2-ethylhexyl) phthalate	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	1.8E+02
Butylbenzylphthalate	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
Carbazole	Desert Kit Fox	100% Mammals	2.8E-02	3.5E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.2E-02	2.9E+01
Dibenzofuran	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	3.0E+01
Di-n-butyl phthalate	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	1.8E+03
Isophorone	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	2.9E+01
Pentachlorophenol	Desert Kit Fox	100% Mammals	2.8E-02	4.5E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.6E+01	6.8E+00
Polycyclic Aromatic Hydrocarbons												
PAH Low molecular weight	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	3.3E+02
PAH High molecular weight	Desert Kit Fox	100% Mammals	2.8E-02	0.0E+00	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	0.0E+00	3.1E+00
Pesticides												
4,4-DDE	Desert Kit Fox	100% Mammals	2.8E-02	2.1E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	7.3E-01	2.0E-05
4,4-DDT	Desert Kit Fox	100% Mammals	2.8E-02	2.1E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	7.3E-01	1.6E-03
Alpha-Chlordane	Desert Kit Fox	100% Mammals	2.8E-02	2.5E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	9.0E+00	2.1E-01
Dieldrin	Desert Kit Fox	100% Mammals	2.8E-02	8.3E-01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	2.9E-02	6.8E-04
Gamma-Chlordane	Desert Kit Fox	100% Mammals	2.8E-02	2.5E+02	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	9.0E+00	2.1E-01
Polychlorinated Biphenyls												
Total PCBs	Desert Kit Fox	100% Mammals	2.8E-02	3.4E+01	2.0E+00	3.5E-02	9.9E-04	1.0E+00	--	--	1.2E+00	7.1E-02
Inorganics												
Aluminum	Merriam's Kangaroo Rat	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00	--	--	--	2.0E-03
Antimony	Merriam's Kangaroo Rat	100% Plants	2.4E-02	3.9E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	3.2E-01	--	--	2.7E-01
Arsenic	Merriam's Kangaroo Rat	100% Plants	2.4E-02	1.7E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	1.4E+00	--	--	9.1E-01
Barium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	8.7E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00	7.2E+01	--	--	1.1E+01
Beryllium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	7.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	5.7E-01	--	--	5.7E-02
Cadmium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	4.1E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	3.4E+00	--	--	4.3E+00
Calcium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00	--	--	--	2.0E-03
Chromium, hexavalent	Merriam's Kangaroo Rat	100% Plants	2.4E-02	2.9E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00	2.4E+01	--	--	1.4E+01
Chromium, total	Merriam's Kangaroo Rat	100% Plants	2.4E-02	7.4E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	6.1E+00	--	--	3.6E+00
Cobalt	Merriam's Kangaroo Rat	100% Plants	2.4E-02	5.4E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	4.5E+00	--	--	1.4E+01
Copper	Merriam's Kangaroo Rat	100% Plants	2.4E-02	5.7E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	4.7E+00	--	--	1.0E+01
Cyanide	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	1.3E+01
Iron	Merriam's Kangaroo Rat	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00	--	--	--	2.0E-03
Lead	Merriam's Kangaroo Rat	100% Plants	2.4E-02	2.6E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	2.1E+00	--	--	6.8E+00
Magnesium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00	--	--	--	2.0E-03
Manganese	Merriam's Kangaroo Rat	100% Plants	2.4E-02	1.4E+03	3.4E-02	8.2E-02	2.0E-03	1.0E+00	1.1E+02	--	--	3.4E+01
Mercury	Merriam's Kangaroo Rat	100% Plants	2.4E-02	1.8E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	1.5E+00	--	--	2.5E+00
Molybdenum	Merriam's Kangaroo Rat	100% Plants	2.4E-02	2.9E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	2.4E+00	--	--	2.3E-01
Nickel	Merriam's Kangaroo Rat	100% Plants	2.4E-02	1.8E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	1.5E+00	--	--	1.9E+00
Potassium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00	--	--	--	2.0E-03
Selenium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	3.7E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	3.0E-01	--	--	1.2E-02
Silver	Merriam's Kangaroo Rat	100% Plants	2.4E-02	3.8E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00	3.1E+01	--	--	5.3E+01
Sodium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00	--	--	--	2.0E-03
Thallium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	2.5E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	2.0E-01	--	--	1.2E+00
Vanadium	Merriam's Kangaroo Rat	100% Plants	2.4E-02	1.7E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	1.4E+00	--	--	6.9E+00
Zinc	Merriam's Kangaroo Rat	100% Plants	2.4E-02	2.2E+03	3.4E-02	8.2E-02	2.0E-03	1.0E+00	1.8E+02	--	--	1.2E+02

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	Desert Kit Fox	2.9E+01	--	--	--
4-Methylphenol	Desert Kit Fox	2.9E+01	--	--	--
Bis (2-ethylhexyl) phthalate	Desert Kit Fox	1.8E+02	1.8E+02	1E+00	1.8E+05
Butylbenzylphthalate	Desert Kit Fox	2.9E+01	--	--	--
Carbazole	Desert Kit Fox	2.9E+01	--	--	--
Dibenzofuran	Desert Kit Fox	3.0E+01	3.0E+01	1E+00	3.0E+04
Di-n-butyl phthalate	Desert Kit Fox	1.8E+03	1.8E+03	1E+00	1.9E+06
Isophorone	Desert Kit Fox	2.9E+01	--	--	--
Pentachlorophenol	Desert Kit Fox	2.3E+01	2.3E+01	1E+00	6.8E+03
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	Desert Kit Fox	3.3E+02	3.3E+02	1E+00	3.3E+05
PAH High molecular weight	Desert Kit Fox	3.1E+00	3.1E+00	1E+00	3.1E+03
Pesticides					
4,4-DDE	Desert Kit Fox	7.4E-01	7.4E-01	1E+00	2.0E-02
4,4-DDT	Desert Kit Fox	7.4E-01	7.4E-01	1E+00	1.6E+00
Alpha-Chlordane	Desert Kit Fox	9.2E+00	9.2E+00	1E+00	2.1E+02
Dieldrin	Desert Kit Fox	3.0E-02	3.0E-02	1E+00	6.9E-01
Gamma-Chlordane	Desert Kit Fox	9.2E+00	9.2E+00	1E+00	2.1E+02
Polychlorinated Biphenyls					
Total PCBs	Desert Kit Fox	1.3E+00	1.3E+00	1E+00	7.1E+01
Inorganics					
Aluminum	Merriam's Kangaroo Rat	2.0E-03	pH<5.5	--	--
Antimony	Merriam's Kangaroo Rat	5.9E-01	5.9E-01	1E+00	1.4E+02
Arsenic	Merriam's Kangaroo Rat	2.3E+00	2.3E+00	1E+00	4.6E+02
Barium	Merriam's Kangaroo Rat	8.3E+01	8.3E+01	1E+00	5.6E+03
Beryllium	Merriam's Kangaroo Rat	6.3E-01	6.3E-01	1E+00	2.9E+01
Cadmium	Merriam's Kangaroo Rat	7.7E+00	7.7E+00	1E+00	2.2E+03
Calcium	Merriam's Kangaroo Rat	2.0E-03	--	--	--
Chromium, hexavalent	Merriam's Kangaroo Rat	3.8E+01	3.8E+01	1E+00	7.2E+03
Chromium, total	Merriam's Kangaroo Rat	9.6E+00	9.6E+00	1E+00	1.8E+03
Cobalt	Merriam's Kangaroo Rat	1.9E+01	1.9E+01	1E+00	7.3E+03
Copper	Merriam's Kangaroo Rat	1.5E+01	1.5E+01	1E+00	5.3E+03
Cyanide	Merriam's Kangaroo Rat	1.3E+01	1.3E+01	1E+00	6.3E+03
Iron	Merriam's Kangaroo Rat	2.0E-03	--	--	--
Lead	Merriam's Kangaroo Rat	8.9E+00	8.9E+00	1E+00	3.4E+03
Magnesium	Merriam's Kangaroo Rat	2.0E-03	--	--	--
Manganese	Merriam's Kangaroo Rat	1.5E+02	1.5E+02	1E+00	1.7E+04
Mercury	Merriam's Kangaroo Rat	4.0E+00	4.0E+00	1E+00	1.3E+03
Molybdenum	Merriam's Kangaroo Rat	2.6E+00	2.6E+00	1E+00	1.2E+02
Nickel	Merriam's Kangaroo Rat	3.4E+00	3.4E+00	1E+00	9.6E+02
Potassium	Merriam's Kangaroo Rat	2.0E-03	--	--	--
Selenium	Merriam's Kangaroo Rat	3.1E-01	3.1E-01	1E+00	6.0E+00
Silver	Merriam's Kangaroo Rat	8.4E+01	8.4E+01	1E+00	2.7E+04
Sodium	Merriam's Kangaroo Rat	2.0E-03	--	--	--
Thallium	Merriam's Kangaroo Rat	1.4E+00	1.4E+00	1E+00	6.2E+02
Vanadium	Merriam's Kangaroo Rat	8.3E+00	8.3E+00	1E+00	3.5E+03
Zinc	Merriam's Kangaroo Rat	3.0E+02	3.0E+02	1E+00	6.1E+04

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Volatile Organic Compounds												
1,2,4-Trimethylbenzene	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
1,3,5-Trimethylbenzene	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
Acetone	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.0E+01
Bromomethane	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
Chloro methane	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
Chloroform	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	4.1E+01
Ethyl- benzene	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	2.9E+02
Isopropylbenzene	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
Methyl acetate	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	3.6E+02
Methyl ethyl ketone	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	4.6E+03
Methylene chloride	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.0E+01
N-Butylbenzene	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
N-Propylbenzene	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
sec-Butylbenzene	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
Toluene	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	2.6E+02
Xylene, m,p-	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	2.6E+00
Xylene, o-	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	2.6E+00
Xylenes, total	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	2.6E+00
Semi-Volatile Organic Compounds												
2,4-Dimethylphenol	Merriam's Kangaroo Rat	100% Plants	2.4E-02	7.0E+05	3.4E-02	8.2E-02	2.0E-03	1.0E+00	5.7E+04	--	--	5.8E+01
4-Methylphenol	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
Bis (2-ethylhexyl) phthalate	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	1.8E+02
Butylbenzylphthalate	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
Carbazole	Merriam's Kangaroo Rat	100% Plants	2.4E-02	5.3E+05	3.4E-02	8.2E-02	2.0E-03	1.0E+00	4.3E+04	--	--	5.8E+01
Dibenzofuran	Merriam's Kangaroo Rat	100% Plants	2.4E-02	3.6E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00	3.0E+01	--	--	4.2E-02
Di-n-butyl phthalate	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	1.8E+03
Isophorone	Merriam's Kangaroo Rat	100% Plants	2.4E-02	0.0E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	0.0E+00	--	--	5.8E+01
Pentachlorophenol	Merriam's Kangaroo Rat	100% Plants	2.4E-02	2.7E+02	3.4E-02	8.2E-02	2.0E-03	1.0E+00	2.3E+01	--	--	9.2E-02
Polycyclic Aromatic Hydrocarbons												
PAH Low molecular weight	Merriam's Kangaroo Rat	100% Plants	2.4E-02	6.2E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	5.1E+00	--	--	3.2E+02
PAH High molecular weight	Merriam's Kangaroo Rat	100% Plants	2.4E-02	3.2E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	2.6E+00	--	--	4.6E-01
Pesticides												
4,4-DDE	Merriam's Kangaroo Rat	100% Plants	2.4E-02	4.3E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	3.5E-01	--	--	3.8E-01
4,4-DDT	Merriam's Kangaroo Rat	100% Plants	2.4E-02	4.3E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	3.5E-01	--	--	3.8E-01
Alpha-Chlordane	Merriam's Kangaroo Rat	100% Plants	2.4E-02	9.9E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	8.2E+00	--	--	1.0E+00
Dieldrin	Merriam's Kangaroo Rat	100% Plants	2.4E-02	3.4E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	2.8E-02	--	--	1.7E-03
Gamma-Chlordane	Merriam's Kangaroo Rat	100% Plants	2.4E-02	9.9E+01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	8.2E+00	--	--	1.0E+00

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	Merriam's Kangaroo Rat	5.8E+01	--	--	--
1,3,5-Trimethylbenzene	Merriam's Kangaroo Rat	5.8E+01	--	--	--
Acetone	Merriam's Kangaroo Rat	5.0E+01	5.0E+01	1E+00	2.5E+04
Bromomethane	Merriam's Kangaroo Rat	5.8E+01	--	--	--
Chloro methane	Merriam's Kangaroo Rat	5.8E+01	--	--	--
Chloroform	Merriam's Kangaroo Rat	4.1E+01	4.1E+01	1E+00	2.1E+04
Ethyl- benzene	Merriam's Kangaroo Rat	2.9E+02	2.9E+02	1E+00	1.5E+05
Isopropylbenzene	Merriam's Kangaroo Rat	5.8E+01	--	--	--
Methyl acetate	Merriam's Kangaroo Rat	3.6E+02	3.6E+02	1E+00	1.8E+05
Methyl ethyl ketone	Merriam's Kangaroo Rat	4.6E+03	4.6E+03	1E+00	2.3E+06
Methylene chloride	Merriam's Kangaroo Rat	5.0E+01	5.0E+01	1E+00	2.5E+04
N-Butylbenzene	Merriam's Kangaroo Rat	5.8E+01	--	--	--
N-Propylbenzene	Merriam's Kangaroo Rat	5.8E+01	--	--	--
sec-Butylbenzene	Merriam's Kangaroo Rat	5.8E+01	--	--	--
Toluene	Merriam's Kangaroo Rat	2.6E+02	2.6E+02	1E+00	1.3E+05
Xylene, m,p-	Merriam's Kangaroo Rat	2.6E+00	2.6E+00	1E+00	1.3E+03
Xylene, o-	Merriam's Kangaroo Rat	2.6E+00	2.6E+00	1E+00	1.3E+03
Xylenes, total	Merriam's Kangaroo Rat	2.6E+00	2.6E+00	1E+00	1.3E+03
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	Merriam's Kangaroo Rat	5.7E+04	--	--	--
4-Methylphenol	Merriam's Kangaroo Rat	5.8E+01	--	--	--
Bis (2-ethylhexyl) phthalate	Merriam's Kangaroo Rat	1.8E+02	1.8E+02	1E+00	9.3E+04
Butylbenzylphthalate	Merriam's Kangaroo Rat	5.8E+01	--	--	--
Carbazole	Merriam's Kangaroo Rat	4.4E+04	--	--	--
Dibenzofuran	Merriam's Kangaroo Rat	3.0E+01	3.0E+01	1E+00	2.1E+01
Di-n-butyl phthalate	Merriam's Kangaroo Rat	1.8E+03	1.8E+03	1E+00	9.3E+05
Isophorone	Merriam's Kangaroo Rat	5.8E+01	--	--	--
Pentachlorophenol	Merriam's Kangaroo Rat	2.3E+01	2.3E+01	1E+00	4.6E+01
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	Merriam's Kangaroo Rat	3.3E+02	3.3E+02	1E+00	1.6E+05
PAH High molecular weight	Merriam's Kangaroo Rat	3.1E+00	3.1E+00	1E+00	2.3E+02
Pesticides					
4,4-DDE	Merriam's Kangaroo Rat	7.4E-01	7.4E-01	1E+00	1.9E+02
4,4-DDT	Merriam's Kangaroo Rat	7.4E-01	7.4E-01	1E+00	1.9E+02
Alpha-Chlordane	Merriam's Kangaroo Rat	9.2E+00	9.2E+00	1E+00	5.2E+02
Dieldrin	Merriam's Kangaroo Rat	3.0E-02	3.0E-02	1E+00	8.4E-01
Gamma-Chlordane	Merriam's Kangaroo Rat	9.2E+00	9.2E+00	1E+00	5.2E+02

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Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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PG&E Topock Compressor Station
Needles, California

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Polychlorinated Biphenyls												
Total PCBs	Merriam's Kangaroo Rat	100% Plants	2.4E-02	4.6E+00	3.4E-02	8.2E-02	2.0E-03	1.0E+00	3.8E-01	--	--	9.0E-01
Dioxins (presented in ng/kg)												
TEQ Mammals	Merriam's Kangaroo Rat	100% Plants	2.4E-02	5.4E-01	3.4E-02	8.2E-02	2.0E-03	1.0E+00	4.5E-02	--	--	4.0E-01
TEQ Mammals	Merriam's Kangaroo Rat	100% Plants	2.4E-02	--	3.4E-02	8.2E-02	2.0E-03	1.0E+00	--	--	--	4.0E-01
Inorganics												
Aluminum	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00	--	--	--	4.1E-03
Antimony	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	2.8E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	3.9E-02	--	--	3.9E-01
Arsenic	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.3E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	1.8E-01	--	--	1.5E+00
Barium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	2.1E+03	6.8E+01	1.4E-02	4.1E-03	1.0E+00	2.8E+01	--	--	5.4E+01
Beryllium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.2E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	1.7E-01	--	--	2.6E-01
Cadmium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	3.1E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	4.2E-01	--	--	5.3E+00
Calcium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00	--	--	--	4.1E-03
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	3.4E+02	6.8E+01	1.4E-02	4.1E-03	1.0E+00	4.6E+00	--	--	3.4E+01
Chromium, total	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	8.4E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	1.2E+00	--	--	8.5E+00
Cobalt	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	3.3E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	4.6E-01	--	--	1.8E+01
Copper	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	4.0E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	5.5E-01	--	--	8.8E+00
Cyanide	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	8.8E+00
Iron	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00	--	--	--	4.1E-03
Lead	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.6E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	2.2E-01	--	--	6.2E+00
Magnesium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00	--	--	--	4.1E-03
Manganese	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	2.2E+03	6.8E+01	1.4E-02	4.1E-03	1.0E+00	3.0E+01	--	--	1.2E+02
Mercury	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.3E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	1.7E-01	--	--	2.7E+00
Molybdenum	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	5.4E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	7.4E-01	--	--	8.9E-01
Nickel	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.1E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	1.5E-01	--	--	2.0E+00
Potassium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00	--	--	--	4.1E-03
Selenium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.1E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	1.5E-01	--	--	6.6E-02
Silver	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	2.0E+02	6.8E+01	1.4E-02	4.1E-03	1.0E+00	2.7E+00	--	--	5.8E+01
Sodium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	--	6.8E+01	1.4E-02	4.1E-03	1.0E+00	--	--	--	4.1E-03
Thallium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	1.4E-02	--	--	1.0E+00
Vanadium	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	6.2E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	8.5E-02	--	--	5.3E+00
Zinc	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	2.2E+03	6.8E+01	1.4E-02	4.1E-03	1.0E+00	3.1E+01	--	--	2.7E+02

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Polychlorinated Biphenyls					
Total PCBs	Merriam's Kangaroo Rat	1.3E+00	1.3E+00	1E+00	4.6E+02
Dioxins (presented in ng/kg)					
TEQ Mammals	Merriam's Kangaroo Rat	4.5E-01	3.0E+01	1E-02	1.4E+04
TEQ Mammals	Merriam's Kangaroo Rat	4.0E-01	3.0E+01	1E-02	--
Inorganics					
Aluminum	Nelson's Desert Bighorn Sheep	4.1E-03	pH<5.5	--	--
Antimony	Nelson's Desert Bighorn Sheep	4.3E-01	4.3E-01	1E+00	9.5E+01
Arsenic	Nelson's Desert Bighorn Sheep	1.7E+00	1.7E+00	1E+00	3.6E+02
Barium	Nelson's Desert Bighorn Sheep	8.3E+01	8.3E+01	1E+00	1.3E+04
Beryllium	Nelson's Desert Bighorn Sheep	4.2E-01	4.2E-01	1E+00	6.2E+01
Cadmium	Nelson's Desert Bighorn Sheep	5.7E+00	5.7E+00	1E+00	1.3E+03
Calcium	Nelson's Desert Bighorn Sheep	4.1E-03	--	--	--
Chromium, hexavalent	Nelson's Desert Bighorn Sheep	3.8E+01	3.8E+01	1E+00	8.2E+03
Chromium, total	Nelson's Desert Bighorn Sheep	9.6E+00	9.6E+00	1E+00	2.1E+03
Cobalt	Nelson's Desert Bighorn Sheep	1.9E+01	1.9E+01	1E+00	4.5E+03
Copper	Nelson's Desert Bighorn Sheep	9.3E+00	9.3E+00	1E+00	2.1E+03
Cyanide	Nelson's Desert Bighorn Sheep	8.8E+00	9.1E+00	1E+00	2.1E+03
Iron	Nelson's Desert Bighorn Sheep	4.1E-03	--	--	--
Lead	Nelson's Desert Bighorn Sheep	6.4E+00	6.4E+00	1E+00	1.5E+03
Magnesium	Nelson's Desert Bighorn Sheep	4.1E-03	--	--	--
Manganese	Nelson's Desert Bighorn Sheep	1.5E+02	1.5E+02	1E+00	2.8E+04
Mercury	Nelson's Desert Bighorn Sheep	2.9E+00	2.9E+00	1E+00	6.7E+02
Molybdenum	Nelson's Desert Bighorn Sheep	1.6E+00	1.6E+00	1E+00	2.2E+02
Nickel	Nelson's Desert Bighorn Sheep	2.1E+00	2.1E+00	1E+00	4.8E+02
Potassium	Nelson's Desert Bighorn Sheep	4.1E-03	--	--	--
Selenium	Nelson's Desert Bighorn Sheep	2.1E-01	2.2E-01	1E+00	1.6E+01
Silver	Nelson's Desert Bighorn Sheep	6.0E+01	6.0E+01	1E+00	1.4E+04
Sodium	Nelson's Desert Bighorn Sheep	4.1E-03	--	--	--
Thallium	Nelson's Desert Bighorn Sheep	1.0E+00	1.0E+00	1E+00	2.5E+02
Vanadium	Nelson's Desert Bighorn Sheep	5.4E+00	5.4E+00	1E+00	1.3E+03
Zinc	Nelson's Desert Bighorn Sheep	3.0E+02	3.0E+02	1E+00	6.5E+04

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Diet Composition (fraction)		Tissue EPCs (mg/kg dw)	Body Weight (kg)	Intake Estimates (kg dw/kg-day)		Site Use Factor (unitless)	Dose From Dietary Components (mg/kg-day)[b]			
		Diet	Soil			Food Ingestion Rate	Soil Ingestion Rate		Terrestrial Plants	Terrestrial Insects	Small Mammals	Soil
Volatile Organic Compounds												
1,2,4-Trimethylbenzene	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
1,3,5-Trimethylbenzene	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Acetone	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	3.6E+01
Bromomethane	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Chloro methane	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Chloroform	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	3.0E+01
Ethyl- benzene	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	2.1E+02
Isopropylbenzene	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Methyl acetate	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	2.6E+02
Methyl ethyl ketone	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	3.3E+03
Methylene chloride	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	3.6E+01
N-Butylbenzene	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
N-Propylbenzene	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
sec-Butylbenzene	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Toluene	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.6E+02
Xylene, m,p-	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.6E+00
Xylene, o-	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.6E+00
Xylenes, total	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.6E+00
Semi-Volatile Organic Compounds												
2,4-Dimethylphenol	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	7.0E+05	6.8E+01	1.4E-02	4.1E-03	1.0E+00	9.6E+03	--	--	1.2E+02
4-Methylphenol	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Bis (2-ethylhexyl) phthalate	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Butylbenzylphthalate	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Carbazole	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	5.3E+05	6.8E+01	1.4E-02	4.1E-03	1.0E+00	7.3E+03	--	--	1.2E+02
Dibenzofuran	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.6E+03	6.8E+01	1.4E-02	4.1E-03	1.0E+00	2.2E+01	--	--	3.8E-01
Di-n-butyl phthalate	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+03
Isophorone	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	0.0E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	0.0E+00	--	--	1.2E+02
Pentachlorophenol	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.6E+03	6.8E+01	1.4E-02	4.1E-03	1.0E+00	2.2E+01	--	--	1.1E+00
Polycyclic Aromatic Hydrocarbons												
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	4.5E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	6.2E-01	--	--	3.3E+02
PAH High molecular weight	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	6.8E+01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	9.3E-01	--	--	2.1E+00
Pesticides												
4,4-DDE	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	2.8E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	3.8E-02	--	--	4.5E-01
4,4-DDT	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	2.8E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	3.8E-02	--	--	4.5E-01
Alpha-Chlordane	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.6E+02	6.8E+01	1.4E-02	4.1E-03	1.0E+00	2.2E+00	--	--	3.5E+00
Dieldrin	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	8.8E-01	6.8E+01	1.4E-02	4.1E-03	1.0E+00	1.2E-02	--	--	8.8E-03
Gamma-Chlordane	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.6E+02	6.8E+01	1.4E-02	4.1E-03	1.0E+00	2.2E+00	--	--	3.5E+00
Polychlorinated Biphenyls												
Total PCBs	Nelson's Desert Bighorn Sheep	100% Plants	3.0E-01	1.9E+00	6.8E+01	1.4E-02	4.1E-03	1.0E+00	2.6E-02	--	--	7.8E-01

Table RBC-A
Risk-Based Concentration Calculations for Ecological Potential Receptors (SUF = 1, Selected LOAEL TRVs)

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

Constituent[a]	Terrestrial Receptors	Total Dose (mg/kg-day)	TRV (mg/kg-day) LOAEL	HQ (unitless)[c] LOAEL	Risk-Based Concentration (mg/kg)[d,e] LOAEL
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
1,3,5-Trimethylbenzene	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
Acetone	Nelson's Desert Bighorn Sheep	3.6E+01	3.6E+01	1E+00	8.9E+03
Bromomethane	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
Chloro methane	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
Chloroform	Nelson's Desert Bighorn Sheep	3.0E+01	3.0E+01	1E+00	7.3E+03
Ethyl- benzene	Nelson's Desert Bighorn Sheep	2.1E+02	2.1E+02	1E+00	5.2E+04
Isopropylbenzene	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
Methyl acetate	Nelson's Desert Bighorn Sheep	2.6E+02	2.6E+02	1E+00	6.4E+04
Methyl ethyl ketone	Nelson's Desert Bighorn Sheep	3.3E+03	3.3E+03	1E+00	8.1E+05
Methylene chloride	Nelson's Desert Bighorn Sheep	3.6E+01	3.6E+01	1E+00	8.9E+03
N-Butylbenzene	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
N-Propylbenzene	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
sec-Butylbenzene	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
Toluene	Nelson's Desert Bighorn Sheep	1.6E+02	1.6E+02	1E+00	4.0E+04
Xylene, m,p-	Nelson's Desert Bighorn Sheep	1.6E+00	1.6E+00	1E+00	4.0E+02
Xylene, o-	Nelson's Desert Bighorn Sheep	1.6E+00	1.6E+00	1E+00	4.0E+02
Xylenes, total	Nelson's Desert Bighorn Sheep	1.6E+00	1.6E+00	1E+00	4.0E+02
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	Nelson's Desert Bighorn Sheep	9.7E+03	--	--	--
4-Methylphenol	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
Bis (2-ethylhexyl) phthalate	Nelson's Desert Bighorn Sheep	1.2E+02	1.2E+02	1E+00	2.8E+04
Butylbenzylphthalate	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
Carbazole	Nelson's Desert Bighorn Sheep	7.4E+03	--	--	--
Dibenzofuran	Nelson's Desert Bighorn Sheep	2.2E+01	2.2E+01	1E+00	9.2E+01
Di-n-butyl phthalate	Nelson's Desert Bighorn Sheep	1.2E+03	1.2E+03	1E+00	2.8E+05
Isophorone	Nelson's Desert Bighorn Sheep	1.2E+02	--	--	--
Pentachlorophenol	Nelson's Desert Bighorn Sheep	2.3E+01	2.3E+01	1E+00	2.7E+02
Polycyclic Aromatic Hydrocarbons					
PAH Low molecular weight	Nelson's Desert Bighorn Sheep	3.3E+02	3.3E+02	1E+00	8.0E+04
PAH High molecular weight	Nelson's Desert Bighorn Sheep	3.1E+00	3.1E+00	1E+00	5.2E+02
Pesticides					
4,4-DDE	Nelson's Desert Bighorn Sheep	4.9E-01	4.9E-01	1E+00	1.1E+02
4,4-DDT	Nelson's Desert Bighorn Sheep	4.9E-01	4.9E-01	1E+00	1.1E+02
Alpha-Chlordane	Nelson's Desert Bighorn Sheep	5.8E+00	5.8E+00	1E+00	8.6E+02
Dieldrin	Nelson's Desert Bighorn Sheep	2.1E-02	2.1E-02	1E+00	2.1E+00
Gamma-Chlordane	Nelson's Desert Bighorn Sheep	5.8E+00	5.8E+00	1E+00	8.6E+02
Polychlorinated Biphenyls					
Total PCBs	Nelson's Desert Bighorn Sheep	8.1E-01	8.1E-01	1E+00	1.9E+02

Table RBC-A Notes
Notes for Risk-Based Concentration Calculations for Ecological Potential Receptors

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

Notes:

[a] Dioxin presented in ng/kg.

[b] Total dose equation is presented below:

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

[c] HQ = Total Dose / TRV

[d] Risk-based remediation goal calculated by using Excel solver to back-calculate a soil concentration that results in an HQ equal to 1.

[e] For the desert shrew, kangaroo rat, Gambel's quail, and cactus wren, alternate and more robust uptake models and TRVs were developed for dioxin TEQ (See Section 8.2 of the main report). The following assumptions were applied:

- For invertivorous/insectivorous species, the congener-specific BAFs (USEPA 1999 and Fagervold et al. 2010) were used.
- For herbivorous species, the congener-specific BAFs (USEPA 1999) were used. Vegetation BAFs are not available from Fagervold et al. (2010).
- A recommended mammalian dioxin TRV of 30 ng/kg bw-day was used to calculate the RBC protective of small mammals, and the selected dioxin LOAEL TRV (140 ng/kg bw-day) was used to calculate the RBC protective of birds.
- The surface soil EPCs (0 to 0.5 ft bgs) calculated for Bat Cave Wash exposure area were used to develop the congener-specific dioxin TEQ tissue concentrations.

Abbreviations:

AOC = area of concern
BAF = bioaccumulation factor
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
ng/kg = nanograms per kilogram
NOAEL = no observed adverse effect level (mg/kg-day)
SIR = soil ingestion rate (kg dw/kg bw-day)
SUF = site use factor (fraction)
TEQ = toxic equivalent
TRV = toxicity reference value (mg/kg-day)
USEPA = United States Environmental Protection Agency

References:

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.

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

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Appendix AHE
Acute Hazard Evaluation

ARCADIS Design & Consultancy for natural and built assets

Pacific Gas and Electric Company

APPENDIX AHE
ACUTE HAZARD EVALUATION

Topock Compressor Station
Needles, California

October 2019

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AHE-1.1 Summary Statistics for COPCs in OCS Potential Exposure Area Subsurface II Soil (0 to 10 feet bgs)

AHE-2.1 Human Health Acute Risk-Based Concentrations

ATTACHMENT

A Acute Risk-Based Concentration Calculations

ACRONYMS AND ABBREVIATIONS

AOC	area of concern
CalEPA	California Environmental Protection Agency
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
DTSC	Department of Toxic Substances Control
HHERA	Human Health and Ecological Risk Assessment
HHRA	Human Health Risk Assessment
main report	Soil Human Health and Ecological Risk Assessment Report
OCS	outside the compressor station
OEHHA	Office of Environmental Health Hazard Assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
RBC	risk-based concentration
REL	reference exposure level
RfC	reference concentration
RfD	reference dose
SVOC	semi-volatile organic compound
TCS	Topock Compressor Station
TEQ	toxicity equivalent
TPH	total petroleum hydrocarbon
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

1 INTRODUCTION

This Acute Hazard Evaluation appendix is included as part of the Human Health and Ecological Risk Assessment (HHERA) Report ("main report") to evaluate potential acute exposure of human receptors to chemicals in soil detected at individual sample locations at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station (TCS) in Needles, California (the site). The combined Areas of Concern (AOCs) and other investigation areas located outside the TCS (referred to here and in the HHERA as the outside the compressor station [OCS] potential exposure area) are included in this evaluation.

Acute risk-based concentrations (RBCs) were developed for the list of constituents of potential concern (COPCs) identified in the human health risk assessment (HHRA) for the OCS potential exposure area. These COPCs are presented in Table AHE-1.1 of this appendix, and include inorganics, polycyclic aromatic hydrocarbons (PAHs), total polychlorinated biphenyls (PCBs), pesticides, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), total petroleum hydrocarbons (TPHs), and dioxin toxicity equivalent (TEQ). Acute RBCs were compared to COPC concentrations in the OCS potential exposure area soil. Sample locations where COPC concentrations in soil exceed acute RBCs would indicate that potential acute exposure to soil in these locations may be of concern for human receptors evaluated in the HHRA for the OCS potential exposure area. The approach for the derivation of acute RBCs and the comparison of acute RBCs to COPC concentrations in OCS potential exposure area soil are discussed in Sections 2 and 3, respectively, of this appendix.

2 APPROACH

2.1 Development of Acute RBCs

Acute RBCs were developed for potential human receptors that could be present in the OCS potential exposure area (specifically maintenance workers, recreational users, and tribal users). Development of acute RBCs included a toxicity assessment to identify or derive toxicity values that can be used to estimate the likelihood of adverse effects occurring in humans at acute exposure levels. Consistent with general U.S. Environmental Protection Agency (USEPA) and California Environmental Protection Agency (CalEPA), Department of Toxic Substances Control (DTSC) guidance, acute hazards are evaluated for noncarcinogenic endpoints only, even for chemicals that may also have a carcinogenic endpoint, as the acute hazard evaluation is intended to evaluate the potential for short-term exposures; in contrast, the cancer endpoint is based on long-term chronic exposures. Noncancer toxicity values for acute RBCs were selected consistent with the hierarchy approach used in the HHRA for the selection of chronic toxicity values and presented in the main report. In general, the more conservative acute reference dose / reference exposure level (RfD/REL) and acute reference concentration (RfC)/REL obtained from either the Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database (2018) or a USEPA source (provided below) were used to develop RBCs for acute noncancer health effects.

The hierarchy of USEPA acute toxicity values for noncarcinogenic effects for acute oral and inhalation exposures (i.e., RfDs and RfCs, respectively) used in the acute hazard evaluation is as follows:

1. USEPA acute toxicity values as recommended by the Agency for Toxic Substances Disease Registry Minimal Risk Levels (2019)
2. USEPA Acute Exposure Guideline Levels (2019).
3. Office of Pesticide Programs, Human Health Benchmarks for Pesticides (USEPA 2017).

The 40 COPCs evaluated in the HHRA for acute hazard for the OCS potential exposure area are presented in Table AHE-1.1. COPCs without currently available noncancer acute toxicity values for either oral or inhalation exposures were not included in the acute hazard evaluation. The last column of Table AHE-1.1 indicates whether or not an acute toxicity value was available for the compound, and thus whether or not it was included in the acute hazard evaluation. All acute noncancer toxicity values used for the eight COPCs carried through in this acute hazard evaluation are presented in Table AHE-A.1 in Attachment A of this appendix,. Acute exposure parameters for the potential receptors are presented in Table AHE-A.2. Table AHE-A.3 presents chemical properties for each COPC identical to those used in the HHERA for chronic exposure, and volatilization factors for volatile COPCs evaluated via the inhalation route of exposure are shown in Table AHE-A.4. The equations used to calculate acute RBCs are presented in Table AHE-A.5 of Attachment AHE-A. The final human health acute RBCs for workers, recreational users, and tribal users are presented in Table AHE-2.1.

2.2 Comparison of Acute RBCs to Soil Concentrations

As an initial screening assessment, acute RBCs were compared to maximum concentrations of COPCs detected in OCS potential exposure area subsurface II soil (0 to 10 feet below ground surface). Exceedances

of the acute RBCs would indicate that acute exposure may be of concern for potential receptors evaluated in the HHRA and further evaluation is warranted to identify specific individual sample locations that may exceed acute RBCs.

3 RESULTS AND CONCLUSIONS

The acute hazard evaluation did not identify any individual sample locations where concentrations of COPCs detected in the OCS potential exposure area exceed acute RBCs for potential human receptors at the site. The results of the acute hazard evaluation support the conclusion that acute (1 day) or one-time exposures to COPCs in the OCS potential exposure area soil are not of concern to potential human receptors that could be present in this potential exposure area (such as maintenance workers, recreational users, and tribal users).

4 UNCERTAINTIES

Many of the assumptions used in the development of the acute RBCs, regarding potential human exposures and chemical toxicity are conservative, follow agency guidance, and reflect a 90th or 95th percentile value rather than a typical or average value. The use of conservative exposure assumptions and toxicity estimates can introduce considerable uncertainty into the risk assessment as discussed in Section 5.6 of the main report. The uncertainties applicable only to the development of acute RBCs are discussed below.

Exposure parameters and toxicity values used to develop acute RBCs conservatively assume that the duration of exposure is equivalent to the entire daily exposure for each receptor. The COPC concentration detected in an individual sample location, representative of a small land area, would not be representative of an average exposure concentration to which a receptor could be exposed for the entire daily exposure time and would likely overestimate the potential for acute health effects.

5 REFERENCES

Agency for Toxic Substances and Disease Registry. 2019. Minimal Risk Levels for Hazardous Substances. Available at: http://www.atsdr.cdc.gov/mrls/mrllist.asp.

OEHHA. 2018. Toxicity Criteria Database. Table of chronic RELs. Available at http://www.oehha.ca.gov/air/allrels.html.

Superfund Health Risk Technical Support Center. 2019. Provisional Peer Reviewed Toxicity Values (PPRTV). Available at: http://hhpprtv.ornl.gov/index.html.

USEPA. 1997. Health Effects Assessment (HEAST) Summary Tables. FY 1997 Update. July. Office of Solid Waste and Emergency Response (OSWER).

USEPA. 2017. Office of Pesticide Programs. Human Health Benchmarks for Pesticides. January.

USEPA. 2019. Acute Exposure Guideline Levels for Airborne Chemicals. Available at: https://www.epa.gov/aegl/access-acute-exposure-guideline-levels-aegls-values#chemicals.

TABLES

Table AHE-1.1
Summary Statistics for COPCs in OCS Potential Exposure Area Subsurface II Soil (0 to 10 feet bgs)

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

Chemical	Detection Frequency (Detections/ Samples Analyzed)	Range of Detected Site Concentrations	Units	Included in Acute Risk Assessment [a]
Inorganics				
Antimony	17 / 1149	2.1 - 19	mg/kg	Yes
Chromium, Hexavalent	417 / 1268	0.060 - 2,700	mg/kg	No
Chromium, total	1281 / 1281	2.9 - 4,400	mg/kg	No
Copper	1268 / 1274	1.8 - 3,100	mg/kg	No
Cyanide	1 / 96	0.22	mg/kg	No
Lead	1141 / 1166	1.0 - 1,600	mg/kg	No
Mercury (inorganic)	68 / 1152	0.10 - 180	mg/kg	No
Nitrate	5 / 5	6.0 - 54	mg/kg	Yes
Orthophosphate	13 / 13	204 - 359	mg/kg	No
Phosphate	5 / 5	8.8 - 358	mg/kg	No
Thallium	12 / 1149	2.1 - 6.1	mg/kg	No
Zinc	1273 / 1274	1.9 - 2,000	mg/kg	No
Volatile Organic Compounds				
Bromomethane	3 / 431	11 - 26	ug/kg	Yes
Chloro methane	4 / 431	5.3 - 11	ug/kg	Yes
Chloroform	1 / 431	11	ug/kg	Yes
Isophorone	2 / 663	2,200 - 2,800	ug/kg	No
Methyl acetate	3 / 71	6.6 - 17	ug/kg	No
Semi-Volatile Organic Compounds				
4-Methylphenol	2 / 663	430 - 460	ug/kg	No
bis (2-ethylhexyl) phthalate	5 / 663	370 - 2,000	ug/kg	No
Butylbenzylphthalate	1 / 663	630	ug/kg	No
Polycyclic Aromatic Hydrocarbons				
1-Methyl naphthalene	11 / 1019	5.8 - 220	ug/kg	No
2-Methyl naphthalene	17 / 1026	5.0 - 240	ug/kg	No
Acenaphthene	11 / 1026	5.1 - 53	ug/kg	No

Table AHE-1.1
Summary Statistics for COPCs in OCS Potential Exposure Area Subsurface II Soil (0 to 10 feet bgs)

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

Chemical	Detection Frequency (Detections/ Samples Analyzed)	Range of Detected Site Concentrations	Units	Included in Acute Risk Assessment [a]
Acenaphthylene	8 / 1026	5.1 - 26	ug/kg	No
Anthracene	51 / 1026	5.0 - 710	ug/kg	No
Benzo (ghi) perylene	270 / 1027	5.0 - 1,500	ug/kg	No
Fluoranthene	387 / 1029	5.1 - 8,600	ug/kg	No
Fluorene	8 / 1026	5.1 - 29	ug/kg	No
Naphthalene	17 / 1026	5.0 - 32	ug/kg	Yes
Phenanthrene	253 / 1028	5.1 - 3,100	ug/kg	No
Pyrene	377 / 1029	5.0 - 6,600	ug/kg	No
Pesticides				
4,4-DDE	5 / 258	2.6 - 6.1	ug/kg	No
4,4-DDT	1 / 258	3.0	ug/kg	Yes
alpha-Chlordane	1 / 258	12	ug/kg	No
Dieldrin	1 / 258	6.7	ug/kg	No
gamma-Chlordane	1 / 258	13	ug/kg	No
Polychlorinated Biphenyls				
Total PCBs [b]	193 / 624	17 - 6,280	ug/kg	No
Total Petroleum Hydrocarbons				
TPH as diesel	116 / 725	10 - 4,000	mg/kg	No
TPH as motor oil	353 / 723	10 - 8,900	mg/kg	No
Dioxins/Furans				
TEQ Human [c]	513 / 534	0.021 - 12,000	ng/kg	Yes

Table AHE-1.1
Summary Statistics for COPCs in OCS Potential Exposure Area Subsurface II Soil (0 to 10 feet bgs)

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

Notes:

[a] COPCs for the OCS potential exposure area were included in the acute hazard evaluation if acute toxicity values were available as described in Section 2.1 of Appendix AHE.

[b] Polychlorinated biphenyls (PCBs) are evaluated as total PCBs in the risk assessment.

[c] Dioxins are evaluated in toxic equivalents.

Abbreviations:

mg/kg = milligrams per kilogram.

ng/kg = nanograms per kilogram.

ug/kg = micrograms per kilogram.

COPC = Constituent of Potential Concern.

TPH = Total Petroleum Hydrocarbons.

TEQ = Toxic Equivalent.

Table AHE-2.1
Human Health Risk-Based Concentrations for Acute Exposure

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

COPC	Maximum Concentration in OCS Potential Exposure Area (mg/kg)	Short-Term Maintenance Worker	Long-Term Maintenance Worker	Child Camper / Hiker	Hunter	OHV Rider	Tribal
		Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]
Inorganics							
Antimony	19	3,000	5,900	69,000	SC(490,000)	13,000	SC(16,000,000)
Nitrate	54	SC(1,500,000)	SC(2,400,000)	SC(290,000)	SC(3,100,000)	SC(2,400,000)	--
Volatile Organic Compounds							
Bromomethane	0.026	200	390	320	66	SC(4,100)	800
Chloro methane	0.011	890	SC(1,800)	SC(1,500)	300	SC(14,000)	SC(3,500)
Chloroform	0.011	920	1,800	1,500	320	SC(15,000)	SC(3,800)
Polycyclic Aromatic Hydrocarbons							
Naphthalene	0.032	SC(54,000)	SC(60,000)	SC(31,000)	SC(290,000)	SC(52,000)	--
Pesticides							
4,4-DDT	0.003	SC(98)	SC(120)	SC(33)	SC(330)	SC(110)	--

Table AHE-2.1
Human Health Risk-Based Concentrations for Acute Exposure

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

COPC	Maximum Concentration in OCS Potential Exposure Area (mg/kg)	Short-Term Maintenance Worker	Long-Term Maintenance Worker	Child Camper / Hiker	Hunter	OHV Rider	Tribal
		Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]	Noncancer Hazard Risk-Based Concentrations (mg/kg) [a]
Dioxins/Furans							
TEQ Human	0.012	0.052	0.070	0.014	0.14	0.066	--

[a] Noncancer hazard RBCs correspond to a target chemical-specific hazard quotient (HQ) of 1 for either the potential child or adult receptor as applicable for each potential exposure scenario. For hypothetical future residential and recreational user exposure scenarios where a potential child receptor is evaluated (i.e., camper, hiker, and OHV rider scenarios) the chemical-specific RBCs calculated for the potential child receptor are generally lower than the chemical-specific RBCs for the potential adult receptor; therefore the lower RBCs calculated for the potential child receptor are presented here as the most conservative RBCs for each scenario.

Abbreviations:

-- = not calculated.
COPC = Constituent of Potential Concern.
mg/kg = milligrams per kilogram.
RBC = Risk-Based Concentration.
SC() = The RBCs indicated in parentheses represent an RBC that is greater than the theoretical soil saturation limit for that compound or the theoretical ceiling limit of 100,000 mg/kg (United States Environmental Protection Agency [USEPA] 2018). The theoretical soil saturation limit is the contaminant concentration in soil at which the absorptive limits of the soil particles, the solubility limits of the soil pore water, and saturation of soil pore air have been reached. Calculated soil saturation limits are presented in Table 5-4 of the main report. The theoretical ceiling limit of 100,000 mg/kg is equivalent to a chemical representing 10% by weight of the soil sample. At this contaminant concentration (and higher), the assumptions for soil contact may be violated (for example, soil adherence and wind-borne dispersion assumptions) due to the presence of the foreign substance itself.

TEQ = Toxic Equivalent.

References:

Department of Toxic Substances Control (DTSC). 2018. DTSC-modified Screening Levels (DTSC-SLs). Human Health Risk Assessment (HHRA) Note Number: 3. Human and Ecological Risk Office (HERO). June.

United States Environmental Protection Agency (USEPA). 2018. User's Guide to Regional Screening Levels for Chemical Contaminants, May. Available at: https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide

ATTACHMENT A

Acute Risk-Based Concentration Calculations

Table AHE-A.1
Noncarcinogenic Acute Toxicity Values for COPCs in OCS Potential Exposure Area Soil

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

COPC	Reference Concentration, RfC (mg/m^3)		Reference Dose, RfD (mg/kg-day)	
	Acute RfC Value	Source	Acute RfD Value	Source
Inorganics				
Antimony	0.001	ATSDR	1	ATSDR
Nitrate	--		4.0	ATSDR
Volatile Organic Compounds				
Bromomethane	0.19	ATSDR	0.14	OPP
Chloro methane	1.03	ATSDR	--	
Chloroform	0.49	ATSDR	0.3	ATSDR
Polycyclic Aromatic Hydrocarbons				
Naphthalene	--		0.6	ATSDR
Pesticides				
4,4-DDT	--		0.0005	ATSDR
Dioxins/Furans				
TEQ Human	--		0.0000002	Surrogate

Table AHE-A.1
Noncarcinogenic Acute Toxicity Values for COPCs in OCS Potential Exposure Area Soil

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

Abbreviations:

-- = Acute toxicity value not available.
COPC = Constituent of Potential Concern.
Surrogate = In the absence of available acute toxicity values for chemicals of potential concern, surrogate chemicals were chosen based on structural similarity to avoid underestimating potential carcinogenic risks/noncarcinogenic hazards:
- TEQ human was represented by 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD).

Sources:

ATSDR Agency for Toxic Substances and Disease Registry (ATSDR). 2018. Minimal Risk Levels (MRLs) for Hazardous Substances. Available at: http://www.atsdr.cdc.gov/mrls/mrllist.asp

OPP USEPA. 2017. Office of Pesticide Programs (OPP). Human Health Benchmarks for Pesticides (HHBP). January.

Table AHE-A.2
Human Health Exposure Parameters for Acute Exposure

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

Exposure Parameter	Symbol	Potential Receptor Scenario						Units
		Short Term Maintenance Worker	Long Term Maintenance Worker	Child Camper/Hiker	Hunter	Child OHV Rider	Tribal User	
Inhalation of Soil Particulates								
Particulate Emission Factor [a]	PEF	1.0E+06	1.0E+06	1.4E+09	1.4E+09	8.5E+05	1.4E+09	m^3/kg
Dermal Contact with Soil								
Surface Area [b]	SA	6032	6032	2900	6032	2900	NA	cm^2/day
Adherence Factor [c]	AF	0.8	0.8	0.2	0.07	0.8	NA	mg/cm^2
Absorption Factor-PAHs/PCBs [d]	ABS-PAH	0.15	0.15	0.15	0.15	0.15	NA	unitless
Absorption Factor-Metals [d]	ABS-Met	0.01	0.01	0.01	0.01	0.01	NA	unitless
Absorption Factor-Organochlorine Pesticides [d]	ABS-Pest	0.05	0.05	0.05	0.05	0.05	NA	unitless
Absorption Factor-Organics [d]	ABS-Org	0.1	0.1	0.1	0.1	0.1	NA	unitless
Conversion Factor	CF	1.0E-06	1.0E-06	1.0E-06	1.0E-06	1.0E-06	NA	kg/mg
Ingestion of Soil								
Ingestion Rate [e]	IR	330	330	200	100	330	NA	mg/day
Conversion Factor	CF	1.0E-06	1.0E-06	1.0E-06	1.0E-06	1.0E-06	NA	kg/mg
Population-Specific Intake Parameters								
Exposure Time (ingestion) [f]	ET_{ing}	8	4	16	16	1.5	2	hrs/day
Exposure Time (inhalation) [g]	ET_{inh}	8	4	24	24	1.5	2	hrs/day
Time Conversion Factor (ingestion)	TCF_{ing}	8	8	16	16	16	16	hrs/day
Time Conversion Factor (inhalation)	TCF_{inh}	24	24	24	24	24	24	hrs/day
Body Weight [h]	BW	80	80	15	80	33	80	kg

Table AHE-A.2
Human Health Exposure Parameters for Acute Exposure

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

Notes:

[a] A default particulate emission factor (PEF) of 1.4×10^9 m^3/kg as recommended by Department of Toxic Substances Control (DTSC 2014) was used for recreational users (campers, hikers, and hunters) and tribal users. A PEF of 8.5×10^5 m^3/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). A default PEF of 1.0×10^6 m^3/kg was used for maintenance workers (short-term and long-term) as recommended by DTSC (2014).

[b] The default area of exposed skin as recommended by DTSC (2014) was used for recreational users (campers, hikers, and hunters) and tribal users. For long-term and short-term worker scenarios, corresponds to the area of exposed skin recommended by DTSC for construction workers (DTSC 2014).

[c] Soil adherence factors as recommended by DTSC (2014) was used for recreational users (campers, hikers, and hunters) and tribal users. For long-term and short-term worker scenarios, corresponds to the adherence factor recommended by DTSC for construction workers (DTSC 2014).

[d] Dermal absorption factors for specific compound classes from DTSC (2015).

[e] Default incidental soil ingestion rates as recommended by DTSC (2014) used for recreational users (campers, hikers, and hunters) and tribal users. For long-term and short-term worker scenarios, corresponds to the incidential soil ingestion rate recommended by DTSC for construction workers (DTSC 2014).

[f] Exposure time for ingestion for all potential receptor scenarios consistent with that defined in the "Final Human Health and Ecological Risk Assessment Work Plan Addendum 2" ([RAWP Addendum 2] Arcadis 2015). For hikers and hunters 16 hours is assumed to be awake hours where ingestion will occur.

[g] Exposure time for inhalation for all potential receptor scenarios consistent with that defined in the "Final Human Health and Ecological Risk Assessment Work Plan Addendum 2" ([RAWP Addendum 2] Arcadis 2015). For child hikers, an assumed 24 hour per day exposure time is provided to generate a 10 m^3 daily inhalation volume, based on an assumed elevated activity rate for hiking. The actual expected exposure time is more likely between 8 to 12 hours per day (e.g., daylight hours). For adult hikers and hunters, an assumed 24 hour per day exposure time is provided to generate a 20 m^3 daily inhalation volume, based on an assumed elevated activity rate for hiking and hunting. The actual expected exposure time is more likely between 8 to 12 hours per day (e.g., daylight hours).

[h] Body weight values correspond to Cal/EPA default values for potential adult and child receptors (DTSC 2014).

Abbreviations:

cm^2/day = centimeters squared per day
days/yr = days per year
hrs/day = hours per day
kg/mg = kilograms per milligram
m^3/kg = meters cubed per kilogram
mg/cm^2 = milligrams per centimeters squared
mg/day = milligrams per day
NA = Not applicable; parameter not applicable to exposure scenario for potential exposure pathways evaluated in the Human Health Risk Assessment (HHRA). Hexavalent chromium is not absorbed via dermal contact.

References:

Arcadis. 2015. *Final Human Health and Ecological Risk Assessment Work Plan Addendum 2* . PG&E Topock Compressor Station, Needles, California. June.

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Table AHE-A.3
Chemical Properties for COPCs in OCS Potential Exposure Area Soil

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

COPC	Diffusivity in air, D_a (cm^2/s)		Diffusivity in water, D_w (cm^2/s)		Henry's Law Constant at Reference Temperature (25° C), H (atm-m^3/mol)		Dimensionless Henry's Law Constant at Reference Temperature (25° C), H' (unitless)		Enthalpy of Vaporization at the Normal Boiling Point, $DH_{v,b}$ (cal/mol)		Normal Boiling Point, T_B (K)		Critical Temperature, T_C (K)		Enthalpy of Vaporization at Average Soil Temperature, $DH_{v,TS}$ (cal/mol)		Henry's Law Constant at Average Soil Temperature, H_{TS} (atm-m^3/mol)		Dimensionless Henry's Law Constant at Average Soil Temperature, H'_{TS} (unitless)		Vadose Zone Effective Diffusion Coefficient, $D_{eff,V}$ (cm^2/s)		Organic Carbon Partition Coefficient, K_{oc} (cm^3/g)		Pure Component Water Solubility, S (mg/L)		Vapor Pressure, VP (mmHg)		Soil Saturation Concentration, C_{sat}, calculated [a] (mg/kg)
Inorganics																																		
Antimony	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
Nitrate	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
Volatile Organic Compounds																																		
Bromomethane	1.0E-01	1	1.4E-05	1	7.3E-03	1	3.0E-01	1	5.7E+03	1	2.8E+02	1	4.7E+02	1	5.5E+03	J&E	7.1E-03	J&E	2.9E-01	J&E	7.8E-03	J&E	1.3E+01	1	1.5E+04	1	8.9E+02	1	3.6E+03					
Chloro methane	1.2E-01	1	1.4E-05	1	8.8E-03	1	3.6E-01	1	5.1E+03	1	2.5E+02	1	4.2E+02	1	4.6E+03	J&E	8.6E-03	J&E	3.5E-01	J&E	9.7E-03	J&E	1.3E+01	1	5.3E+03	1	7.1E+02	1	1.3E+03					
Chloroform	7.7E-02	1	1.1E-05	1	3.7E-03	1	1.5E-01	1	7.0E+03	1	3.3E+02	1	5.4E+02	1	7.4E+03	J&E	3.5E-03	J&E	1.4E-01	J&E	6.0E-03	J&E	3.2E+01	1	8.0E+03	1	1.9E+02	1	2.5E+03					
Polycyclic Aromatic Hydrocarbons																																		
Naphthalene	6.0E-02	1	8.4E-06	1	4.4E-04	1	1.8E-02	1	1.0E+04	1	4.9E+02	1	7.5E+02	1	1.3E+04	J&E	4.1E-04	J&E	1.7E-02	J&E	4.7E-03	J&E	1.5E+03	1	3.1E+01	1	8.1E-02	1	2.9E+02					
Pesticides																																		
4,4-DDT	3.8E-02	2	4.4E-06	2	8.3E-06	2	3.4E-04	2	NA		3.8E+02	3	NA		NA		8.3E-06	J&E	3.4E-04	J&E	3.1E-03	J&E	1.7E+05	2	5.5E-03	2	1.6E-07	2	5.6E+00					

Table AHE-A.3
Chemical Properties for COPCs in OCS Potential Exposure Area Soil

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

COPC	Diffusivity in air, D_a (cm^2/s)		Diffusivity in water, D_w (cm^2/s)		Henry's Law Constant at Reference Temperature (25° C), H ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Reference Temperature (25° C), H' (unitless)		Enthalpy of Vaporization at the Normal Boiling Point, $DH_{v,b}$ (cal/mol)		Normal Boiling Point, T_B (K)		Critical Temperature, T_C (K)		Enthalpy of Vaporization at Average Soil Temperature, $DH_{v,TS}$ (cal/mol)		Henry's Law Constant at Average Soil Temperature, H_{TS} ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Average Soil Temperature, H'_{TS} (unitless)		Vadose Zone Effective Diffusion Coefficient, $D_{eff,v}$ (cm^2/s)		Organic Carbon Partition Coefficient, K_{oc} (cm^3/g)		Pure Component Water Solubility, S (mg/L)		Vapor Pressure, VP (mmHg)		Soil Saturation Concentration, C_{sat}, calculated [a] (mg/kg)
Dioxins/Furans																														
TEQ Human	4.7E-02	2	6.8E-06	2	5.0E-05	2	2.0E-03	2	NA		NA		NA		NA		5.0E-05	J&E	2.1E-03	J&E	3.7E-03	J&E	2.5E+05	2	2.0E-04	2	1.5E-09	2	3.0E-01	

Notes:

[a] = Csat = the contaminant concentration in soil at which the absorptive limits of the soil particles, the solubility limits of the soil pore water, and saturation of soil pore air have been reached (USEPA 2018). The equation used to calculate Csat is:

$C_{sat} = S / \rho_b \times (K_d \times \rho_b + \theta_w + H' \times \theta_a)$, where:

S = solubility in water

ρ_b = dry bulk density (1.5 g/cm^3; [default, DTSC 2018])

K_d = soil-water partition coefficient ($K_{oc} \times f_{oc}$, where foc = 0.006 g/g [default, USEPA 2002])

θ_w = water-filled soil porosity (0.15 cm^3/cm^3; [default, DTSC 2018])

H' = dimensionless Henry's Law constant

θ_a = air-filled soil porosity (0.28 cm^3/cm^3; [default, DTSC 2018])

[b] = Although isophorone is listed under volatile organic compounds, the chemical properties for isophorone do not meet the USEPA criteria to be evaluated as a volatile for purposes of the HHRA.

Abbreviations:

COPC = Constituent of Potential Concern.
J&E = Calculated using Johnson and Ettinger model (DTSC 2014).
NA = Chemical property not applicable.

Sources:

1. Department of Toxic Substances Control (DTSC). 2014. Johnson and Ettinger SG-SCREEN Model, EPA Version 2.0, dated April 2003, as modified by DTSC. December.
2. United States Environmental Protection Agency (USEPA). 2018. *Regional Screening Levels (RSLs).* May. Available at: https://www.epa.gov/risk/regional-screening-levels-rsls.
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USEPA. 2018. *Regional Screening Levels (RSLs) - User's Guide (May 2018).* Available at: https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide.

Table AHE-A.4
Volatilization Factors for Volatile COPCs Evaluated via the Inhalation Route of Exposure

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

COPC	Volatilzation Factor (m^3/kg) for Potential Receptor					
	Short-Term Maintenance Worker	Long-Term Maintenance Worker	Child Camper/Hiker	Hunter	Child OHV Rider	Tribal User
Volatile Organic Compounds						
Bromomethane	3.4E+02	1.9E+03	1.7E+03	1.7E+03	1.7E+03	2.6E+03
Chloro methane	2.9E+02	1.6E+03	1.5E+03	1.5E+03	1.5E+03	2.2E+03
Chloroform	6.5E+02	3.5E+03	3.3E+03	3.3E+03	3.3E+03	5.0E+03

Abbreviations:
COPC = Constituent of Potential Concern.
m^3/kg = cubic meters per kilogram.

Table AHE-A.5
Equations Used to Calculate Acute Risk-Based Concentrations

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

Acute Risk-Based Concentration

$$RBC_{acute,\ nc} = \frac{1}{(1/RBC_{inhv}) + (1/RBC_{inhp}) + (1/RBC_{derm}) + (1/RBC_{ing})}$$

Risk-Based Concentration: Vapor Inhalation

$$RBC_{inhv,\ nc} = \frac{THQ}{(1/RfC) \times (1/VF) \times ET \times (1/TCF_{inh})}$$

Risk-Based Concentration: Soil Particulate Inhalation

$$RBC_{inhp,\ nc} = \frac{THQ}{(1/RfC) \times (1/PEF) \times ET \times (1/TCF_{inh})}$$

Risk-Based Concentration: Dermal Contact

$$RBC_{derm,\ nc} = \frac{THQ \times BW}{(1/RfDo) \times SA \times AF \times ABS \times CF}$$

Risk-Based Concentration: Soil Ingestion

$$RBC_{ing,\ nc} = \frac{THQ \times BW}{(1/RfDo) \times IR \times CF \times ET \times (1/TCF_{ing})}$$

Table AHE-A.5
Equations Used to Calculate Acute Risk-Based Concentrations

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

Where:

ABS = Absorption Factor [unitless]
AF = Soil to Skin Adherence Factor [mg/cm^2]
BW = Body Weight [kg]
CF = Conversion Factor [kg/mg]
ET = Exposure Time [hours/day]
IR = Soil Ingestion Rate [mg/day]
PEF = Soil-to-Air Particulate Emission Factor [m^3/kg]
RBC = Risk-Based Concentration
RfC = Reference Concentration [mg/m^3]
RfDo = Reference Dose [mg/kg-day]
SA = Surface Area of Exposed Skin [cm^2/day]
TCF = Time Conversion Factor [hours/day]
THQ = Target Hazard Quotient [unitless]
VF = Soil-to-Air Volatilization Factor [m^3/kg]

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Appendix RTC
Response to Comments and Final Resolution Table

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)	Comment Type (RA/Non - RA)	Comment Category	Section / Page	Reference Text	Soil HHERA Comment (Please provide sufficient detail, include specifically what you are looking for)	PG&E Response	DTSC Comments on RTCs Received on June 5, 2019	Final Resolution June 20-21, 2019
1	FMIT-1	RA		Entire	n/a	The Tribes (for these comments mean the Chemehuevi, Cocopah, Colorado River Indian Tribes, Fort Mojave, Hualapai and Quechan) generally do not disagree with the procedures and the conclusions in the main body of the HHERA which evaluates risk across the entire OCS potential exposure area.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
2	FMIT-2			Entire	n/a	The addition or changing of risk assessment assumptions or procedures AFTER the risk assessment work plan has been reviewed and approved is not acceptable to the Tribes. The Tribes have asked for full participation in the development and implementation of the HHERA. Procedural changes made without Tribal consultation and implemented in the work plan unacceptably bypass Tribal participation.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		Agencies not requesting changes to the HHERA report. The Tribes stand by their comment that the AOC-by-AOC evaluation is inappropriate for inclusion in the HHERA because it was not part of the approved HHERA Work Plan. The Tribes formally request that the AOC-by-AOC risk assessment NOT be included in the HHERA or utilized in risk management decisions UNTIL such time that appropriate consultation between agencies and the Tribes is completed. In addition, DTSC will provide chronology of the AOC-by-AOC risk discussions.
3	FMIT-3	RA		Entire		The Tribes do not disagree with the limited soil remediation (8 sample locations) that is determined based on risk across the entire OCS potential exposure area. The HHERA recommendation for limited soil remediation (8 sample locations) that are protective of both human ecological receptors.	Comment acknowledged. Note that the eight samples referenced in Sections 8.1.2 and 8.2.2 of the HHERA Report were provided as an example of one way to identify locations where concentrations of risk driving compounds contribute substantially to risk estimates. The HHERA Report does not make recommendations regarding soil remediation, because that is the role of the risk managers. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
4	FMIT-4	RA		Entire	n/a	The Tribes do not disagree with the findings of the sediment transport evaluation that no contaminated sediment is reaching the Colorado River	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
5	FMIT-5	RA		Entire	n/a	The Tribes do not disagree with the use of a single exposure area Outside the Compressor Station (OCS)	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
6	FMIT-6	RA		Entire	n/a	The Tribes do not disagree with the exclusion of the residential exposure scenario in DOI-areas of Bat Cave Wash from soil remediation recommendations	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
7	FMIT-7	RA		Entire	n/a	The Tribes do not disagree with the exclusion of individual SWMU/AOC-exposure areas in the soil remediation recommendations.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.

Comment No.	Unique Comment ID (if applicable)	Comment Type (RA/Non - RA)	Comment Category	Section / Page	Reference Text	Soil HHERA Comment (Please provide sufficient detail, include specifically what you are looking for)	PG&E Response	DTSC Comments on RTCs Received on June 5, 2019	Final Resolution June 20-21, 2019
					NOTE: Any Exec Summary comments are also applicable to the main HHERA text and appendices. Due to the exceptional length of this report, it is not be possible for the reviewers to identify each occurrence of a topic. The Tribes expect that these comments will be addressed wherever in this HHERA this subject topic occurs.		N/A		N/A
8	FMIT-8	Non -RA		ESl / ES-1	"...additional surrounding land owned or managed by..."	The Fort Mojave Indian Tribe is a land-owner of land adjacent to the TCS and the text and maps must accurately reflect this.	A statement will be added to this section in the HHERA Report to reflect that the FMIT owns a 100-acre parcel located about 0.25 mile north of the TCS.		Update HHERA as reported in PG&E's response.
9	FMIT-9			ES.2.3.1/ ES-5	Ecological Habitat Characteristics Geology -Unconsolidated alluvial and fluvial deposits are underlain by bedrock with very low permeability...	There is no mention of the dredged soils that make up surface soils from present-day rivers edge to the base of alluvial terrace deposits to the west. These soils are different than local alluvial/fluvial sediments because they are derived partly from upstream sources. Also, interesting that no discussion is made here on reducing zone surrounding river. All of this strongly suggests the need for Arcadis to present a single, unified, consistent CSM that explains site characteristics the same way regardless of soils or GW focus.	Section 2.3 of the HHERA Report will be updated to include additional detail regarding the presence of non-site soils and reducing zone near the river's edge as discussed below. The historical aerial photographs for the study area (included in Section 3.3 of the 2007 Final RFI/RI Report, Volume 1, CH2M HILL, 2007a) provide information on the general timeframes and locations of dredging, as evidenced by the extensive sand dune areas present in the historical photographs on both the western and eastern shorelines of the Colorado River. Sources of dredge sand were along main river channel and presumably Topock Marsh (AZ side near Marina) as well as CA side Park Moabi. Reducing conditions have been documented in most shallow to mid- depth fluvial wells and sediments near and underlying the river. South of the railroad tracks, these reducing conditions are also encountered in deep wells near and beneath the river. The observed reducing conditions are characterized by the presence of organic carbon, dissolved iron, dissolved manganese, and ammonia in groundwater samples. Under non-pumping conditions, as Cr(VI) migrates in groundwater from non-reducing conditions in the alluvial and deep fluvial sediments to reducing conditions near and beneath the river, it undergoes chemical reduction and reverts to Cr(III) which is immobilized in the sediments. The fluvial sediments in the floodplain are relatively recent in origin and contain abundant organic material from several sources. Following the construction of Parker Dam in 1938, the river channel near Topock began to accumulate silt. The river level rose approximately 27 feet, and the channel near Topock became a braided stream. Organic material, probably from vegetation in the Topock marsh area, was incorporated into the fluvial sediments. Some of these organic-rich sediments were deposited directly on the floodplain. In addition, dredging operations resulted in placement of additional organic-rich river bottom materials on the floodplain. The reducing conditions observed in the floodplain sediments are likely caused by microbial breakdown of the organic carbon present (regardless of the source) in these shallow fluvial deposits. These reducing conditions in the fluvial deposits play a key role in the attenuation of Cr(VI). A detailed groundwater CSM was presented in the RFI/RI report (Volume 2). The integration of the groundwater CSM in relation to the soil CSM will be discussed in the forthcoming RFI/RI Report (Volume 3).		Update HHERA as reported in PG&E's response.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)	Comment Type (RA/Non - RA)	Comment Category	Section / Page	Reference Text	Soil HHERA Comment (Please provide sufficient detail, include specifically what you are looking for)	PG&E Response	DTSC Comments on RTCs Received on June 5, 2019	Final Resolution June 20-21, 2019
10	FMIT-10			ES. 2.3.1 / ES-6	Ecological Habitat Characteristics Overview - Relatively barren of vegetation	A higher density of vegetation occurs along BCW, from its mouth to high density tamarisk at outlet, with the exception of the mouth of Bat Cave Wash.	Comment acknowledged. This is stated in the last sentence of the bullet on Ecological Habitat Characteristics Overview for the HHERA Report (ES 2.3.1): "Dense vegetation is present in the Tamarisk Thicket area, located at the northern end of BCW." No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
11	FMIT-11			ES.2.3.1 / ES-6	Ecological Habitat Characteristics Overview - May periodically flood during stormwater runoff events but remains dry.	Standard analysis would include quantitatively defining the frequency/magnitude of 'flooding' events.	Monitoring for the frequency and intensity of flooding events in AOC 10 is not done formally. Flooding events are periodic; on the frequency of one or two times a year and usually during the summer monsoon season. This anecdotal information will be included in the HHERA.		Update HHERA as reported in PG&E's response.
12	FMIT-12			ES.2.3. 1 / ES-6	Ecological Habitat Characteristics Overview - Ephemerally flooded	Is the cause of the ephemeral flooding relevant to the exposure pathway and CSM? If so, it would be important to clarify if this is due to the infrequent flooding associated with washes, or annual variations in stage along CO River - which are several feet.	The text in Section ES.2.3.1 and Section 2.2.5 will be clarified to include that ephemeral flooding is due to infrequent flooding associated with washes or annual variations in stage along the CO River, the latter of which is not associated with the potential for transport of site-related materials. This distinction will be clarified in the CSM (Figure 2-7) as well.		Update HHERA as reported in PG&E's response.
13	FMIT-13			ES.3 / ES-8	Only Category 1 data are included in the datasets used in the quantitative risk assessment. Soil samples representative of soil that has been removed as part of a removal action were not included in the HHERA datasets.	As stated in the HHERA, removed soils are not included in the risk. Therefore, the risk assessment conclusions will need to be updated if any soil removal is implemented prior to risk management decisions are made. Please clearly describe how soils removed during other site activities will be addressed within the risk assessment dataset and subsequent risk calculations.	Any samples associated with soil that has been removed after the approval of the HHERA Report and prior to risk management will not be included in the remedial design/implementation and/or risk management documents. No changes to the HHERA Report are proposed to address this comment.	The response should also specify that resulting risks associated with removed soil may be refined with additional evaluation.	No change to HHERA report.
14	FMIT-14	RA		ES.4 / ES-11	"Soil Background Investigations (Various reports/authors)	The HHERA should list individually by title/author/date these reports.	The soil background investigation reports will be listed individually by title/author/date in Section 3.4.1.1.1 of the HHERA Report. • Soil Background Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California. CH2M. May 15. 2009 • Revised Final Soil RCRA Facility Investigation/Remedial Investigation Work Plan, PG&E Topock Compressor Station, Needles, California, Appendix A, Subappendix E: Additional Inorganic Compounds – Soil Background Evaluation. CH2M. January 14, 2013. • Technical Memorandum. Ambient/Background Study of Dioxins and Furans at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California. CH2M. July 20, 2017.		Update HHERA as reported in PG&E's response.
15	FMIT-15			ES.5.1.2 /ES-13	In addition, at the direction of DTSC, potential exposure areas based on individual AOCs outside the fence line were evaluated in separate appendices	Please include in the text that risks calculated separately for individual AOCs are overly conservative and will greatly overestimate site risks. Specifically, none of the human site-specific uses would occur solely in any one AOC. In addition, no large-range mammal or bird would spend an entire exposure period in a single AOC.	The requested text will be incorporated into the HHERA Report.	Statement regarding conservativeness and representation is already stated in original text cited in FMIT-16 as part of ES.5.3.2 / ES-15. No need for additional statement as requested in FMIT-15.	The following text will be added to the Executive Summary: "Risks calculated separately for individual AOCs are conservative and likely overestimate site risks." A global check will be done to make the same update elsewhere in the HHERA report.

Comment No.	Unique Comment ID (if applicable)	Comment Type (RA/Non - RA)	Comment Category	Section / Page	Reference Text	Soil HHERA Comment (Please provide sufficient detail, include specifically what you are looking for)	PG&E Response	DTSC Comments on RTCs Received on June 5, 2019	Final Resolution June 20-21, 2019
16	FMIT-16			ES.5.3.2 / ES-15	The risks/hazards estimated for the OCS potential exposure area are believed to provide a more appropriate representation of the potential exposures for the human populations… than the risks/hazards estimated for individual AOCs/SWMU/UA potential exposure areas.	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
17	FMIT-17			ES.5.3.2/ES-18	Some targeted form of risk management or remediation, addressing elevated levels of hexavalent chromium and dioxin, would be effective at reducing risks for the campers, hikers and OHV riders to levels below 1 x 10^{-6}	Risk values that fall within the allowable risk range of 1 x 10^{-4} to 1 x 10^{-6} do not automatically require remediation, but rather additional evaluation. The HHERA text indicates a remedial goal of 1 x 10^{-6}. Establishing the appropriate remedial goal, however, should be determined during the risk management process which includes stake holder input. In addition, use of 1 x10^{-6} risk threshold for remedial goals is overly conservative for the camper, hiker and OHV rider. As has been discussed throughout the risk assessment process, these uses of the site are not site specific, are overly conservative, and will greatly overestimate risk. Therefore, to overestimate the potential risks due to conservative assessment and then use remedial goals at the upper bounds of allowable risk range would result in an increased amount of unnecessary and avoidable site impacts.	Comment acknowledged. The target risk of 1 x 10^{-6} was selected for reference as the lower end of the acceptable risk management range of 1 x 10^{-6} and 1 x 10^{-4}. Text will be included in Section ES.5.3.2 to acknowledge this.		Update HHERA as reported in PG&E's response.
18	FMIT-18			ES.5.3.2 / ES-17	Recreational User- Camper and others	There are both practical (presence of freeway, railroad, etc.) and topographical (slope) constraints to the recreational scenarios evaluated in the HHERA. The Tribes request that a map that clearly indicates areas that could realistically be used for these recreational activities be prepared and included in the HHERA. For example, is camping anticipated at location AOC10-20? Exposure scenarios that cannot occur in a given area should not be included in the HHERA evaluation, or, at a minimum the possibility of these exposures must be discussed.	There is insufficient information about specific recreational activity for certain areas of the AOCs outside the TCS; therefore, it is not possible to prepare a figure showing the specific locations that could realistically be used for these recreational activities. There is no physical barrier (such as fencing) that would stop an individual recreational user from accessing any and all areas of all AOCs outside the TCS. The uncertainties section of the HHRA (Section 5.6.3.2 for Exposure Assumptions and Pathways) will be revised to include language emphasizing this uncertainty in the assumptions used to assess recreational land use at the site. The following text will be added into Section 5.6.3.2, Exposure Assumptions and Pathways: "In addition, as recommended by DOI (Arcadis 2015), it is assumed that each of the recreational activities could take place at any location on federal land. In reality, specific locations may be preferred for certain activities, while other locations may be less attractive or may have limited recreational options~~; however, there is insufficient information to preclude certain recreational activities from certain areas of the AOCs outside the TCS~~. No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. Therefore, potential receptor populations would more likely be exposed randomly, over the course of a lifetime, to soils present across the OCS potential exposure area, rather than have a lifetime of contact limited to a potential exposure area based on an individual AOC (as evaluated in the area-specific appendices at the request of DTSC)."		Update HHERA as reported in PG&E's response (modified). The sentence shown as strike through font will not be included in the updated HHERA report.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)	Comment Type (RA/Non - RA)	Comment Category	Section / Page	Reference Text	Soil HHERA Comment (Please provide sufficient detail, include specifically what you are looking for)	PG&E Response	DTSC Comments on RTCs Received on June 5, 2019	Final Resolution June 20-21, 2019
19	FMIT-19			ES.5.3.2	the alternate and more robust BAFs approaches for dioxin TEQ based on congener-specific uptake are recommended for developing risk-based remediation goals	The Tribes request that a more detailed discussion of the implications behind the use of single congener versus congener-specific RBRGs be presented in more detail in a TWG format.	Comment acknowledged. A more detailed discussion regarding use of single congener verses congener-specific RBRGs will be presented in more detail at an upcoming TWG meeting. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
20	FMIT-20			ES.5.4 / ES-19	By using multiple conservative exposure assumptions or toxicity estimates, the risk estimates likely develop a conservative bias that may result in significant overestimation of potential risk and hazard.	The Tribes request that the text be updated to state that the use of conservative exposure assumptions "will" overestimate risk rather than "likely" overestimate risk.	Comment acknowledged. It is proposed that the word "likely" will be replaced with the words "will likely" throughout the HHERA Report wherever this sentence appears.		The HHERA will keep "likely" in the report and not change to "will likely". No changes to the HHERA Report.
21	FMIT-21			ES.6.2.2/ES-22	For terrestrial birds and mammals, risks were evaluated using two site specific use factors (SUF) scenarios: a generic SUF of 1 and a SUF based on species- and site-specific home range comparted to the total area of each exposure area	It is unclear why risk calculations based on an SUF of 1 are used for ecological receptors that are known not to exist solely within the site. Please update the text to state that the "risks/hazards estimated using the site-specific home range potential exposure areas are believed to provide a more appropriate representation of the potential exposures for the ecological populations than the risks/hazards estimated based on a SUF of 1". If the text is not updated, please include why the use of a SUF of 1 is appropriate and necessary for birds and large range mammals.	Following the approved RAWP (Section 6.3.3.3.12), a generic SUF of 1 was used as a conservative parameter for the initial phase of the ERA. Where applicable, site- or area-specific SUFs were used to refine the risk estimates to make them more site-specific. This is typical of an ERA process. Use of site-specific SUFs is discussed in Section 6.6.1 of the HHERA Report. For each area, COPECs with HQs greater than 1 using the depth-weighted EPCs were identified for further evaluation using refined exposure and effects assumptions, including site-specific SUFs. For ecological receptor populations exposed to COPECs in soil, risk conclusions were ultimately characterized based on HQs that were calculated using refined exposure and effects assumptions associated with a higher level of confidence in predicting risks (area-weighted EPCs, site-specific SUF, and selected TRVs) and supporting lines of evidence. Section ES.6.2.2 will be updated to clarify the approach in using generic and site-specific SUFs.		Update HHERA as reported in PG&E's response.
22	FMIT-22			ES.6.3 / ES-23	Although the dioxin TEQ TRVs selected in the RAWP...were used to estimate risk...the alternate and more robust TRVs for dioxin TEQ based on more recent date are recommended for developing RBRGs,	The Tribes request that a more detailed discussion of the implications behind the use of single congener verses congener-specific RBRGs be presented in more detail in a TWG format.	Comment acknowledged. A more detailed discussion regarding use of single congener verses congener-specific RBRGs will be presented in more detail at an upcoming TWG meeting. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
23	FMIT-23	RA		ES-7	Various typographical/spelling errors. e.g., first line pg ES-7	A global spell and grammar check should be performed on the document.	Comment acknowledged. A global spell and grammar check will be performed during the finalization of the HHERA Report.		Update HHERA as reported in PG&E's response.
24	FMIT-24	RA		ES-7	Table, Current- Residential and recreational	The distance from the TCS to the listed (closest) residential area should be provided.	The closest residence is located at the Topock Marina, on the Arizona side of the river. It is approximately 2,000 feet away as the crow flies. The distance of 2,000 feet from the TCS to the listed (closest) residential area will be included in the HHERA Report.		Update HHERA as reported in PG&E's response.

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25	FMIT-25	RA		ES-7	Table, Future (land use)	The DOI requirement for residential land use evaluation, either seasonal or year-round, was intended for informational purposes only and not for decision-making. This commitment should be clearly presented in the HHERA.	Comment acknowledged. The last bullet of Section ES-7.1 will be revised to state: This evaluation was included in the HHRA for informational purposes only. As stated in DOI (2015) Land Use Memo, "DOI will not utilize a future residential scenario on Federal lands within the project area when evaluating cleanup options in the Feasibility Study phase." The last bullet under conclusions for the HHRA in Section 7.1.3 of the main text will also be revised to be consistent with this revision in the Executive Summary.		Update HHERA as reported in PG&E's response.
26	FMIT-26			ES.7.2 / ES-29	Some targeted form of risk management or remediation… to levels below 1 x 10-6.	The risk assessment continues to default to 1 x 10^{-6} as the acceptable level of risk at the site. As stated earlier, within the text acceptable risk ranges from 1 x10^{-4} through 1 x 10^{-6}. Therefore, the risk assessment should be updated to state that "remediation to reduce risk to 1 x 10^{-6} may not be necessary however If risk management concludes it is necessary to reduce risk below 1 x 10^{-6}, then targeted assessment of risk management or remediation should be required."	Comment acknowledged. The target risk of 1 x 10^{-6} was selected for reference as the lower end of the acceptable risk range of 1 x 10^{-6} and 1 x 10^{-4}. The text is not implying that 10^{-6} is the acceptable target risk for the site, or that remediation is necessary to get risks down to 10^{-6}. Additional clarification text will be incorporated into the HHERA Report to specify that the risk management range is 1 x 10^{-6} to 1 x 10^{-4} and can be considered in making remedial and risk management decision, as indicated in Comment DTSC-19 regarding the RBRGs.		Update HHERA as reported in PG&E's response.
27	FMIT-27			ES.8 / ES-29	RBRGs, risked based remedial goals, "are proposed health protective target cleanup concentrations that can be used in combination with other factors such as background concentrations, as a starting point [underline added for emphasis] for making risk management decisions."	This would indicate that the HHERA is a starting point in creating a firm foundation resulting in remedial decisions that would be mutually shared, i.e. tribal consultations, PRIOR to any activities taking place.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
28	FMIT-28			ES.8.1.1 /ES-30	Rearranging the equations used to estimate the ILCRs and noncancer hazards and using the target ILCR of 1 x 10^{-6} (and 1 x 10^{-5} for dioxin TEQ) and the target noncancer HQ of 1, the concentration of each risk driver associated with the target ILCR and HQ levels was determined.	The text should provide RBRGs developed using the entire acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6} not simply based on the upper bounds of the acceptable risk range. Please update text for RBRG discussions to address the RBRG range and not a single RBRG developed for the upper bounds limit. In addition, please update the table in this section to show RBRGs associated with entire acceptable risk range	Comment acknowledged. Additional clarification text will be incorporated into the HHERA Report to specify that the risk management range is 1 x 10^{-6} to 1 x 10^{-4} and can be considered in making remedial and risk management decisions, as indicated in Comment DTSC-19 regarding the RBRGs. Further, RBRGs corresponding to the acceptable risk management range of 1 x 10^{-6} to 1 x 10^{-4} and to a hazard quotient of 1 will be presented in Sections ES.8.1.1 and 8 of the HHERA Report.		Update HHERA as reported in PG&E's response. In addition, include language to acknowledge that RBRGs are a tool and not a bright line intended for remediation. Also include that 10^{-6} is the typical point of departure for developing RBRGs for HHRAs.
29	FMIT-29			ES.8.2.2 /ES-32	AOC9 AOC10-21 to meet the RBRG of 145	Why are AOC10 samples discussed under AOC9? Please outline how soil sample locations were assigned to each AOC and the basis for changing AOC boundaries. Was any sample location repeated in EPC calculations for two different AOCs? If so which samples/locations? This is an example of another post-risk assessment work plan procedural change on which the Tribes were not consulted.	As shown in the embedded table in Section 3.3 of the HHERA Report, sample locations from AOCs 9 and 10 were included in the HHERA dataset for the AOC 9 potential exposure area, which is described in the RAWP documents (Arcadis 2008, 2009, 2015). For the development of AOC-specific datasets, in some cases, sample locations along or just outside the investigation area-specific boundaries were included in the potential exposure area dataset because the samples were collected as part of the nature and extent investigations for that specific investigation area or because there is potential for transport of soil into the potential exposure area. According to Section 3.3 of the HHERA Report: "Details of the exact samples and sampling locations included in each potential exposure area are presented in the Data Evaluation and COPC/COPEC Selection section (Section 2) of each potential exposure area-specific appendix." For clarity, this text will be added to the Executive Summary.		Update HHERA as reported in PG&E's response.

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30	FMIT-30	RA		ES.3 / ES-9	Table, Overview of Data Included in the HHERA Third bullet on 'white powder'	Exposure to waste materials, e.g., white powder, should not be included in the risk assessment the Tribes prefer that any surficial occurrence should be removed.	As indicated in Sections ES.3 and 3.1.5, samples designated "white powder" collected from AOC 9, AOC 10, AOC 14, and SWMU 1 are included in the datasets used in the quantitative risk assessment as a conservative measure assuming that contact would not differ significantly from exposure to surrounding soil. This is consistent with the approach discussed in the EPC workshops with stakeholders and presented in Appendix C of the RAWP Addendum 2 (Arcadis 2015). No changes to the HHERA Report are proposed to address this comment.	White powder, like all material at the site, may contribute to the total risk if bio-available or if there is possibility of exposure. Therefore, it is appropriate that these material be included in the base-line risk assessment.	Tribes commented that they prefer physical removal of surficial white powder and other debris from the site, which will be addressed in risk management documents. No changes to HHERA Report.
31	FMIT-31	RA		ES 3.2 / ES-11	"For human health, the various potential receptors were assumed to contact soil…"	Excluding the scouring scenarios, the likelihood of human contact with soil decreases with increasing depth. None of the human site uses includes activities where an individual digs down to 10' below grade. This decreasing probability of soil contact needs to be reflected in all discussions of soil depth zones used for EPC calculations as well as in discussions of uncertainty.	Exposure depths were selected for each receptor scenario based on the potential for future exposure to soil in each depth interval. The rationale for the evaluation of each depth interval for each exposure scenario are discussed in detail in the RAWP (Arcadis 2008). Under current conditions, surface soil (0 to 0.5 feet bgs) is theoretically most likely to be contacted by recreational users; however, soil at the site is loose desert sand, not compacted or densely vegetated. As such, wind erosion and surface water runoff may mix material at the surface (0 to 0.5 feet bgs) with shallow soil (up to 3 feet bgs). The surface soil depth interval (0 to 0.5 feet bgs) was used to evaluate hypothetical future exposures under soil conditions similar to those that currently exist at the site. The shallow soil depth interval (0 to 3 feet bgs) was used to evaluate hypothetical future exposures where natural conditions have promoted soil mixing of surface (0 to 0.5 feet bgs) and shallow soil (0 to 3 feet bgs). Both exposure depth intervals represent depths to which the hypothetical future recreational user may be exposed. Risks and noncancer hazards are calculated for both of these depth intervals and as such the influence of the different depth intervals on estimated risks and hazards are readily identifiable. The maintenance worker scenario may include excavation and grading activities associated with equipment maintenance and repair. This work may require intrusive activity and direct contact with subsurface soil at depths from surface to 10 feet bgs. No changes to the HHERA Report are proposed to address this comment.		No change to HHERA report.
32	FMIT-32	RA		ES.4 / ES-12	pp 2. "If the soil dataset had fewer than four detected values…"	The use of the maximum detected soil concentration when there are less than 4 detects or 8 observations is an assumption that overestimates the calculated EPCs. Whenever this default is used in the HHERA, it should be noted in the EPC section as well as in the discussion of conservatism.	The basis for the depth and area-weighted EPCs are presented in Table 3.1 (Summary Statistics and Exposure Point Concentrations for Soil Data table) of each potential exposure area-specific appendix. The use of maximum concentrations as EPCs that contribute significantly to the overall cancer risks and HIs above 1 x 10^{-6} and 1, respectively, are discussed in the potential exposure area-specific results and conclusions of the HHERA Report, as applicable. No changes to the HHERA Report are proposed to address this comment.		Add qualitative discussion of the uncertainty associated with use of maximum detected concentration as EPCs when there are less than 4 detects or 8 observations in Section 5.6.3.4 of the HHERA and specifically in the AOC-specific appendices, as appropriate.

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33	FMIT-33	RA		EA.5.1.1/ES-12	Last pp. "The potential human receptors…: workers…	Whenever worker receptors are mentioned, the HHERA must acknowledge that both OSHA and Cal-OSHA regulations, not the HHERA, is the appropriate criteria to ensure their adequate protection.	This is true if we know or can be assured that any workers engaged in subsurface activity at the site are appropriately trained, in accordance with the OSHA HAZWOPER standard, Title 29 CFR, Part 1910.120. HAZWOPER training may not be required for all workers at the site. As stated in Section 5.3.1.1, workers involved in either investigation sampling or remedy implementation are required to be appropriately trained, in accordance with the OSHA HAZWOPER standard. Also stated in Section 5.3.1.1, maintenance workers evaluated in the HHERA are not involved in these types of activities (investigation sampling and remedy implementation). ~~Text will be added to Section ES.5.1.1 to clarify that workers evaluated in the HHERA may not be OSHA HAZWOPER.~~		No changes to the HHERA report. The sentence in strike through font will not be included in the HHERA report. Additional information on worker safety under CERCLA/RCRA was provided by DTSC via email on June 20 and 26, 2019. Further discussions on this topic will occur during risk management decisions. FMIT has concerns regarding worker risk management issues.
34	FMIT-34	RA		ES.5.1.1/ES-13	Pp 2. "Four types of potential recreational user…"	The likelihood of these recreational users at the TCS project site is very minimal, and in many cases zero. Hunting and camping adjacent to the TCS have not ever been reported. Much of the topography renders OHV riding impossible or physically dangerous. The HHERA must provide some language which reflects the reality that these land uses are not reliable for soil cleanup determinations. (See comment above requesting a recreational land-use map)	See the response to Comment FMIT-18. ~~There is insufficient information to preclude any of the recreational activities from certain areas of the AOCs outside the TCS.~~ No physical barrier (such as fencing) is present that would preclude a recreational user from accessing any and all areas of the AOCs outside the TCS. All recreational scenarios were provided by DOI and presented in the RAWP Addendum 2 (Arcadis 2015). The uncertainties sections of the HHERA Report (Sections ES.5.4 and 5.6.3.2 for Exposure Assumptions and Pathways) will be updated to include language emphasizing the uncertainty in the assumptions used to assess recreational land use at the site.		Update HHERA as reported in PG&E's response (modified). The sentence shown as strike through font will not be included in the updated HHERA report.
35	FMIT-35	RA		ES.5.3.2-ES-17	Bullet 2. Last sentence.	Why has the target risk of 10^{-6} been selected for the evaluation of potential soil removal related to the Camper? The calculated risk for this receptor is within the risk management range and the FIRST decision is whether the estimated risk is acceptable. The proposal of cleanup to 10^{-6} is presumptuous. Perhaps a 10^{-5} cleanup scenario should also be proposed?	The target risk of 1×10^{-6} was selected for reference as the lower end of the acceptable risk management range of 1×10^{-6} and 1×10^{-4}. Further, the HHERA Report does not propose cleanup; rather, the document presents a hypothetical example of which samples are contributing most significantly to risk, and if removed, would results in estimated risks of 1×10^{-6}. Section ES.5.3.2 will be updated to acknowledge this and state that no risk management or remediation would be necessary to reduce risks for the recreational users (hiker, camper, and OHV rider) to levels below 1×10^{-5}.		Update HHERA as reported in PG&E's response. In addition, include language to acknowledge that RBRGs are a tool and not a bright line intended for remediation.
36	FMIT-36	RA		ES.5.3.2/ES-17	Bullet 3, Last sentence	Ditto above comment for hiker.	See the response to Comment FMIT-35 above.		Update HHERA as reported in PG&E's response. In addition, include language to acknowledge that RBRGs are a tool and not a bright line intended for remediation.
37	FMIT-37	RA		ES.5.3.2 / ES-17	Bullet 4, last sentence	Ditto above for OHV rider	See the response to comment FMIT-35 above.		Update HHERA as reported in PG&E's response. In addition, include language to acknowledge that RBRGs are a tool and not a bright line intended for remediation.
38	FMIT-38	RA		ES.5.3.2 / ES-18	The estimated risks and hazards for the NORR exposure area are provided for information purposes only."	This statement must be clear and present anywhere in the HHERA that residential risks are presented. The phrase used should be edited to include "…the NORR hypothetical residential exposures are provided…"	Comment acknowledged. All text stating that "the estimated risks and hazards for the NORR potential exposure area are provided for information purposes only" will be revised to state: "the estimated risks and hazards for the hypothetical future resident in the NORR potential exposure area are provided for information purposes only."		Update HHERA as reported in PG&E's response.

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39	FMIT-39	RA		ES.6.3 / ES-23	"In addition, a second set of NOAEL- and LOAEL-TRVs based on the Navy/BTAG…"	BTAG criteria are screening criteria. They might be useful in screening soil samples in terms of characterization issues, but they are not reliable TRVs to predict ecological effects.	PG&E agrees with the Tribes. The BTAG TRVs were used for the ERA following the approved RAWP (Arcadis 2008) and were presented for documentation purposes only. As discussed in Sections 6.6.1 and 6.7.5.3 of the HHERA Report, risk to mammals and birds potentially present at the Site were characterized based on the risks estimated using selected TRVs, also presented in the RAWP. BTAG TRVs were used only when USEPA Eco-SSL based TRVs were not available (i.e., mercury and PCBs for birds and mammals and thallium for mammals). See the response to Comment DTSC-23 for additional information on BTAG TRVs. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
40	FMIT-40	RA		ES.6.3 / ES-24	"Avian NOAEL and LOAEL TRVs for hexavalent chromium were developed…"	The need for these criteria is not a surprise and the development of chrome +6 TRVs for avian receptors should have been done and reviewed with the Tribe prior to the HHERA. That is the purpose of the work plan. This is another example of a post-risk assessment work plan procedural change on which the Tribes were not consulted.	Comment acknowledged. No avian TRVs for CrVI were proposed in the RAWP documents because, as noted in the HHERA Report, TRVs are not available from published sources and available primary data are limited. Without avian TRVs, potential for CrVI-associated risk to birds cannot be quantitatively evaluated in the ERA. In order to estimate risk to birds for this key COPEC, an avian TRV was developed based on the approach outlined in the RAWP (Arcadis 2008). Section 6.5.2.1 of the HHERA Report discusses the development of avian TRVs for CrVI, and associated uncertainties are discussed in Section 6.7.5.2.2. Updating toxicity values to current values available at the time of implementing an ERA is typical of all risk assessments, even with approved work plans in place. Inclusion of the avian TRVs developed for CrVI is similar to using updated TRVs for other constituents based on toxicity values published since the RAWP (2008). This does not represent a procedural change in the ERA. It is, rather, an update using methods approved in the RAWP. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
41	FMIT-41	RA		ES.6.4.2 / ES-24	Section ES.6.4.2	In the identification of ERA risk drivers, it should be specified which TRV was used. NOAEL or LOAEL or ??	As stated in Section 6.6.2 of the HHERA Report, potential risk drivers were identified based on unacceptable community/ population-level risk (i.e., HQ greater than 1 for plants and soil invertebrates and LOAEL-based HQs greater than 1 for mammals and birds [or LOAEL-based HQs greater than 10 for dioxin TEQ]) predicted using the most refined exposure and effects assumptions (i.e., site-specific SUF, area-weighted EPCs, and selected TRVs) and additional LOEs supporting the conclusion of unacceptable risk. Section ES.6.4.2 of the HHERA Report will be updated to make this clarification.		Update HHERA as reported in PG&E's response.

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42	FMIT-42	RA		ES.7.1 / ES-27	Section ES.7.1 Conclusions and Recommendations	The Tribes agree with the HHRA conclusions that 1) lead is not present at unsafe levels, that AOC/SWMU-specific HHRAs are not appropriate for decision-making related to proposed soil cleanup, the OCS is the appropriate exposure area, that soils are safe related to non-cancer health effects, that Tribal users risks are de minimus, and the residential evaluation is hypothetical, for informational purposes and not appropriate for decision-making. The Tribes do NOT agree that for "all potential human receptors evaluated," that the COPCs of dioxin-TEQs and Chrome+6 are applicable in the SWMU/AOCs listed. Not all the human activities are realistic in these areas. For example, the AOC9 risks are driven by fence line samples (at the top of a steep slope). Are campers and OHV riders going to be present along the fence line?	It is agreed that not all human activities are realistic in all areas of the site; however, there is insufficient information to preclude certain recreational activities from certain areas of the AOCs outside the TCS. No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. The uncertainties section of the HHRA (Section 5.6.3.2 for Exposure Assumptions and Pathways) will be revised to include language emphasizing this uncertainty in the assumptions used to assess recreational land use at the site. The following text will be added to Section 5.6.3.2, Exposure Assumptions and Pathways: "In addition, as recommended by DOI (Arcadis 2015), it is assumed that each of the recreational activities could take place at any location on federal land. In reality, specific locations may be preferred for certain activities, while other locations may be less attractive or may have limited recreational options~~; however, there is insufficient information to preclude certain recreational activities from certain areas of the AOCs outside the TCS.~~ No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. Therefore, potential receptor populations would more likely be exposed randomly, over the course of a lifetime, to soils present across the OCS potential exposure area, rather than have a lifetime of contact limited to a potential exposure area based on an individual AOC (as evaluated in the area-specific appendices at the request of DTSC)."		Update HHERA as reported in PG&E's response (modified). The sentence shown as strike through font will not be included in the updated HHERA report.
43	FMIT-43	RA		ES.7.1 / ES-28	Section ES.7.1 Conclusions and Recommendations	As stated above, The Tribes do not agree that "RBRGs for potential recreational users are the most appropriate benchmarks…". The Tribes also do not agree that the target risk for these hypothetical users must be at 1 x 10^{-6}. The calculated risks within the recognized risk management range must be first evaluated to determine if any action is necessary.	The sentence was intended to convey that it is the recreational receptor, as opposed to other receptors, that would be the appropriate receptor for basing risk management decisions. As stated in response to Comment DTSC-19, Section 8 of the HHERA Report will be modified to include RBRGs corresponding to the acceptable risk management range of 1 x 10^{-5} and 1 x 10^{-4}.		Update HHERA as reported in PG&E's response. In addition, include language to acknowledge that RBRGs are a tool and not a bright line intended for remediation.
44	FMIT-44	RA		ES.7.1.1 / ES-30	Section ES.8.1.1 Methodology and Calculated RBRG Values	As stated previously, the use of 1 x 10^{-6} as a 'bright line' ILCR in the RBRG calculations ignores the first step of evaluating the estimated risks that are within the agency 'risk management' range.	The target ILCR of 1 x 10^{-6} was not intended to be used as a "bright line" for risk management decisions. The text in Section ES.8.1.1 will be revised to clarify that the agency risk management range is 1 x 10^{-6} to 1 x 10^{-4} and the table will be updated to include RBRGs for ILCRs of 1 x 10^{-5} and 1 x 10^{-4}.		Update HHERA as reported in PG&E's response. In addition, include language to acknowledge that RBRGs are a tool and not a bright line intended for remediation.
45	FMIT-45	RA		1 / 1	Section 1. Introduction	The Fort Mojave Indian Tribe is a land-owner of land adjacent to the TCS and the text and maps must accurately reflect this.	A statement will be added to this section in the HHERA Report to reflect that the FMIT owns a 100-acre parcel located about 0.25 mile north of the TCS. The parcel that is owned by the FMIT is depicted on Figure 1-2 of the HHERA Report.		Update HHERA as reported in PG&E's response.

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46	FMIT-46	RA		1.1 / 2	Second paragraph: "Information and sampling data…"	The DTSC, after the close of Risk Assessment Work Plan comments, submitted the directive letter to PG&E requiring the individual SWMU/AOC risk assessments. This decision was never part of the work plan discussion or review with the Tribes, nor were the Tribes consulted on this directive. The Tribes had already reviewed and given their comments on the single OCS exposure area, which is the most appropriate area for soil remediation decision-making.	Comment acknowledged. Per the RAWP (Arcadis 2008) and RAWP Addendum 2 (Arcadis 2015) the OCS was identified as the most reasonable potential exposure area and the AOC-specific analysis was completed at the direction of DTSC. The HHERA Report provides the results of the AOC-specific and OCS HHRAs. Risk management decisions will be made by the agencies based on the results presented in the HHERA Report. No changes to the HHERA Report are proposed to address this comment.		Agencies not requesting changes to the HHERA report. The Tribes stand by their comment that the AOC-by-AOC evaluation is inappropriate for inclusion in the HHERA because it was not part of the approved HHERA Work Plan. The Tribes formally request that the AOC-by-AOC risk assessment NOT be included in the HHERA or utilized in risk management decisions UNTIL such time that appropriate consultation between agencies and the Tribes is completed. In addition, DTSC will provide chronology of the AOC-by-AOC risk discussions.
47	FMIT-47	RA		1.2 / 3	Section 1.2 Regulatory Framework, last pp	The DTSC, after the close of Risk Assessment Work Plan comments, submitted the directive letter to PG&E requiring the individual SWMU/AOC risk assessments. This decision was never part of the work plan discussion or review with the Tribes, nor were the Tribes consulted on this directive. The Tribes had already reviewed and given their comments on the single OCS exposure area, which is the most appropriate area for soil remediation decision-making.	Comment acknowledged. Per the RAWP (Arcadis 2008) and RAWP Addendum 2 (Arcadis 2015) the OCS was identified as the most reasonable potential exposure area and the AOC specific analysis was completed at the direction of DTSC. The HHERA Report provides the results of the AOC-specific and OCS HHRAs. Risk management decisions will be made by the agencies based on the results presented in the HHERA Report. No changes to the HHERA Report are proposed to address this comment.		Agencies not requesting changes to the HHERA report. The Tribes stand by their comment that the AOC-by-AOC evaluation is inappropriate for inclusion in the HHERA because it was not part of the approved HHERA Work Plan. The Tribes formally request that the AOC-by-AOC risk assessment NOT be included in the HHERA or utilized in risk management decisions UNTIL such time that appropriate consultation between agencies and the Tribes is completed. In addition, DTSC will provide chronology of the AOC-by-AOC risk discussions.
48	FMIT-48	RA		2.1 / 5	Section 2.1 Site Historical Operation	Since property ownership/use is included in this section, then the mention of more recent property ownership changes, including the transfer of land to Fort Mojave, should be included.	A statement will be added to Section 2.1 in the HHERA Report to reflect that the FMIT owns a 100-acre parcel located about 0.25 mile north of the TCS.		Update HHERA as reported in PG&E's response.
49	FMIT-49	RA		7	Last paragraph	The HHERA recognizes that in SWMU 1 there have been storm events that have changed the sediment distribution in BCS. The 2006 event is referenced. How are soil depths for samples collected prior to 2006 adjusted to reflect their depth today so those pre-2006 samples can be incorporated into the EPC calculations? Can the text provide an explanaton/description?	Soil samples collected before 2006 were included in the HHERA datasets for EPC calculations and the depths for these samples were not adjusted to account for the 2006 storm event because no information is available to accurately make this adjustment. A statement will be added to Section 3.3 (Groupings of Data) and Section 4.2 (Calculations of EPC) to indicate that no adjustments to the depths of pre-2006 samples were made to account for the movement of surface/shallow soils that may have occurred due to the 2006 storm event. The scouring scenarios for the AOC 1 potential exposure area were included in the HHERA to account for possible movement of surface/shallow soils during future storm events.		Update HHERA as reported in PG&E's response.

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50	FMIT-50	RA		9	Last paragraph of AOC 1 section	Same comment as above.	See the response to Comment FMIT-49 above.		See final resolution for FMIT-49.
51	FMIT-51	RA		9	Section on AOC 4	This section does not discuss the finding of buried debris (and possible dioxin source) just below the water tanks and at the top of the east ravine drainage.	The following discussion will be added to the section on AOC 4 in Section 2.1.1.1 o the HHERA Report: "A piece of debris was observed on the hillside east of and below the water tanks. A sample of that debris was collected (AOC4-tar) and analyzed for the suite of chemicals of concern (COCs). Dioxins were detected, but this small debris sample would not be characterized as a 'possible source of dioxins'. No other buried debris was observed at this location."		Update HHERA as reported in PG&E's response.
52	FMIT-52			2.2 / 17	Entire section	Please include the conclusion of the groundwater risk assessment within this section	Comment acknowledged. The conclusions of the groundwater risk assessment will be briefly summarized in Section 2.2.		Update HHERA as reported in PG&E's response.
53	FMIT-53			2.2.2 / 19		This section should include a discussion of the EE/CA that was released by DOI in 2018 if the non-time critical removal action moves forward	In response to this comment, the following text will be added to Section 2.2.2. of the HHERA Report: "On October 30, 2018, the Department of the Interior issued an Engineering Evaluation/Cost Analysis (EE/CA) Approval Memorandum and directed PG&E to conduct an EE/CA to evaluate the need for a non-time critical removal action to address contaminated soil. The DOI Approval Memorandum identified five of the eleven AOCs/SWMUs located on or adjacent to Federal land for evaluation in the EE/CA."		Update HHERA as reported in PG&E's response.
54	FMIT-54	RA		30	Footnote 3	The Hepta- and Octa- chlorinated dioxin congeners should be included in the sediment migration analysis. Depending on the source of dioxin compounds (burning PCBs vs. burning organic trash), the hepta-a and Octa- congeners could be important markers of dioxin migration in BCW and ER sediment.	As indicated in footnote 3 in Section 2.5.2.5, SSTPA for BCW and AOC 10, (at the bottom of page 30) and as stated in Appendix SSTPA, analytical results for the hepta- and octa-chlorinated dioxin/furan congeners were not included in the sediment migration analysis, because: 1) they are frequently associated with background sources of dioxins/furans and 2) their TEFs are so low (0.01 or 0.003) that their total contribution to the TEQ is insignificant. As requested, the hepta- and octa- dioxin/furan congener concentration trends are included as Attachment Figures 1 through 10. As can be seen, these trends are similar to the other congeners. At BCW, concentrations generally decrease downgradient with the northernmost locations within the Tamarisk Thicket area. Where data are available (AOC1- BCW27 through AOC1-BCW30, and AOC10-BCW6), the hepta- and octa-dioxins/ congeners are at low concentrations or non-detect. Similarly, at AOC 10, the trends indicate that concentrations generally decrease downgradient with the eastern-most locations at low concentrations or not detected. Ultimately, the SSTPA conclusions remain the same, that is, the migration pathway in both BCW and ER is insignificant because dioxins are low to non-detect in downgradient areas for both areas. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.

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55	FMIT-55	RA		2.5.2.5.1 /30-31	Decision criteria for Gradient Analysis	The criteria for the Gradient Analysis listed on page 30 is different than what is listed on page 31	In Section 2.5.2.5.1, the criteria listed on page 31 for determining whether the surface soil transport pathway is complete/incomplete include consideration of: 1) detected soil concentrations relative to background; and 2) presence of non-detect concentrations. The criteria listed on page 30 note only the background comparison but will be expanded to include consideration of non-detect concentrations in soil as well.		Update HHERA as reported in PG&E's response.
56	FMIT-56	RA		2.5.2.5.2 / 31	Section 2.5.2.5.2 Conclusions for the Gradient Analyses	The Tribes agree with the conclusions of this evaluation that sediment is not significantly migrating and entering the river.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
57	FMIT-57			2.5.2.5.2 / 31	Based on the gradient analyses and the physical characteristics of BCW, specifically the Tamarisk Thicket area, potential transport of indicator chemicals and other constituents from the surface soil entrained in runoff from upland areas at BCW to downgradient locations may be potentially complete; however, this pathway is not considered significant based on the low concentrations and NDs in the northernmost BCW soil locations west of the National Trails Highway, before soil transitions to sediment. Therefore, a quantitative risk evaluation of the BCW sediment area, east of the National Trails Highway was not required, as subsequent sediment exposure pathways would likewise be insignificant. This conclusion is further supported by data showing that concentrations of the indicator chemicals (and dioxin TEQ) are low (below the BTVs) or not detected in the BCW sediment area.	The Tribes agree with this conclusion and support the inclusion of this concept in any future soil risk evaluation or remedial action.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
58	FMIT-58	RA		2.6.1 / 33	Pp 2	The phrase "recreational access is potentially present across much of the site" is not the same as various recreational activities occurring at the site. The Tribes have argued that hunting, camping, OHV riding and hiking are not very likely along the fence line of the TCS. The presentation of these human receptor activities needs to include that caveat that they do not occur in all areas of the OCS exposure area.	It is agreed that not all human activities are realistic in all areas of the site~~; however, there is insufficient information to preclude certain recreational activities from certain areas of the AOCs outside the TCS.~~ No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. The uncertainties sections of the HHERA Report (Sections ES.5.4 and 5.6.3.2 for Exposure Assumptions and Pathways) will be revised to include language emphasizing this uncertainty in the assumptions used to assess recreational land use at the site.		Update HHERA as reported in PG&E's response (modified). The sentence shown as strike through font will not be included in the updated HHERA report.
59	FMIT-59			2.6.2 / 33	Due to the openness of the federal land and limited restrictions to site access, recreational access is potentially present across much of the site.	It is the Tribes perspective that camping, hunting hiking and OHV riding is not likely to occur in many of the AOCs due to the current site use and topography of the site. This section should identify AOCs in which recreational activity is likely to occur and should also include language that identifies regions within each AOC that are not suitable for all recreational activities (e.g. steep slopes unsuitable for camping).	See the response to Comment FMIT-58 above.		See final resolution for FMIT-58.

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60	FMIT-60			2.6.2 / 34	The purpose of the proposed expansion included a variety of seasonal residential and recreational uses, including mobile homes, expansion of tent camping and recreational vehicle areas, a hotel, and reconstruction of an old restaurant. According to DOI, the requested expansion by San Bernardino County would allow for new pull-through recreational vehicle camping sites and tent camping areas.	The Tribes would like this topic addressed in greater detail during consultation meetings with DOI and expect tribal consultations, PRIOR to any activities taking place.	Comment acknowledged. According to DOI, the expansion of the San Bernardino County lease and the transfer of land are outside the scope of the cleanup project. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
61	FMIT-61			2.6.2 / 34	It is reasonably foreseeable that camping on the floodplain will occur under either San Bernardino's proposed expansion or USBLM's future use of non-leased areas.	The Tribes would like this topic addressed in greater detail during consultation meetings with DOI and expect tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-60 above.		See final resolution for FMIT-60.
62	FMIT-62	RA		3.1.1 / 36	"Asbestos soil data will be discussed in the forthcoming…"	This is another example where not having the final soil RFI/RI report hinders the Tribes from understanding the full impact of potential soil remediation issues. Will the RFI/RI report make recommendations related to asbestos in soil?	Comment acknowledged. The forthcoming RFI/RI Report will discuss the presence of asbestos and make recommendations related to asbestos in soil, if necessary, and as required by law. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
63	FMIT-63	RA		3.1.3 / 37	Section 3.1.3, last pp	The text states that sediment migration from upland areas into the site drainages (e.g., BCW, ER) "may be potentially complete; however, this pathway is not considered significant". The basis for this conclusion is the gradient analysis in Section 2.5. However, the gradient analysis looks at depositional patterns in the full length of BCW/ER to determine if contamination is migrating to the river. This gradient analysis does not evaluate the potential for high concentrations above the site drainages to migrate into the drainages.	The purpose of this SSTPA was to evaluate whether surface soil constituents entrained in runoff from BCW and AOC 10 reach the sediment depositional areas along the edge of the CO River (and eventually the river) in potentially significant amounts. This evaluation follows the gradient analysis approach outlined in the RAWP (Arcadis 2008). Based on the depositional trends observed from upgradient site locations to downgradient locations considering the transport that has occurred in the past, it is reasonable to assume that such trends from other upgradient AOCs/SWMUs to BCW and AOC10 will remain comparable, and ultimately, migration to sediment areas will be insignificant. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
64	FMIT-64	RA		3.2.5 / 44	Section 3.2.5	Representativeness is inherently biased when biased (vs. random) soil sampling protocols are used. Sampling high concentration locations and then stepping out to find extent results in a dataset that is biased towards high concentrations. That is why the area-weighting in the EPC calculations is important in countering this sampling bias.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.

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65	FMIT-65			3.2.7 / 46	As stated in the RAWP (Arcadis 2008a), for cases where a field duplicate sample is present, a single representative concentration for the sample was selected generally consistent with USEPA guidance regarding data verification, data validation, and data quality assessment (USEPA 1992, 2002a).	Using the maximum detected concentration from a primary sample and its duplicate is not an appropriate procedure. The use of the maximum concentration will result in an overestimation bias of the calculated exposure point concentrations in each of the exposure areas, which in turn results in an increase in estimated hazards and risks in the risk assessment. Agency guidance on soil sampling consistently states that the overriding goal is to collect unbiased and representative samples. Please include a discussion in the uncertainty section on how the use of the highest detected concentration will influence risk calculations.	The treatment of parent/duplicate sample pairs was discussed in RAWP Addendum 2 (Arcadis 2015), as follows: "At the September 2013 RA Workshop and in FMIT's letter (2013) to DOI and DTSC, the Tribes raised a concern regarding bias related to the use of the maximum detected concentration as representative of a data pair when data from duplicate samples are available. The agencies acknowledge this approach as conservative. In their response letter to FMIT (DOI/DTSC 2014a), DOI and DTSC stated that although the approach is conservative, it is not unreasonable and is consistent with United States Environmental Protection Agency (USEPA) recommendations (Appendix A). Therefore, as directed by DTSC and DOI, PG&E will manage field duplicate data and data from multiple analytical methods in accordance with the stated approach set forth in Section 3.2.8 of the RAWP (Arcadis 2008). If the detected concentration in one sample is significantly higher than the other, it will be identified as an uncertainty and its impact will be discussed in the uncertainty analysis of the soil risk assessment." Given the heterogeneity in concentrations of chemicals in soils, it is appropriate to use the higher value of the pair in a risk assessment. The uncertainty associated with this approach will be included in the HHERA Report		Update HHERA as reported in PG&E's response.
66	FMIT-66			3.3 / 46	Soil samples collected at four locations…are the only sample locations …samples evaluated as part of BCW and also as part of AOC4	It appears from this text that single soil sample locations are used in two different exposure areas and included in risk calculations for two different AOCs. Please provide a thorough outline of all samples that are included in two different AOC risk calculations and how those samples contribute to the risk calculated for each area. Also, please discuss the use of samples in multiple exposure areas within the uncertainty section.	A table presenting a comprehensive list of the sample locations that were analyzed in more than one AOC-based exposure area will be added to Section 3.3 of the HHERA Report. These locations are identified in the AOC-specific appendices of the HHERA Report as well. The number of sample locations evaluated in more than one potential exposure area is small relative to the risk assessment datasets and elevated COPC/COPEC concentrations are not present at these locations. As a result, the effect on the calculated EPCs and resulting risk estimates is expected to be negligible. This discussion of uncertainty related to the evaluation of sample locations in more than one potential exposure area will be added to Sections 5.6.1.4 and 6.7.3.2 of the HHERA Report.		Update HHERA as reported in PG&E's response.
67	FMIT-67	RA		3.4.1.1.1 / 50	Section 3.4.1.1.1 Comparison to Background	The Tribes support the comparison of sampling data to background using a variety of appropriate approaches to ensure that soil concentrations that are evaluated in the HHERA are contamination, not background.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
68	FMIT-68	RA		4 / 54	Section 4 Estimation of Exposure Point Concentrations	The Tribe supports the various procedures for estimating Exposure Point Concentrations (EPCs). Both the depth-weighted and area-weighted calculations incorporate important spatial characteristics of both the data and potential exposure. The Tribes particularly support the area-weighted EPCs because they reduce the sampling bias inherent in the data. (see above)	Comment acknowledged. Per the DTSC Directive Letter to PG&E, the area-weighted approach was originally proposed in the RAWP as a refinement to significant risk findings and not as a default evaluation. No changes to the HHERA Report are proposed to address this comment.	Add statement per DTSC letter that area-weighted approach was originally proposed in RAWP as a refinement to significant risk findings and not a default evaluation	No further discussion needed. No changes to the HHERA Report.
69	FMIT-69			5.3.1 / 61	Current land use does not include residential use for any part of the sire, nor is I likely to in the future	Please update section 2.6 to be consistent with this language.	Comment acknowledged. Section 2.6.1 will be updated to include the following sentence: "Current land use does not include residential use in any part of the site." Section 2.6.2 will also be updated to include the following sentence: "Future unrestricted residential use of the site is highly unlikely (DOI 2014)."		Update HHERA as reported in PG&E's response.

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70	FMIT-70	RA		5.3.1.1 / 62	Section 5.3.1.1 Maintenance Workers	The inclusion of TCS workers as receptors in the HHERA includes potential exposures both inside and outside the TCS (i.e., OCS and ICS areas). The assumptions include exposures to only soils outside the compressor station. While short-term workers could be hired for one project outside the fence line, it is unlikely that long term maintenance workers would only work outside the fence line. The Tribe does not accept these receptors as acceptable for making soil cleanup decisions. In addition, there are federal and state regulations for the protection of workers that are more applicable than the results of a risk assessment.	Per the RAWP (Arcadis 2008) and RAWP Addendum 2 (Arcadis 2015), the long-term maintenance worker scenario represents local PG&E employees who could work at TCS for approximately 30 years. According to PG&E, long-term employees may work both inside and outside the TCS (Arcadis 2008, 2015). As noted in the comment, it is unlikely that long-term maintenance workers would work only outside the fenceline. To adjust for this intermittent exposure, the exposure frequency for a long-term maintenance worker evaluated in the HHERA is assumed to be 20 days per year based on site-specific information provided by PG&E. As noted in our response to Comment FMIT-33, there are state and federal regulations for the protection of workers that may be applicable to workers engaged in certain types of subsurface activity at the site (investigation sampling and remedy implementation). As described in Section 5.3.1.1, maintenance workers evaluated in the HHERA are not involved in these types of activities and therefore, not required to be appropriately trained, in accordance with the OSHA HAZWOPER standard. Consistent with the RAWP (Arcadis 2008) and RAWP Addendum 2 (Arcadis 2015), the maintenance worker scenario is included in the HHERA. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report. Additional information on worker safety under CERCLA/RCRA was provided by DTSC via email on June 20 and 26, 2019. Further discussions on this topic will occur during risk management decisions. FMIT has concerns regarding worker risk management issues.
71	FMIT-71			5.3.1.1 / 62	Section 5.3.1.1 Maintenance Workers - Long-term workers, primarily PG&E employees, who may be present during various types of activities for a certain period of hours and days per year for a 30-year period	Please confirm that Cal EPA guidance on occupational duration is 30-years. It has been reported in other DTSC documents that the 95th percentile occupational exposure duration is a 25-year period. Please provide reference for the 30-year exposure duration.	The HERO HHRA Note Number 1, *Recommended DTSC Default Exposure Factors for Use in Risk Assessments at California Hazardous Waste Sites and Permitted Facilities,* recommends 25 years as a default exposure duration for occupational exposure. See also response to Comment FMIT-70. Per RAWP Addendum 2 (Arcadis 2015), current maintenance worker activity patterns for those working both inside and outside the TCS were site-specific (i.e., an exposure duration of 30 years) and provided by PG&E for use in developing the exposure assumptions, including exposure duration, for the HHRA. Section 5.3.1.1 of the text will be updated to reference the RAWP Addendum 2 (Arcadis 2015) for exposure duration.		Update HHERA as reported in PG&E's response.
72	FMIT-72			5.3.1.1 / 62	The baseline risk assessment assumes that potential contact with soil is not limited by the presence of engineering or institutional controls in the future	Please include this conservative assumption in the uncertainty section and discuss how dust suppression and other SOPs are in place that ensure limited exposures and risks.	Comment acknowledged. Please see Section 5.6.3.2 regarding uncertainty which states: "Current use of health and safety protocols, required by PG&E as part of routine work practices inside and outside the TCS, limit worker exposure to soil and dust. The exposure assumptions used for the workers do not account for the protective measures that are part of required work practices, and therefore the exposure assumptions and corresponding risks for the workers, for potential exposure areas located inside and outside TCS are overestimated." No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.

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73	FMIT-73	RA		5.3.1.2 / 63	Section 5.3.1.2 Recreational Users	The various recreational land users evaluated in the risk assessment represent activities that have little to no precedent of having occurred and are unlikely to occur in the future. Camping, hunting OHV riding on areas (SWMU/AOCs) immediately adjacent to the compressor station have not occurred. For example, have these activities ever been recorded as occurring in AOC 9 or 10 or 11 or 12, areas adjacent and below the compressor station? Any decisions regarding soils cleanup should be based on real and complete exposures, not theoretical.	There is insufficient information to preclude certain recreational activities from certain areas of the AOCs outside the TCS. No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. The uncertainty sections of the HHERA Report (Sections ES.5.4 and 5.6.3.2 for Exposure Assumptions and Pathways) will be updated to include language emphasizing this uncertainty in the assumptions used to assess recreational land use at the site. Risk management decisions will be made by the agencies considering the results presented in the HHERA Report and the forthcoming RFI/RI Report.		No changes to the HHERA report.
74	FMIT-74			5.3.1.5 / 65	Section 5.3.1.5 Hypothetical Future Residential Users - ...hypothetical future resident as a rural resident who obtains a significant portion of his/her diet from onsite produced food.	This text should clearly indicate that this exposure scenario was only included based on agency direction and does not reflect current or expected exposures. The Tribes do not support the use of overly conservative and non-site-specific exposure assumptions.	Comment acknowledged. The referenced paragraph will be revised to read: "The exposure scenario evaluated for a hypothetical future residential user was requested by the DOI for informational purposes and is not based on current or likely potential future site use. Under the direction of DOI, the hypothetical future resident is a rural resident who obtains……."		Update HHERA as reported in PG&E's response.
75	FMIT-75			5.3.2 / 66	Section 5.3.2 Potential Exposure Areas - "Although these additional risk evaluations do not represent reasonable current or future long-term exposure scenarios, and thus should not be the primary basis for risk management decisions, the information is presented in this HHERA Report at the agency's direction.	The Tribes concur that these AOC specific risk assessments do not represent reasonable current or future long-term exposure scenarios. Risk management decisions should be determined based on realistic site usage with the input of the Tribes.	Comment acknowledged. Risk management decisions will be made by the agencies considering the results presented in the HHERA Report and the forthcoming RFI/RI Report.		Agencies not requesting changes to the HHERA report. The Tribes stand by their comment that the AOC-by-AOC evaluation is inappropriate for inclusion in the HHERA because it was not part of the approved HHERA Work Plan. The Tribes formally request that the AOC-by-AOC risk assessment NOT be included in the HHERA or utilized in risk management decisions UNTIL such time that appropriate consultation between agencies and the Tribes is completed. In addition, DTSC will provide chronology of the AOC-by-AOC risk discussions.

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76	FMIT-76	RA		66	Last pp	The inclusion of the exposure area BCWxSWMU1+TCS-4 seems like an attempt to predict soil cleanup scenarios by including this additional/modified scenario. Each of the individual SWMU/AOCs are included, by agency request, in the HHERA and those individual evaluations should be sufficient information for risk managers.	Comment acknowledged. The inclusion of the BCWxSWMU1+TCS-4 potential exposure area was at the direction of DTSC and intended to provide additional information/perspective regarding risks associated with potential soil impacts in BCW, when data from SWMU1 and TCS-4 are excluded.		Agencies not requesting changes to the HHERA report. The Tribes stand by their comment that the AOC-by-AOC evaluation is inappropriate for inclusion in the HHERA because it was not part of the approved HHERA Work Plan. The Tribes formally request that the AOC-by-AOC risk assessment NOT be included in the HHERA or utilized in risk management decisions UNTIL such time that appropriate consultation between agencies and the Tribes is completed. In addition, DTSC will provide chronology of the AOC-by-AOC risk discussions.
77	FMIT-77			5.4.5 / 82	Section 5.4.5 Toxicity Factors for Dioxins and Furans - DTSC remedial goal of 50 picograms per gram (pg/g) total TCDD TEQ for residential land use based on a target cancer risk of 1 x 10-5..."	It is stated within this section that DTSC has used 1 x 10^{-5} as an appropriate risk threshold for residential exposures. Therefore, please adjust the language throughout the report to indicate that DTSC has used risk thresholds higher than 1 x 10^{-6} for allowable risk thresholds.	The text will be revised to clarify that the 1 x 10^{-6} risk-based goals are multiplied by 10 to account for the bioavailability of dioxins, not to meet a cleanup goal of 1 x 10^{-5}, consistent with the specific language in Comment DTSC-19.		Update HHERA as reported in PG&E's response.
78	FMIT-78			5.5.1.1 / 87	Section 5.5.1.1 Carcinogenic Health Effects - CalEPA's point of departure for excess incremental lifetime cancer risk for all receptor groups (i.e., residential populations) is 1 x 10-6, and risk management decisions may raise this criterion depending on site-specific conditions	There are numerous examples were CalEPA uses risk range of 1 x 10^{-4} through 1 x 10^{-6}. This should be stated in the text rather than suggesting CalEPA's point of departure is a default 1 x 10^{-5}.	The statement is consistent with CalEPA guidance. Language in Section 5.5.1.1 will remain as submitted. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
79	FMIT-79	RA		5.5.3 / 89	Section 5.5.3 Results of the Cancer Risk and Noncancer Hazard Assessment	The presentation of both cancer risks and noncancer hazards occur in an order which does not reflect their applicability. The area-weighted results, which appropriately account for the spatial distribution of samples, is the most applicable scenario. The Tribes request that in both the main text and in all appendices that the area-weighted results are presented first.	The depth-weighted EPCs are presented as an initial assessment of the cancer risks and noncancer hazards. Area-weighted EPCs were only calculated and applied to those receptors and scenarios where the depth-weighted EPCs resulted in ILCRs and HIs above 1 x 10^{-6} or 1, respectively. Area-weighted results are therefore not available for all receptors and scenarios. The order of the area-weighted cancer risks and noncancer hazards will remain as presented in the HHERA Report. No changes to the HHERA Report are proposed to address this comment.		Comment acknowledged. The order of presentation of the risk analyses is based on a process and does not imply a preference of results. No changes to the HHERA report.
80	FMIT-80	RA		5.5.3 / 132	Section 5.5.3 Results of the Cancer Risk and Noncancer Hazard Assessment	The presentation of the Outside Compressor Station (OCS) results should be the first results presented. The OCS scenario, with the area-weighted EPCs, is the most applicable to potential exposures outside the compressor station. By presenting it first the reports give this scenario the appropriate importance rather than being buried within the other SMWU/AOC results.	The order of presentation/discussion of the potential exposure areas was selected to provide context to potential individual exposure areas and COPCs that may contribute to the overall risks from the larger combined OCS potential exposure area. The depth-weighted EPC analysis is presented first because it provides the basis for the additional area-weighted EPC analysis. Therefore, the order of presentation of the potential exposure areas and EPCs will remain as presented in the HHERA Report. No changes to the HHERA Report are proposed to address this comment.		Comment acknowledged. The order of presentation of the risk analyses is based on a process and does not imply a preference of results. No changes to the HHERA report.

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81	FMIT-81			5.5.3.14 / 135	Section 5.5.3.14 Outside the Compressor Station - Therefore, the combination of all exposure areas outside the TCS...represent both current and potential future exposures...	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
82	FMIT-82	RA		135	"Alternative" Evaluation	As described in Comment #76 above, the inclusion of the "Alternative" evaluations (OCSxSWMU1+TCS-4) in a presumptuous and unnecessary evaluation. Prior to any evaluation of potential soil cleanup scenarios (i.e., removing certain samples and re-running risk calculations), the presented risks/hazards must be evaluated to determine if any action is required. None of the OCS, area-weighted risks are higher than 7×10^{-6}, clearly in the agency "risk management" range. This means that a reasonable and acceptable risk management decision could be "no action".	Comment acknowledged. The inclusion of the OCSxSWMU1+TCS-4 potential exposure area was at the direction of DTSC and was intended provide additional information/perspective regarding risks associated with potential soil impacts in BCW, when data from SWMU1 and TCS-4 are excluded. Additional clarification text will be incorporated into the HHERA Report to specify that the risk management range is 1×10^{-6} to 1×10^{-4} and can be considered in making remedial and risk management decision.		Agencies not requesting changes to the HHERA report. The Tribes stand by their comment that the AOC-by-AOC evaluation is inappropriate for inclusion in the HHERA because it was not part of the approved HHERA Work Plan. The Tribes formally request that the AOC-by-AOC risk assessment NOT be included in the HHERA or utilized in risk management decisions UNTIL such time that appropriate consultation between agencies and the Tribes is completed. In addition, DTSC will provide chronology of the AOC-by-AOC risk discussions.

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83	FMIT-83			5.6.3.2 / 152	Section 5.6.3.2 Exposure Assumptions and Pathways - Entire section	This section does not adequately address the uncertainties and overestimations of exposures that are included in all of the recreational exposure scenarios. For example, the intake parameters for the hiker and hunter are defined as 24 hours/ day. It can be presumed that hiking and hunting would only occur during daylight hours (varying seasonally from 8 to 12 hours per day). In addition, it is the Tribe's position is that neither hunting nor off-road vehicle driving are reasonable future uses of the Topock Maze and surrounding area because these land uses are inconsistent with management of this sacred area, a recognized historic resource and Traditional Cultural Property (TCP). The basis for the selection of these recreational activities and the exposure parameters which define the extent to which these activities occur are based on information collected from other DOI/BLM sites and will greatly overestimate risk at the Topock site. Furthermore, a recreational hiker exposure frequency is based on data that is generic and not specific to the Topock site and it is assumed that the duration of hiking is spent only on contaminated areas of the Topock site. The hiking exposure durations and frequencies are based on visits to areas with existing trail systems and will unrealistically overestimate the frequency of visits to the Topock Site which does not have a developed hiking trail network. While some BLM trails cross portions of the Site, there is no organized trail network through the soil investigation area and, absent evidence to the contrary, it is unreasonable to assume that a hiker will spend an entire day on the Site. Thus, these recommended exposure parameters do not represent a "reasonably anticipated use" of the site. This overestimation of exposure that is present in all recreational exposure scenarios needs to be discussed in greater detail in the uncertainty section.	As indicated in footnote g of Table 5-1, the 24-hour-per-day exposure time for the hiker and hunter receptors are provided to generate a daily inhalation volume of 10 m^3 and 20 m^3 for the child and adult, respectively, based on an assumed elevated activity rate for these receptors compared to default residential child and adult inhalation rates. The specific exposure assumptions for the recreational user were provided by DOI and were included in RAWP Addendum 2 (Arcadis 2015). Section 5.6.3.2 (for Exposure Assumptions and Pathways) will be updated to include the uncertainties associated with the exposure frequency for the recreational user scenarios and use of other exposure factors for recreational user scenarios evaluated in the HHRA. The following paragraphs will be added to Section 5.6.3.2, Exposure Assumptions and Pathways: "The specific exposure assumptions for the recreational user were provided by DOI and included in RAWP Addendum 2 (Arcadis 2015). As summarized by DOI, generic, or default, exposure factors are generally not available for recreational land use (except for some specific scenarios, such as fishing and fish ingestion rates). USEPA's 2011 Exposure Factors Handbook Update does not present exposure factors for any recreational scenarios other than fishermen (USEPA 2011). Rather, informed professional judgment is necessary to select factors that best represent the types of recreational activities that may be conducted at the site of interest. Recreational use of federal land at the site is expected to vary during the course of a year due to a variety of factors, including weather (especially hot, cold, or rainy periods), seasonality of hunting, and time of year. In general, recreational activities at the site are expected to be limited in frequency and duration during the hottest summer months. Hunting would only occur during those months that are legally permitted; the exposure potential could vary based on game species being hunted. The exposure frequency (EF) is expected to be limited to a few weeks for the species of interest (e.g., game birds). The exposure parameters recommended by DOI and used in the HHRA for recreational users are based on site-specific considerations and information provided from nearby sites and relevant sources. The EF parameters have been informed by information presented in State of California's Natural Resources Agency's (CNRA) document "Complete Findings: Survey on Public Opinions and Attitudes on Outdoor Recreation in California" (CNRA 2009). The use rates provided by CNRA are mean values; for risk assessment purposes, an upper bound measure of exposure (e.g., the 95% upper confidence limit on the mean) is generally preferred. To be protective of human health, it is assumed herein that a participant's entire annual recreational activity is conducted at the Topock Site rather than spread out at various recreational locations across the state. Exposure duration values (ED, in years) below are consistent with those used in the Clear Creek Management Area HHRA (USEPA 2008a) for similar activities. The exposure time, frequency, and duration for the recreational user provided by DOI and used in the HHRA erred on the side of conservatism to be protective of human health and may not represent "reasonably anticipated use" of the site. Therefore, the health risks estimated for recreational users may be overestimated and lower than presented in the HHRA."	See comment 1. What will be included in the uncertainties update in Section 5.6.3.2?	Update HHERA as reported in PG&E's response.

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84	FMIT-84			5.6.3.2 / 153	Section 5.6.3.2 Exposure Assumptions and Pathways - In sum, the risk assessment meets the regulatory requirement to address an upper bound for potential exposures...the actual exposures to soil...would probably be much lower than has been estimated in this HHRA	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.

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85	FMIT-85			6.1 / 158	Section 6.1 Purpose and Objective- Ultimately, the conclusions reached from conducting the ERA along with other site information will be used to establish an overall site risk management strategy.	Please discuss other lines of evidence that will be, or can be, used in determining site risk. For example, plant and invertebrate population surveys or use of plant survey data that already exists should be used to support (if the actual population does support) the risk calculations.	Comprehensive botanical surveys were completed in 2013 for the entire FEIR project area and the results of these surveys are presented in the Topock Groundwater Remediation Project Floristic Survey Report (GANDA and CH2M 2013). In addition, pre-construction botanical surveys were conducted and reported in the Topock Groundwater Remediation Project Pre-construction Floristic Survey Report – Spring 2017 (CH2M 2017). These observations are summarized in Section 2.4.2 of the HHERA Report. The risk characterization for plant communities will include discussion of these observations as additional LOEs in Section 6. No formal surveys have been conducted for invertebrates. General observations will be included in the risk characterization for soil invertebrate populations. See the response to Comment FMIT-89.	What risk characterization will be added for plant communities in Section 6?	Section 6.6.1 of the HHERA will be updated (additional bullet under the interpretation of potential risks to ecological communities): "Observations made during the comprehensive botanical surveys completed in 2013 (GANDA and CH2M 2013) and in 2017 (CH2M 2017) will be used as a LOE in interpreting potential risk to ecological communities." Several places in Section 6.6.2 of the main text and the exposure area-specific appendices will be updated to address this comment. Proposed text for BCW (Plant Communities section) is provided below as an example of the text planned for inclusion in the HHERA to address this comment. For BCW, under Plant Communities, the following text will be added: "Vegetation communities observed at the site during the floristic surveys conducted in 2013 (GANDA and CH2M 2013) and in 2017 (CH2M 2017) is typical of Mojave Desert plant communities (summarized in Section 2.4.2). Over a hundred different vascular plant species have been observed at BCW and documented in these survey reports (GANDA and CH2M 2013, CH2M 2017). The floristic surveys report a diverse assemblage of plants species found in typical abundance, density, cover, and vigor of plant communities in undisturbed desert habitat. These observations are not consistent with impairment of the plant community at the site. The floristic surveys provide site-specific observations that support the health of plant communities at the site and is considered a stronger LOE than the exceedances of low-confidence generic plant screening values, which are widely acknowledged to have low ability to predict toxicity in plants." Similar text changes will be made for other exposure areas.

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86	FMIT-86			6.3 / 159	Section 6.3 Problem Formulation - The surface soil transport pathway analyses...concluded potentially complete but insignificant transport pathways for surface soil entrained in runoff to reach the sediment areas near the river downgradient of BCW and AOC 10 and therefore, quantitative evaluation of these sediment areas was not required.	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site-wide risks for any future soil remedial action.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
87	FMIT-87	RA		6.5.2 / 172	Section 6.5.2 Toxicity Reference Values	While ecological screening levels may be applicable to designing soil sampling activities, screening levels do not provide reliable or appropriate ecological hazard estimates. The Tribe supports the use of LOAEL-based TRVs as the most appropriate values to use in the calculation of ecological hazards.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
88	FMIT-88			6.6.1 / 179	The BTAG NOAEL-based TRVs are considered very conservative, resulting in a wide range of risks to potential wildlife receptors. For the Topock site ERAs, the selected TRVs are considered more robust than the BTAG TRVs.	The inclusion of the BTAG NOAELs and LOAELs is unnecessary and should be removed from the text. The inclusion of overly conservative NOAELs (BTAG) does not add value to the risk calculations, leads to confusing results and an increased perception of risk that does not exist at the site. Please remove the BTAG NOAELs.	The BTAG TRVs were used for the ERA following the approved RAWP (Arcadis 2008) and were presented for documentation purposes only. See Comment DTSC-23 for information on BTAG TRVs. As discussed in Sections 6.6.1 and 6.7.5.3, risk to mammals and birds potentially present at the site was characterized based on the risks estimated using selected TRVs, also presented in the RAWP (Arcadis 2008). BTAG TRVs were used only when USEPA Eco-SSL based TRVs were not available (i.e., mercury and PCBs for birds and mammals and thallium for mammals). No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.

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89	FMIT-89	RA		6.6.1 / 179	For the risk description part of the risk characterization process, a semi-quantitative WOE approach was used incorporating multiple LOEs.	Please include plant population survey information (that is currently available) as an additional line of evidence to determine if risk calculations (HQ>1 indicate unacceptable risk) are correctly reflected in current ecological site status. Also, a soil invertebrate population study should be included in areas that have shown calculated risk (HQ>1) to determine if risk calculations are correctly reflected in invertebrate impacts. This is of particular relevance to risks calculated in SWMU1, AOC9, AOC10.	Comprehensive botanical surveys were completed in 2013 for the entire FEIR project area and the results of these surveys are presented in the Topock Groundwater Remediation Project Floristic Survey Report (GANDA and CH2M 2013). In addition, pre-construction botanical surveys were conducted and reported in the Topock Groundwater Remediation Project Pre-construction Floristic Survey Report – Spring 2017 (CH2M 2017). These observations are summarized in Section 2.4.2 of the HHERA Report. The risk characterization for plant communities will include discussion of these observations as additional LOEs in Section 6. A soil invertebrate population study is not considered critical as T&E species are not present and it is not feasible to conduct such a survey at this point. General observations made during other surveys will be included in the risk characterization for soil invertebrates in Section 6.	Same as 85, FMIT-85	Section 6.6.1 of the HHERA will be updated (additional bullet under the interpretation of potential risks to ecological communities): "Observations made during the comprehensive botanical surveys completed in 2013 (GANDA and CH2M 2013) and in 2017 (CH2M 2017) will be used as a LOE in interpreting potential risk to ecological communities." Several places in Section 6.6.2 of the main text and the exposure area-specific appendices will be updated to address this comment. Proposed text for BCW (Plant Communities section) is provided below as an example of the text planned for inclusion in the HHERA to address this comment. For BCW, under Plant Communities, the following text will be added: "Vegetation communities observed at the site during the floristic surveys conducted in 2013 (GANDA and CH2M 2013) and in 2017 (CH2M 2017) is typical of Mojave Desert plant communities (summarized in Section 2.4.2). Over a hundred different vascular plant species have been observed at BCW and documented in these survey reports (GANDA and CH2M 2013, CH2M 2017). The floristic surveys report a diverse assemblage of plants species found in typical abundance, density, cover, and vigor of plant communities in undisturbed desert habitat. These observations are not consistent with impairment of the plant community at the site. The floristic surveys provide site-specific observations that support the health of plant communities at the site and is considered a stronger LOE than the exceedances of low-confidence generic plant screening values, which are widely acknowledged to have low ability to predict toxicity in plants." Similar text changes will be made for other exposure areas.

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90	FMIT-90			6.6.2 / 181	Section 6.6.2 Results	(See comments #79 and 80, above) The presentation of ecological risks should be done with the most applicable and appropriate first. Otherwise, the reader might determine the first risks are the most appropriate. The Tribe requests that OCS results using LOAEL TRVs are presented first. Then, the other scenarios which provide additional information for risk management decisions, can be presented.	The order of presentation/discussion of ecological risks are done in order of refinement starting with use of conservative parameters (SUF=1, depth-weighted EPCs, etc.) and refining using site-specific parameters. This is typical of a "tiered" approach and allows risk managers to see range of risks. In addition, per the RAWP (Arcadis 2008), a range of risks was estimated (i.e., NOAEL-based HQs and LOAEL-based HQs). The text of Section 6.6.1 will be updated to make it clear that potential risk drivers were based on LOAEL-based TRVs and reference the reader to appropriate sections. The order of presentation of the ecological risks for the OCS potential exposure area (and other potential exposure areas) will remain as presented in the HHERA Report.		Comment acknowledged. The order of presentation of the risk analyses is based on a process and does not imply a preference of results. No changes to the HHERA report.
91	FMIT-91			6.6.2.1.1 / 182	Baseline Scenario – Desert Shrew	It is unclear what species at the site is being modeled by the Desert Shrew. The Desert Shrew has a very large diet and will always have a high exposure and high calculated risk. The ERA notes that the Desert Shrew has never been observed at the site. Therefore, the ERA should clearly indicate what species observed at the site is modeled based on the Desert Shrew.	The desert shrew was selected as a representative species for small invertivorous mammals. PG&E worked with the agencies and stakeholders to select representative species for the ERA, including the desert shrew during development of the RAWP (Arcadis 2008). Please see the FMIT March 19, 2019 letter to the agencies regarding consensus of the selection of representative species. Because shrews have a small body weight, large diet, and high metabolism, they are commonly selected in ERAs as representative for small invertivorous mammals to be protective of other species potentially present at the site. Although the desert shrew has not been observed at the site, the 2014 PBA (CH2M 2007) reported that they could potentially be present onsite. Other invertivorous/ omnivorous small mammals observed onsite include the deer mouse and raccoon. Please see Table 2-2 of the HHERA Report for a list of species present/potentially present at the site. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA report.
92	FMIT-92			6.6.2.3 / 197	Bat Cave Wash excluding SMUW 1 and TCS-4	(see comment #76, above) The evaluation of exposure areas with 'removed' soil samples (e.g., BCWxSWMU1+TCS-4) are presumptuous and un necessary evaluations since each SMMU and AOC risks are presented.	Comment acknowledged. The inclusion of the BCWxSWMU1+TCS-4 potential exposure area was at the direction of DTSC and intended to provide additional information/perspective regarding risks associated with potential soil impacts in BCW, when data from SWMU1 and TCS-4 are excluded. No changes to the HHERA Report are proposed to address this comment.		Agencies not requesting changes to the HHERA report. The Tribes stand by their comment that the AOC-by-AOC evaluation is inappropriate for inclusion in the HHERA because it was not part of the approved HHERA Work Plan. The Tribes formally request that the AOC-by-AOC risk assessment NOT be included in the HHERA or utilized in risk management decisions UNTIL such time that appropriate consultation between agencies and the Tribes is completed. In addition, DTSC will provide chronology of the AOC-by-AOC risk discussions.

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93	FMIT-93			6.7.3.3 / 251	When the available dataset for a depth interval and exposure area was composed of less than eight total samples, the maximum depth weighted concentration was selected as the EPC for all three EPC scenarios.	This approach is not consistent with the statement provided in section 6.4.3 which states: "Risk estimates using maximum concentrations are considered overly conservative and generally used for screening level purposes." Use of maximum concentrations is not recommended for use in making risk management decisions. Please update the text in section 6.7.3.2 to more consistently reflect what is stated in section 6.4.3 that the use of the maximum concentrations will not correctly characterize site risk.	Section 6.7.3.2 of the HHERA Report will be updated to be to consistent with Section 6.4.3, which states that the use of maximum concentrations may not appropriately characterize site risk.		Update HHERA as reported in PG&E's response.
94	FMIT-94			6.7.3.3 / 251	Receptor Exposure Assumptions	It is unclear what species at the site is being modeled by the Desert Shrew. The ERA notes that the desert shrew has never been observed at the site. Therefore, the ERA should clearly indicate what species observed at the site is modeled based on the Desert Shrew. In addition, the Uncertainty section should clearly indicate that the Desert Shrew (or any shrew) has not been observed at the site.	See the response to Comment FMIT-91. See also the FMIT March 19, 2019 letter to the agencies regarding selection of representative species.		See final resolution for FMIT-91.
95	FMIT-95			6.7.4 / 252	Uncertainty in Uptake Assumptions	The ERA should include the results of the technical memo, Potential For Chromium Uptake by Arrow weed and Potential Exposure Pathways (2013), which show that CrVI which may be taken into plants is converted into CrIII. This finding has not been sufficiently included in the ERA uptake assumptions for plants.	The main conclusions of the Arrowweed Tech memo and their expected effect on risk estimates for plants and herbivorous wildlife will be discussed in Section 6.7.4. Specifically, the Arrowweed tech memo found that plants can take up CrVI and CrIII from soil, but much of the CrVI is converted to CrIII in the plant. As a result, little CrVI is present in above-ground plant structures relative to the exposure concentration in growth media. For plants, CrVI toxicity was evaluated using a screening level of 1 mg/kg based on CrVI applied to various crop plants (Efroymson et al. 1997). This exposure scenario is similar to that evaluated in the ERA. Therefore, toxicity to plants is not likely to be over- or underestimated based on consideration of the chemical form of chromium in plant tissues. Herbivorous wildlife evaluated in the ERA include Merriam's kangaroo rat, Nelson's desert bighorn sheep, and Gambel's quail (a granivorous bird). For these receptors, the plant dietary fraction was evaluated in the ERA using CrVI TRVs. However, based on the information presented in the Arrowweed Tech Memo, the chromium in plant tissue is likely to be predominantly CrIII and could be evaluated using CrIII TRVs for the plant dietary fraction. Use of CrIII TRVs to evaluate the plant dietary dose is not expected to change risk conclusions for these receptors. For birds, the LOAEL CrVI TRV is <2x greater than the LOAEL CrIII TRV and use of the CrIII TRVs for the plant dietary fraction would slightly increase LOAEL HQs. For mammals, the CrVI LOAEL TRV is about 4-fold higher than for CrIII; use of the CrIII TRV to evaluate the plant dietary dose would also increase HQs. However, for all herbivorous receptors evaluated in the ERA, CrVI LOAEL HQs for Cr III (total Cr) were less than 1 in all potential exposure areas, and therefore risk conclusions for these receptors are unlikely to change based on consideration of information presented in the Arrowweed Tech Memo. This discussion will be included in the uncertainty analysis (Section 6.7) of the HHERA.		Update HHERA as reported in PG&E's response.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

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96	FMIT-96			7.1.3 / 280	Summary and Overall Conclusions and Recommendations for the HHRA RBRGs for the potential recreation users are the most appropriate benchmarks for the protection of human health and associated risk management decisions going forward	It is the Tribes perspective that camping, hunting, hiking and OHV riding is not likely to occur because these land uses are inconsistent with management of this sacred area, a recognized historic resource and Traditional Cultural Property (TCP). The presence of Tribal sacred areas has an impact on DOI/BLM-allowed activities as these federal agencies are mandated through Executive Orders, Federal Trust Responsibility and other ARARs (i.e., both federal and state laws) to protect Tribal sacred lands as a priority. The authority for, and the responsibility of, DOI/BLM to specifically protect the Topock Maze area and surrounding documented Tribal use areas comes in part from the Federal Land Policy and Management Act and the National Environmental Policy Act and has been documented in the Record of Decision (ROD) and Resource Management Plan (RMP) published by the Lake Havasu Field Office in 2007. In the ROD/RMP the Topock Maze area has been designated for Traditional Use as part of the Cultural Resource Management actions (ROD/RMP Table 2, page 26). This designation requires long-term protection as well as consultation with the Tribes to determine which safeguards the DOI/BLM will put in-place to achieve this long-term protection. DOI/BLM has both the authority and responsibility to take management actions to achieve this protection.	Comment acknowledged. The sentence was intended to convey that it is the recreational receptor, as opposed to other receptors, that would be the appropriate receptor on which to base risk management decisions going forward. The recreational land use and receptors (i.e., camper, hiker, hunter, and OVH rider) were included in the HHERA at the direction of DOI and is consistent with the RAWP Addendum 2 (Arcadis 2015). No changes to the HHERA Report are proposed to address this comment.		No changes to HHERA Report.
97	FMIT-97	RA		8 / 285	Section 8 Risk-Based Remediation Goals for Risk Drivers in Soils	In this section the Risk-Based Remedial Goals (RBRGs) are calculated and presented. Whole RBRGs can be useful in soils RI/RFI activities, their presentation in the risk assessment seems pre-mature and unnecessary. There has been no decision that any action for soils is necessary (a risk management decision). Therefore, why calculate soil cleanup goals? Another option, if indeed some soils—related action is deemed necessary, is to perform a risk evaluation where sequentially the highest soil concentrations of risk-driving chemicals are 'removed', and EPC and risk calculations are redone. This is a preferable process to using RBRGs since the risk evaluation retains the appropriate and applicable area-weighted EPCs. RBRGs could be mis-used and applied as 'absolute' soil cleanup goals which essentially by-passes the important area-weighted-based risk/hazard evaluations.	Comment acknowledged. RBRGs were developed to identify areas of the site where COPC/COPEC concentrations in soil contribute most significantly to risk for the receptors evaluated. As stated in Section 8 of the HHERA Report, paragraph 2 of page 285, the RBRGs are intended to be used in the upcoming remedial planning, including the Soil CMS/FS, to identify those areas of the site that may warrant some form of remedial or risk management action. It is agreed that the use of RBRGs as absolute soil clean up goals is inappropriate. If remedial action for soils is deemed necessary, a post-remediation risk assessment would be performed in which the EPCs and risk calculations would be updated to account for removal of soil. This process would retain the applicable depth- and area-weighted risk and hazard evaluations and would be used to confirm that remediation has been successful in reducing residual concentrations of COPCs/COPECs to concentrations that are protective of human health and the environment for the reasonable anticipated future land uses. No changes to the HHERA Report are proposed to address this comment.		No changes to HHERA Report.
98	FMIT-98	RA		8//85	Section 8 Risk-Based Remediation Goals for Risk Drivers in Soils	The RBRGs are based on an incremental lifetime cancer risk of 1 x 10-6. While this is considering a point of departure for risk management decisions, it is not a required risk level in soil remediation decisions. The risk range of 1 x 10^{-4} to 1 x 10^{-6} (inclusive of 1 x 10^{-5}) should also be considered since this is not a residential area but the only potential exposures are workers, recreators, or Tribal members.	Additional clarification text will be incorporated into the HHERA Report to specify that the allowable risk range is 1 x 10^{-6} to 1 x 10^{-4} and can be considered in making remedial and risk management decision as indicated in Comment DTSC-19 regarding the RBRGs. Per DTSC request in Comment DTSC-19, RBRGs corresponding to the acceptable risk management range of 1 x 10^{-6} to 1 x 10^{-4} and to a hazard quotient of 1 will be presented in Section 8 of the report.		Update HHERA as reported in PG&E's response.

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99	FMIT-99	RA		8.1.1 – 8.2.1 / 286-290	8.1.1 and 8.2.1 Methodology for Deriving RBRGs and Values	Please clearly explain how background CrVI and Dioxin/furan values are included in the RBRG calculations. Specifically, are background concentrations subtracted out prior to the RBRG calculation? If not, please explain how the inclusion of background increases the RBRG value.	RBRGs are risk-based concentrations irrespective of background. Calculation of RBRGs does not account for background. For those COPCs, receptors, and scenarios where the RBRG is less than the site-specific BTV, the BTV would be used in place of the RBRG as the remediation goal for the site. For this HHERA, the RBRGs for CrVI and dioxin TEQ are greater than the respective BTVs for these COPCs so the RBRGs are recommended for use as the starting point remediation goals for the site. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
100	FMIT-100			8.1.1 / 289	8.1.1 Methodology for Deriving Human health RBRGs and Values Therefore, potential exposure to dioxin TEQ in soil for the recreational users over a lifetime would be less… As such the RBRGs for the recreation users equal to a theoretical potential cancer risk of 1 x 10-5 may be appropriate.	The recreational user has been proposed as the most appropriate benchmarks for the protection of human health and associated risk management decisions going forward. In addition, the text acknowledges that use of a 10-6 risk threshold for the recreational user is not appropriate. Therefore, please update the RBRGs to include the calculated concentrations based on a 10^{-5} risk threshold.	Text will be added to the HHERA Report to clarify that the allowable risk range is 1 x 10^{-6} to 1 x 10^{-4} and can be considered in making remedial and risk management decisions. RBRGs for the 1 x 10^{-5} and 1 x 10^{-4} risk threshold will be presented in Section 8 of the HHERA Report as indicated in Comment DTSC-19 regarding the RBRGs.		Update HHERA as reported in PG&E's response.
101	FMIT-101			8.2.1 / 291	8.2.1 Methodology for Deriving Ecological RBRGs and Values The congener specific BAFs and a recommended mammalian dioxin TEQ LOAEL TRV of 30 ng/kg bw-day were used to calculate the RBRGs protective of invertivorous small mammals.	If exposure concentration based on a more scientifically defensible BAF value rather than assuming all congener uptake as 2,3,7,8-TCDD, why was the more appropriate TCDD BAF value not used in the risk calculations?	All forward calculations were conducted using the BAFs presented in the RAWP documents (Arcadis 2008, 2009, 2015) to minimize changes in the risk assessment methodology agreed to by the agencies and stakeholders. However, for the development of RBRGs, a refinement was warranted as the 2,3,7,8-TCDD BAF was considered conservative and would result in very conservative RBRGs (less than background) and may suggest unnecessary management of soil. See also response to Comments DOI-23 and DTSC-20.		No changes to the HHERA Report.
102	FMIT-102			9 / 294	9 Key Findings Or target ILCR of 1 x 10-5 for workers	The Tribes agree that an ILCR point of departure of 1 x 10^{-5} for workers and recreational visitors is more reasonable than a 1 x 10^{-6} value. Please update text to include recreational visitors in this section.	The target risk of 1 x 10^{-6} was selected for reference as the lower end of the acceptable risk management range of 1 x 10^{-6} and 1 x 10^{-4}. Text will be added to Section 9 to acknowledge this and specify that the acceptable risk management range is 1 x 10^{-6} and 1 x 10^{-4} and can be considered in making remedial and risk management decisions. Additional clarification will be added to Section 9 of the HHERA Report to clarify that the locations associated with potentially unacceptable risk are identified using a target risk of 1 x 10^{-6} and that risk management or remediation may not be necessary to reduce risks for the recreational users (hiker, camper, and OHV rider) to levels below 1 x 10^{-5}.		Update HHERA as reported in PG&E's response.
103	FMIT-103			9 / 294	9 Key Findings Risk drivers were identified based on a target HQ of 1 and additional LOE support the conclusion of unacceptable risk.	Please include population surveys as an additional LOE. All LOEs to date are based on conservative quantitative evaluation of soil sample data. No effort has been made to determine whether the quantitative evaluation of risk is correctly reflected in the current ecological site status.	Population surveys were conducted for special-status species only, not for general populations. The results of these special-status species surveys are summarized in Section 2.4.5 of the HHERA Report and in the individual potential exposure area appendices; they are also included in the overall exposure area/site conclusions. Qualitative observations made in the field for general ecological populations will be included in the ecological risk characterization sections as an LOE.		Update HHERA as reported in PG&E's response.

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104	FMIT-104	RA		9 / 295	Section 9 Key Findings	The listing of the nine (9) soil sampling locations that contain risk driving-chemicals and contribute to higher risk estimates is more appropriately a post-risk management exercise. The listing of these 9 locations has embedded assumptions regarding the acceptability of risks and hazards which are not appropriate at this stage in the soils RI/RFI process as no determination of the acceptability of risks has been made. The Tribe requests that this presentation of the 9 risk-driving soil sample locations be removed from the HHERA.	Figure 9-1 depicts locations that contribute significantly to overall risks above the point of departure for the site and provides useful information that can be considered for risk management purposes. It is an example of just one approach that can be useful in identifying those areas and chemicals that are contributing most significantly to risk in the OCS area. Therefore, Figure 9-1 will remain in the HHERA Report. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
105	FMIT-105				The following comments refer to HHERA Appendices. Many of the comments related to the main text are also applicable to the individual SWMU/AOC risk assessment presented in the Appendices and should be considered and address as such.		N/A		No changes to the HHERA Report.
106	FMIT-106	RA		1-1	Appendix RBC Soil Management Plan Risk-Based Concentrations for Groundwater Remedy (Appendix RBCs)	The text references a table in the main text, Table 3-7. While that Table is listed in the TOC for the main text, that table does not appear in my copy of the HHERA. The Appendices should be stand-alone and not be referring to tables or figures in other sections of this 11,000+page document.	Table 3-7 was inadvertently omitted in the hardcopies of the HHERA Report but included in the electronic version that was accessible to all stakeholders. The appendices for the individual and combined potential exposure areas provide information specific to each potential exposure area and were not intended to be stand-alone documents. Including general information applicable to all potential exposure areas in each appendix would be redundant and increase the size of the documents substantially. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
107	FMIT-107	RA		2-1	Appendix RBCs	The Appendix refers to procedures from the main report/RBRGs as being used for the RBCs. This makes the review of these appendices difficult as the reader then must find other sections of the report in order to understand the procedures being used. The appendices should be stand-alone.	The RBC Appendix is the last appendix of the HHERA and was provided to support the Soil Management Plan. The discussion of methodology for calculations of RBRGs is presented in the main report and re-iterated in this appendix. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
108	FMIT-108	RA		2-1	Appendix RBCs	The use of a bright-line risk value of 1×10^{-6} is not appropriate for setting RBCs. An important issue for the Tribe has been the repatriation of excavated soils and to keep as much soil at the site as reasonable possible (i.e., do not exceed hazardous water levels or pose an unacceptable risk).	As indicated in the footnote of the RBC table in the RBC Appendix, the cancer-based RBCs can be adjusted based on a target risk level of 1×10^{-5} and 1×10^{-4} by multiplying the value by 10 and 100, respectively. The HHERA Report does not recommend which RBCs are appropriate for use in soil handling/management decisions. That is a risk management decision to be made by the agencies. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
109	FMIT-109	RA		3-1	Appendix RBCs	Notwithstanding the above Appendix RBC comments, The Tribe supports the use of the LOAEL-based TRVs in the calculation of RBCs	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
110	FMIT-110			Draft Appendix RBC Soil Management Plan Section 3	Site Use Factor =1	Ecological RBCs based on a site use factor of 1 is overly conservative and unrealistic. A baseline risk assessment is intended to incorporate site specific data and not use generic assumptions. Please revise using appropriate SUF.	Comment acknowledged. Please see the response to Comment FMIT-21.		See final resolution for FMIT-21.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)	Comment Type (RA/Non - RA)	Comment Category	Section / Page	Reference Text	Soil HHERA Comment (Please provide sufficient detail, include specifically what you are looking for)	PG&E Response	DTSC Comments on RTCs Received on June 5, 2019	Final Resolution June 20-21, 2019
111	FMIT-111			Draft Appendix RBC Soil Management Plan Section 3	TEQ mammals	The Tribes believe the RBC of 192 ng/kg is a more appropriate RBC then the unrealistic hiker scenario which is overly conservative and results in an unrealistic calculation of risk for the Topock site.	Comment acknowledged. This is a risk management decision to be made by the agencies. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
112	FMIT-112	RA		Table RBC 2-1	Appendix RBCs	The appendix presents a table of multiple human and eco-based RBCs. The tables present RBCs for multiple receptors. Some of these receptors are not applicable to appropriate for the OCS exposure areas. There is no discussion as to how the various human or eco RBCs would be selected for use in soil repatriation.	RBCs were provided for all potential receptors evaluated in the HHERA to support the Soil Management Plan. The appropriate RBCs to use for the implementation of the Soil Management Plan is a risk management decision to be made by the agencies.		No changes to the HHERA Report.
113	FMIT-113	RA		General	Appendices: OCS-Soil HHERA for Outside the Compressor Station Exposure Area; OCSxBCW--Soil HHERA for Outside the Compressor Station Excluding Bat Cave Wash Exposure Area; BCW+AOC4--Soil HHERA for Bat Cave Wash and AOC-4 Exposure Area; OCSxBCW+AOC4--Soil HHERA for Outside the Compressor Station Excluding Bat Cave Wash and AOC-4; BCW Soil HHERA for BCW Exposure Area; SWMU1 Soil HHERA for SWMU1 and TCS-4 Exposure Area; BCWxSWMU1 Soil HHERA for BCWxSWMU1 and TCS-4 Exposure Area; AOC4 Soil HHERA for AOC4 Exposure Area; AOC9 Soil HHERA for AOC9 Exposure Area; AOC10 Soil HHERA for AOC10 Exposure Area; AOC11 Soil HHERA for AOC11 Exposure Area; AOC12 Soil HHERA for AOC12 Exposure Area; AOC14 Soil HHERA for AOC14 Exposure Area; AOC27 Soil HHERA for AOC27 Exposure Area; AOC28 Soil HHERA for AOC28 Exposure Area; AOC31 Soil HHERA for AOC31 Exposure Area; UA-2 Soil HHERA for UA-2 Exposure Area	The following comments are applicable to the various SMWU/AOC HHERAs provided in the appendices to the main HHERA report.	Comment acknowledged. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
114	FMIT-114					All of the human exposure scenarios and ecological receptors are evaluated in each of the listed HHERA appendices. Many of these scenarios and receptors are not supported by the topography and land characteristics in some of the SWMU/AOCs. For example, AOC9 is a steep slope immediately adjacent to the TCS. The applicability of the terrain characteristics to be able to support either the human or ecological exposures must be addressed in the uncertainty discussion in each of these reports. Further, if one of these scenarios or receptors that is not supported by the terrain characteristics is driving risk, then that scenario/receptor should not be the basis for any decisions. This issue must be fully developed and discussed in the uncertainty section of each of these appendices. The Tribes request a map showing the areas where the individual recreational land sue scenarios would be supported by site characteristics.	It is agreed that not all human activities are realistic in all areas of the site~~; however, there is insufficient information to preclude certain recreational activities from certain areas of the AOCs outside the TCS.~~ No physical barrier (such as fencing) is present that would stop an individual recreational user from accessing any and all areas of the AOCs outside the TCS. The uncertainties sections of the HHERA Report (Sections ES.5.4 and 5.6.3.2 for Exposure Assumptions and Pathways) will be revised to include language emphasizing this uncertainty in the assumptions used to assess recreational land use at the site.		Update HHERA as reported in PG&E's response (modified). The sentence shown as strike through font will not be included in the updated HHERA report.

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115	FMIT-115	General			Risk associated with background	Please provide a detailed explanation of how background soil concentrations are included into the HRA and ERA risk calculations and RBRGs. Is risk from background removed prior to calculation of site risk? If not please explain why not. Are RBRGs developed including the risk associated with background?	As recommended in current DTSC guidance (1997) and discussed in detail in Section 3.4.1.1.1 of the HHERA Report, inorganic compounds were excluded from the HHERA if they were detected at concentrations equivalent to or less than local background levels. Ubiquitous anthropogenic compounds such as dioxins/furans and PAHs may also be excluded from the risk assessment if they are present at concentrations equivalent to or below background. General methodology recommended by DTSC guidance (1997, 2009d) was used to determine whether inorganic compounds, dioxins/furans, and PAHs detected in soils at the site are present at concentrations that are consistent with background levels as described in detail in Section 3.4.1.1.1. For COPCs/COPECs included in the risk assessment, total risks/hazards for a site are calculated based on site EPCs which are inclusive of background levels. In this HHERA, a majority of the total risks/hazards above 1 x 10^{-6} and HI of 1, respectively, for a given receptor in AOC 9, 10, 11, and UA-2 were attributed to arsenic. Therefore, the contribution of background concentrations of arsenic to the total risks/hazards was accounted for in the results and conclusions sections for these potential exposure areas where arsenic was a risk driver. For those COPCs, receptors, and scenarios where the RBRG is less than the site-specific BTV, the BTV would be used in place of the RBRG as the remediation goal for the site. For this HHERA, the RBRGs for CrVI and dioxin TEQ are greater than the respective BTVs for these COPCs, so the RBRGs are recommended for use as the starting point remediation goals for the site. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
116	FMIT-116		General		Figures	Please provide figures (similar to Figure 9-1) for all of the individual AOC risk assessments	As stated in Sections ES.7.1. and 7.1 of the HHERA Report, the OCS potential exposure area evaluation is the most representative scenario for the basis of HHRA conclusions and recommendations for the protection and safety of potential human receptors outside the fenceline. Therefore, including figures for all individual AOCs presenting locations that exceed the RBRGs based on the HHRA dataset for individual AOCs is misleading and overly conservative. The requested figures will not be included in the HHERA Report. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report.
117	FMIT-117		General		Table 6-5a Bioaccumulation Factors for Estimating Tissue Concentrations from Soil BAF plant	Please indicate how the ERA includes the findings from the Potential For Chromium Uptake by Arrow weed and Potential Exposure Pathways (2013) which shows that CrVI which may be taken into plants is converted into CrIII	See the response to Comment FMIT-95. Results of the Arrowweed Tech memo will be included in the ERA uncertainty analysis in Section 6.7.4.		See final resolution for FMIT-95.

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118	FMIT-118		General		Table 6-11	Please explain why the risk to small mammals and birds is based on total chrome and not on hexavalent chrome. Is total chrome considered a site COPEC? What is the uncertainty that is included in the risk assessment when basing the risk on total chrome? How was background total chrome accounted for in this risk calculation? How was the speciation of chrome accounted for in the toxicity study used to select the total chrome trv?	Total chromium (assumed to be CrIII) was identified as a COPEC (see Section 3.4 and Table 3-7 of the HHERA Report). Potential risks to small mammals and birds were estimated for both CrVI and total chromium. CrVI TRVs were developed based on dietary CrVI exposure, and total chromium TRVs are based on dietary exposure to CrIII. Available wildlife toxicity data for CrVI are quite limited. Toxicity endpoints for wildlife considered in ERAs generally include population-level effects (i.e., survival, growth, and reproduction), and these data indicate that dietary exposure to CrIII is more toxic than dietary CrVI (NOAEL- and LOAEL-based TRVs are generally lower for CrIII). Cancer endpoints are not evaluated for population-level impacts to wildlife. The LOAEL-based HQs for CrVI are less than 1 for all the potential exposure areas and LOAEL-based HQ for total chromium is > 1 for one area (AOC 9) based on the shrew; therefore, only total chromium was identified as a potential risk driver. The EPCs for total chromium are based on the measured concentrations in soil, which include background and site-related inputs. Background total chromium was not removed from the exposure estimates used in the risk calculations (i.e., incremental risks were not estimated). In the ERA, chromium exposure was assumed to occur as the state/valence measured in soil (i.e., dietary exposure to wildlife receptors for CrVI is via incidental ingestion of CrVI in soil and ingestion of prey tissues containing CrVI). This assumption ignores the potential for CrVI reduction to CrIII *in vivo*, which is known to occur in many plant and animal tissues (USEPA 2008). Chromium is an essential nutrient for humans and animals and CrIII has been shown to have antioxidative properties *in vivo* that are critical for activating enzymes and maintaining stability of proteins and nucleic acids (USEPA 2008). CrVI is absorbed better than CrIII and some studies suggest that when ingested orally, most of the CrVI is reduced to CrIII before reaching the sites of adsorption in the small intestine. However, as noted above, available wildlife toxicity data suggest that CrIII is more toxic than CrVI. Thus, risk estimates for CrVI for mammals and birds may be underestimated by not accounting for this biological reduction in prey tissues. Due to the lack of data for relative proportion of each chromium species present in plants, soil invertebrates, and small mammal prey, the magnitude of this uncertainty cannot be readily assessed. The uncertainty associated with chromium toxicity, as discussed above, will be added to Section 6.7.5.2 of the HHERA Report.		Update HHERA as reported in PG&E's response.
119	Cocopah-1	RA		Entire	n/a	The Tribes (for these comments mean the Chemehuevi, Cocopah, Colorado River Indian Tribes, Fort Mojave, Hualapai and Quechan) generally do not disagree with the procedures and the conclusions in the main body of the HHERA which evaluates risk across the entire OCS potential exposure area.	See the response to Comment FMIT-1.		See final resolution for FMIT-1.
120	Cocopah-2			Entire	n/a	The addition or changing of risk assessment assumptions or procedures AFTER the risk assessment work plan has been reviewed and approved is not acceptable to the Tribes. The Tribes have asked for full participation in the development and implementation of the HHERA. Procedural changes made without Tribal consultation and implemented in the work plan unacceptably bypass Tribal participation.	See the response to Comment FMIT-2.		See final resolution for FMIT-2.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

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121	Cocopah-3	RA		Entire		The Tribes do not disagree with the limited soil remediation (8 sample locations) that is determined based on risk across the entire OCS potential exposure area. The HHERA recommendation for limited soil remediation (8 sample locations) that are protective of both human ecological receptors.	See the response to Comment FMIT-3.		See final resolution for FMIT-3.
122	Cocopah-4	RA		Entire	n/a	The Tribes do not disagree with the findings of the sediment transport evaluation that no contaminated sediment is reaching the Colorado River	See the response to Comment FMIT-4.		See final resolution for FMIT-4.
123	Cocopah-5	RA		Entire	n/a	The Tribes do not disagree with the use of a single exposure area Outside the Compressor Station (OCS)	See the response to Comment FMIT-5.		See final resolution for FMIT-5.
124	Cocopah-6	RA		Entire	n/a	The Tribes do not disagree with the exclusion of the residential exposure scenario in DOI-areas of Bat Cave Wash from soil remediation recommendations	See the response to Comment FMIT-6.		See final resolution for FMIT-6.
125	Cocopah-7	RA		Entire	n/a	The Tribes do not disagree with the exclusion of individual SWMU/AOC-exposure areas in the soil remediation recommendations.	See the response to Comment FMIT-7.		See final resolution for FMIT-7.
					NOTE: Any Exec Summary comments are also applicable to the main HHERA text and appendices. Due to the exceptional length of this report, it is not be possible for the reviewers to identify each occurrence of a topic. The Tribes expect that these comments will be addressed wherever in this HHERA this subject topic occurs.		N/A		N/A
126	Cocopah-8	Non -RA		ESl / ES-1	"…additional surrounding land owned or managed by…"	The Fort Mojave Indian Tribe is a land-owner of land adjacent to the TCS and the text and maps must accurately reflect this.	See the response to Comment FMIT-8.		See final resolution for FMIT-8.
127	Cocopah-9			ES.2.3.1/ ES-5	Ecological Habitat Characteristics Geology -Unconsolidated alluvial and fluvial deposits are underlain by bedrock with very low permeability…	There is no mention of the dredged soils that make up surface soils from present-day rivers edge to the base of alluvial terrace deposits to the west. These soils are different than local alluvial/fluvial sediments because they are derived partly from upstream sources. Also, interesting that no discussion is made here on reducing zone surrounding river. All of this strongly suggests the need for Arcadis to present a single, unified, consistent CSM that explains site characteristics the same way regardless of soils or GW focus.	See the response to Comment FMIT-9.		See final resolution for FMIT-9.
128	Cocopah-10			ES. 2.3.1 / ES-6	Ecological Habitat Characteristics Overview - Relatively barren of vegetation	A higher density of vegetation occurs along BCW, from its mouth to high density tamarisk at outlet, with the exception of the mouth of Bat Cave Wash.	See the response to Comment FMIT-10.		See final resolution for FMIT-10.
129	Cocopah-11			ES.2.3.1 / ES-6	Ecological Habitat Characteristics Overview - May periodically flood during stormwater runoff events but remains dry.	Standard analysis would include quantitatively defining the frequency/magnitude of 'flooding' events.	See the response to Comment FMIT-11.		See final resolution for FMIT-11
130	Cocopah-12			ES.2.3. 1 / ES-6	Ecological Habitat Characteristics Overview - Ephemerally flooded	Is the cause of the ephemeral flooding relevant to the exposure pathway and CSM? If so, it would be important to clarify if this is due to the infrequent flooding associated with washes, or annual variations in stage along CO River - which are several feet.	See the response to Comment FMIT-12.		See final resolution for FMIT-12.

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131	Cocopah-13			ES.3 / ES-8	Only Category 1 data are included in the datasets used in the quantitative risk assessment. Soil samples representative of soil that has been removed as part of a removal action were not included in the HHERA datasets.	As stated in the HHERA, removed soils are not included in the risk. Therefore, the risk assessment conclusions will need to be updated if any soil removal is implemented prior to risk management decisions are made. Please clearly describe how soils removed during other site activities will be addressed within the risk assessment dataset and subsequent risk calculations	See the response to Comment FMIT-13.		See final resolution for FMIT-13.
132	Cocopah-14	RA		ES.4 / ES-11	"Soil Background Investigations (Various reports/authors)	The HHERA should list individually by title/author/date these reports.	See the response to Comment FMIT-14.		See final resolution for FMIT-14.
133	Cocopah-15			ES.5.1.2 /ES-13	In addition, at the direction of DTSC, potential exposure areas based on individual AOCs outside the fence line were evaluated in separate appendices	Please include in the text that risks calculated separately for individual AOCs are overly conservative and will greatly overestimate site risks. Specifically, none of the human site-specific uses would occur solely in any one AOC. In addition, no large-range mammal or bird would spend an entire exposure period in a single AOC.	See the response to Comment FMIT-15.		See final resolution for FMIT-15.
134	Cocopah-16			ES.5.3.2 / ES-15	The risks/hazards estimated for the OCS potential exposure area are believed to provide a more appropriate representation of the potential exposures for the human populations… than the risks/hazards estimated for individual AOCs/SWMU/UA potential exposure areas.	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action.	See the response to Comment FMIT-16.		See final resolution for FMIT-16.
135	Cocopah-17			ES.5.3.2/ES-18	Some targeted form of risk management or remediation, addressing elevated levels of hexavalent chromium and dioxin, would be effective at reducing risks for the campers, hikers and OHV riders to levels below 1 x 10^{-6}	Risk values that fall within the allowable risk range of 1 x 10^{-4} to 1 x 10^{-6} do not automatically require remediation, but rather additional evaluation. The HHERA text indicates a remedial goal of 1 x 10^{-6}. Establishing the appropriate remedial goal, however, should be determined during the risk management process which includes stake holder input. In addition, use of 1 x10^{-6} risk threshold for remedial goals is overly conservative for the camper, hiker and OHV rider. As has been discussed throughout the risk assessment process, these uses of the site are not site specific, are overly conservative, and will greatly overestimate risk. Therefore, to overestimate the potential risks due to conservative assessment and then use remedial goals at the upper bounds of allowable risk range would result in an increased amount of unnecessary and avoidable site impacts. .	See the response to Comment FMIT-17.		See final resolution for FMIT-17.
136	Cocopah-18			ES.5.3.2 / ES-17	Recreational User- Camper and others	There are both practical (presence of freeway, railroad, etc.) and topographical (slope) constraints to the recreational scenarios evaluated in the HHERA. The Tribes request that a map that clearly indicates areas that could realistically be used for these recreational activities be prepared and included in the HHERA. For example, is camping anticipated at location AOC10-20? Exposure scenarios that cannot occur in a given area should not be included in the HHERA evaluation, or, at a minimum the possibility of these exposures must be discussed.	See the response to Comment FMIT-18.		See final resolution for FMIT-18.
137	Cocopah-19			ES.5.3.2	the alternate and more robust BAFs approaches for dioxin TEQ based on congener-specific uptake are recommended for developing risk-based remediation goals	The Tribes request that a more detailed discussion of the implications behind the use of single congener verses congener-specific RBRGs be presented in more detail in a TWG format.	See the response to Comment FMIT-19.		See final resolution for FMIT-19.
138	Cocopah-20			ES.5.4 / ES-19	By using multiple conservative exposure assumptions or toxicity estimates, the risk estimates likely develop a conservative bias that may result in significant overestimation of potential risk and hazard.	The Tribes request that the text be updated to state that the use of conservative exposure assumptions "will" overestimate risk rather than "likely" overestimate risk.	See the response to Comment FMIT-20.		See final resolution for FMIT-20.

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139	Cocopah-21			ES.6.2.2/ES-22	For terrestrial birds and mammals, risks were evaluated using two site specific use factors (SUF) scenarios: a generic SUF of 1 and a SUF based on species- and site-specific home range comparted to the total area of each exposure area	It is unclear why risk calculations based on an SUF of 1 are used for ecological receptors that are known not to exist solely within the site. Please update the text to state that the "risks/hazards estimated using the site-specific home range potential exposure areas are believed to provide a more appropriate representation of the potential exposures for the ecological populations than the risks/hazards estimated based on a SUF of 1". If the text is not updated, please include why the use of a SUF of 1 is appropriate and necessary for birds and large range mammals.	See the response to Comment FMIT-21.		See final resolution for FMIT-21.
140	Cocopah-22			ES.6.3 / ES-23	Although the dioxin TEQ TRVs selected in the RAWP...were used to estimate risk...the alternate and more robust TRVs for dioxin TEQ based on more recent date are recommended for developing RBRGs,	The Tribes request that a more detailed discussion of the implications behind the use of single congener verses congener-specific RBRGs be presented in more detail in a TWG format.	See the response to Comment FMIT-22.		See final resolution for FMIT-22.
141	Cocopah-23	RA		ES-7	Various typographical/spelling errors. e.g., first line pg ES-7	A global spell and grammar check should be performed on the document.	See the response to Comment FMIT-23.		See final resolution for FMIT-23.
142	Cocopah-24	RA		ES-7	Table, Current-Residential and recreational	The distance from the TCS to the listed (closest) residential area should be provided.	See the response to Comment FMIT-24.		See final resolution for FMIT-24.
143	Cocopah-25	RA		ES-7	Table, Future (land use)	The DOI requirement for residential land use evaluation, either seasonal or year-round, was intended for informational purposes only and not for decision-making. This commitment should be clearly presented in the HHERA.	See the response to Comment FMIT-25.		See final resolution for FMIT-25.
144	Cocopah-26			ES.7.2 / ES-29	Some targeted form of risk management or remediation… to levels below 1 x 10-6.	The risk assessment continues to default to 1 x 10^{-6} as the acceptable level of risk at the site. As stated earlier, within the text acceptable risk ranges from 1 x10^{-4} through 1 x 10^{-6}. Therefore, the risk assessment should be updated to state that "remediation to reduce risk to 1 x 10^{-6} may not be necessary however If risk management concludes it is necessary to reduce risk below 1 x 10^{-6}, then targeted assessment of risk management or remediation should be required."	See the response to Comment FMIT-26.		See final resolution for FMIT-26.
145	Cocopah-27			ES.8 / ES-29	RBRGs, risked based remedial goals, "are proposed health protective target cleanup concentrations that can be used in combination with other factors such as background concentrations, as a starting point [underline added for emphasis] for making risk management decisions."	This would indicate that the HHERA is a starting point in creating a firm foundation resulting in remedial decisions that would be mutually shared, i.e. tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-27.		See final resolution for FMIT-27
146	Cocopah-28			ES.8.1.1 /ES-30	Rearranging the equations used to estimate the ILCRs and noncancer hazards and using the target ILCR of 1 x 10^{-6} (and 1 x 10^{-5} for dioxin TEQ) and the target noncancer HQ of 1, the concentration of each risk driver associated with the target ILCR and HQ levels was determined.	The text should provide RBRGs developed using the entire acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6} not simply based on the upper bounds of the acceptable risk range. Please update text for RBRG discussions to address the RBRG range and not a single RBRG developed for the upper bounds limit. In addition, please update the table in this section to show RBRGs associated with entire acceptable risk range	See the response to Comment FMIT-28.		See final resolution for FMIT-28.
147	Cocopah-29			ES.8.2.2 /ES-32	AOC9 AOC10-21 to meet the RBRG of 145	Why are AOC10 samples discussed under AOC9? Please outline how soil sample locations were assigned to each AOC and the basis for changing AOC boundaries. Was any sample location repeated in EPC calculations for two different AOCs? If so which samples/locations? This is an example of another post-risk assessment work plan procedural change on which the Tribes were not consulted.	See the response to Comment FMIT-29.		See final resolution for FMIT-29.

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148	Cocopah-30	RA		ES.3 / ES-9	Table, Overview of Data Included in the HHERA Third bullet on 'white powder'	Exposure to waste materials, e.g., white powder, should not be included in the risk assessment the Tribes prefer that any surficial occurrence should be removed.	See the response to Comment FMIT-30.		See final resolution for FMIT-30.
149	Cocopah-31	RA		ES 3.2 / ES-11	"For human health, the various potential receptors were assumed to contact soil…"	Excluding the scouring scenarios, the likelihood of human contact with soil decreases with increasing depth. None of the human site uses includes activities where an individual digs down to 10' below grade. This decreasing probability of soil contact needs to be reflected in all discussions of soil depth zones used for EPC calculations as well as in discussions of uncertainty.	See the response to Comment FMIT-31.		See final resolution for FMIT-31.
150	Cocopah-32	RA		ES.4 / ES-12	pp 2. "If the soil dataset had fewer than four detected values…"	The use of the maximum detected soil concentration when there are less than 4 detects or 8 observations is an assumption that overestimates the calculated EPCs. Whenever this default is used in the HHERA, it should be noted in the EPC section as well as in the discussion of conservatism.	See the response to Comment FMIT-32.		See final resolution for FMIT-32.
151	Cocopah-33	RA		EA.5.1.1/ES-12	Last pp. "The potential human receptors…: workers…	Whenever worker receptors are mentioned, the HHERA must acknowledge that both OSHA and Cal-OSHA regulations, not the HHERA, is the appropriate criteria to ensure their adequate protection.	See the response to Comment FMIT-33.		See final resolution for FMIT-33.
152	Cocopah-34	RA		ES.5.1.1/ES-13	Pp 2. "Four types of potential recreational user…"	The likelihood of these recreational users at the TCS project site is very minimal, and in many cases zero. Hunting and camping adjacent to the TCS have not ever been reported. Much of the topography renders OHV riding impossible or physically dangerous. The HHERA must provide some language which reflects the reality that these land uses are not reliable for soil cleanup determinations. (See comment above requesting a recreational land-use map)	See the response to Comment FMIT-34.		See final resolution for FMIT-34.
153	Cocopah-35	RA		ES.5.3.2-ES-17	Bullet 2. Last sentence.	Why has the target risk of 10^{-6} been selected for the evaluation of potential soil removal related to the Camper? The calculated risk for this receptor is within the risk management range and the FIRST decision is whether the estimated risk is acceptable. The proposal of cleanup to 10^{-6} is presumptuous. Perhaps a 10^{-5} cleanup scenario should also be proposed?	See the response to Comment FMIT-35.		See final resolution for FMIT-35.
154	Cocopah-36	RA		ES.5.3.2/ES-17	Bullet 3, Last sentence	Ditto above comment for hiker.	See the response to Comment FMIT-36.		See final resolution for FMIT-36.
155	Cocopah-37	RA		ES.5.3.2 / ES-17	Bullet 4, last sentence	Ditto above for OHV rider	See the response to Comment FMIT-37.		See final resolution for FMIT-37.
156	Cocopah-38	RA		ES.5.3.2 / ES-18	The estimated risks and hazards for the NORR exposure area are provided for information purposes only."	This statement must be clear and present anywhere in the HHERA that residential risks are presented. The phrase used should be edited to include "…the NORR hypothetical residential exposures are provided…"	See the response to Comment FMIT-38.		See final resolution for FMIT-38.
157	Cocopah-39	RA		ES.6.3 / ES-23	"In addition, a second set of NOAEL- and LOAEL-TRVs based on the Navy/BTAG…"	BTAG criteria are screening criteria. They might be useful in screening soil samples in terms of characterization issues, but they are not reliable TRVs to predict ecological effects.	See the response to Comment FMIT-39.		See final resolution for FMIT-39.
158	Cocopah-40	RA		ES.6.3 / ES-24	"Avian NOAEL and LOAEL TRVs for hexavalent chromium were developed…"	The need for these criteria is not a surprise and the development of chrome +6 TRVs for avian receptors should have been done and reviewed with the Tribe prior to the HHERA. That is the purpose of the work plan. This is another example of a post-risk assessment work plan procedural change on which the Tribes were not consulted.	See the response to Comment FMIT-40.		See final resolution for FMIT-40.
159	Cocopah-41	RA		ES.6.4.2 / ES-24	Section ES.6.4.2	In the identification of ERA risk drivers, it should be specified which TRV was used. NOAEL or LOAEL or ??	See the response to Comment FMIT-41.		See final resolution for FMIT-41.

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160	Cocopah-42	RA		ES.7.1 / ES-27	Section ES.7.1 Conclusions and Recommendations	The Tribes agree with the HHRA conclusions that 1) lead is not present at unsafe levels, that AOC/SWMU-specific HHRAs are not appropriate for decision-making related to proposed soil cleanup, the OCS is the appropriate exposure area, that soils are safe related to non-cancer health effects, that Tribal users risks are de minimus, and the residential evaluation is hypothetical, for informational purposes and not appropriate for decision-making. The Tribes do NOT agree that for "all potential human receptors evaluated," that the COPCs of dioxin-TEQs and Chrome+6 are applicable in the SWMU/AOCs listed. Not all the human activities are realistic in these areas. For example, the AOC9 risks are driven by fence line samples (at the top of a steep slope). Are campers and OHV riders going to be present along the fence line?	See the response to Comment FMIT-42.		See final resolution for FMIT-42.
161	Cocopah-43	RA		ES.7.1 / ES-28	Section ES.7.1 Conclusions and Recommendations	As stated above, The Tribes do not agree that "RBRGs for potential recreational users are the most appropriate benchmarks…". The Tribes also do not agree that the target risk for these hypothetical users must be at 1×10^{-6}. The calculated risks within the recognized risk management range must be first evaluated to determine if any action is necessary.	See the response to Comment FMIT-43.		See final resolution for FMIT-43.
162	Cocopah-44	RA		ES.7.1.1 / ES-30	Section ES.8.1.1 Methodology and Calculated RBRG Values	As stated previously, the use of 1×10^{-6} as a 'bright line' ILCR in the RBRG calculations ignores the first step of evaluating the estimated risks that are within the agency 'risk management' range.	See the response to Comment FMIT-44.		See final resolution for FMIT-44.
163	Cocopah-45	RA		1 / 1	Section 1. Introduction	The Fort Mojave Indian Tribe is a land-owner of land adjacent to the TCS and the text and maps must accurately reflect this.	See the response to Comment FMIT-45.		See final resolution for FMIT-45.
164	Cocopah-46	RA		1.1 / 2	Second paragraph: "Information and sampling data…"	The DTSC, after the close of Risk Assessment Work Plan comments, submitted the directive letter to PG&E requiring the individual SWMU/AOC risk assessments. This decision was never part of the work plan discussion or review with the Tribes, nor were the Tribes consulted on this directive. The Tribes had already reviewed and given their comments on the single OCS exposure area, which is the most appropriate area for soil remediation decision-making.	See the response to Comment FMIT-46.		See final resolution for FMIT-46.
165	Cocopah-47	RA		1.2 / 3	Section 1.2 Regulatory Framework, last pp	The DTSC, after the close of Risk Assessment Work Plan comments, submitted the directive letter to PG&E requiring the individual SWMU/AOC risk assessments. This decision was never part of the work plan discussion or review with the Tribes, nor were the Tribes consulted on this directive. The Tribes had already reviewed and given their comments on the single OCS exposure area, which is the most appropriate area for soil remediation decision-making.	See the response to Comment FMIT-47.		See final resolution for FMIT-47.
166	Cocopah-48	RA		2.1 / 5	Section 2.1 Site Historical Operation	Since property ownership/use is included in this section, then the mention of more recent property ownership changes, including the transfer of land to Fort Mojave, should be included.	See the response to Comment FMIT-48.		See final resolution for FMIT-48.
167	Cocopah-49	RA		7	Last paragraph	The HHERA recognizes that in SWMU 1 there have been storm events that have changed the sediment distribution in BCS. The 2006 event is referenced. How are soil depths for samples collected prior to 2006 adjusted to reflect their depth today so those pre-2006 samples can be incorporated into the EPC calculations? Can the text provide an explanation/description?	See the response to Comment FMIT-49.		See final resolution for FMIT-49.
168	Cocopah-50	RA		9	Last paragraph of AOC 1 section	Same comment as above.	See the response to Comment FMIT-50.		See final resolution for FMIT-50.

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169	Cocopah-51	RA		9	Section on AOC 4	This section does not discuss the finding of buried debris (and possible dioxin source) just below the water tanks and at the top of the east ravine drainage.	See the response to Comment FMIT-51.		See final resolution for FMIT-51.
170	Cocopah-52			2.2 / 17	Entire section	Please include the conclusion of the groundwater risk assessment within this section	See the response to Comment FMIT-52.		See final resolution for FMIT-52.
171	Cocopah-53			2.2.2 / 19		This section should include a discussion of the EE/CA that was released by DOI in 2018 if the non-time critical removal action moves forward	See the response to Comment FMIT-53.		See final resolution for FMIT-53.
172	Cocopah-54	RA		30	Footnote 3	The Hepta- and Octa- chlorinated dioxin congeners should be included in the sediment migration analysis. Depending on the source of dioxin compounds (burning PCBs vs. burning organic trash), the hepta-a and Octa- congeners could be important markers of dioxin migration in BCW and ER sediment.	See the response to Comment FMIT-54.		See final resolution for FMIT-54.
173	Cocopah-55	RA		2.5.2.5.1 /30-31	Decision criteria for Gradient Analysis	The criteria for the Gradient Analysis listed on page 30 is different than what is listed on page 31	See the response to Comment FMIT-55.		See final resolution for FMIT-55.
174	Cocopah-56	RA		2.5.2.5.2 / 31	Section 2.5.2.5.2 Conclusions for the Gradient Analyses	The Tribes agree with the conclusions of this evaluation that sediment is not significantly migrating and entering the river.	See the response to Comment FMIT-56.		See final resolution for FMIT-56.
175	Cocopah-57			2.5.2.5.2 / 31	Based on the gradient analyses and the physical characteristics of BCW, specifically the Tamarisk Thicket area, potential transport of indicator chemicals and other constituents from the surface soil entrained in runoff from upland areas at BCW to downgradient locations may be potentially complete; however, this pathway is not considered significant based on the low concentrations and NDs in the northernmost BCW soil locations west of the National Trails Highway, before soil transitions to sediment. Therefore, a quantitative risk evaluation of the BCW sediment area, east of the National Trails Highway was not required, as subsequent sediment exposure pathways would likewise be insignificant. This conclusion is further supported by data showing that concentrations of the indicator chemicals (and dioxin TEQ) are low (below the BTVs) or not detected in the BCW sediment area.	The Tribes agree with this conclusion and support the inclusion of this concept in any future soil risk evaluation or remedial action.	See the response to Comment FMIT-57.		See final resolution for FMIT-57.
176	Cocopah-58	RA		2.6.1 / 33	Pp 2	The phrase “recreational access is potentially present across much of the site” is not the same as various recreational activities occurring at the site. The Tribes have argued that hunting, camping, OHV riding and hiking are not very likely along the fence line of the TCS. The presentation of these human receptor activities needs to include that caveat that they do not occur in all areas of the OCS exposure area.	See the response to Comment FMIT-58.		See final resolution for FMIT-58.

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177	Cocopah-59			2.6.2 / 33	Due to the openness of the federal land and limited restrictions to site access, recreational access is potentially present across much of the site.	It is the Tribes perspective that camping, hunting hiking and OHV riding is not likely to occur in many of the AOCs due to the current site use and topography of the site. This section should identify AOCs in which recreational activity is likely to occur and should also include language that identifies regions within each AOC that are not suitable for all recreational activities (e.g. steep slopes unsuitable for camping).	See the response to Comment FMIT-59.		See final resolution for FMIT-59.
178	Cocopah-60			2.6.2 / 34	The purpose of the proposed expansion included a variety of seasonal residential and recreational uses, including mobile homes, expansion of tent camping and recreational vehicle areas, a hotel, and reconstruction of an old restaurant. According to DOI, the requested expansion by San Bernardino County would allow for new pull-through recreational vehicle camping sites and tent camping areas.	The Tribes would like this topic addressed in greater detail during consultation meetings with DOI and expect tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-60.		See final resolution for FMIT-60.
179	Cocopah-61			2.6.2 / 34	It is reasonably foreseeable that camping on the floodplain will occur under either San Bernardino's proposed expansion or USBLM's future use of non-leased areas.	The Tribes would like this topic addressed in greater detail during consultation meetings with DOI and expect tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-61.		See final resolution for FMIT-61.
180	Cocopah-62	RA		3.1.1 / 36	"Asbestos soil data will be discussed in the forthcoming…"	This is another example where not having the final soil RFI/RI report hinders the Tribes from understanding the full impact of potential soil remediation issues. Will the RFI/RI report make recommendations related to asbestos in soil?	See the response to Comment FMIT-62.		See final resolution for FMIT-62.
181	Cocopah-63	RA		3.1.3 / 37	Section 3.1.3, last pp	The text states that sediment migration from upland areas into the site drainages (e.g., BCW, ER) "may be potentially complete; however, this pathway is not considered significant". The basis for this conclusion is the gradient analysis in Section 2.5. However, the gradient analysis looks at depositional patterns in the full length of BCW/ER to determine if contamination is migrating to the river. This gradient analysis does not evaluate the potential for high concentrations above the site drainages to migrate into the drainages.	See the response to Comment FMIT-63.		See final resolution for FMIT-63.
182	Cocopah-64	RA		3.2.5 / 44	Section 3.2.5	Representativeness is inherently biased when biased (vs. random) soil sampling protocols are used. Sampling high concentration locations and then stepping out to find extent results in a dataset that is biased towards high concentrations. That is why the area-weighting in the EPC calculations is important in countering this sampling bias.	See the response to Comment FMIT-64.		See final resolution for FMIT-64.
183	Cocopah-65			3.2.7 / 46	As stated in the RAWP (Arcadis 2008a), for cases where a field duplicate sample is present, a single representative concentration for the sample was selected generally consistent with USEPA guidance regarding data verification, data validation, and data quality assessment (USEPA 1992, 2002a).	Using the maximum detected concentration from a primary sample and its duplicate is not an appropriate procedure. The use of the maximum concentration will result in an overestimation bias of the calculated exposure point concentrations in each of the exposure areas, which in turn results in an increase in estimated hazards and risks in the risk assessment. Agency guidance on soil sampling consistently states that the overriding goal is to collect unbiased and representative samples. Please include a discussion in the uncertainty section on how the use of the highest detected concentration will influence risk calculations.	See the response to Comment FMIT-65.		See final resolution for FMIT-65.

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184	Cocopah-66			3.3 / 46	Soil samples collected at four locations...are the only sample locations ...samples evaluated as part of BCW and also as part of AOC4	It appears from this text that single soil sample locations are used in two different exposure areas and included in risk calculations for two different AOCs. Please provide a thorough outline of all samples that are included in two different AOC risk calculations and how those samples contribute to the risk calculated for each area. Also, please discuss the use of samples in multiple exposure areas within the uncertainty section.	See the response to Comment FMIT-66.		See final resolution for FMIT-66.
185	Cocopah-67	RA		3.4.1.1.1 / 50	Section 3.4.1.1.1 Comparison to Background	The Tribes support the comparison of sampling data to background using a variety of appropriate approaches to ensure that soil concentrations that are evaluated in the HHERA are contamination, not background.	See the response to Comment FMIT-67.		See final resolution for FMIT-67.
186	Cocopah-68	RA		4 / 54	Section 4 Estimation of Exposure Point Concentrations	The Tribe supports the various procedures for estimating Exposure Point Concentrations (EPCs). Both the depth-weighted and area-weighted calculations incorporate important spatial characteristics of both the data and potential exposure. The Tribes particularly support the area-weighted EPCs because they reduce the sampling bias inherent in the data. (see above)	See the response to Comment FMIT-68.		See final resolution for FMIT-68.
187	Cocopah-69			5.3.1 / 61	Current land use does not include residential use for any part of the sire, nor is I likely to in the future	Please update section 2.6 to be consistent with this language.	See the response to Comment FMIT-69.		See final resolution for FMIT-69.
188	Cocopah-70	RA		5.3.1.1 / 62	Section 5.3.1.1 Maintenance Workers	The inclusion of TCS workers as receptors in the HHERA includes potential exposures both inside and outside the TCS (i.e., OCS and ICS areas). The assumptions include exposures to only soils outside the compressor station. While short-term workers could be hired for one project outside the fence line, it is unlikely that long term maintenance workers would only work outside the fence line. The Tribe does not accept these receptors as acceptable for making soil cleanup decisions. In addition, there are federal and state regulations for the protection of workers that are more applicable than the results of a risk assessment.	See the response to Comment FMIT-70.		See final resolution for FMIT-70.
189	Cocopah-71			5.3.1.1 / 62	Section 5.3.1.1 Maintenance Workers - Long-term workers, primarily PG&E employees, who may be present during various types of activities for a certain period of hours and days per year for a 30-year period	Please confirm that Cal EPA guidance on occupational duration is 30-years. It has been reported in other DTSC documents that the 95th percentile occupational exposure duration is a 25-year period. Please provide reference for the 30-year exposure duration.	See the response to Comment FMIT-71.		See final resolution for FMIT-71.
190	Cocopah-72			5.3.1.1 / 62	The baseline risk assessment assumes that potential contact with soil is not limited by the presence of engineering or institutional controls in the future	Please include this conservative assumption in the uncertainty section and discuss how dust suppression and other SOPs are in place that ensure limited exposures and risks.	See the response to Comment FMIT-72.		See final resolution for FMIT-72.
191	Cocopah-73	RA		5.3.1.2 / 63	Section 5.3.1.2 Recreational Users	The various recreational land users evaluated in the risk assessment represent activities that have little to no precedent of having occurred and are unlikely to occur in the future. Camping, hunting OHV riding on areas (SWMU/AOCs) immediately adjacent to the compressor station have not occurred. For example, have these activities ever been recorded as occurring in AOC 9 or 10 or 11 or 12, areas adjacent and below the compressor station? Any decisions regarding soils cleanup should be based on real and complete exposures, not theoretical.	See the response to Comment FMIT-73.		See final resolution for FMIT-73.
192	Cocopah-74			5.3.1.5 / 65	Section 5.3.1.5 Hypothetical Future Residential Users - ...hypothetical future resident as a rural resident who obtains a significant portion of his/her diet from onsite produced food.	This text should clearly indicate that this exposure scenario was only included based on agency direction and does not reflect current or expected exposures. The Tribes do not support the use of overly conservative and non-site-specific exposure assumptions.	See the response to Comment FMIT-74.		See final resolution for FMIT-74.

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193	Cocopah-75			5.3.2 / 66	Section 5.3.2 Potential Exposure Areas - "Although these additional risk evaluations do not represent reasonable current or future long-term exposure scenarios, and thus should not be the primary basis for risk management decisions, the information is presented in this HHERA Report at the agency's direction.	The Tribes concur that these AOC specific risk assessments do not represent reasonable current or future long-term exposure scenarios. Risk management decisions should be determined based on realistic site usage with the input of the Tribes.	See the response to Comment FMIT-75.		See final resolution for FMIT-75.
194	Cocopah-76	RA		66	Last pp	The inclusion of the exposure area BCWxSWMU1+TCS-4 seems like an attempt to predict soil cleanup scenarios by including this additional/modified scenario. Each of the individual SWMU/AOCs are included, by agency request, in the HHERA and those individual evaluations should be sufficient information for risk managers.	See the response to Comment FMIT-76.		See final resolution for FMIT-76.
195	Cocopah-77			5.4.5 / 82	Section 5.4.5 Toxicity Factors for Dioxins and Furans - DTSC remedial goal of 50 picograms per gram (pg/g) total TCDD TEQ for residential land use based on a target cancer risk of 1 x 10-5..."	It is stated within this section that DTSC has used 1 x 10^{-5} as an appropriate risk threshold for residential exposures. Therefore, please adjust the language throughout the report to indicate that DTSC has used risk thresholds higher than 1 x 10^{-6} for allowable risk thresholds.	See the response to Comment FMIT-77.		See final resolution for FMIT-77.
196	Cocopah-78			5.5.1.1 / 87	Section 5.5.1.1 Carcinogenic Health Effects - CalEPA's point of departure for excess incremental lifetime cancer risk for all receptor groups (i.e., residential populations) is 1 x 10-6, and risk management decisions may raise this criterion depending on site-specific conditions	There are numerous examples were CalEPA uses risk range of 1 x 10^{-4} through 1 x 10^{-6}. This should be stated in the text rather than suggesting CalEPA's point of departure is a default 1 x 10^{-5}.	See the response to Comment FMIT-78.		See final resolution for FMIT-78.
197	Cocopah-79	RA		5.5.3 / 89	Section 5.5.3 Results of the Cancer Risk and Noncancer Hazard Assessment	The presentation of both cancer risks and noncancer hazards occur in an order which does not reflect their applicability. The area-weighted results, which appropriately account for the spatial distribution of samples, is the most applicable scenario. The Tribes request that in both the main text and in all appendices that the area-weighted results are presented first.	See the response to Comment FMIT-79.		See final resolution for FMIT-79.
198	Cocopah-80	RA		5.5.3 / 132	Section 5.5.3 Results of the Cancer Risk and Noncancer Hazard Assessment	The presentation of the Outside Compressor Station (OCS) results should be the first results presented. The OCS scenario, with the area-weighted EPCs, is the most applicable to potential exposures outside the compressor station. By presenting it first the reports give this scenario the appropriate importance rather than being buried within the other SMWU/AOC results.	See the response to Comment FMIT-80.		See final resolution for FMIT-80.
199	Cocopah-81			5.5.3.14 / 135	Section 5.5.3.14 Outside the Compressor Station - Therefore, the combination of all exposure areas outside the TCS...represent both current and potential future exposures...	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action.	See the response to Comment FMIT-81.		See final resolution for FMIT-81.
200	Cocopah-82	RA		135	"Alternative" Evaluation	As described in Comment #76 above, the inclusion of the "Alternative" evaluations (OCSxSWMU1+TCS-4) in a presumptuous and unnecessary evaluation. Prior to any evaluation of potential soil cleanup scenarios (i.e., removing certain samples and re-running risk calculations), the presented risks/hazards must be evaluated to determine if any action is required. None of the OCS, area-weighted risks are higher than 7 x 10^{-6}, clearly in the agency "risk management" range. This means that a reasonable and acceptable risk management decision could be "no action".	See the response to Comment FMIT-82.		See final resolution for FMIT-82.

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201	Cocopah-83			5.6.3.2 / 152	Section 5.6.3.2 Exposure Assumptions and Pathways - Entire section	This section does not adequately address the uncertainties and overestimations of exposures that are included in all of the recreational exposure scenarios. For example, the intake parameters for the hiker and hunter are defined as 24 hours/ day. It can be presumed that hiking and hunting would only occur during daylight hours (varying seasonally from 8 to 12 hours per day). In addition, it is the Tribe's position is that neither hunting nor off-road vehicle driving are reasonable future uses of the Topock Maze and surrounding area because these land uses are inconsistent with management of this sacred area, a recognized historic resource and Traditional Cultural Property (TCP). The basis for the selection of these recreational activities and the exposure parameters which define the extent to which these activities occur are based on information collected from other DOI/BLM sites and will greatly overestimate risk at the Topock site. Furthermore, a recreational hiker exposure frequency is based on data that is generic and not specific to the Topock site and it is assumed that the duration of hiking is spent only on contaminated areas of the Topock site. The hiking exposure durations and frequencies are based on visits to areas with existing trail systems and will unrealistically overestimate the frequency of visits to the Topock Site which does not have a developed hiking trail network. While some BLM trails cross portions of the Site, there is no organized trail network through the soil investigation area and, absent evidence to the contrary, it is unreasonable to assume that a hiker will spend an entire day on the Site. Thus, these recommended exposure parameters do not represent a "reasonably anticipated use" of the site. This overestimation of exposure that is present in all recreational exposure scenarios needs to be discussed in greater detail in the uncertainty section.	See the response to Comment FMIT-83.		See final resolution for FMIT-83.
202	Cocopah-84			5.6.3.2 / 153	Section 5.6.3.2 Exposure Assumptions and Pathways - In sum, the risk assessment meets the regulatory requirement to address an upper bound for potential exposures...the actual exposures to soil...would probably be much lower than has been estimated in this HHRA	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action	See the response to Comment FMIT-84.		See final resolution for FMIT-84.
203	Cocopah-85			6.1 / 158	Section 6.1 Purpose and Objective- Ultimately, the conclusions reached from conducting the ERA along with other site information will be used to establish an overall site risk management strategy.	Please discuss other lines of evidence that will be, or can be, used in determining site risk. For example, plant and invertebrate population surveys or use of plant survey data that already exists should be used to support (if the actual population does support) the risk calculations.	See the response to Comment FMIT-85.		See final resolution for FMIT-85.
204	Cocopah-86			6.3 / 159	Section 6.3 Problem Formulation - The surface soil transport pathway analyses...concluded potentially complete but insignificant transport pathways for surface soil entrained in runoff to reach the sediment areas near the river downgradient of BCW and AOC 10 and therefore, quantitative evaluation of these sediment areas was not required.	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site-wide risks for any future soil remedial action.	See the response to Comment FMIT-86.		See final resolution for FMIT-86.

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205	Cocopah-87	RA		6.5.2 / 172	Section 6.5.2 Toxicity Reference Values	While ecological screening levels may be applicable to designing soil sampling activities, screening levels do not provide reliable or appropriate ecological hazard estimates. The Tribe supports the use of LOAEL-based TRVs as the most appropriate values to use in the calculation of ecological hazards.	See the response to Comment FMIT-87.		See final resolution for FMIT-87.
206	Cocopah-88			6.6.1 / 179	The BTAG NOAEL-based TRVs are considered very conservative, resulting in a wide range of risks to potential wildlife receptors. For the Topock site ERAs, the selected TRVs are considered more robust than the BTAG TRVs.	The inclusion of the BTAG NOAELs and LOAELs is unnecessary and should be removed from the text. The inclusion of overly conservative NOAELs (BTAG) does not add value to the risk calculations, leads to confusing results and an increased perception of risk that does not exist at the site. Please remove the BTAG NOAELs.	See the response to Comment FMIT-88.		See final resolution for FMIT-88.
207	Cocopah-89	RA		6.6.1 / 179	For the risk description part of the risk characterization process, a semi-quantitative WOE approach was used incorporating multiple LOEs.	Please include plant population survey information (that is currently available) as an additional line of evidence to determine if risk calculations (HQ>1 indicate unacceptable risk) are correctly reflected in current ecological site status. Also, a soil invertebrate population study should be included in areas that have shown calculated risk (HQ>1) to determine if risk calculations are correctly reflected in invertebrate impacts. This is of particular relevance to risks calculated in SWMU1, AOC9, AOC10.	See the response to Comment FMIT-89.		See final resolution for FMIT-89.
208	Cocopah-90			6.6.2 / 181	Section 6.6.2 Results	(See comments #79 and 80, above) The presentation of ecological risks should be done with the most applicable and appropriate first. Otherwise, the reader might determine the first risks are the most appropriate. The Tribe requests that OCS results using LOAEL TRVs are presented first. Then, the other scenarios which provide additional information for risk management decisions, can be presented.	See the response to Comment FMIT-90.		See final resolution for FMIT-90.
209	Cocopah-91			6.6.2.1.1 / 182	Baseline Scenario – Desert Shrew	It is unclear what species at the site is being modeled by the Desert Shrew. The Desert Shrew has a very large diet and will always have a high exposure and high calculated risk. The ERA notes that the Desert Shrew has never been observed at the site. Therefore, the ERA should clearly indicate what species observed at the site is modeled based on the Desert Shrew.	See the response to Comment FMIT-91.		See final resolution for FMIT-91.
210	Cocopah-92			6.6.2.3 / 197	Bat Cave Wash excluding SMUW 1 and TCS-4	(see comment #76, above) The evaluation of exposure areas with 'removed' soil samples (e.g., BCWxSWMU1+TCS-4) are presumptuous and un necessary evaluations since each SMMU and AOC risks are presented.	See the response to Comment FMIT-92.		See final resolution for FMIT-92.
211	Cocopah-93			6.7.3.3 / 251	When the available dataset for a depth interval and exposure area was composed of less than eight total samples, the maximum depth weighted concentration was selected as the EPC for all three EPC scenarios.	This approach is not consistent with the statement provided in section 6.4.3 which states: "Risk estimates using maximum concentrations are considered overly conservative and generally used for screening level purposes." Use of maximum concentrations is not recommended for use in making risk management decisions. Please update the text in section 6.7.3.2 to more consistently reflect what is stated in section 6.4.3 that the use of the maximum concentrations will not correctly characterize site risk.	See the response to Comment FMIT-93.		See final resolution for FMIT-93.
212	Cocopah-94			6.7.3.3 / 251	Receptor Exposure Assumptions	It is unclear what species at the site is being modeled by the Desert Shrew. The ERA notes that the desert shrew has never been observed at the site. Therefore, the ERA should clearly indicate what species observed at the site is modeled based on the Desert Shrew. In addition, the Uncertainty section should clearly indicate that the Desert Shrew (or any shrew) has not been observed at the site.	See the response to Comment FMIT-94.		See final resolution for FMIT-94.

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213	Cocopah-95			6.7.4 / 252	Uncertainty in Uptake Assumptions	The ERA should include the results of the technical memo, Potential For Chromium Uptake by Arrow weed and Potential Exposure Pathways (2013), which show that CrVI which may be taken into plants is converted into CrIII. This finding has not been sufficiently included in the ERA uptake assumptions for plants.	See the response to Comment FMIT-95.		See final resolution for FMIT-95.
214	Cocopah-96			7.1.3 / 280	Summary and Overall Conclusions and Recommendations for the HHRA RBRGs for the potential recreation users are the most appropriate benchmarks for the protection of human health and associated risk management decisions going forward	It is the Tribes perspective that camping, hunting, hiking and OHV riding is not likely to occur because these land uses are inconsistent with management of this sacred area, a recognized historic resource and Traditional Cultural Property (TCP). The presence of Tribal sacred areas has an impact on DOI/BLM-allowed activities as these federal agencies are mandated through Executive Orders, Federal Trust Responsibility and other ARARs (i.e., both federal and state laws) to protect Tribal sacred lands as a priority. The authority for, and the responsibility of, DOI/BLM to specifically protect the Topock Maze area and surrounding documented Tribal use areas comes in part from the Federal Land Policy and Management Act and the National Environmental Policy Act and has been documented in the Record of Decision (ROD) and Resource Management Plan (RMP) published by the Lake Havasu Field Office in 2007. In the ROD/RMP the Topock Maze area has been designated for Traditional Use as part of the Cultural Resource Management actions (ROD/RMP Table 2, page 26). This designation requires long-term protection as well as consultation with the Tribes to determine which safeguards the DOI/BLM will put in-place to achieve this long-term protection. DOI/BLM has both the authority and responsibility to take management actions to achieve this protection.	See the response to Comment FMIT-96.		See final resolution for FMIT-96.
215	Cocopah-97	RA		8 / 285	Section 8 Risk-Based Remediation Goals for Risk Drivers in Soils	In this section the Risk-Based Remedial Goals (RBRGs) are calculated and presented. Whole RBRGs can be useful in soils RI/RFI activities, their presentation in the risk assessment seems pre-mature and unnecessary. There has been no decision that any action for soils is necessary (a risk management decision). Therefore, why calculate soil cleanup goals? Another option, if indeed some soils—related action is deemed necessary, is to perform a risk evaluation where sequentially the highest soil concentrations of risk-driving chemicals are 'removed', and EPC and risk calculations are redone. This is a preferable process to using RBRGs since the risk evaluation retains the appropriate and applicable area-weighted EPCs. RBRGs could be mis-used and applied as 'absolute' soil cleanup goals which essentially by-passes the important area-weighted-based risk/hazard evaluations.	See the response to Comment FMIT-97.		See final resolution for FMIT-97.
216	Cocopah-98	RA		8//85	Section 8 Risk-Based Remediation Goals for Risk Drivers in Soils	The RBRGs are based on an incremental lifetime cancer risk of 1 x 10-6. While this is considering a point of departure for risk management decisions, it is not a required risk level in soil remediation decisions. The risk range of 1×10^{-4} to 1×10^{-6} (inclusive of 1×10^{-5}) should also be considered since this is not a residential area but the only potential exposures are workers, recreators, or Tribal members.	See the response to Comment FMIT-98.		See final resolution for FMIT-98.
217	Cocopah-99	RA		8.1.1 – 8.2.1 / 286-290	8.1.1 and 8.2.1 Methodology for Deriving RBRGs and Values	Please clearly explain how background CrVI and Dioxin/furan values are included in the RBRG calculations. Specifically, are background concentrations subtracted out prior to the RBRG calculation? If not, please explain how the inclusion of background increases the RBRG value.	See the response to Comment FMIT-99.		See final resolution for FMIT-99.

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218	Cocopah-100			8.1.1 / 289	8.1.1 Methodology for Deriving Human health RBRGs and Values Therefore, potential exposure to dioxin TEQ in soil for the recreational users over a lifetime would be less… As such the RBRGs for the recreation users equal to a theoretical potential cancer risk of 1 x 10-5 may be appropriate.	The recreational user has been proposed as the most appropriate benchmarks for the protection of human health and associated risk management decisions going forward. In addition, the text acknowledges that use of a 10-6 risk threshold for the recreational user is not appropriate. Therefore, please update the RBRGs to include the calculated concentrations based on a 10^{-5} risk threshold.	See the response to Comment FMIT-100.		See final resolution for FMIT-100.
219	Cocopah-101			8.2.1 / 291	8.2.1 Methodology for Deriving Ecological RBRGs and Values The congener specific BAFs and a recommended mammalian dioxin TEQ LOAEL TRV of 30 ng/kg bw-day were used to calculate the RBRGs protective of invertivorous small mammals.	If exposure concentration based on a more scientifically defensible BAF value rather than assuming all congener uptake as 2,3,7,8-TCDD, why was the more appropriate TCDD BAF value not used in the risk calculations?	See the response to Comment FMIT-101.		See final resolution for FMIT-101.
220	Cocopah-102			9 / 294	9 Key Findings Or target ILCR of 1 x 10-5 for workers	The Tribes agree that an ILCR point of departure of 1 x 10^{-5} for workers and recreational visitors is more reasonable than a 1 x 10^{-6} value. Please update text to include recreational visitors in this section.	See the response to Comment FMIT-102.		See final resolution for FMIT-102.
221	Cocopah-103			9 / 294	9 Key Findings Risk drivers were identified based on a target HQ of 1 and additional LOE support the conclusion of unacceptable risk.	Please include population surveys as an additional LOE. All LOEs to date are based on conservative quantitative evaluation of soil sample data. No effort has been made to determine whether the quantitative evaluation of risk is correctly reflected in the current ecological site status.	See the response to Comment FMIT-103.		See final resolution for FMIT-103.
222	Cocopah-104	RA		9 / 295	Section 9 Key Findings	The listing of the nine (9) soil sampling locations that contain risk driving-chemicals and contribute to higher risk estimates is more appropriately a post-risk management exercise. The listing of these 9 locations has embedded assumptions regarding the acceptability of risks and hazards which are not appropriate at this stage in the soils RI/RFI process as no determination of the acceptability of risks has been made. The Tribe requests that this presentation of the 9 risk-driving soil sample locations be removed from the HHERA.	See the response to Comment FMIT-104.		See final resolution for FMIT-104.
223	Cocopah-105				The following comments refer to HHERA Appendices. Many of the comments related to the main text are also applicable to the individual SWMU/AOC risk assessment presented in the Appendices and should be considered and address as such.		See the response to Comment FMIT-105.		See final resolution for FMIT-105.
224	Cocopah-106	RA		1-1	Appendix RBC Soil Management Plan Risk-Based Concentrations for Groundwater Remedy (Appendix RBCs)	The text references a table in the main text, Table 3-7. While that Table is listed in the TOC for the main text, that table does not appear in my copy of the HHERA. The Appendices should be stand-alone and not be referring to tables or figures in other sections of this 11,000+page document.	See the response to Comment FMIT-106.		See final resolution for FMIT-106.
225	Cocopah-107	RA		2-1	Appendix RBCs	The Appendix refers to procedures from the main report/RBRGs as being used for the RBCs. This makes the review of these appendices difficult as the reader then must find other sections of the report in order to understand the procedures being used. The appendices should be stand-alone.	See the response to Comment FMIT-107.		See final resolution for FMIT-107.
226	Cocopah-108	RA		2-1	Appendix RBCs	The use of a bright-line risk value of 1 x 10^{-6} is not appropriate for setting RBCs. An important issue for the Tribe has been the repatriation of excavated soils and to keep as much soil at the site as reasonable possible (i.e., do not exceed hazardous water levels or pose an unacceptable risk).	See the response to Comment FMIT-108.		See final resolution for FMIT-108.

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227	Cocopah-109	RA		3-1	Appendix RBCs	Notwithstanding the above Appendix RBC comments, The Tribe supports the use of the LOAEL-based TRVs in the calculation of RBCs	See the response to Comment FMIT-109.		See final resolution for FMIT-109.
228	Cocopah-110			Draft Appendix RBC Soil Management Plan Section 3	Site Use Factor =1	Ecological RBCs based on a site use factor of 1 is overly conservative and unrealistic. A baseline risk assessment is intended to incorporate site specific data and not use generic assumptions. Please revise using appropriate SUF.	See the response to Comment FMIT-110.		See final resolution for FMIT-110.
229	Cocopah-111			Draft Appendix RBC Soil Management Plan Section 3	TEQ mammals	The Tribes believe the RBC of 192 ng/kg is a more appropriate RBC then the unrealistic hiker scenario which is overly conservative and results in an unrealistic calculation of risk for the Topock site.	See the response to Comment FMIT-111.		See final resolution for FMIT-111.
230	Cocopah-112	RA		Table RBC 2-1	Appendix RBCs	The appendix presents a table of multiple human and eco-based RBCs. The tables present RBCs for multiple receptors. Some of these receptors are not applicable to appropriate for the OCS exposure areas. There is no discussion as to how the various human or eco RBCs would be selected for use in soil repatriation.	See the response to Comment FMIT-112.		See final resolution for FMIT-112.
231	Cocopah-113	RA		General	Appendices: OCS-Soil HHERA for Outside the Compressor Station Exposure Area; OCSxBCW--Soil HHERA for Outside the Compressor Station Excluding Bat Cave Wash Exposure Area; BCW+AOC4--Soil HHERA for Bat Cave Wash and AOC-4 Exposure Area; OCSxBCW+AOC4--Soil HHERA for Outside the Compressor Station Excluding Bat Cave Wash and AOC-4; BCW Soil HHERA for BCW Exposure Area; SWMU1 Soil HHERA for SWMU1 and TCS-4 Exposure Area; BCWxSWMU1 Soil HHERA for BCWxSWMU1 and TCS-4 Exposure Area; AOC4 Soil HHERA for AOC4 Exposure Area; AOC9 Soil HHERA for AOC9 Exposure Area; AOC10 Soil HHERA for AOC10 Exposure Area; AOC11 Soil HHERA for AOC11 Exposure Area; AOC12 Soil HHERA for AOC12 Exposure Area; AOC14 Soil HHERA for AOC14 Exposure Area; AOC27 Soil HHERA for AOC27 Exposure Area; AOC28 Soil HHERA for AOC28 Exposure Area; AOC31 Soil HHERA for AOC31 Exposure Area; UA-2 Soil HHERA for UA-2 Exposure Area	The following comments are applicable to the various SMWU/AOC HHERAs provided in the appendices to the main HHERA report.	See the response to Comment FMIT-113.		See final resolution for FMIT-113.

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232	Cocopah-114					All of the human exposure scenarios and ecological receptors are evaluated in each of the listed HHERA appendices. Many of these scenarios and receptors are not supported by the topography and land characteristics in some of the SWMU/AOCs. For example, AOC9 is a steep slope immediately adjacent to the TCS. The applicability of the terrain characteristics to be able to support either the human or ecological exposures must be addressed in the uncertainty discussion in each of these reports. Further, if one of these scenarios or receptors that is not supported by the terrain characteristics is driving risk, then that scenario/receptor should not be the basis for any decisions. This issue must be fully developed and discussed in the uncertainty section of each of these appendices. The Tribes request a map showing the areas where the individual recreational land sue scenarios would be supported by site characteristics.	See the response to Comment FMIT-114.		See final resolution for FMIT-114.
233	Cocopah-115	General			Risk associated with background	Please provide a detailed explanation of how background soil concentrations are included into the HRA and ERA risk calculations and RBRGs. Is risk from background removed prior to calculation of site risk? If not please explain why not. Are RBRGs developed including the risk associated with background?	See the response to Comment FMIT-115.		See final resolution for FMIT-115.
234	Cocopah-116		General		Figures	Please provide figures (similar to Figure 9-1) for all of the individual AOC risk assessments	See the response to Comment FMIT-116.		See final resolution for FMIT-116.
235	Cocopah-117		General		Table 6-5a Bioaccumulation Factors for Estimating Tissue Concentrations from Soil BAF plant	Please indicate how the ERA includes the findings from the Potential For Chromium Uptake by Arrow weed and Potential Exposure Pathways (2013) which shows that CrVI which may be taken into plants is converted into CrIII	See the response to Comment FMIT-117.		See final resolution for FMIT-117.
236	Cocopah-118		General		Table 6-11	Please explain why the risk to small mammals and birds is based on total chrome and not on hexavalent chrome. Is total chrome considered a site COPEC? What is the uncertainty that is included in the risk assessment when basing the risk on total chrome? How was background total chrome accounted for in this risk calculation? How was the speciation of chrome accounted for in the toxicity study used to select the total chrome trv?	See the response to Comment FMIT-118.		See final resolution for FMIT-118.
237	Quechan-1	RA		Entire	n/a	The Tribes (for these comments mean the Chemehuevi, Cocopah, Colorado River Indian Tribes, Fort Mojave, Hualapai and Quechan) generally do not disagree with the procedures and the conclusions in the main body of the HHERA which evaluates risk across the entire OCS potential exposure area.	See the response to Comment FMIT-1.		See final resolution for FMIT-1.
238	Quechan-2			Entire	n/a	The addition or changing of risk assessment assumptions or procedures AFTER the risk assessment work plan has been reviewed and approved is not acceptable to the Tribes. The Tribes have asked for full participation in the development and implementation of the HHERA. Procedural changes made without Tribal consultation and implemented in the work plan unacceptably bypass Tribal participation.	See the response to Comment FMIT-2.		See final resolution for FMIT-2.
239	Quechan-3	RA		Entire		The Tribes do not disagree with the limited soil remediation (8 sample locations) that is determined based on risk across the entire OCS potential exposure area. The HHERA recommendation for limited soil remediation (8 sample locations) that are protective of both human ecological receptors.	See the response to Comment FMIT-3.		See final resolution for FMIT-3.
240	Quechan-4	RA		Entire	n/a	The Tribes do not disagree with the findings of the sediment transport evaluation that no contaminated sediment is reaching the Colorado River	See the response to Comment FMIT-4.		See final resolution for FMIT-4.

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241	Quechan-5	RA		Entire	n/a	The Tribes do not disagree with the use of a single exposure area Outside the Compressor Station (OCS)	See the response to Comment FMIT-5.		See final resolution for FMIT-5.
242	Quechan-6	RA		Entire	n/a	The Tribes do not disagree with the exclusion of the residential exposure scenario in DOI-areas of Bat Cave Wash from soil remediation recommendations	See the response to Comment FMIT-6.		See final resolution for FMIT-6.
243	Quechan-7	RA		Entire	n/a	The Tribes do not disagree with the exclusion of individual SWMU/AOC-exposure areas in the soil remediation recommendations.	See the response to Comment FMIT-7.		See final resolution for FMIT-7.
					NOTE: Any Exec Summary comments are also applicable to the main HHERA text and appendices. Due to the exceptional length of this report, it is not be possible for the reviewers to identify each occurrence of a topic. The Tribes expect that these comments will be addressed wherever in this HHERA this subject topic occurs.		N/A		N/A
244	Quechan-8	Non -RA		ESl / ES-1	"…additional surrounding land owned or managed by…"	The Fort Mojave Indian Tribe is a land-owner of land adjacent to the TCS and the text and maps must accurately reflect this.	See the response to Comment FMIT-8.		See final resolution for FMIT-8.
245	Quechan-9			ES.2.3.1/ ES-5	Ecological Habitat Characteristics Geology -Unconsolidated alluvial and fluvial deposits are underlain by bedrock with very low permeability…	There is no mention of the dredged soils that make up surface soils from present-day rivers edge to the base of alluvial terrace deposits to the west. These soils are different than local alluvial/fluvial sediments because they are derived partly from upstream sources. Also, interesting that no discussion is made here on reducing zone surrounding river. All of this strongly suggests the need for Arcadis to present a single, unified, consistent CSM that explains site characteristics the same way regardless of soils or GW focus.	See the response to Comment FMIT-9.		See final resolution for FMIT-9.
246	Quechan-10			ES. 2.3.1 / ES-6	Ecological Habitat Characteristics Overview - Relatively barren of vegetation	A higher density of vegetation occurs along BCW, from its mouth to high density tamarisk at outlet, with the exception of the mouth of Bat Cave Wash.	See the response to Comment FMIT-10.		See final resolution for FMIT-10.
247	Quechan-11			ES.2.3.1 / ES-6	Ecological Habitat Characteristics Overview - May periodically flood during stormwater runoff events but remains dry.	Standard analysis would include quantitatively defining the frequency/magnitude of 'flooding' events.	See the response to Comment FMIT-11.		See final resolution for FMIT-11
248	Quechan-12			ES.2.3. 1 / ES-6	Ecological Habitat Characteristics Overview - Ephemerally flooded	Is the cause of the ephemeral flooding relevant to the exposure pathway and CSM? If so, it would be important to clarify if this is due to the infrequent flooding associated with washes, or annual variations in stage along CO River - which are several feet.	See the response to Comment FMIT-12.		See final resolution for FMIT-12.
249	Quechan-13			ES.3 / ES-8	Only Category 1 data are included in the datasets used in the quantitative risk assessment. Soil samples representative of soil that has been removed as part of a removal action were not included in the HHERA datasets.	As stated in the HHERA, removed soils are not included in the risk. Therefore, the risk assessment conclusions will need to be updated if any soil removal is implemented prior to risk management decisions are made. Please clearly describe how soils removed during other site activities will be addressed within the risk assessment dataset and subsequent risk calculations	See the response to Comment FMIT-13.		See final resolution for FMIT-13.
250	Quechan-14	RA		ES.4 / ES-11	"Soil Background Investigations (Various reports/authors)	The HHERA should list individually by title/author/date these reports.	See the response to Comment FMIT-14.		See final resolution for FMIT-14.

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251	Quechan-15			ES.5.1.2 /ES-13	In addition, at the direction of DTSC, potential exposure areas based on individual AOCs outside the fence line were evaluated in separate appendices	Please include in the text that risks calculated separately for individual AOCs are overly conservative and will greatly overestimate site risks. Specifically, none of the human site-specific uses would occur solely in any one AOC. In addition, no large-range mammal or bird would spend an entire exposure period in a single AOC.	See the response to Comment FMIT-15.		See final resolution for FMIT-15.
252	Quechan-16			ES.5.3.2 / ES-15	The risks/hazards estimated for the OCS potential exposure area are believed to provide a more appropriate representation of the potential exposures for the human populations… than the risks/hazards estimated for individual AOCs/SWMU/UA potential exposure areas.	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action.	See the response to Comment FMIT-16.		See final resolution for FMIT-16.
253	Quechan-17			ES.5.3.2/ES-18	Some targeted form of risk management or remediation, addressing elevated levels of hexavalent chromium and dioxin, would be effective at reducing risks for the campers, hikers and OHV riders to levels below 1 x 10^{-6}	Risk values that fall within the allowable risk range of 1 x 10^{-4} to 1 x 10^{-6} do not automatically require remediation, but rather additional evaluation. The HHERA text indicates a remedial goal of 1 x 10^{-6}. Establishing the appropriate remedial goal, however, should be determined during the risk management process which includes stake holder input. In addition, use of 1 x10^{-6} risk threshold for remedial goals is overly conservative for the camper, hiker and OHV rider. As has been discussed throughout the risk assessment process, these uses of the site are not site specific, are overly conservative, and will greatly overestimate risk. Therefore, to overestimate the potential risks due to conservative assessment and then use remedial goals at the upper bounds of allowable risk range would result in an increased amount of unnecessary and avoidable site impacts. .	See the response to Comment FMIT-17.		See final resolution for FMIT-17.
254	Quechan-18			ES.5.3.2 / ES-17	Recreational User- Camper and others	There are both practical (presence of freeway, railroad, etc.) and topographical (slope) constraints to the recreational scenarios evaluated in the HHERA. The Tribes request that a map that clearly indicates areas that could realistically be used for these recreational activities be prepared and included in the HHERA. For example, is camping anticipated at location AOC10-20? Exposure scenarios that cannot occur in a given area should not be included in the HHERA evaluation, or, at a minimum the possibility of these exposures must be discussed.	See the response to Comment FMIT-18.		See final resolution for FMIT-18.
255	Quechan-19			ES.5.3.2	the alternate and more robust BAFs approaches for dioxin TEQ based on congener-specific uptake are recommended for developing risk-based remediation goals	The Tribes request that a more detailed discussion of the implications behind the use of single congener verses congener-specific RBRGs be presented in more detail in a TWG format.	See the response to Comment FMIT-19.		See final resolution for FMIT-19.
256	Quechan-20			ES.5.4 / ES-19	By using multiple conservative exposure assumptions or toxicity estimates, the risk estimates likely develop a conservative bias that may result in significant overestimation of potential risk and hazard.	The Tribes request that the text be updated to state that the use of conservative exposure assumptions "will" overestimate risk rather than “likely” overestimate risk.	See the response to Comment FMIT-20.		See final resolution for FMIT-20.
257	Quechan-21			ES.6.2.2/ES-22	For terrestrial birds and mammals, risks were evaluated using two site specific use factors (SUF) scenarios: a generic SUF of 1 and a SUF based on species- and site-specific home range comparted to the total area of each exposure area	It is unclear why risk calculations based on an SUF of 1 are used for ecological receptors that are known not to exist solely within the site. Please update the text to state that the “risks/hazards estimated using the site-specific home range potential exposure areas are believed to provide a more appropriate representation of the potential exposures for the ecological populations than the risks/hazards estimated based on a SUF of 1”. If the text is not updated, please include why the use of a SUF of 1 is appropriate and necessary for birds and large range mammals.	See the response to Comment FMIT-21.		See final resolution for FMIT-21.

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258	Quechan-22			ES.6.3 / ES-23	Although the dioxin TEQ TRVs selected in the RAWP...were used to estimate risk...the alternate and more robust TRVs for dioxin TEQ based on more recent date are recommended for developing RBRGs,	The Tribes request that a more detailed discussion of the implications behind the use of single congener verses congener-specific RBRGs be presented in more detail in a TWG format.	See the response to Comment FMIT-22.		See final resolution for FMIT-22.
259	Quechan-23	RA		ES-7	Various typographical/spelling errors. e.g., first line pg ES-7	A global spell and grammar check should be performed on the document.	See the response to Comment FMIT-23.		See final resolution for FMIT-23.
260	Quechan-24	RA		ES-7	Table, Current- Residential and recreational	The distance from the TCS to the listed (closest) residential area should be provided.	See the response to Comment FMIT-24.		See final resolution for FMIT-24.
261	Quechan-25	RA		ES-7	Table, Future (land use)	The DOI requirement for residential land use evaluation, either seasonal or year-round, was intended for informational purposes only and not for decision-making. This commitment should be clearly presented in the HHERA.	See the response to Comment FMIT-25.		See final resolution for FMIT-25.
262	Quechan-26			ES.7.2 / ES-29	Some targeted form of risk management or remediation… to levels below 1 x 10-6.	The risk assessment continues to default to 1 x 10^{-6} as the acceptable level of risk at the site. As stated earlier, within the text acceptable risk ranges from 1 x10^{-4} through 1 x 10^{-6}. Therefore, the risk assessment should be updated to state that "remediation to reduce risk to 1 x 10^{-6} may not be necessary however If risk management concludes it is necessary to reduce risk below 1 x 10^{-6}, then targeted assessment of risk management or remediation should be required."	See the response to Comment FMIT-26.		See final resolution for FMIT-26.
263	Quechan-27			ES.8 / ES-29	RBRGs, risked based remedial goals, "are proposed health protective target cleanup concentrations that can be used in combination with other factors such as background concentrations, as a starting point [underline added for emphasis] for making risk management decisions."	This would indicate that the HHERA is a starting point in creating a firm foundation resulting in remedial decisions that would be mutually shared, i.e. tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-27.		See final resolution for FMIT-27
264	Quechan-28			ES.8.1.1 /ES-30	Rearranging the equations used to estimate the ILCRs and noncancer hazards and using the target ILCR of 1 x 10^{-6} (and 1 x 10^{-5} for dioxin TEQ) and the target noncancer HQ of 1, the concentration of each risk driver associated with the target ILCR and HQ levels was determined.	The text should provide RBRGs developed using the entire acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6} not simply based on the upper bounds of the acceptable risk range. Please update text for RBRG discussions to address the RBRG range and not a single RBRG developed for the upper bounds limit. In addition, please update the table in this section to show RBRGs associated with entire acceptable risk range	See the response to Comment FMIT-28.		See final resolution for FMIT-28.
265	Quechan-29			ES.8.2.2 /ES-32	AOC9 AOC10-21 to meet the RBRG of 145	Why are AOC10 samples discussed under AOC9? Please outline how soil sample locations were assigned to each AOC and the basis for changing AOC boundaries. Was any sample location repeated in EPC calculations for two different AOCs? If so which samples/locations? This is an example of another post-risk assessment work plan procedural change on which the Tribes were not consulted.	See the response to Comment FMIT-29.		See final resolution for FMIT-29.
266	Quechan-30	RA		ES.3 / ES-9	Table, Overview of Data Included in the HHERA Third bullet on 'white powder'	Exposure to waste materials, e.g., white powder, should not be included in the risk assessment the Tribes prefer that any surficial occurrence should be removed.	See the response to Comment FMIT-30.		See final resolution for FMIT-30.
267	Quechan-31	RA		ES 3.2 / ES-11	"For human health, the various potential receptors were assumed to contact soil…"	Excluding the scouring scenarios, the likelihood of human contact with soil decreases with increasing depth. None of the human site uses includes activities where an individual digs down to 10' below grade. This decreasing probability of soil contact needs to be reflected in all discussions of soil depth zones used for EPC calculations as well as in discussions of uncertainty.	See the response to Comment FMIT-31.		See final resolution for FMIT-31.

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268	Quechan-32	RA		ES.4 / ES-12	pp 2. "If the soil dataset had fewer than four detected values…"	The use of the maximum detected soil concentration when there are less than 4 detects or 8 observations is an assumption that overestimates the calculated EPCs. Whenever this default is used in the HHERA, it should be noted in the EPC section as well as in the discussion of conservatism.	See the response to Comment FMIT-32.		See final resolution for FMIT-32.
269	Quechan-33	RA		EA.5.1.1/ES-12	Last pp. "The potential human receptors…: workers…	Whenever worker receptors are mentioned, the HHERA must acknowledge that both OSHA and Cal-OSHA regulations, not the HHERA, is the appropriate criteria to ensure their adequate protection.	See the response to Comment FMIT-33.		See final resolution for FMIT-33.
270	Quechan-34	RA		ES.5.1.1/ES-13	Pp 2. "Four types of potential recreational user…"	The likelihood of these recreational users at the TCS project site is very minimal, and in many cases zero. Hunting and camping adjacent to the TCS have not ever been reported. Much of the topography renders OHV riding impossible or physically dangerous. The HHERA must provide some language which reflects the reality that these land uses are not reliable for soil cleanup determinations. (See comment above requesting a recreational land-use map)	See the response to Comment FMIT-34.		See final resolution for FMIT-34.
271	Quechan-35	RA		ES.5.3.2-ES-17	Bullet 2. Last sentence.	Why has the target risk of 10^{-6} been selected for the evaluation of potential soil removal related to the Camper? The calculated risk for this receptor is within the risk management range and the FIRST decision is whether the estimated risk is acceptable. The proposal of cleanup to 10^{-6} is presumptuous. Perhaps a 10^{-5} cleanup scenario should also be proposed?	See the response to Comment FMIT-35.		See final resolution for FMIT-35.
272	Quechan-36	RA		ES.5.3.2/ES-17	Bullet 3, Last sentence	Ditto above comment for hiker.	See the response to Comment FMIT-36.		See final resolution for FMIT-36.
273	Quechan-37	RA		ES.5.3.2 / ES-17	Bullet 4, last sentence	Ditto above for OHV rider	See the response to Comment FMIT-37.		See final resolution for FMIT-37.
274	Quechan-38	RA		ES.5.3.2 / ES-18	The estimated risks and hazards for the NORR exposure area are provided for information purposes only."	This statement must be clear and present anywhere in the HHERA that residential risks are presented. The phrase used should be edited to include "…the NORR hypothetical residential exposures are provided…"	See the response to Comment FMIT-38.		See final resolution for FMIT-38.
275	Quechan-39	RA		ES.6.3 / ES-23	"In addition, a second set of NOAEL- and LOAEL-TRVs based on the Navy/BTAG…"	BTAG criteria are screening criteria. They might be useful in screening soil samples in terms of characterization issues, but they are not reliable TRVs to predict ecological effects.	See the response to Comment FMIT-39.		See final resolution for FMIT-39.
276	Quechan-40	RA		ES.6.3 / ES-24	"Avian NOAEL and LOAEL TRVs for hexavalent chromium were developed…"	The need for these criteria is not a surprise and the development of chrome +6 TRVs for avian receptors should have been done and reviewed with the Tribe prior to the HHERA. That is the purpose of the work plan. This is another example of a post-risk assessment work plan procedural change on which the Tribes were not consulted.	See the response to Comment FMIT-40.		See final resolution for FMIT-40.
277	Quechan-41	RA		ES.6.4.2 / ES-24	Section ES.6.4.2	In the identification of ERA risk drivers, it should be specified which TRV was used. NOAEL or LOAEL or ??	See the response to Comment FMIT-41.		See final resolution for FMIT-41.

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278	Quechan-42	RA		ES.7.1 / ES-27	Section ES.7.1 Conclusions and Recommendations	The Tribes agree with the HHRA conclusions that 1) lead is not present at unsafe levels, that AOC/SWMU-specific HHRAs are not appropriate for decision-making related to proposed soil cleanup, the OCS is the appropriate exposure area, that soils are safe related to non-cancer health effects, that Tribal users risks are de minimus, and the residential evaluation is hypothetical, for informational purposes and not appropriate for decision-making. The Tribes do NOT agree that for "all potential human receptors evaluated," that the COPCs of dioxin-TEQs and Chrome+6 are applicable in the SWMU/AOCs listed. Not all the human activities are realistic in these areas. For example, the AOC9 risks are driven by fence line samples (at the top of a steep slope). Are campers and OHV riders going to be present along the fence line?	See the response to Comment FMIT-42.		See final resolution for FMIT-42.
279	Quechan-43	RA		ES.7.1 / ES-28	Section ES.7.1 Conclusions and Recommendations	As stated above, The Tribes do not agree that "RBRGs for potential recreational users are the most appropriate benchmarks…". The Tribes also do not agree that the target risk for these hypothetical users must be at 1×10^{-6}. The calculated risks within the recognized risk management range must be first evaluated to determine if any action is necessary.	See the response to Comment FMIT-43.		See final resolution for FMIT-43.
280	Quechan-44	RA		ES.7.1.1 / ES-30	Section ES.8.1.1 Methodology and Calculated RBRG Values	As stated previously, the use of 1×10^{-6} as a 'bright line' ILCR in the RBRG calculations ignores the first step of evaluating the estimated risks that are within the agency 'risk management' range.	See the response to Comment FMIT-44.		See final resolution for FMIT-44.
281	Quechan-45	RA		1 / 1	Section 1. Introduction	The Fort Mojave Indian Tribe is a land-owner of land adjacent to the TCS and the text and maps must accurately reflect this.	See the response to Comment FMIT-45.		See final resolution for FMIT-45.
282	Quechan-46	RA		1.1 / 2	Second paragraph: "Information and sampling data…"	The DTSC, after the close of Risk Assessment Work Plan comments, submitted the directive letter to PG&E requiring the individual SWMU/AOC risk assessments. This decision was never part of the work plan discussion or review with the Tribes, nor were the Tribes consulted on this directive. The Tribes had already reviewed and given their comments on the single OCS exposure area, which is the most appropriate area for soil remediation decision-making.	See the response to Comment FMIT-46.		See final resolution for FMIT-46.
283	Quechan-47	RA		1.2 / 3	Section 1.2 Regulatory Framework, last pp	The DTSC, after the close of Risk Assessment Work Plan comments, submitted the directive letter to PG&E requiring the individual SWMU/AOC risk assessments. This decision was never part of the work plan discussion or review with the Tribes, nor were the Tribes consulted on this directive. The Tribes had already reviewed and given their comments on the single OCS exposure area, which is the most appropriate area for soil remediation decision-making.	See the response to Comment FMIT-47.		See final resolution for FMIT-47.
284	Quechan-48	RA		2.1 / 5	Section 2.1 Site Historical Operation	Since property ownership/use is included in this section, then the mention of more recent property ownership changes, including the transfer of land to Fort Mojave, should be included.	See the response to Comment FMIT-48.		See final resolution for FMIT-48.
285	Quechan-49	RA		7	Last paragraph	The HHERA recognizes that in SWMU 1 there have been storm events that have changed the sediment distribution in BCS. The 2006 event is referenced. How are soil depths for samples collected prior to 2006 adjusted to reflect their depth today so those pre-2006 samples can be incorporated into the EPC calculations? Can the text provide an explanation/description?	See the response to Comment FMIT-49.		See final resolution for FMIT-49.
286	Quechan-50	RA		9	Last paragraph of AOC 1 section	Same comment as above.	See the response to Comment FMIT-50.		See final resolution for FMIT-50.

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287	Quechan-51	RA		9	Section on AOC 4	This section does not discuss the finding of buried debris (and possible dioxin source) just below the water tanks and at the top of the east ravine drainage.	See the response to Comment FMIT-51.		See final resolution for FMIT-51.
288	Quechan-52			2.2 / 17	Entire section	Please include the conclusion of the groundwater risk assessment within this section	See the response to Comment FMIT-52.		See final resolution for FMIT-52.
289	Quechan-53			2.2.2 / 19		This section should include a discussion of the EE/CA that was released by DOI in 2018 if the non-time critical removal action moves forward	See the response to Comment FMIT-53.		See final resolution for FMIT-53.
290	Quechan-54	RA		30	Footnote 3	The Hepta- and Octa- chlorinated dioxin congeners should be included in the sediment migration analysis. Depending on the source of dioxin compounds (burning PCBs vs. burning organic trash), the hepta-a and Octa- congeners could be important markers of dioxin migration in BCW and ER sediment.	See the response to Comment FMIT-54.		See final resolution for FMIT-54.
291	Quechan-55	RA		2.5.2.5.1 /30-31	Decision criteria for Gradient Analysis	The criteria for the Gradient Analysis listed on page 30 is different than what is listed on page 31	See the response to Comment FMIT-55.		See final resolution for FMIT-55.
292	Quechan-56	RA		2.5.2.5.2 / 31	Section 2.5.2.5.2 Conclusions for the Gradient Analyses	The Tribes agree with the conclusions of this evaluation that sediment is not significantly migrating and entering the river.	See the response to Comment FMIT-56.		See final resolution for FMIT-56.
293	Quechan-57			2.5.2.5.2 / 31	Based on the gradient analyses and the physical characteristics of BCW, specifically the Tamarisk Thicket area, potential transport of indicator chemicals and other constituents from the surface soil entrained in runoff from upland areas at BCW to downgradient locations may be potentially complete; however, this pathway is not considered significant based on the low concentrations and NDs in the northernmost BCW soil locations west of the National Trails Highway, before soil transitions to sediment. Therefore, a quantitative risk evaluation of the BCW sediment area, east of the National Trails Highway was not required, as subsequent sediment exposure pathways would likewise be insignificant. This conclusion is further supported by data showing that concentrations of the indicator chemicals (and dioxin TEQ) are low (below the BTVs) or not detected in the BCW sediment area.	The Tribes agree with this conclusion and support the inclusion of this concept in any future soil risk evaluation or remedial action.	See the response to Comment FMIT-57.		See final resolution for FMIT-57.
294	Quechan-58	RA		2.6.1 / 33	Pp 2	The phrase “recreational access is potentially present across much of the site” is not the same as various recreational activities occurring at the site. The Tribes have argued that hunting, camping, OHV riding and hiking are not very likely along the fence line of the TCS. The presentation of these human receptor activities needs to include that caveat that they do not occur in all areas of the OCS exposure area.	See the response to Comment FMIT-58.		See final resolution for FMIT-58.

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295	Quechan-59			2.6.2 / 33	Due to the openness of the federal land and limited restrictions to site access, recreational access is potentially present across much of the site.	It is the Tribes perspective that camping, hunting hiking and OHV riding is not likely to occur in many of the AOCs due to the current site use and topography of the site. This section should identify AOCs in which recreational activity is likely to occur and should also include language that identifies regions within each AOC that are not suitable for all recreational activities (e.g. steep slopes unsuitable for camping).	See the response to Comment FMIT-59.		See final resolution for FMIT-59.
296	Quechan-60			2.6.2 / 34	The purpose of the proposed expansion included a variety of seasonal residential and recreational uses, including mobile homes, expansion of tent camping and recreational vehicle areas, a hotel, and reconstruction of an old restaurant. According to DOI, the requested expansion by San Bernardino County would allow for new pull-through recreational vehicle camping sites and tent camping areas.	The Tribes would like this topic addressed in greater detail during consultation meetings with DOI and expect tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-60.		See final resolution for FMIT-60.
297	Quechan-61			2.6.2 / 34	It is reasonably foreseeable that camping on the floodplain will occur under either San Bernardino's proposed expansion or USBLM's future use of non-leased areas.	The Tribes would like this topic addressed in greater detail during consultation meetings with DOI and expect tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-61.		See final resolution for FMIT-61.
298	Quechan-62	RA		3.1.1 / 36	"Asbestos soil data will be discussed in the forthcoming…"	This is another example where not having the final soil RFI/RI report hinders the Tribes from understanding the full impact of potential soil remediation issues. Will the RFI/RI report make recommendations related to asbestos in soil?	See the response to Comment FMIT-62.		See final resolution for FMIT-62.
299	Quechan-63	RA		3.1.3 / 37	Section 3.1.3, last pp	The text states that sediment migration from upland areas into the site drainages (e.g., BCW, ER) "may be potentially complete; however, this pathway is not considered significant". The basis for this conclusion is the gradient analysis in Section 2.5. However, the gradient analysis looks at depositional patterns in the full length of BCW/ER to determine if contamination is migrating to the river. This gradient analysis does not evaluate the potential for high concentrations above the site drainages to migrate into the drainages.	See the response to Comment FMIT-63.		See final resolution for FMIT-63.
300	Quechan-64	RA		3.2.5 / 44	Section 3.2.5	Representativeness is inherently biased when biased (vs. random) soil sampling protocols are used. Sampling high concentration locations and then stepping out to find extent results in a dataset that is biased towards high concentrations. That is why the area-weighting in the EPC calculations is important in countering this sampling bias.	See the response to Comment FMIT-64.		See final resolution for FMIT-64.
301	Quechan-65			3.2.7 / 46	As stated in the RAWP (Arcadis 2008a), for cases where a field duplicate sample is present, a single representative concentration for the sample was selected generally consistent with USEPA guidance regarding data verification, data validation, and data quality assessment (USEPA 1992, 2002a).	Using the maximum detected concentration from a primary sample and its duplicate is not an appropriate procedure. The use of the maximum concentration will result in an overestimation bias of the calculated exposure point concentrations in each of the exposure areas, which in turn results in an increase in estimated hazards and risks in the risk assessment. Agency guidance on soil sampling consistently states that the overriding goal is to collect unbiased and representative samples. Please include a discussion in the uncertainty section on how the use of the highest detected concentration will influence risk calculations.	See the response to Comment FMIT-65.		See final resolution for FMIT-65.

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302	Quechan-66			3.3 / 46	Soil samples collected at four locations...are the only sample locations ...samples evaluated as part of BCW and also as part of AOC4	It appears from this text that single soil sample locations are used in two different exposure areas and included in risk calculations for two different AOCs. Please provide a thorough outline of all samples that are included in two different AOC risk calculations and how those samples contribute to the risk calculated for each area. Also, please discuss the use of samples in multiple exposure areas within the uncertainty section.	See the response to Comment FMIT-66.		See final resolution for FMIT-66.
303	Quechan-67	RA		3.4.1.1.1 / 50	Section 3.4.1.1.1 Comparison to Background	The Tribes support the comparison of sampling data to background using a variety of appropriate approaches to ensure that soil concentrations that are evaluated in the HHERA are contamination, not background.	See the response to Comment FMIT-67.		See final resolution for FMIT-67.
304	Quechan-68	RA		4 / 54	Section 4 Estimation of Exposure Point Concentrations	The Tribe supports the various procedures for estimating Exposure Point Concentrations (EPCs). Both the depth-weighted and area-weighted calculations incorporate important spatial characteristics of both the data and potential exposure. The Tribes particularly support the area-weighted EPCs because they reduce the sampling bias inherent in the data. (see above)	See the response to Comment FMIT-68.		See final resolution for FMIT-68.
305	Quechan-69			5.3.1 / 61	Current land use does not include residential use for any part of the sire, nor is I likely to in the future	Please update section 2.6 to be consistent with this language.	See the response to Comment FMIT-69.		See final resolution for FMIT-69.
306	Quechan-70	RA		5.3.1.1 / 62	Section 5.3.1.1 Maintenance Workers	The inclusion of TCS workers as receptors in the HHERA includes potential exposures both inside and outside the TCS (i.e., OCS and ICS areas). The assumptions include exposures to only soils outside the compressor station. While short-term workers could be hired for one project outside the fence line, it is unlikely that long term maintenance workers would only work outside the fence line. The Tribe does not accept these receptors as acceptable for making soil cleanup decisions. In addition, there are federal and state regulations for the protection of workers that are more applicable than the results of a risk assessment.	See the response to Comment FMIT-70.		See final resolution for FMIT-70.
307	Quechan-71			5.3.1.1 / 62	Section 5.3.1.1 Maintenance Workers - Long-term workers, primarily PG&E employees, who may be present during various types of activities for a certain period of hours and days per year for a 30-year period	Please confirm that Cal EPA guidance on occupational duration is 30-years. It has been reported in other DTSC documents that the 95th percentile occupational exposure duration is a 25-year period. Please provide reference for the 30-year exposure duration.	See the response to Comment FMIT-71.		See final resolution for FMIT-71.
308	Quechan-72			5.3.1.1 / 62	The baseline risk assessment assumes that potential contact with soil is not limited by the presence of engineering or institutional controls in the future	Please include this conservative assumption in the uncertainty section and discuss how dust suppression and other SOPs are in place that ensure limited exposures and risks.	See the response to Comment FMIT-72.		See final resolution for FMIT-72.
309	Quechan-73	RA		5.3.1.2 / 63	Section 5.3.1.2 Recreational Users	The various recreational land users evaluated in the risk assessment represent activities that have little to no precedent of having occurred and are unlikely to occur in the future. Camping, hunting OHV riding on areas (SWMU/AOCs) immediately adjacent to the compressor station have not occurred. For example, have these activities ever been recorded as occurring in AOC 9 or 10 or 11 or 12, areas adjacent and below the compressor station? Any decisions regarding soils cleanup should be based on real and complete exposures, not theoretical.	See the response to Comment FMIT-73.		See final resolution for FMIT-73.
310	Quechan-74			5.3.1.5 / 65	Section 5.3.1.5 Hypothetical Future Residential Users - ...hypothetical future resident as a rural resident who obtains a significant portion of his/her diet from onsite produced food.	This text should clearly indicate that this exposure scenario was only included based on agency direction and does not reflect current or expected exposures. The Tribes do not support the use of overly conservative and non-site-specific exposure assumptions.	See the response to Comment FMIT-74.		See final resolution for FMIT-74.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)	Comment Type (RA/Non - RA)	Comment Category	Section / Page	Reference Text	Soil HHERA Comment (Please provide sufficient detail, include specifically what you are looking for)	PG&E Response	DTSC Comments on RTCs Received on June 5, 2019	Final Resolution June 20-21, 2019
311	Quechan-75			5.3.2 / 66	Section 5.3.2 Potential Exposure Areas - "Although these additional risk evaluations do not represent reasonable current or future long-term exposure scenarios, and thus should not be the primary basis for risk management decisions, the information is presented in this HHERA Report at the agency's direction.	The Tribes concur that these AOC specific risk assessments do not represent reasonable current or future long-term exposure scenarios. Risk management decisions should be determined based on realistic site usage with the input of the Tribes.	See the response to Comment FMIT-75.		See final resolution for FMIT-75.
312	Quechan-76	RA		66	Last pp	The inclusion of the exposure area BCWxSWMU1+TCS-4 seems like an attempt to predict soil cleanup scenarios by including this additional/modified scenario. Each of the individual SWMU/AOCs are included, by agency request, in the HHERA and those individual evaluations should be sufficient information for risk managers.	See the response to Comment FMIT-76.		See final resolution for FMIT-76.
313	Quechan-77			5.4.5 / 82	Section 5.4.5 Toxicity Factors for Dioxins and Furans - DTSC remedial goal of 50 picograms per gram (pg/g) total TCDD TEQ for residential land use based on a target cancer risk of 1 x 10-5..."	It is stated within this section that DTSC has used 1 x 10^{-5} as an appropriate risk threshold for residential exposures. Therefore, please adjust the language throughout the report to indicate that DTSC has used risk thresholds higher than 1 x 10^{-6} for allowable risk thresholds.	See the response to Comment FMIT-77.		See final resolution for FMIT-77.
314	Quechan-78			5.5.1.1 / 87	Section 5.5.1.1 Carcinogenic Health Effects - CalEPA's point of departure for excess incremental lifetime cancer risk for all receptor groups (i.e., residential populations) is 1 x 10-6, and risk management decisions may raise this criterion depending on site-specific conditions	There are numerous examples were CalEPA uses risk range of 1 x 10^{-4} through 1 x 10^{-6}. This should be stated in the text rather than suggesting CalEPA's point of departure is a default 1 x 10^{-5}.	See the response to Comment FMIT-78.		See final resolution for FMIT-78.
315	Quechan-79	RA		5.5.3 / 89	Section 5.5.3 Results of the Cancer Risk and Noncancer Hazard Assessment	The presentation of both cancer risks and noncancer hazards occur in an order which does not reflect their applicability. The area-weighted results, which appropriately account for the spatial distribution of samples, is the most applicable scenario. The Tribes request that in both the main text and in all appendices that the area-weighted results are presented first.	See the response to Comment FMIT-79.		See final resolution for FMIT-79.
316	Quechan-80	RA		5.5.3 / 132	Section 5.5.3 Results of the Cancer Risk and Noncancer Hazard Assessment	The presentation of the Outside Compressor Station (OCS) results should be the first results presented. The OCS scenario, with the area-weighted EPCs, is the most applicable to potential exposures outside the compressor station. By presenting it first the reports give this scenario the appropriate importance rather than being buried within the other SMWU/AOC results.	See the response to Comment FMIT-80.		See final resolution for FMIT-80.
317	Quechan-81			5.5.3.14 / 135	Section 5.5.3.14 Outside the Compressor Station - Therefore, the combination of all exposure areas outside the TCS...represent both current and potential future exposures...	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action.	See the response to Comment FMIT-81.		See final resolution for FMIT-81.
318	Quechan-82	RA		135	"Alternative" Evaluation	As described in Comment #76 above, the inclusion of the "Alternative" evaluations (OCSxSWMU1+TCS-4) in a presumptuous and unnecessary evaluation. Prior to any evaluation of potential soil cleanup scenarios (i.e., removing certain samples and re-running risk calculations), the presented risks/hazards must be evaluated to determine if any action is required. None of the OCS, area-weighted risks are higher than 7 x 10^{-6}, clearly in the agency "risk management" range. This means that a reasonable and acceptable risk management decision could be "no action".	See the response to Comment FMIT-82.		See final resolution for FMIT-82.

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319	Quechan-83			5.6.3.2 / 152	Section 5.6.3.2 Exposure Assumptions and Pathways - Entire section	This section does not adequately address the uncertainties and overestimations of exposures that are included in all of the recreational exposure scenarios. For example, the intake parameters for the hiker and hunter are defined as 24 hours/ day. It can be presumed that hiking and hunting would only occur during daylight hours (varying seasonally from 8 to 12 hours per day). In addition, it is the Tribe's position is that neither hunting nor off-road vehicle driving are reasonable future uses of the Topock Maze and surrounding area because these land uses are inconsistent with management of this sacred area, a recognized historic resource and Traditional Cultural Property (TCP). The basis for the selection of these recreational activities and the exposure parameters which define the extent to which these activities occur are based on information collected from other DOI/BLM sites and will greatly overestimate risk at the Topock site. Furthermore, a recreational hiker exposure frequency is based on data that is generic and not specific to the Topock site and it is assumed that the duration of hiking is spent only on contaminated areas of the Topock site. The hiking exposure durations and frequencies are based on visits to areas with existing trail systems and will unrealistically overestimate the frequency of visits to the Topock Site which does not have a developed hiking trail network. While some BLM trails cross portions of the Site, there is no organized trail network through the soil investigation area and, absent evidence to the contrary, it is unreasonable to assume that a hiker will spend an entire day on the Site. Thus, these recommended exposure parameters do not represent a "reasonably anticipated use" of the site. This overestimation of exposure that is present in all recreational exposure scenarios needs to be discussed in greater detail in the uncertainty section.	See the response to Comment FMIT-83.		See final resolution for FMIT-83.
320	Quechan-84			5.6.3.2 / 153	Section 5.6.3.2 Exposure Assumptions and Pathways - In sum, the risk assessment meets the regulatory requirement to address an upper bound for potential exposures...the actual exposures to soil...would probably be much lower than has been estimated in this HHRA	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action	See the response to Comment FMIT-84.		See final resolution for FMIT-84.
321	Quechan-85			6.1 / 158	Section 6.1 Purpose and Objective- Ultimately, the conclusions reached from conducting the ERA along with other site information will be used to establish an overall site risk management strategy.	Please discuss other lines of evidence that will be, or can be, used in determining site risk. For example, plant and invertebrate population surveys or use of plant survey data that already exists should be used to support (if the actual population does support) the risk calculations.	See the response to Comment FMIT-85.		See final resolution for FMIT-85.
322	Quechan-86			6.3 / 159	Section 6.3 Problem Formulation - The surface soil transport pathway analyses...concluded potentially complete but insignificant transport pathways for surface soil entrained in runoff to reach the sediment areas near the river downgradient of BCW and AOC 10 and therefore, quantitative evaluation of these sediment areas was not required.	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site-wide risks for any future soil remedial action.	See the response to Comment FMIT-86.		See final resolution for FMIT-86.

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323	Quechan-87	RA		6.5.2 / 172	Section 6.5.2 Toxicity Reference Values	While ecological screening levels may be applicable to designing soil sampling activities, screening levels do not provide reliable or appropriate ecological hazard estimates. The Tribe supports the use of LOAEL-based TRVs as the most appropriate values to use in the calculation of ecological hazards.	See the response to Comment FMIT-87.		See final resolution for FMIT-87.
324	Quechan-88			6.6.1 / 179	The BTAG NOAEL-based TRVs are considered very conservative, resulting in a wide range of risks to potential wildlife receptors. For the Topock site ERAs, the selected TRVs are considered more robust than the BTAG TRVs.	The inclusion of the BTAG NOAELs and LOAELs is unnecessary and should be removed from the text. The inclusion of overly conservative NOAELs (BTAG) does not add value to the risk calculations, leads to confusing results and an increased perception of risk that does not exist at the site. Please remove the BTAG NOAELs.	See the response to Comment FMIT-88.		See final resolution for FMIT-88.
325	Quechan-89	RA		6.6.1 / 179	For the risk description part of the risk characterization process, a semi-quantitative WOE approach was used incorporating multiple LOEs.	Please include plant population survey information (that is currently available) as an additional line of evidence to determine if risk calculations (HQ>1 indicate unacceptable risk) are correctly reflected in current ecological site status. Also, a soil invertebrate population study should be included in areas that have shown calculated risk (HQ>1) to determine if risk calculations are correctly reflected in invertebrate impacts. This is of particular relevance to risks calculated in SWMU1, AOC9, AOC10.	See the response to Comment FMIT-89.		See final resolution for FMIT-89.
326	Quechan-90			6.6.2 / 181	Section 6.6.2 Results	(See comments #79 and 80, above) The presentation of ecological risks should be done with the most applicable and appropriate first. Otherwise, the reader might determine the first risks are the most appropriate. The Tribe requests that OCS results using LOAEL TRVs are presented first. Then, the other scenarios which provide additional information for risk management decisions, can be presented.	See the response to Comment FMIT-90.		See final resolution for FMIT-90.
327	Quechan-91			6.6.2.1.1 / 182	Baseline Scenario – Desert Shrew	It is unclear what species at the site is being modeled by the Desert Shrew. The Desert Shrew has a very large diet and will always have a high exposure and high calculated risk. The ERA notes that the Desert Shrew has never been observed at the site. Therefore, the ERA should clearly indicate what species observed at the site is modeled based on the Desert Shrew.	See the response to Comment FMIT-91.		See final resolution for FMIT-91.
328	Quechan-92			6.6.2.3 / 197	Bat Cave Wash excluding SMUW 1 and TCS-4	(see comment #76, above) The evaluation of exposure areas with 'removed' soil samples (e.g., BCWxSWMU1+TCS-4) are presumptuous and un necessary evaluations since each SMMU and AOC risks are presented.	See the response to Comment FMIT-92.		See final resolution for FMIT-92.
329	Quechan-93			6.7.3.3 / 251	When the available dataset for a depth interval and exposure area was composed of less than eight total samples, the maximum depth weighted concentration was selected as the EPC for all three EPC scenarios.	This approach is not consistent with the statement provided in section 6.4.3 which states: "Risk estimates using maximum concentrations are considered overly conservative and generally used for screening level purposes." Use of maximum concentrations is not recommended for use in making risk management decisions. Please update the text in section 6.7.3.2 to more consistently reflect what is stated in section 6.4.3 that the use of the maximum concentrations will not correctly characterize site risk.	See the response to Comment FMIT-93.		See final resolution for FMIT-93.
330	Quechan-94			6.7.3.3 / 251	Receptor Exposure Assumptions	It is unclear what species at the site is being modeled by the Desert Shrew. The ERA notes that the desert shrew has never been observed at the site. Therefore, the ERA should clearly indicate what species observed at the site is modeled based on the Desert Shrew. In addition, the Uncertainty section should clearly indicate that the Desert Shrew (or any shrew) has not been observed at the site.	See the response to Comment FMIT-94.		See final resolution for FMIT-94.

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331	Quechan-95			6.7.4 / 252	Uncertainty in Uptake Assumptions	The ERA should include the results of the technical memo, Potential For Chromium Uptake by Arrow weed and Potential Exposure Pathways (2013), which show that CrVI which may be taken into plants is converted into CrIII. This finding has not been sufficiently included in the ERA uptake assumptions for plants.	See the response to Comment FMIT-95.		See final resolution for FMIT-95.
332	Quechan-96			7.1.3 / 280	Summary and Overall Conclusions and Recommendations for the HHRA RBRGs for the potential recreation users are the most appropriate benchmarks for the protection of human health and associated risk management decisions going forward	It is the Tribes perspective that camping, hunting, hiking and OHV riding is not likely to occur because these land uses are inconsistent with management of this sacred area, a recognized historic resource and Traditional Cultural Property (TCP). The presence of Tribal sacred areas has an impact on DOI/BLM-allowed activities as these federal agencies are mandated through Executive Orders, Federal Trust Responsibility and other ARARs (i.e., both federal and state laws) to protect Tribal sacred lands as a priority. The authority for, and the responsibility of, DOI/BLM to specifically protect the Topock Maze area and surrounding documented Tribal use areas comes in part from the Federal Land Policy and Management Act and the National Environmental Policy Act and has been documented in the Record of Decision (ROD) and Resource Management Plan (RMP) published by the Lake Havasu Field Office in 2007. In the ROD/RMP the Topock Maze area has been designated for Traditional Use as part of the Cultural Resource Management actions (ROD/RMP Table 2, page 26). This designation requires long-term protection as well as consultation with the Tribes to determine which safeguards the DOI/BLM will put in-place to achieve this long-term protection. DOI/BLM has both the authority and responsibility to take management actions to achieve this protection.	See the response to Comment FMIT-96.		See final resolution for FMIT-96.
333	Quechan-97	RA		8 / 285	Section 8 Risk-Based Remediation Goals for Risk Drivers in Soils	In this section the Risk-Based Remedial Goals (RBRGs) are calculated and presented. Whole RBRGs can be useful in soils RI/RFI activities, their presentation in the risk assessment seems pre-mature and unnecessary. There has been no decision that any action for soils is necessary (a risk management decision). Therefore, why calculate soil cleanup goals? Another option, if indeed some soils—related action is deemed necessary, is to perform a risk evaluation where sequentially the highest soil concentrations of risk-driving chemicals are 'removed', and EPC and risk calculations are redone. This is a preferable process to using RBRGs since the risk evaluation retains the appropriate and applicable area-weighted EPCs. RBRGs could be mis-used and applied as 'absolute' soil cleanup goals which essentially by-passes the important area-weighted-based risk/hazard evaluations.	See the response to Comment FMIT-97.		See final resolution for FMIT-97.
334	Quechan-98	RA		8//85	Section 8 Risk-Based Remediation Goals for Risk Drivers in Soils	The RBRGs are based on an incremental lifetime cancer risk of 1 x 10-6. While this is considering a point of departure for risk management decisions, it is not a required risk level in soil remediation decisions. The risk range of 1×10^{-4} to 1×10^{-6} (inclusive of 1×10^{-5}) should also be considered since this is not a residential area but the only potential exposures are workers, recreators, or Tribal members.	See the response to Comment FMIT-98.		See final resolution for FMIT-98.
335	Quechan-99	RA		8.1.1 – 8.2.1 / 286-290	8.1.1 and 8.2.1 Methodology for Deriving RBRGs and Values	Please clearly explain how background CrVI and Dioxin/furan values are included in the RBRG calculations. Specifically, are background concentrations subtracted out prior to the RBRG calculation? If not, please explain how the inclusion of background increases the RBRG value.	See the response to Comment FMIT-99.		See final resolution for FMIT-99.

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336	Quechan-100			8.1.1 / 289	8.1.1 Methodology for Deriving Human health RBRGs and Values Therefore, potential exposure to dioxin TEQ in soil for the recreational users over a lifetime would be less… As such the RBRGs for the recreation users equal to a theoretical potential cancer risk of 1 x 10-5 may be appropriate.	The recreational user has been proposed as the most appropriate benchmarks for the protection of human health and associated risk management decisions going forward. In addition, the text acknowledges that use of a 10-6 risk threshold for the recreational user is not appropriate. Therefore, please update the RBRGs to include the calculated concentrations based on a 10^{-5} risk threshold.	See the response to Comment FMIT-100.		See final resolution for FMIT-100.
337	Quechan-101			8.2.1 / 291	8.2.1 Methodology for Deriving Ecological RBRGs and Values The congener specific BAFs and a recommended mammalian dioxin TEQ LOAEL TRV of 30 ng/kg bw-day were used to calculate the RBRGs protective of invertivorous small mammals.	If exposure concentration based on a more scientifically defensible BAF value rather than assuming all congener uptake as 2,3,7,8-TCDD, why was the more appropriate TCDD BAF value not used in the risk calculations?	See the response to Comment FMIT-101.		See final resolution for FMIT-101.
338	Quechan-102			9 / 294	9 Key Findings Or target ILCR of 1 x 10-5 for workers	The Tribes agree that an ILCR point of departure of 1 x 10^{-5} for workers and recreational visitors is more reasonable than a 1 x 10^{-6} value. Please update text to include recreational visitors in this section.	See the response to Comment FMIT-102.		See final resolution for FMIT-102.
339	Quechan-103			9 / 294	9 Key Findings Risk drivers were identified based on a target HQ of 1 and additional LOE support the conclusion of unacceptable risk.	Please include population surveys as an additional LOE. All LOEs to date are based on conservative quantitative evaluation of soil sample data. No effort has been made to determine whether the quantitative evaluation of risk is correctly reflected in the current ecological site status.	See the response to Comment FMIT-103.		See final resolution for FMIT-103.
340	Quechan-104	RA		9 / 295	Section 9 Key Findings	The listing of the nine (9) soil sampling locations that contain risk driving-chemicals and contribute to higher risk estimates is more appropriately a post-risk management exercise. The listing of these 9 locations has embedded assumptions regarding the acceptability of risks and hazards which are not appropriate at this stage in the soils RI/RFI process as no determination of the acceptability of risks has been made. The Tribe requests that this presentation of the 9 risk-driving soil sample locations be removed from the HHERA.	See the response to Comment FMIT-104.		See final resolution for FMIT-104.
341	Quechan-105				The following comments refer to HHERA Appendices. Many of the comments related to the main text are also applicable to the individual SWMU/AOC risk assessment presented in the Appendices and should be considered and address as such.		See the response to Comment FMIT-105.		See final resolution for FMIT-105.
342	Quechan-106	RA		1-1	Appendix RBC Soil Management Plan Risk-Based Concentrations for Groundwater Remedy (Appendix RBCs)	The text references a table in the main text, Table 3-7. While that Table is listed in the TOC for the main text, that table does not appear in my copy of the HHERA. The Appendices should be stand-alone and not be referring to tables or figures in other sections of this 11,000+page document.	See the response to Comment FMIT-106.		See final resolution for FMIT-106.
343	Quechan-107	RA		2-1	Appendix RBCs	The Appendix refers to procedures from the main report/RBRGs as being used for the RBCs. This makes the review of these appendices difficult as the reader then must find other sections of the report in order to understand the procedures being used. The appendices should be stand-alone.	See the response to Comment FMIT-107.		See final resolution for FMIT-107.
344	Quechan-108	RA		2-1	Appendix RBCs	The use of a bright-line risk value of 1 x 10^{-6} is not appropriate for setting RBCs. An important issue for the Tribe has been the repatriation of excavated soils and to keep as much soil at the site as reasonable possible (i.e., do not exceed hazardous water levels or pose an unacceptable risk).	See the response to Comment FMIT-108.		See final resolution for FMIT-108.

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345	Quechan-109	RA		3-1	Appendix RBCs	Notwithstanding the above Appendix RBC comments, The Tribe supports the use of the LOAEL-based TRVs in the calculation of RBCs	See the response to Comment FMIT-109.		See final resolution for FMIT-109.
346	Quechan-110			Draft Appendix RBC Soil Management Plan Section 3	Site Use Factor =1	Ecological RBCs based on a site use factor of 1 is overly conservative and unrealistic. A baseline risk assessment is intended to incorporate site specific data and not use generic assumptions. Please revise using appropriate SUF.	See the response to Comment FMIT-110.		See final resolution for FMIT-110.
347	Quechan-111			Draft Appendix RBC Soil Management Plan Section 3	TEQ mammals	The Tribes believe the RBC of 192 ng/kg is a more appropriate RBC then the unrealistic hiker scenario which is overly conservative and results in an unrealistic calculation of risk for the Topock site.	See the response to Comment FMIT-111.		See final resolution for FMIT-111.
348	Quechan-112	RA		Table RBC 2-1	Appendix RBCs	The appendix presents a table of multiple human and eco-based RBCs. The tables present RBCs for multiple receptors. Some of these receptors are not applicable to appropriate for the OCS exposure areas. There is no discussion as to how the various human or eco RBCs would be selected for use in soil repatriation.	See the response to Comment FMIT-112.		See final resolution for FMIT-112.
349	Quechan-113	RA		General	Appendices: OCS-Soil HHERA for Outside the Compressor Station Exposure Area; OCSxBCW--Soil HHERA for Outside the Compressor Station Excluding Bat Cave Wash Exposure Area; BCW+AOC4--Soil HHERA for Bat Cave Wash and AOC-4 Exposure Area; OCSxBCW+AOC4--Soil HHERA for Outside the Compressor Station Excluding Bat Cave Wash and AOC-4; BCW Soil HHERA for BCW Exposure Area; SWMU1 Soil HHERA for SWMU1 and TCS-4 Exposure Area; BCWxSWMU1 Soil HHERA for BCWxSWMU1 and TCS-4 Exposure Area; AOC4 Soil HHERA for AOC4 Exposure Area; AOC9 Soil HHERA for AOC9 Exposure Area; AOC10 Soil HHERA for AOC10 Exposure Area; AOC11 Soil HHERA for AOC11 Exposure Area; AOC12 Soil HHERA for AOC12 Exposure Area; AOC14 Soil HHERA for AOC14 Exposure Area; AOC27 Soil HHERA for AOC27 Exposure Area; AOC28 Soil HHERA for AOC28 Exposure Area; AOC31 Soil HHERA for AOC31 Exposure Area; UA-2 Soil HHERA for UA-2 Exposure Area	The following comments are applicable to the various SMWU/AOC HHERAs provided in the appendices to the main HHERA report.	See the response to Comment FMIT-113.		See final resolution for FMIT-113.

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350	Quechan-114					All of the human exposure scenarios and ecological receptors are evaluated in each of the listed HHERA appendices. Many of these scenarios and receptors are not supported by the topography and land characteristics in some of the SWMU/AOCs. For example, AOC9 is a steep slope immediately adjacent to the TCS. The applicability of the terrain characteristics to be able to support either the human or ecological exposures must be addressed in the uncertainty discussion in each of these reports. Further, if one of these scenarios or receptors that is not supported by the terrain characteristics is driving risk, then that scenario/receptor should not be the basis for any decisions. This issue must be fully developed and discussed in the uncertainty section of each of these appendices. The Tribes request a map showing the areas where the individual recreational land sue scenarios would be supported by site characteristics.	See the response to Comment FMIT-114.		See final resolution for FMIT-114.
351	Quechan-115	General			Risk associated with background	Please provide a detailed explanation of how background soil concentrations are included into the HRA and ERA risk calculations and RBRGs. Is risk from background removed prior to calculation of site risk? If not please explain why not. Are RBRGs developed including the risk associated with background?	See the response to Comment FMIT-115.		See final resolution for FMIT-115.
352	Quechan-116		General		Figures	Please provide figures (similar to Figure 9-1) for all of the individual AOC risk assessments	See the response to Comment FMIT-116.		See final resolution for FMIT-116.
353	Quechan-117		General		Table 6-5a Bioaccumulation Factors for Estimating Tissue Concentrations from Soil BAF plant	Please indicate how the ERA includes the findings from the Potential For Chromium Uptake by Arrow weed and Potential Exposure Pathways (2013) which shows that CrVI which may be taken into plants is converted into CrIII	See the response to Comment FMIT-117.		See final resolution for FMIT-117.
354	Quechan-118		General		Table 6-11	Please explain why the risk to small mammals and birds is based on total chrome and not on hexavalent chrome. Is total chrome considered a site COPEC? What is the uncertainty that is included in the risk assessment when basing the risk on total chrome? How was background total chrome accounted for in this risk calculation? How was the speciation of chrome accounted for in the toxicity study used to select the total chrome trv?	See the response to Comment FMIT-118.		See final resolution for FMIT-118.
355	Hualapai-1	RA		Entire	n/a	The Tribes (for these comments mean the Chemehuevi, Cocopah, Colorado River Indian Tribes, Fort Mojave, Hualapai and Quechan) generally do not disagree with the procedures and the conclusions in the main body of the HHERA which evaluates risk across the entire OCS potential exposure area.	See the response to Comment FMIT-1.		See final resolution for FMIT-1.
356	Hualapai-2			Entire	n/a	The addition or changing of risk assessment assumptions or procedures AFTER the risk assessment work plan has been reviewed and approved is not acceptable to the Tribes. The Tribes have asked for full participation in the development and implementation of the HHERA. Procedural changes made without Tribal consultation and implemented in the work plan unacceptably bypass Tribal participation.	See the response to Comment FMIT-2.		See final resolution for FMIT-2.
357	Hualapai-3	RA		Entire		The Tribes do not disagree with the limited soil remediation (8 sample locations) that is determined based on risk across the entire OCS potential exposure area. The HHERA recommendation for limited soil remediation (8 sample locations) that are protective of both human ecological receptors.	See the response to Comment FMIT-3.		See final resolution for FMIT-3.
358	Hualapai-4	RA		Entire	n/a	The Tribes do not disagree with the findings of the sediment transport evaluation that no contaminated sediment is reaching the Colorado River	See the response to Comment FMIT-4.		See final resolution for FMIT-4.

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359	Hualapai-5	RA		Entire	n/a	The Tribes do not disagree with the use of a single exposure area Outside the Compressor Station (OCS)	See the response to Comment FMIT-5.		See final resolution for FMIT-5.
360	Hualapai-6	RA		Entire	n/a	The Tribes do not disagree with the exclusion of the residential exposure scenario in DOI-areas of Bat Cave Wash from soil remediation recommendations	See the response to Comment FMIT-6.		See final resolution for FMIT-6.
361	Hualapai-7	RA		Entire	n/a	The Tribes do not disagree with the exclusion of individual SWMU/AOC-exposure areas in the soil remediation recommendations.	See the response to Comment FMIT-7.		See final resolution for FMIT-7.
					NOTE: Any Exec Summary comments are also applicable to the main HHERA text and appendices. Due to the exceptional length of this report, it is not be possible for the reviewers to identify each occurrence of a topic. The Tribes expect that these comments will be addressed wherever in this HHERA this subject topic occurs.		N/A		N/A
362	Hualapai-8	Non -RA		ESl / ES-1	"…additional surrounding land owned or managed by…"	The Fort Mojave Indian Tribe is a land-owner of land adjacent to the TCS and the text and maps must accurately reflect this.	See the response to Comment FMIT-8.		See final resolution for FMIT-8.
363	Hualapai-9			ES.2.3.1/ ES-5	Ecological Habitat Characteristics Geology -Unconsolidated alluvial and fluvial deposits are underlain by bedrock with very low permeability…	There is no mention of the dredged soils that make up surface soils from present-day rivers edge to the base of alluvial terrace deposits to the west. These soils are different than local alluvial/fluvial sediments because they are derived partly from upstream sources. Also, interesting that no discussion is made here on reducing zone surrounding river. All of this strongly suggests the need for Arcadis to present a single, unified, consistent CSM that explains site characteristics the same way regardless of soils or GW focus.	See the response to Comment FMIT-9.		See final resolution for FMIT-9.
364	Hualapai-10			ES. 2.3.1 / ES-6	Ecological Habitat Characteristics Overview - Relatively barren of vegetation	A higher density of vegetation occurs along BCW, from its mouth to high density tamarisk at outlet, with the exception of the mouth of Bat Cave Wash.	See the response to Comment FMIT-10.		See final resolution for FMIT-10.
365	Hualapai-11			ES.2.3.1 / ES-6	Ecological Habitat Characteristics Overview - May periodically flood during stormwater runoff events but remains dry.	Standard analysis would include quantitatively defining the frequency/magnitude of 'flooding' events.	See the response to Comment FMIT-11.		See final resolution for FMIT-11
366	Hualapai-12			ES.2.3. 1 / ES-6	Ecological Habitat Characteristics Overview - Ephemerally flooded	Is the cause of the ephemeral flooding relevant to the exposure pathway and CSM? If so, it would be important to clarify if this is due to the infrequent flooding associated with washes, or annual variations in stage along CO River - which are several feet.	See the response to Comment FMIT-12.		See final resolution for FMIT-12.
367	Hualapai-13			ES.3 / ES-8	Only Category 1 data are included in the datasets used in the quantitative risk assessment. Soil samples representative of soil that has been removed as part of a removal action were not included in the HHERA datasets.	As stated in the HHERA, removed soils are not included in the risk. Therefore, the risk assessment conclusions will need to be updated if any soil removal is implemented prior to risk management decisions are made. Please clearly describe how soils removed during other site activities will be addressed within the risk assessment dataset and subsequent risk calculations	See the response to Comment FMIT-13.		See final resolution for FMIT-13.
368	Hualapai-14	RA		ES.4 / ES-11	"Soil Background Investigations (Various reports/authors)	The HHERA should list individually by title/author/date these reports.	See the response to Comment FMIT-14.		See final resolution for FMIT-14.

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369	Hualapai-15			ES.5.1.2 /ES-13	In addition, at the direction of DTSC, potential exposure areas based on individual AOCs outside the fence line were evaluated in separate appendices	Please include in the text that risks calculated separately for individual AOCs are overly conservative and will greatly overestimate site risks. Specifically, none of the human site-specific uses would occur solely in any one AOC. In addition, no large-range mammal or bird would spend an entire exposure period in a single AOC.	See the response to Comment FMIT-15.		See final resolution for FMIT-15.
370	Hualapai-16			ES.5.3.2 / ES-15	The risks/hazards estimated for the OCS potential exposure area are believed to provide a more appropriate representation of the potential exposures for the human populations… than the risks/hazards estimated for individual AOCs/SWMU/UA potential exposure areas.	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action.	See the response to Comment FMIT-16.		See final resolution for FMIT-16.
371	Hualapai-17			ES.5.3.2/ES-18	Some targeted form of risk management or remediation, addressing elevated levels of hexavalent chromium and dioxin, would be effective at reducing risks for the campers, hikers and OHV riders to levels below 1 x 10^{-6}	Risk values that fall within the allowable risk range of 1 x 10^{-4} to 1 x 10^{-6} do not automatically require remediation, but rather additional evaluation. The HHERA text indicates a remedial goal of 1 x 10^{-6}. Establishing the appropriate remedial goal, however, should be determined during the risk management process which includes stake holder input. In addition, use of 1 x10^{-6} risk threshold for remedial goals is overly conservative for the camper, hiker and OHV rider. As has been discussed throughout the risk assessment process, these uses of the site are not site specific, are overly conservative, and will greatly overestimate risk. Therefore, to overestimate the potential risks due to conservative assessment and then use remedial goals at the upper bounds of allowable risk range would result in an increased amount of unnecessary and avoidable site impacts. .	See the response to Comment FMIT-17.		See final resolution for FMIT-17.
372	Hualapai-18			ES.5.3.2 / ES-17	Recreational User- Camper and others	There are both practical (presence of freeway, railroad, etc.) and topographical (slope) constraints to the recreational scenarios evaluated in the HHERA. The Tribes request that a map that clearly indicates areas that could realistically be used for these recreational activities be prepared and included in the HHERA. For example, is camping anticipated at location AOC10-20? Exposure scenarios that cannot occur in a given area should not be included in the HHERA evaluation, or, at a minimum the possibility of these exposures must be discussed.	See the response to Comment FMIT-18.		See final resolution for FMIT-18.
373	Hualapai-19			ES.5.3.2	the alternate and more robust BAFs approaches for dioxin TEQ based on congener-specific uptake are recommended for developing risk-based remediation goals	The Tribes request that a more detailed discussion of the implications behind the use of single congener verses congener-specific RBRGs be presented in more detail in a TWG format.	See the response to Comment FMIT-19.		See final resolution for FMIT-19.
374	Hualapai-20			ES.5.4 / ES-19	By using multiple conservative exposure assumptions or toxicity estimates, the risk estimates likely develop a conservative bias that may result in significant overestimation of potential risk and hazard.	The Tribes request that the text be updated to state that the use of conservative exposure assumptions "will" overestimate risk rather than “likely” overestimate risk.	See the response to Comment FMIT-20.		See final resolution for FMIT-20.

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375	Hualapai-21			ES.6.2.2/ES-22	For terrestrial birds and mammals, risks were evaluated using two site specific use factors (SUF) scenarios: a generic SUF of 1 and a SUF based on species- and site-specific home range comparted to the total area of each exposure area	It is unclear why risk calculations based on an SUF of 1 are used for ecological receptors that are known not to exist solely within the site. Please update the text to state that the "risks/hazards estimated using the site-specific home range potential exposure areas are believed to provide a more appropriate representation of the potential exposures for the ecological populations than the risks/hazards estimated based on a SUF of 1". If the text is not updated, please include why the use of a SUF of 1 is appropriate and necessary for birds and large range mammals.	See the response to Comment FMIT-21.		See final resolution for FMIT-21.
376	Hualapai-22			ES.6.3 / ES-23	Although the dioxin TEQ TRVs selected in the RAWP...were used to estimate risk...the alternate and more robust TRVs for dioxin TEQ based on more recent date are recommended for developing RBRGs,	The Tribes request that a more detailed discussion of the implications behind the use of single congener verses congener-specific RBRGs be presented in more detail in a TWG format.	See the response to Comment FMIT-22.		See final resolution for FMIT-22.
377	Hualapai-23	RA		ES-7	Various typographical/spelling errors. e.g., first line pg ES-7	A global spell and grammar check should be performed on the document.	See the response to Comment FMIT-23.		See final resolution for FMIT-23.
378	Hualapai-24	RA		ES-7	Table, Current-Residential and recreational	The distance from the TCS to the listed (closest) residential area should be provided.	See the response to Comment FMIT-24.		See final resolution for FMIT-24.
379	Hualapai-25	RA		ES-7	Table, Future (land use)	The DOI requirement for residential land use evaluation, either seasonal or year-round, was intended for informational purposes only and not for decision-making. This commitment should be clearly presented in the HHERA.	See the response to Comment FMIT-25.		See final resolution for FMIT-25.
380	Hualapai-26			ES.7.2 / ES-29	Some targeted form of risk management or remediation… to levels below 1 x 10-6.	The risk assessment continues to default to 1 x 10^{-6} as the acceptable level of risk at the site. As stated earlier, within the text acceptable risk ranges from 1 x10^{-4} through 1 x 10^{-6}. Therefore, the risk assessment should be updated to state that "remediation to reduce risk to 1 x 10^{-6} may not be necessary however If risk management concludes it is necessary to reduce risk below 1 x 10^{-6}, then targeted assessment of risk management or remediation should be required."	See the response to Comment FMIT-26.		See final resolution for FMIT-26.
381	Hualapai-27			ES.8 / ES-29	RBRGs, risked based remedial goals, "are proposed health protective target cleanup concentrations that can be used in combination with other factors such as background concentrations, as a starting point [underline added for emphasis] for making risk management decisions."	This would indicate that the HHERA is a starting point in creating a firm foundation resulting in remedial decisions that would be mutually shared, i.e. tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-27.		See final resolution for FMIT-27
382	Hualapai-28			ES.8.1.1 /ES-30	Rearranging the equations used to estimate the ILCRs and noncancer hazards and using the target ILCR of 1 x 10^{-6} (and 1 x 10^{-5} for dioxin TEQ) and the target noncancer HQ of 1, the concentration of each risk driver associated with the target ILCR and HQ levels was determined.	The text should provide RBRGs developed using the entire acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6} not simply based on the upper bounds of the acceptable risk range. Please update text for RBRG discussions to address the RBRG range and not a single RBRG developed for the upper bounds limit. In addition, please update the table in this section to show RBRGs associated with entire acceptable risk range	See the response to Comment FMIT-28.		See final resolution for FMIT-28.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

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383	Hualapai-29			ES.8.2.2 /ES-32	AOC9 AOC10-21 to meet the RBRG of 145	Why are AOC10 samples discussed under AOC9? Please outline how soil sample locations were assigned to each AOC and the basis for changing AOC boundaries. Was any sample location repeated in EPC calculations for two different AOCs? If so which samples/locations? This is an example of another post-risk assessment work plan procedural change on which the Tribes were not consulted.	See the response to Comment FMIT-29.		See final resolution for FMIT-29.
384	Hualapai-30	RA		ES.3 / ES-9	Table, Overview of Data Included in the HHERA Third bullet on 'white powder'	Exposure to waste materials, e.g., white powder, should not be included in the risk assessment the Tribes prefer that any surficial occurrence should be removed.	See the response to Comment FMIT-30.		See final resolution for FMIT-30.
385	Hualapai-31	RA		ES 3.2 / ES-11	"For human health, the various potential receptors were assumed to contact soil…"	Excluding the scouring scenarios, the likelihood of human contact with soil decreases with increasing depth. None of the human site uses includes activities where an individual digs down to 10' below grade. This decreasing probability of soil contact needs to be reflected in all discussions of soil depth zones used for EPC calculations as well as in discussions of uncertainty.	See the response to Comment FMIT-31.		See final resolution for FMIT-31.
386	Hualapai-32	RA		ES.4 / ES-12	pp 2. "If the soil dataset had fewer than four detected values…"	The use of the maximum detected soil concentration when there are less than 4 detects or 8 observations is an assumption that overestimates the calculated EPCs. Whenever this default is used in the HHERA, it should be noted in the EPC section as well as in the discussion of conservatism.	See the response to Comment FMIT-32.		See final resolution for FMIT-32.
387	Hualapai-33	RA		EA.5.1.1/ES-12	Last pp. "The potential human receptors…: workers…	Whenever worker receptors are mentioned, the HHERA must acknowledge that both OSHA and Cal-OSHA regulations, not the HHERA, is the appropriate criteria to ensure their adequate protection.	See the response to Comment FMIT-33.		See final resolution for FMIT-33.
388	Hualapai-34	RA		ES.5.1.1/ES-13	Pp 2. "Four types of potential recreational user…"	The likelihood of these recreational users at the TCS project site is very minimal, and in many cases zero. Hunting and camping adjacent to the TCS have not ever been reported. Much of the topography renders OHV riding impossible or physically dangerous. The HHERA must provide some language which reflects the reality that these land uses are not reliable for soil cleanup determinations. (See comment above requesting a recreational land-use map)	See the response to Comment FMIT-34.		See final resolution for FMIT-34.
389	Hualapai-35	RA		ES.5.3.2-ES-17	Bullet 2. Last sentence.	Why has the target risk of 10^{-6} been selected for the evaluation of potential soil removal related to the Camper? The calculated risk for this receptor is within the risk management range and the FIRST decision is whether the estimated risk is acceptable. The proposal of cleanup to 10^{-6} is presumptuous. Perhaps a 10^{-5} cleanup scenario should also be proposed?	See the response to Comment FMIT-35.		See final resolution for FMIT-35.
390	Hualapai-36	RA		ES.5.3.2/ES-17	Bullet 3, Last sentence	Ditto above comment for hiker.	See the response to Comment FMIT-36.		See final resolution for FMIT-36.
391	Hualapai-37	RA		ES.5.3.2 / ES-17	Bullet 4, last sentence	Ditto above for OHV rider	See the response to Comment FMIT-37.		See final resolution for FMIT-37.
392	Hualapai-38	RA		ES.5.3.2 / ES-18	The estimated risks and hazards for the NORR exposure area are provided for information purposes only."	This statement must be clear and present anywhere in the HHERA that residential risks are presented. The phrase used should be edited to include "…the NORR hypothetical residential exposures are provided…"	See the response to Comment FMIT-38.		See final resolution for FMIT-38.
393	Hualapai-39	RA		ES.6.3 / ES-23	"In addition, a second set of NOAEL- and LOAEL-TRVs based on the Navy/BTAG…"	BTAG criteria are screening criteria. They might be useful in screening soil samples in terms of characterization issues, but they are not reliable TRVs to predict ecological effects.	See the response to Comment FMIT-39.		See final resolution for FMIT-39.

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394	Hualapai-40	RA		ES.6.3 / ES-24	"Avian NOAEL and LOAEL TRVs for hexavalent chromium were developed…"	The need for these criteria is not a surprise and the development of chrome +6 TRVs for avian receptors should have been done and reviewed with the Tribe prior to the HHERA. That is the purpose of the work plan. This is another example of a post-risk assessment work plan procedural change on which the Tribes were not consulted.	See the response to Comment FMIT-40.		See final resolution for FMIT-40.
395	Hualapai-41	RA		ES.6.4.2 / ES-24	Section ES.6.4.2	In the identification of ERA risk drivers, it should be specified which TRV was used. NOAEL or LOAEL or ??	See the response to Comment FMIT-41.		See final resolution for FMIT-41.
396	Hualapai-42	RA		ES.7.1 / ES-27	Section ES.7.1 Conclusions and Recommendations	The Tribes agree with the HHRA conclusions that 1) lead is not present at unsafe levels, that AOC/SWMU-specific HHRAs are not appropriate for decision-making related to proposed soil cleanup, the OCS is the appropriate exposure area, that soils are safe related to non-cancer health effects, that Tribal users risks are de minimus, and the residential evaluation is hypothetical, for informational purposes and not appropriate for decision-making. The Tribes do NOT agree that for "all potential human receptors evaluated," that the COPCs of dioxin-TEQs and Chrome+6 are applicable in the SWMU/AOCs listed. Not all the human activities are realistic in these areas. For example, the AOC9 risks are driven by fence line samples (at the top of a steep slope). Are campers and OHV riders going to be present along the fence line?	See the response to Comment FMIT-42.		See final resolution for FMIT-42.
397	Hualapai-43	RA		ES.7.1 / ES-28	Section ES.7.1 Conclusions and Recommendations	As stated above, The Tribes do not agree that "RBRGs for potential recreational users are the most appropriate benchmarks…". The Tribes also do not agree that the target risk for these hypothetical users must be at 1 x 10^{-6}. The calculated risks within the recognized risk management range must be first evaluated to determine if any action is necessary.	See the response to Comment FMIT-43.		See final resolution for FMIT-43.
398	Hualapai-44	RA		ES.7.1.1 / ES-30	Section ES.8.1.1 Methodology and Calculated RBRG Values	As stated previously, the use of 1 x 10^{-6} as a 'bright line' ILCR in the RBRG calculations ignores the first step of evaluating the estimated risks that are within the agency 'risk management' range.	See the response to Comment FMIT-44.		See final resolution for FMIT-44.
399	Hualapai-45	RA		1 / 1	Section 1. Introduction	The Fort Mojave Indian Tribe is a land-owner of land adjacent to the TCS and the text and maps must accurately reflect this.	See the response to Comment FMIT-45.		See final resolution for FMIT-45.
400	Hualapai-46	RA		1.1 / 2	Second paragraph: "Information and sampling data…"	The DTSC, after the close of Risk Assessment Work Plan comments, submitted the directive letter to PG&E requiring the individual SWMU/AOC risk assessments. This decision was never part of the work plan discussion or review with the Tribes, nor were the Tribes consulted on this directive. The Tribes had already reviewed and given their comments on the single OCS exposure area, which is the most appropriate area for soil remediation decision-making.	See the response to Comment FMIT-46.		See final resolution for FMIT-46.
401	Hualapai-47	RA		1.2 / 3	Section 1.2 Regulatory Framework, last pp	The DTSC, after the close of Risk Assessment Work Plan comments, submitted the directive letter to PG&E requiring the individual SWMU/AOC risk assessments. This decision was never part of the work plan discussion or review with the Tribes, nor were the Tribes consulted on this directive. The Tribes had already reviewed and given their comments on the single OCS exposure area, which is the most appropriate area for soil remediation decision-making.	See the response to Comment FMIT-47.		See final resolution for FMIT-47.
402	Hualapai-48	RA		2.1 / 5	Section 2.1 Site Historical Operation	Since property ownership/use is included in this section, then the mention of more recent property ownership changes, including the transfer of land to Fort Mojave, should be included.	See the response to Comment FMIT-48.		See final resolution for FMIT-48.

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403	Hualapai-49	RA		7	Last paragraph	The HHERA recognizes that in SWMU 1 there have been storm events that have changed the sediment distribution in BCS. The 2006 event is referenced. How are soil depths for samples collected prior to 2006 adjusted to reflect their depth today so those pre-2006 samples can be incorporated into the EPC calculations? Can the text provide an explanation/description?	See the response to Comment FMIT-49.		See final resolution for FMIT-49.
404	Hualapai-50	RA		9	Last paragraph of AOC 1 section	Same comment as above.	See the response to Comment FMIT-50.		See final resolution for FMIT-50.
405	Hualapai-51	RA		9	Section on AOC 4	This section does not discuss the finding of buried debris (and possible dioxin source) just below the water tanks and at the top of the east ravine drainage.	See the response to Comment FMIT-51.		See final resolution for FMIT-51.
406	Hualapai-52			2.2 / 17	Entire section	Please include the conclusion of the groundwater risk assessment within this section	See the response to Comment FMIT-52.		See final resolution for FMIT-52.
407	Hualapai-53			2.2.2 / 19		This section should include a discussion of the EE/CA that was released by DOI in 2018 if the non-time critical removal action moves forward	See the response to Comment FMIT-53.		See final resolution for FMIT-53.
408	Hualapai-54	RA		30	Footnote 3	The Hepta- and Octa- chlorinated dioxin congeners should be included in the sediment migration analysis. Depending on the source of dioxin compounds (burning PCBs vs. burning organic trash), the hepta-a and Octa-congeners could be important markers of dioxin migration in BCW and ER sediment.	See the response to Comment FMIT-54.		See final resolution for FMIT-54.
409	Hualapai-55	RA		2.5.2.5.1 /30-31	Decision criteria for Gradient Analysis	The criteria for the Gradient Analysis listed on page 30 is different than what is listed on page 31	See the response to Comment FMIT-55.		See final resolution for FMIT-55.
410	Hualapai-56	RA		2.5.2.5.2 / 31	Section 2.5.2.5.2 Conclusions for the Gradient Analyses	The Tribes agree with the conclusions of this evaluation that sediment is not significantly migrating and entering the river.	See the response to Comment FMIT-56.		See final resolution for FMIT-56.
411	Hualapai-57			2.5.2.5.2 / 31	Based on the gradient analyses and the physical characteristics of BCW, specifically the Tamarisk Thicket area, potential transport of indicator chemicals and other constituents from the surface soil entrained in runoff from upland areas at BCW to downgradient locations may be potentially complete; however, this pathway is not considered significant based on the low concentrations and NDs in the northernmost BCW soil locations west of the National Trails Highway, before soil transitions to sediment. Therefore, a quantitative risk evaluation of the BCW sediment area, east of the National Trails Highway was not required, as subsequent sediment exposure pathways would likewise be insignificant. This conclusion is further supported by data showing that concentrations of the indicator chemicals (and dioxin TEQ) are low (below the BTVs) or not detected in the BCW sediment area.	The Tribes agree with this conclusion and support the inclusion of this concept in any future soil risk evaluation or remedial action.	See the response to Comment FMIT-57.		See final resolution for FMIT-57.

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412	Hualapai-58	RA		2.6.1 / 33	Pp 2	The phrase "recreational access is potentially present across much of the site" is not the same as various recreational activities occurring at the site. The Tribes have argued that hunting, camping, OHV riding and hiking are not very likely along the fence line of the TCS. The presentation of these human receptor activities needs to include that caveat that they do not occur in all areas of the OCS exposure area.	See the response to Comment FMIT-58.		See final resolution for FMIT-58.
413	Hualapai-59			2.6.2 / 33	Due to the openness of the federal land and limited restrictions to site access, recreational access is potentially present across much of the site.	It is the Tribes perspective that camping, hunting hiking and OHV riding is not likely to occur in many of the AOCs due to the current site use and topography of the site. This section should identify AOCs in which recreational activity is likely to occur and should also include language that identifies regions within each AOC that are not suitable for all recreational activities (e.g. steep slopes unsuitable for camping).	See the response to Comment FMIT-59.		See final resolution for FMIT-59.
414	Hualapai-60			2.6.2 / 34	The purpose of the proposed expansion included a variety of seasonal residential and recreational uses, including mobile homes, expansion of tent camping and recreational vehicle areas, a hotel, and reconstruction of an old restaurant. According to DOI, the requested expansion by San Bernardino County would allow for new pull-through recreational vehicle camping sites and tent camping areas.	The Tribes would like this topic addressed in greater detail during consultation meetings with DOI and expect tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-60.		See final resolution for FMIT-60.
415	Hualapai-61			2.6.2 / 34	It is reasonably foreseeable that camping on the floodplain will occur under either San Bernardino's proposed expansion or USBLM's future use of non-leased areas.	The Tribes would like this topic addressed in greater detail during consultation meetings with DOI and expect tribal consultations, PRIOR to any activities taking place.	See the response to Comment FMIT-61.		See final resolution for FMIT-61.
416	Hualapai-62	RA		3.1.1 / 36	"Asbestos soil data will be discussed in the forthcoming…"	This is another example where not having the final soil RFI/RI report hinders the Tribes from understanding the full impact of potential soil remediation issues. Will the RFI/RI report make recommendations related to asbestos in soil?	See the response to Comment FMIT-62.		See final resolution for FMIT-62.
417	Hualapai-63	RA		3.1.3 / 37	Section 3.1.3, last pp	The text states that sediment migration from upland areas into the site drainages (e.g., BCW, ER) "may be potentially complete; however, this pathway is not considered significant". The basis for this conclusion is the gradient analysis in Section 2.5. However, the gradient analysis looks at depositional patterns in the full length of BCW/ER to determine if contamination is migrating to the river. This gradient analysis does not evaluate the potential for high concentrations above the site drainages to migrate into the drainages.	See the response to Comment FMIT-63.		See final resolution for FMIT-63.
418	Hualapai-64	RA		3.2.5 / 44	Section 3.2.5	Representativeness is inherently biased when biased (vs. random) soil sampling protocols are used. Sampling high concentration locations and then stepping out to find extent results in a dataset that is biased towards high concentrations. That is why the area-weighting in the EPC calculations is important in countering this sampling bias.	See the response to Comment FMIT-64.		See final resolution for FMIT-64.

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419	Hualapai-65			3.2.7 / 46	As stated in the RAWP (Arcadis 2008a), for cases where a field duplicate sample is present, a single representative concentration for the sample was selected generally consistent with USEPA guidance regarding data verification, data validation, and data quality assessment (USEPA 1992, 2002a).	Using the maximum detected concentration from a primary sample and its duplicate is not an appropriate procedure. The use of the maximum concentration will result in an overestimation bias of the calculated exposure point concentrations in each of the exposure areas, which in turn results in an increase in estimated hazards and risks in the risk assessment. Agency guidance on soil sampling consistently states that the overriding goal is to collect unbiased and representative samples. Please include a discussion in the uncertainty section on how the use of the highest detected concentration will influence risk calculations.	See the response to Comment FMIT-65.		See final resolution for FMIT-65.
420	Hualapai-66			3.3 / 46	Soil samples collected at four locations...are the only sample locations ...samples evaluated as part of BCW and also as part of AOC4	It appears from this text that single soil sample locations are used in two different exposure areas and included in risk calculations for two different AOCs. Please provide a thorough outline of all samples that are included in two different AOC risk calculations and how those samples contribute to the risk calculated for each area. Also, please discuss the use of samples in multiple exposure areas within the uncertainty section.	See the response to Comment FMIT-66.		See final resolution for FMIT-66.
421	Hualapai-67	RA		3.4.1.1.1 / 50	Section 3.4.1.1.1 Comparison to Background	The Tribes support the comparison of sampling data to background using a variety of appropriate approaches to ensure that soil concentrations that are evaluated in the HHERA are contamination, not background.	See the response to Comment FMIT-67.		See final resolution for FMIT-67.
422	Hualapai-68	RA		4 / 54	Section 4 Estimation of Exposure Point Concentrations	The Tribe supports the various procedures for estimating Exposure Point Concentrations (EPCs). Both the depth-weighted and area-weighted calculations incorporate important spatial characteristics of both the data and potential exposure. The Tribes particularly support the area-weighted EPCs because they reduce the sampling bias inherent in the data. (see above)	See the response to Comment FMIT-68.		See final resolution for FMIT-68.
423	Hualapai-69			5.3.1 / 61	Current land use does not include residential use for any part of the sire, nor is I likely to in the future	Please update section 2.6 to be consistent with this language.	See the response to Comment FMIT-69.		See final resolution for FMIT-69.
424	Hualapai-70	RA		5.3.1.1 / 62	Section 5.3.1.1 Maintenance Workers	The inclusion of TCS workers as receptors in the HHERA includes potential exposures both inside and outside the TCS (i.e., OCS and ICS areas). The assumptions include exposures to only soils outside the compressor station. While short-term workers could be hired for one project outside the fence line, it is unlikely that long term maintenance workers would only work outside the fence line. The Tribe does not accept these receptors as acceptable for making soil cleanup decisions. In addition, there are federal and state regulations for the protection of workers that are more applicable than the results of a risk assessment.	See the response to Comment FMIT-70.		See final resolution for FMIT-70.
425	Hualapai-71			5.3.1.1 / 62	Section 5.3.1.1 Maintenance Workers - Long-term workers, primarily PG&E employees, who may be present during various types of activities for a certain period of hours and days per year for a 30-year period	Please confirm that Cal EPA guidance on occupational duration is 30-years. It has been reported in other DTSC documents that the 95th percentile occupational exposure duration is a 25-year period. Please provide reference for the 30-year exposure duration.	See the response to Comment FMIT-71.		See final resolution for FMIT-71.
426	Hualapai-72			5.3.1.1 / 62	The baseline risk assessment assumes that potential contact with soil is not limited by the presence of engineering or institutional controls in the future	Please include this conservative assumption in the uncertainty section and discuss how dust suppression and other SOPs are in place that ensure limited exposures and risks.	See the response to Comment FMIT-72.		See final resolution for FMIT-72.

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427	Hualapai-73	RA		5.3.1.2 / 63	Section 5.3.1.2 Recreational Users	The various recreational land users evaluated in the risk assessment represent activities that have little to no precedent of having occurred and are unlikely to occur in the future. Camping, hunting OHV riding on areas (SWMU/AOCs) immediately adjacent to the compressor station have not occurred. For example, have these activities ever been recorded as occurring in AOC 9 or 10 or 11 or 12, areas adjacent and below the compressor station? Any decisions regarding soils cleanup should be based on real and complete exposures, not theoretical.	See the response to Comment FMIT-73.		See final resolution for FMIT-73.
428	Hualapai-74			5.3.1.5 / 65	Section 5.3.1.5 Hypothetical Future Residential Users - ...hypothetical future resident as a rural resident who obtains a significant portion of his/her diet from onsite produced food.	This text should clearly indicate that this exposure scenario was only included based on agency direction and does not reflect current or expected exposures. The Tribes do not support the use of overly conservative and non-site-specific exposure assumptions.	See the response to Comment FMIT-74.		See final resolution for FMIT-74.
429	Hualapai-75			5.3.2 / 66	Section 5.3.2 Potential Exposure Areas - "Although these additional risk evaluations do not represent reasonable current or future long-term exposure scenarios, and thus should not be the primary basis for risk management decisions, the information is presented in this HHERA Report at the agency's direction.	The Tribes concur that these AOC specific risk assessments do not represent reasonable current or future long-term exposure scenarios. Risk management decisions should be determined based on realistic site usage with the input of the Tribes.	See the response to Comment FMIT-75.		See final resolution for FMIT-75.
430	Hualapai-76	RA		66	Last pp	The inclusion of the exposure area BCWxSWMU1+TCS-4 seems like an attempt to predict soil cleanup scenarios by including this additional/modified scenario. Each of the individual SWMU/AOCs are included, by agency request, in the HHERA and those individual evaluations should be sufficient information for risk managers.	See the response to Comment FMIT-76.		See final resolution for FMIT-76.
431	Hualapai-77			5.4.5 / 82	Section 5.4.5 Toxicity Factors for Dioxins and Furans - DTSC remedial goal of 50 picograms per gram (pg/g) total TCDD TEQ for residential land use based on a target cancer risk of 1 x 10-5..."	It is stated within this section that DTSC has used 1 x 10^{-5} as an appropriate risk threshold for residential exposures. Therefore, please adjust the language throughout the report to indicate that DTSC has used risk thresholds higher than 1 x 10^{-6} for allowable risk thresholds.	See the response to Comment FMIT-77.		See final resolution for FMIT-77.
432	Hualapai-78			5.5.1.1 / 87	Section 5.5.1.1 Carcinogenic Health Effects - CalEPA's point of departure for excess incremental lifetime cancer risk for all receptor groups (i.e., residential populations) is 1 x 10-6, and risk management decisions may raise this criterion depending on site-specific conditions	There are numerous examples were CalEPA uses risk range of 1 x 10^{-4} through 1 x 10^{-6}. This should be stated in the text rather than suggesting CalEPA's point of departure is a default 1 x 10^{-5}.	See the response to Comment FMIT-78.		See final resolution for FMIT-78.
433	Hualapai-79	RA		5.5.3 / 89	Section 5.5.3 Results of the Cancer Risk and Noncancer Hazard Assessment	The presentation of both cancer risks and noncancer hazards occur in an order which does not reflect their applicability. The area-weighted results, which appropriately account for the spatial distribution of samples, is the most applicable scenario. The Tribes request that in both the main text and in all appendices that the area-weighted results are presented first.	See the response to Comment FMIT-79.		See final resolution for FMIT-79.
434	Hualapai-80	RA		5.5.3 / 132	Section 5.5.3 Results of the Cancer Risk and Noncancer Hazard Assessment	The presentation of the Outside Compressor Station (OCS) results should be the first results presented. The OCS scenario, with the area-weighted EPCs, is the most applicable to potential exposures outside the compressor station. By presenting it first the reports give this scenario the appropriate importance rather than being buried within the other SMWU/AOC results.	See the response to Comment FMIT-80.		See final resolution for FMIT-80.

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435	Hualapai-81			5.5.3.14 / 135	Section 5.5.3.14 Outside the Compressor Station - Therefore, the combination of all exposure areas outside the TCS...represent both current and potential future exposures...	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action.	See the response to Comment FMIT-81.		See final resolution for FMIT-81.
436	Hualapai-82	RA		135	"Alternative" Evaluation	As described in Comment #76 above, the inclusion of the "Alternative" evaluations (OCSxSWMU1+TCS-4) in a presumptuous and unnecessary evaluation. Prior to any evaluation of potential soil cleanup scenarios (i.e., removing certain samples and re-running risk calculations), the presented risks/hazards must be evaluated to determine if any action is required. None of the OCS, area-weighted risks are higher than 7×10^{-6}, clearly in the agency "risk management" range. This means that a reasonable and acceptable risk management decision could be "no action".	See the response to Comment FMIT-82.		See final resolution for FMIT-82.
437	Hualapai-83			5.6.3.2 / 152	Section 5.6.3.2 Exposure Assumptions and Pathways - Entire section	This section does not adequately address the uncertainties and overestimations of exposures that are included in all of the recreational exposure scenarios. For example, the intake parameters for the hiker and hunter are defined as 24 hours/ day. It can be presumed that hiking and hunting would only occur during daylight hours (varying seasonally from 8 to 12 hours per day). In addition, it is the Tribe's position is that neither hunting nor off-road vehicle driving are reasonable future uses of the Topock Maze and surrounding area because these land uses are inconsistent with management of this sacred area, a recognized historic resource and Traditional Cultural Property (TCP). The basis for the selection of these recreational activities and the exposure parameters which define the extent to which these activities occur are based on information collected from other DOI/BLM sites and will greatly overestimate risk at the Topock site. Furthermore, a recreational hiker exposure frequency is based on data that is generic and not specific to the Topock site and it is assumed that the duration of hiking is spent only on contaminated areas of the Topock site. The hiking exposure durations and frequencies are based on visits to areas with existing trail systems and will unrealistically overestimate the frequency of visits to the Topock Site which does not have a developed hiking trail network. While some BLM trails cross portions of the Site, there is no organized trail network through the soil investigation area and, absent evidence to the contrary, it is unreasonable to assume that a hiker will spend an entire day on the Site. Thus, these recommended exposure parameters do not represent a "reasonably anticipated use" of the site. This overestimation of exposure that is present in all recreational exposure scenarios needs to be discussed in greater detail in the uncertainty section.	See the response to Comment FMIT-83.		See final resolution for FMIT-83.

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438	Hualapai-84			5.6.3.2 / 153	Section 5.6.3.2 Exposure Assumptions and Pathways - In sum, the risk assessment meets the regulatory requirement to address an upper bound for potential exposures...the actual exposures to soil...would probably be much lower than has been estimated in this HHRA	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site wide risks for any future soil remedial action	See the response to Comment FMIT-84.		See final resolution for FMIT-84.
439	Hualapai-85			6.1 / 158	Section 6.1 Purpose and Objective- Ultimately, the conclusions reached from conducting the ERA along with other site information will be used to establish an overall site risk management strategy.	Please discuss other lines of evidence that will be, or can be, used in determining site risk. For example, plant and invertebrate population surveys or use of plant survey data that already exists should be used to support (if the actual population does support) the risk calculations.	See the response to Comment FMIT-85.		See final resolution for FMIT-85.
440	Hualapai-86			6.3 / 159	Section 6.3 Problem Formulation - The surface soil transport pathway analyses...concluded potentially complete but insignificant transport pathways for surface soil entrained in runoff to reach the sediment areas near the river downgradient of BCW and AOC 10 and therefore, quantitative evaluation of these sediment areas was not required.	The Tribes agree with this main conclusion stated throughout the risk assessment and support the use risk calculations based on site-wide risks for any future soil remedial action.	See the response to Comment FMIT-86.		See final resolution for FMIT-86.
441	Hualapai-87	RA		6.5.2 / 172	Section 6.5.2 Toxicity Reference Values	While ecological screening levels may be applicable to designing soil sampling activities, screening levels do not provide reliable or appropriate ecological hazard estimates. The Tribe supports the use of LOAEL-based TRVs as the most appropriate values to use in the calculation of ecological hazards.	See the response to Comment FMIT-87.		See final resolution for FMIT-87.
442	Hualapai-88			6.6.1 / 179	The BTAG NOAEL-based TRVs are considered very conservative, resulting in a wide range of risks to potential wildlife receptors. For the Topock site ERAs, the selected TRVs are considered more robust than the BTAG TRVs.	The inclusion of the BTAG NOAELs and LOAELs is unnecessary and should be removed from the text. The inclusion of overly conservative NOAELs (BTAG) does not add value to the risk calculations, leads to confusing results and an increased perception of risk that does not exist at the site. Please remove the BTAG NOAELs.	See the response to Comment FMIT-88.		See final resolution for FMIT-88.
443	Hualapai-89	RA		6.6.1 / 179	For the risk description part of the risk characterization process, a semi-quantitative WOE approach was used incorporating multiple LOEs.	Please include plant population survey information (that is currently available) as an additional line of evidence to determine if risk calculations (HQ>1 indicate unacceptable risk) are correctly reflected in current ecological site status. Also, a soil invertebrate population study should be included in areas that have shown calculated risk (HQ>1) to determine if risk calculations are correctly reflected in invertebrate impacts. This is of particular relevance to risks calculated in SWMU1, AOC9, AOC10.	See the response to Comment FMIT-89.		See final resolution for FMIT-89.
444	Hualapai-90			6.6.2 / 181	Section 6.6.2 Results	(See comments #79 and 80, above) The presentation of ecological risks should be done with the most applicable and appropriate first. Otherwise, the reader might determine the first risks are the most appropriate. The Tribe requests that OCS results using LOAEL TRVs are presented first. Then, the other scenarios which provide additional information for risk management decisions, can be presented.	See the response to Comment FMIT-90.		See final resolution for FMIT-90.

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445	Hualapai-91			6.6.2.1.1 / 182	Baseline Scenario – Desert Shrew	It is unclear what species at the site is being modeled by the Desert Shrew. The Desert Shrew has a very large diet and will always have a high exposure and high calculated risk. The ERA notes that the Desert Shrew has never been observed at the site. Therefore, the ERA should clearly indicate what species observed at the site is modeled based on the Desert Shrew.	See the response to Comment FMIT-91.		See final resolution for FMIT-91.
446	Hualapai-92			6.6.2.3 / 197	Bat Cave Wash excluding SMUW 1 and TCS-4	(see comment #76, above) The evaluation of exposure areas with 'removed' soil samples (e.g., BCWxSWMU1+TCS-4) are presumptuous and un necessary evaluations since each SMMU and AOC risks are presented.	See the response to Comment FMIT-92.		See final resolution for FMIT-92.
447	Hualapai-93			6.7.3.3 / 251	When the available dataset for a depth interval and exposure area was composed of less than eight total samples, the maximum depth weighted concentration was selected as the EPC for all three EPC scenarios.	This approach is not consistent with the statement provided in section 6.4.3 which states: "Risk estimates using maximum concentrations are considered overly conservative and generally used for screening level purposes." Use of maximum concentrations is not recommended for use in making risk management decisions. Please update the text in section 6.7.3.2 to more consistently reflect what is stated in section 6.4.3 that the use of the maximum concentrations will not correctly characterize site risk.	See the response to Comment FMIT-93.		See final resolution for FMIT-93.
448	Hualapai-94			6.7.3.3 / 251	Receptor Exposure Assumptions	It is unclear what species at the site is being modeled by the Desert Shrew. The ERA notes that the desert shrew has never been observed at the site. Therefore, the ERA should clearly indicate what species observed at the site is modeled based on the Desert Shrew. In addition, the Uncertainty section should clearly indicate that the Desert Shrew (or any shrew) has not been observed at the site.	See the response to Comment FMIT-94.		See final resolution for FMIT-94.
449	Hualapai-95			6.7.4 / 252	Uncertainty in Uptake Assumptions	The ERA should include the results of the technical memo, Potential For Chromium Uptake by Arrow weed and Potential Exposure Pathways (2013), which show that CrVI which may be taken into plants is converted into CrIII. This finding has not been sufficiently included in the ERA uptake assumptions for plants.	See the response to Comment FMIT-95.		See final resolution for FMIT-95.
450	Hualapai-96			7.1.3 / 280	Summary and Overall Conclusions and Recommendations for the HHRA RBRGs for the potential recreation users are the most appropriate benchmarks for the protection of human health and associated risk management decisions going forward	It is the Tribes perspective that camping, hunting, hiking and OHV riding is not likely to occur because these land uses are inconsistent with management of this sacred area, a recognized historic resource and Traditional Cultural Property (TCP). The presence of Tribal sacred areas has an impact on DOI/BLM-allowed activities as these federal agencies are mandated through Executive Orders, Federal Trust Responsibility and other ARARs (i.e., both federal and state laws) to protect Tribal sacred lands as a priority. The authority for, and the responsibility of, DOI/BLM to specifically protect the Topock Maze area and surrounding documented Tribal use areas comes in part from the Federal Land Policy and Management Act and the National Environmental Policy Act and has been documented in the Record of Decision (ROD) and Resource Management Plan (RMP) published by the Lake Havasu Field Office in 2007. In the ROD/RMP the Topock Maze area has been designated for Traditional Use as part of the Cultural Resource Management actions (ROD/RMP Table 2, page 26). This designation requires long-term protection as well as consultation with the Tribes to determine which safeguards the DOI/BLM will put in-place to achieve this long-term protection. DOI/BLM has both the authority and responsibility to take management actions to achieve this protection.	See the response to Comment FMIT-96.		See final resolution for FMIT-96.

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451	Hualapai-97	RA		8 / 285	Section 8 Risk-Based Remediation Goals for Risk Drivers in Soils	In this section the Risk-Based Remedial Goals (RBRGs) are calculated and presented. Whole RBRGs can be useful in soils RI/RFI activities, their presentation in the risk assessment seems pre-mature and unnecessary. There has been no decision that any action for soils is necessary (a risk management decision). Therefore, why calculate soil cleanup goals? Another option, if indeed some soils—related action is deemed necessary, is to perform a risk evaluation where sequentially the highest soil concentrations of risk-driving chemicals are 'removed', and EPC and risk calculations are redone. This is a preferable process to using RBRGs since the risk evaluation retains the appropriate and applicable area-weighted EPCs. RBRGs could be mis-used and applied as 'absolute' soil cleanup goals which essentially by-passes the important area-weighted-based risk/hazard evaluations.	See the response to Comment FMIT-97.		See final resolution for FMIT-97.
452	Hualapai-98	RA		8//85	Section 8 Risk-Based Remediation Goals for Risk Drivers in Soils	The RBRGs are based on an incremental lifetime cancer risk of 1 x 10-6. While this is considering a point of departure for risk management decisions, it is not a required risk level in soil remediation decisions. The risk range of 1 x 10^{-4} to 1 x 10^{-6} (inclusive of 1 x 10^{-5}) should also be considered since this is not a residential area but the only potential exposures are workers, recreators, or Tribal members.	See the response to Comment FMIT-98.		See final resolution for FMIT-98.
453	Hualapai-99	RA		8.1.1 – 8.2.1 / 286-290	8.1.1 and 8.2.1 Methodology for Deriving RBRGs and Values	Please clearly explain how background CrVI and Dioxin/furan values are included in the RBRG calculations. Specifically, are background concentrations subtracted out prior to the RBRG calculation? If not, please explain how the inclusion of background increases the RBRG value.	See the response to Comment FMIT-99.		See final resolution for FMIT-99.
454	Hualapai-100			8.1.1 / 289	8.1.1 Methodology for Deriving Human health RBRGs and Values Therefore, potential exposure to dioxin TEQ in soil for the recreational users over a lifetime would be less… As such the RBRGs for the recreation users equal to a theoretical potential cancer risk of 1 x 10-5 may be appropriate.	The recreational user has been proposed as the most appropriate benchmarks for the protection of human health and associated risk management decisions going forward. In addition, the text acknowledges that use of a 10-6 risk threshold for the recreational user is not appropriate. Therefore, please update the RBRGs to include the calculated concentrations based on a 10^{-5} risk threshold.	See the response to Comment FMIT-100.		See final resolution for FMIT-100.
455	Hualapai-101			8.2.1 / 291	8.2.1 Methodology for Deriving Ecological RBRGs and Values The congener specific BAFs and a recommended mammalian dioxin TEQ LOAEL TRV of 30 ng/kg bw-day were used to calculate the RBRGs protective of invertivorous small mammals.	If exposure concentration based on a more scientifically defensible BAF value rather than assuming all congener uptake as 2,3,7,8-TCDD, why was the more appropriate TCDD BAF value not used in the risk calculations?	See the response to Comment FMIT-101.		See final resolution for FMIT-101.
456	Hualapai-102			9 / 294	9 Key Findings Or target ILCR of 1 x 10-5 for workers	The Tribes agree that an ILCR point of departure of 1 x 10^{-5} for workers and recreational visitors is more reasonable than a 1 x 10^{-6} value. Please update text to include recreational visitors in this section.	See the response to Comment FMIT-102.		See final resolution for FMIT-102.
457	Hualapai-103			9 / 294	9 Key Findings Risk drivers were identified based on a target HQ of 1 and additional LOE support the conclusion of unacceptable risk.	Please include population surveys as an additional LOE. All LOEs to date are based on conservative quantitative evaluation of soil sample data. No effort has been made to determine whether the quantitative evaluation of risk is correctly reflected in the current ecological site status.	See the response to Comment FMIT-103.		See final resolution for FMIT-103.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

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458	Hualapai-104	RA		9 / 295	Section 9 Key Findings	The listing of the nine (9) soil sampling locations that contain risk driving-chemicals and contribute to higher risk estimates is more appropriately a post-risk management exercise. The listing of these 9 locations has embedded assumptions regarding the acceptability of risks and hazards which are not appropriate at this stage in the soils RI/RFI process as no determination of the acceptability of risks has been made. The Tribe requests that this presentation of the 9 risk-driving soil sample locations be removed from the HHERA.	See the response to Comment FMIT-104.		See final resolution for FMIT-104.
459	Hualapai-105				The following comments refer to HHERA Appendices. Many of the comments related to the main text are also applicable to the individual SWMU/AOC risk assessment presented in the Appendices and should be considered and address as such.		See the response to Comment FMIT-105.		See final resolution for FMIT-105.
460	Hualapai-106	RA		1-1	Appendix RBC Soil Management Plan Risk-Based Concentrations for Groundwater Remedy (Appendix RBCs)	The text references a table in the main text, Table 3-7. While that Table is listed in the TOC for the main text, that table does not appear in my copy of the HHERA. The Appendices should be stand-alone and not be referring to tables or figures in other sections of this 11,000+page document.	See the response to Comment FMIT-106.		See final resolution for FMIT-106.
461	Hualapai-107	RA		2-1	Appendix RBCs	The Appendix refers to procedures from the main report/RBRGs as being used for the RBCs. This makes the review of these appendices difficult as the reader then must find other sections of the report in order to understand the procedures being used. The appendices should be stand-alone.	See the response to Comment FMIT-107.		See final resolution for FMIT-107.
462	Hualapai-108	RA		2-1	Appendix RBCs	The use of a bright-line risk value of 1×10^{-6} is not appropriate for setting RBCs. An important issue for the Tribe has been the repatriation of excavated soils and to keep as much soil at the site as reasonable possible (i.e., do not exceed hazardous water levels or pose an unacceptable risk).	See the response to Comment FMIT-108.		See final resolution for FMIT-108.
463	Hualapai-109	RA		3-1	Appendix RBCs	Notwithstanding the above Appendix RBC comments, The Tribe supports the use of the LOAEL-based TRVs in the calculation of RBCs	See the response to Comment FMIT-109.		See final resolution for FMIT-109.
464	Hualapai-110			Draft Appendix RBC Soil Management Plan Section 3	Site Use Factor =1	Ecological RBCs based on a site use factor of 1 is overly conservative and unrealistic. A baseline risk assessment is intended to incorporate site specific data and not use generic assumptions. Please revise using appropriate SUF.	See the response to Comment FMIT-110.		See final resolution for FMIT-110.
465	Hualapai-111			Draft Appendix RBC Soil Management Plan Section 3	TEQ mammals	The Tribes believe the RBC of 192 ng/kg is a more appropriate RBC then the unrealistic hiker scenario which is overly conservative and results in an unrealistic calculation of risk for the Topock site.	See the response to Comment FMIT-111.		See final resolution for FMIT-111.
466	Hualapai-112	RA		Table RBC 2-1	Appendix RBCs	The appendix presents a table of multiple human and eco-based RBCs. The tables present RBCs for multiple receptors. Some of these receptors are not applicable to appropriate for the OCS exposure areas. There is no discussion as to how the various human or eco RBCs would be selected for use in soil repatriation.	See the response to Comment FMIT-112.		See final resolution for FMIT-112.

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467	Hualapai-113	RA		General	Appendices: OCS-Soil HHERA for Outside the Compressor Station Exposure Area; OCSxBCW--Soil HHERA for Outside the Compressor Station Excluding Bat Cave Wash Exposure Area; BCW+AOC4--Soil HHERA for Bat Cave Wash and AOC-4 Exposure Area; OCSxBCW+AOC4--Soil HHERA for Outside the Compressor Station Excluding Bat Cave Wash and AOC-4; BCW Soil HHERA for BCW Exposure Area; SWMU1 Soil HHERA for SWMU1 and TCS-4 Exposure Area; BCWxSWMU1 Soil HHERA for BCWxSWMU1 and TCS-4 Exposure Area; AOC4 Soil HHERA for AOC4 Exposure Area; AOC9 Soil HHERA for AOC9 Exposure Area; AOC10 Soil HHERA for AOC10 Exposure Area; AOC11 Soil HHERA for AOC11 Exposure Area; AOC12 Soil HHERA for AOC12 Exposure Area; AOC14 Soil HHERA for AOC14 Exposure Area; AOC27 Soil HHERA for AOC27 Exposure Area; AOC28 Soil HHERA for AOC28 Exposure Area; AOC31 Soil HHERA for AOC31 Exposure Area; UA-2 Soil HHERA for UA-2 Exposure Area	The following comments are applicable to the various SMWU/AOC HHERAs provided in the appendices to the main HHERA report.	See the response to Comment FMIT-113.		See final resolution for FMIT-113.
468	Hualapai-114					All of the human exposure scenarios and ecological receptors are evaluated in each of the listed HHERA appendices. Many of these scenarios and receptors are not supported by the topography and land characteristics in some of the SWMU/AOCs. For example, AOC9 is a steep slope immediately adjacent to the TCS. The applicability of the terrain characteristics to be able to support either the human or ecological exposures must be addressed in the uncertainty discussion in each of these reports. Further, if one of these scenarios or receptors that is not supported by the terrain characteristics is driving risk, then that scenario/receptor should not be the basis for any decisions. This issue must be fully developed and discussed in the uncertainty section of each of these appendices. The Tribes request a map showing the areas where the individual recreational land sue scenarios would be supported by site characteristics.	See the response to Comment FMIT-114.		See final resolution for FMIT-114.
469	Hualapai-115	General			Risk associated with background	Please provide a detailed explanation of how background soil concentrations are included into the HRA and ERA risk calculations and RBRGs. Is risk from background removed prior to calculation of site risk? If not please explain why not. Are RBRGs developed including the risk associated with background?	See the response to Comment FMIT-115.		See final resolution for FMIT-115.
470	Hualapai-116		General		Figures	Please provide figures (similar to Figure 9-1) for all of the individual AOC risk assessments	See the response to Comment FMIT-116.		See final resolution for FMIT-116.
471	Hualapai-117		General		Table 6-5a Bioaccumulation Factors for Estimating Tissue Concentrations from Soil BAF plant	Please indicate how the ERA includes the findings from the Potential For Chromium Uptake by Arrow weed and Potential Exposure Pathways (2013) which shows that CrVI which may be taken into plants is converted into CrIII	See the response to Comment FMIT-117.		See final resolution for FMIT-117.

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472	Hualapai-118		General		Table 6-11	Please explain why the risk to small mammals and birds is based on total chrome and not on hexavalent chrome. Is total chrome considered a site COPEC? What is the uncertainty that is included in the risk assessment when basing the risk on total chrome? How was background total chrome accounted for in this risk calculation? How was the speciation of chrome accounted for in the toxicity study used to select the total chrome trv?	See the response to Comment FMIT-118.		See final resolution for FMIT-118.
473	DOI-1	RA		Overall		PG&E has provided a comprehensive assembly of information. Overall, it appears PG&E followed DOI directions. There are no fatal flaws and the document generally meets DOI needs for further CERCLA risk-management evaluations. Some clarifications, suggestions, and requests are provided below.	Comment acknowledged.		N/A
474	DOI-2	RA		ES Section 1 And again in the HHERA Introduction	Introduction	Please consider adding the following. s an analysis of the Under CERCLA, the primary purpose of the baseline risk assessment (BRA) is to provide risk managers with an understanding of the actual and potential adverse health effects (current or future) to human and ecological receptors posed by the release of hazardous substance from the Site and in the absence of any actions to control or mitigate those releases. This information may be useful in determining whether a current or potential threat to human health or the environment exists that warrants an action. This soils HHERA, in conjunction with the groundwater risk assessment (Arcadis 2008) represent a BRA.	Language will be added to the introduction section of the ES and the main text of the HHERA Report with the following modifications: "Under CERCLA, the primary purpose of ~~athe~~ baseline risk assessment (BRA) is to provide risk managers with an understanding of the ~~actual and~~ potential adverse health effects (current or future) to human and ecological receptors posed by the release of hazardous substance from the site and in the absence of any actions to control or mitigate those releases. This information may be useful in determining whether a potential current or ~~potential~~ future threat to human health or the environment exists that warrants an action. This soils HHERA, in conjunction with the groundwater risk assessment (Arcadis 2008) represent a BRA."		Update HHERA as reported in PG&E's response (modified).
475	DOI-3	Non-RA		ES-3	AOC 1 – Area Around the Percolation Bed	The definition of AOC 1 should be the "Area of Bat Cave Wash Adjacent to and Down Stream of SWMU 1".	The nomenclature presented in the embedded table on page ES-3 is consistent with the previous naming convention presented in the RFI/RI for AOC 1. The definition of AOC 1 is fully described in Section 2.1.1.1 on page 8 of the HHERA Report. No changes to the HHERA Report are proposed to address this comment.		No changes to HHERA Report.
476	DOI-4	RA		Part 1 / top of page 10	AOC 4 discussion "…threat of release of contaminated	Please add that the TRCA is expected to be consistent with and contribute to any subsequent remedial action selected to respond to contaminated soils that are the subject of the ongoing RFI/RI.	Sections 2.1.1.1, 2.2.2, and 6.6.2.4 and relevant appendices will be updated to incorporate that the "AOC 4 TCRA, completed in 2010, is expected to be consistent with and contribute to any subsequent remedial action selected to respond to contaminated soils that are the subject of the ongoing RFI/RI."		Update HHERA as reported in PG&E's response.
477	DOI-5	RA		Part 1 / ES-17	Discussion of a "targeted form of risk management / remediation and the risk management range"	Please add that "this is consistent with the NCP, previous risk management actions at the Site as well as discussion within the risk assessment forum over the course of planning and development".	The last bullet of the Recommendations for the HHRA on page ES-28 and in Sections 7.1.1 and 7.2.5 of the HHERA Report will be updated to incorporate the following portion of suggested language, "this is consistent with the NCP."		Update HHERA as reported in PG&E's response.
478	DOI-6	RA		Part 1 2.2.1 Page 18	Various	Discussion of the pending RFI/RI Volume 3 The absence of the RFI/RI report and the expose' of the sampling results, nature and extent of contamination discussion, contamination maps and postings, transport and fate analysis, etc., limits the interpretation of the HHREA somewhat. A reader who is not familiar with the lay of the land, history of the data collection, and locations of the sample locations may not be able to grasp the full extent of the data. Will there be an effort to integrate the RFI/RI and / or the key findings at some time when the RFI / RI become available? This limitation is noted several places below.	Comment acknowledged. The HHERA and its report were completed in advance of the RFI/RI at the request of the agencies. The results of the HHERA will be summarized in the forthcoming RFI/RI Report and integrated to the extent feasible. No changes to the HHERA Report are proposed to address this comment.		No changes to HHERA Report.

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479	DOI-7	RA		Part 1 2.2.4.2 Page 20	Discussion of Ambient Dioxin / Furan Study	The reader would benefit from a brief results summary (e.g., perhaps an in-text table summarizing the ambient ranges?) to establish an understanding that there is an existing titer of these constituents that is not TCS related.	A brief summary of the range of ambient dioxins/furans congeners concentrations in site soil based on the results of the ambient/background study (CH2M 2017) will be added to Section 2.2.4.2.		Update HHERA as reported in PG&E's response.
480	DOI-8	RA		Part 1 2.2.5	Discussion of Sediment Study	Did these results have any bearing on the HHERA? If yes -what? Will this be detailed in the RFI/RI?	The results of the sediment study ultimately did not have any bearing on the HHERA as the transport pathway for COPCs/COPECs entrained in surface soil is considered potentially complete but insignificant. Therefore, quantitative risk evaluation of the sediment areas was not conducted, as subsequent sediment exposure pathways in these areas would likewise be insignificant. This conclusion is further supported by the sediment data that show concentrations of the indicator chemicals (and dioxin TEQ) are low or not detected in the mouth of BCW and East Ravine sediment areas. The results of the sediment study and the HHERA will be summarized in the forthcoming RFI/RI Report. No changes to the HHERA Report are proposed to address this comment.		No changes to HHERA Report.
481	DOI-9	HHERA		2.5.2.2 Page 28	Leaching to Ground water	This section seems to dismiss this pathway based on forthcoming RI evaluations. This seems premature. Screening level (conservative) vadose - zone calculations suggest that some locations of high hot spot concentrations may pose a continuing threat to groundwater quality. For example: • Cr VI in soils at 80 mg/kg shows vadose zone breakthrough in 30 to 50 years at ~ 1 - 4 mg/L. (Cal MCL is 50 ug/L) • Cr total in soils at 4400 mg/kg shows vadose zone breakthrough in 50 to 60 years at ~ 1 mg/L (Fed MCL is 0.1 mg/L) We understand that information is forthcoming in the RI, however, currently, DOI does not agree with the claim that the soils leaching to groundwater pathway is not significant. This comment applies to Figure 2-7 (Ecological Conceptual model) as well where the pathway is categorized as insignificant pending confirmation in the forthcoming RI. Depending on the resolution of this comment, the CSMs may need to be modified.	As noted in the comment, the screening-level vadose zone leaching calculations previously presented during the RFI/RI data gaps process were ultra-conservative, by design. The forthcoming RFI/RI Report will present results of more rigorous and realistic vadose zone leaching modeling. Using site-specific input parameters for evapotranspiration rates, aquifer recharge rates, depth to groundwater, and realistic assumptions of lateral vertical distribution of metals concentrations, the metals leaching to groundwater pathway has been demonstrated to be not significant. Section 2.5.2.2 of the HHERA Report does not dismiss the leaching to groundwater pathway; rather, the text acknowledges that the analysis will be presented in the forthcoming RFI/RI Report (Volume 3) and presents *the preliminary* findings described above. Preliminary findings will be reevaluated in the forthcoming RFI/RI Report; the impacts will be evaluated in light of hot spots acting as potential sources to groundwater, and the HHERA will be revisited if the analysis warrants. No changes to the HHERA Report are proposed to address this comment.		No changes to HHERA Report.

<table>
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<tr><td>482</td><td>DOI-10</td><td>HHERA</td><td></td><td>2.5.2.2
Page 31</td><td>Gradient Analysis</td><td>The Gradient analysis seems demonstrates a relationship between current measured upgradient and down gradient concentrations. It seems to suggest an up-to down gradient pathway concentration ratio relationship ranging from the thousands (Figure SSTPA -5) to single digits (Figure SSTPA 4 Cr Total shows ~ 100 mg/kg SWMU N Boundary to ~ 50 mg/kg BCW 28; ratio ~ 2).

Given the plausibility of the scouring phenomenon, and existence of localized subsurface hot spots in the southern reaches of BCW & SWMU 1, this seems to suggest that down gradient reaches may at be risk of further contamination in the event of future erosional episodes as indicated below using a nominal gradient factor of 3 (generally from STTPA 4).

<table><tr><td>Chemical</td><td>Max (0-3ft)</td><td>Conservativ Estimate fro up to down gradient fac of 3</td></tr><tr><td>Cr Total</td><td>2600mg/kg</td><td>867</td></tr><tr><td>Dioxin (TEQ Human)</td><td>12,000 ng/kg</td><td>4000</td></tr><tr><td>Dioxin (TEQ Mammal)</td><td>12,000 ng/kg</td><td>4000</td></tr></table>
DOI’s point here is that the HHERA does not address all plausible future events and that current information suggests the possibility of adverse impacts.

In this light, please address the existence of known hot spots and how they should be addressed either in the HHERA or the forthcoming RFI/RI where nature and extent of contamination and contaminant transport and fate will be addressed.</td><td>Per DOI’s calculations, the “gradient factor” ranges from the 1,000s to the single digits. Selecting the most conservative factor is arbitrary and can considerably overestimate concentrations downgradient.

Including such an evaluation in the HHERA does not provide reliable information as to whether or not subsurface hotspots may represent a future downgradient risk following scouring in BCW.

Even if there are some localized “hot spots” in subsurface soils in the southern reaches of BCW and SWMU 1, it is assumed that these concentrations would be reduced when mixed with low concentrations of upgradient soils when transported down the wash during a scouring event. Given the gradient analysis results and trends in concentrations, it is unlikely that a scouring event would change the conclusions of the transport analysis.

The forthcoming RFI/RI Report will present the soil data and discuss the nature and extent of contamination. Areas of known elevated concentrations (“hot spots”) will be identified. The forthcoming RFI/RI Report will also present conceptual site models that discuss sources and migration potential including the potential for future erosional events.

A statement will be added to Section 2.5.2.2 of the HHERA to acknowledge that the potential impacts of localized hots spots will be completed in the forthcoming RFI/RI Report; the impacts will be evaluated in light of potential HHERA impacts, and the HHERA will be revisited if the analysis warrants.</td><td></td><td>Update HHERA as reported in PG&E’s response.</td></tr>
<tr><td>483</td><td>DOI-11</td><td>HHRA</td><td></td><td>2.6.2
Page 33 & 34</td><td>Future Land Use</td><td>This discussion is consistent with the NCP, RAGS (1989), and prevailing OSWER 174935 guidance.</td><td>Comment acknowledged.

No changes to the HHERA Report are proposed to address this comment.</td><td></td><td>No changes to HHERA Report.</td></tr>
<tr><td>484</td><td>DOI-12</td><td></td><td></td><td>Page 34 and Reference DOI 2007</td><td>Future Land Use</td><td>The 2007 reference provided in the text is in regard to the approval of the Phase 1 RFI/RI. The appropriate reference is a letter from DOI regarding future land use dated 10/5/2007.

This section should also discuss and reference the DOI letter dated March 23, 2015 concerning Future Land Use Assumptions in Remedy Selection.</td><td>The citation, DOI 2007, in the text will be updated to DOI 2007b, which is the correct reference citation for the letter from DOI regarding future land use, as it appears in Section 10, References, of the HHERA Report. A discussion of and reference to the DOI letter dated March 23, 2015 concerning Future Land Use Assumptions in Remedy Selection (DOI 2015) will be included in Section 2.6.2 of the HHERA Report.</td><td></td><td>Update HHERA as reported in PG&E’s response.</td></tr>
<tr><td>485</td><td>DOI-13</td><td>HHERA</td><td></td><td>Section 3.2.4 Text pp 38</td><td>Data Usability</td><td>The section says s the validation results will be presented in the forthcoming RFI/RI. Yet PG&E has completed a data driven report using a very large data set. Can it be stated that all the data used in the risk assessment has been validated and can be used with a high level of confidence and this has been confirmed with the RFI/RI report? Is there need for a formal verification of the risk assessment results vs. the RI/RFI when the investigation report is published?</td><td>All (100%) of the data for the RFI/RI Report were validated. The overall completeness requirement was met and no other systematic protocol errors were identified during the monitoring of the field or laboratory efforts. This, along with the PARCCS evaluation, demonstrate that the overall quality of the analytical program and laboratory are sufficient to meet the project data quality objectives. The text will be updated in Section 3.2.4 of the HHERA Report to include this language.</td><td></td><td>Update HHERA as reported in PG&E’s response.</td></tr>
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486	DOI-14	HHERA		Section 3.2.5 Text pp 44	Completeness	The text states that the data set "appears" to meet completeness goal. ES 3.1 is much more definitive. Has the 95% completeness goal been attained?	According to the PG&E Program QAPP, Rev 3 (CH2M 2004), the completeness goal is 90% for soil samples. As stated in the Data Quality Evaluation Report (an appendix to the forthcoming RFI/RI Report): "The completeness goal of greater than 90 percent was met for all analyte/methods as listed in Appendix A of the Quality Evaluation report, Table A9, with the exception of 1,1'-biphenyl, which was 89 percent complete." The text will be updated in Section 3.2.5 of the HHERA Report to include this statement.		Update HHERA as reported in PG&E's response.
487	DOI-15	HHERA		Section 3.2.6 5	Comparability	Summarize and note that there is confidence that comparability is assured because standard analytical methods and approved sampling techniques were used.	As stated in the Data Quality Evaluation Report (an appendix of the forthcoming RFI/RI Report), there is confidence that comparability is assured because standard analytical methods and approved sampling techniques were used. The text will be updated in Section 3.2.6.5 of the HHERA Report to include this statement.		Update HHERA as reported in PG&E's response.
488	DOI-16	HHERA		Section 3.4.1.1.1 Text pp 52	Discussion of R Core software	Qualify R Core (publicly available, commonly used, etc.). Why was it the right tool?	The following qualifying language will be added to the text of Section 3.4.1.1.1 of the HHERA Report to describe R: "R is a publicly available language and environment for statistical computing and graphics that is commonly used by institutions and commercial enterprises for data manipulation, calculation, and graphical display. Accordingly, R is appropriate for the statistical calculations performed in the HHERA."	Neither USEPA nor DTSC recommends the use of R software in our risk assessments even though it may be a useful statistical tool.	A summary of why ProUCL was not used for area-weighted EPC calculations will be added to the HHERA in Section 3.4.1.1.1: Area-weighting is necessary to control the effect of potential hot spots and biased sampling on the EPC calculations. ProUCL does not have the ability to incorporate area-weighting into 95UCL calculation, and therefore these calculations were conducted in R.
489	DOI-17	HHERA		Section 3.4.1.1.1 Text pp 52	2nd paragraph beginning "Although the maximum…"	Language issue. This is a long sentence. Consider 1st sentence "In some cases, the maximum value was above the BTV.", then explain how it was addressed. As written, it seems to imply this occurred all the time. Also, there are some grammar issues further in the paragraph/sentence.	Comment acknowledged. In Section 3.4.1.1.1 of the HHERA Report, the second paragraph on page 52will be edited for clarity.		Update HHERA as reported in PG&E's response.

PG&E Responses to Comments on the Draft Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station, Needles, California

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490	DOI-18	HHERA		4.2.2.	Page 117 of the Main Text	The section discuses EPC development. There is no discussion or applications of Hot Spot identification. This topic was identified in the original work plan, work plan addendum, as well a major discussion point of the Risk Assessment Forum meetings (Aug 16, 2017) and a method was proposed. Was this omission an oversight? DOI was anticipating hot spot evaluations; at least in the major exposure and residual source areas. An assessment of hot spots would support pending risk-management evaluations including Removal Actions and Feasibility Studies for human and ecological receptors. DOI's interest in Hot Spot recognitions and assessment of significance is tied into comments 7 and 8 above as well.	As presented in the RAWP Addendum 2, the purpose of the hot spot analyses was to identify when spatial heterogeneity, in conjunction with certain patterns of biased sampling, could: 1) result in upward-biased EPC estimates, without area-weighting, that result in unacceptable risk; and 2) indicate that a spatially-explicit approach (i.e., area-weighting) for a given EPC calculation was necessary and appropriate to control for potential influences from localized areas of elevated concentrations (i.e., hot spots). As the project progressed and additional potential exposure areas (i.e., AOC by AOC risk evaluations) were added to the risk assessment, the number of EPC calculations required increased dramatically. Therefore, the evaluation of spatial characteristics – hot spots and biased sampling – for each EPC calculation, and the associated determination of if/when area-weighted EPCs were needed became impractical (i.e., objective #2 listed above). Consequently, as discussed with the agencies and stakeholders, to efficiently scale such large volumes of EPC calculations, an automated approach was developed to calculate the area-weighted EPCs for all exposure calculations. Although calculated, area weighted EPCs were not used to estimate risks for the scenarios where depth-weighted risk estimates were below de minimis levels. For all cases where potential for unacceptable risk was identified using depth weighted EPCs, two complete sets of risk estimates were provided in the HHERA Report: one based on depth-weighted EPCs (which does not correct for the potential presence of hotspots) and one based on area-weighted EPCs (which corrects for any biased sampling or potential hotspots). The area-weighted EPCs were the last step in the EPC calculation process described in the RAWP Addendum 2 (Arcadis 2015).	DTSC agrees that PG&E (at least partially) addressed the hotspot evaluation in section. Although the area weighted averaging approach could identify hotspots, the code that PG&E wrote to perform the analysis was never peer reviewed even though this was discussed in the past. Therefore, there remains some uncertainty regarding the results of the area weighted averaging approach. DTSC further believes that some numerical metric needs to be applied to hotspot analysis such as a multiplier of an exceedance of a risk based value. This ideally should have been discussed and agreed upon in advance.	No changes to the HHERA Report.

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490 (continued)	DOI-18	HHERA		4.2.2.	Page 117 of the Main Text		As a final check on the potential for hot spots, selected AOCs and potential risk drivers at the site driving potentially unacceptable risk were further evaluated using an iterative approach to identify the samples contributing most to that risk in Section 8 of the HHERA Report. This evaluation also constitutes a hot spot analysis in that it identifies the locations with elevated COPC/COPEC concentrations associated with unacceptable risk for an area. Furthermore, based on discussions with the agencies and stakeholders and memorialized in PG&E's response to the agencies directive letter (PG&E 2017), the HHERA Report included a comprehensive set of figures (included in Attachment A3 of each AOC-specific appendix) that display the sampled areas of higher concentration (i.e., potential hot spots). For each EPC, a map of the sample locations is overlaid with Thiessen polygons – indicating the areal contribution of each sample location to the EPC calculation – each of which are shaded to show where that sample falls within the statistical distribution of concentration values for that EPC, as determined using Jenks natural breaks. The combination of processes described above allows for: 1) the comparison of depth- and area-weighted EPCs and associated differences in the risk conclusions; 2) the identification of the locations with the highest concentrations driving unacceptable risk (i.e., a hotspots); and 3) a graphical depiction of the spatial distribution of the samples in a given (EPC) dataset. These processes fully support the needs of the HHERA; any further refinement of hot spots is more appropriately conducted in the feasibility study. No changes to the HHERA Report are proposed to address this comment.		No changes to the HHERA Report
491	DOI-19	HHERA		Test Section 5.2	List of Guidance	Please add: OSWER Directive No. 9355.7-04 Land in the CERCLA Remedy Process OSWER Directive 9355.0-30 Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions 40 CFR 300, National Oil and Hazardous Substances Pollution Contingency Plan Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (RI/FS guidance, EPA/540/G-89/004).	The referenced guidance documents will be included in the list of applicable guidance documents in Section 5.2, Applicable Guidance.		Update HHERA as reported in PG&E's response.
492	DOI-20	HHRA		5.3.1.2	Description of the Recreational Scenarios	Please note that this description is consistent with DOI's 2014 memorandum, the 2015 Work Plan Addendum, and OSWER Directive No. 9355.7-04, Land Use in the CERCLA Remedy Selection Process. The recreational scenarios fulfill the CERCLA future reasonable maximum exposure intent and therefore provide the basis for the development of protective exposure levels.	Comment acknowledged. Section 5.3.1.2 will be revised to state that the description of the recreational user scenarios is consistent with DOI memorandum (2014), the RAWP Addendum 2 (Arcadis 2015), and OSWER Directive No. 9355.7-04, Land Use in the CERCLA Remedy Selection Process (USEPA 1995).		Update HHERA as reported in PG&E's response.

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493	DOI-21	HHRA		5.6	Page 117 second full paragraph	Risk and/or hazards "…. are not considered representative of the realistic…." The messaging here seems to emasculate all the high-quality risk assessment work presented previously. While DOI understands the need to inform the reader that the HHRA results need to be taken within the context of the process, we also need the reader to understand that the process is grounded in national and state policy and regulation requirements and that the results comply with these requirements. Please rephrase this to also express the thought that the process is consistent with CERCLA, the NCP, and DTSC guidance, and thus suitable for making risk management and policy determinations consistent with national and state regulatory requirements.	Comment acknowledged. The statement explicitly refers to the analyses conducted on individual AOCs as being not representative of the realistic or likely potential exposures. This paragraph then concludes with the statement that the results presented in Appendix OCS for all AOCs/SWMU/UA potential exposure areas located outside the TCS combined will help to inform risk management decisions. No changes to the HHERA Report are proposed in response to this comment.	DTSC agrees with DOI's recommendation to document that there are standard risk assessment process to be followed which includes the individual AOC evaluation. Also, the statement that risk and/or hazards "…are not considered representative of the realistic.." and the PG&E response "..as being not representative of the realistic or likely potential exposures" are overstated. Risk and hazard estimates may be unrealistic or they may be realistic. Blanket statements such as this misrepresent the risk assessment results. DTSC disagrees with the response.	DTSC accepts PG&E's response. No changes to the HHERA Report.
494	DOI-22	HHRA		6.4.3.2 & 6.4.3.2.1	Discussion of Log Kow and BAFs	The reference, USEPA 2000 doesn't seem correct – although the discussion is correct (minor). The BAF discussion at the bottom should be clarified. Does this indicate that in BAFs uses in this report are more refined than those used in previous RFI/RI soil screening activities (e.g., 2011 work plan and related data screenings), and these should be used (i.e., is this a simple acknowledgement of refinement?) or is there more? Also, how will the risk manager know when the information was developed from the alternative and more robust values? Were the forward risk calculations done with the less refined BAFs and Dioxin TEQ RBRGs back calculated with the more robust BAFs?	The correct reference (USEPA 2000b, included in the reference list at the end) will be added to the HHERA Report. The BAF discussion presented at the end of Sections 6.4.3.2 and 6.4.3.2.1 will be updated to include the specific COPECs for which alternate BAFs were used and how these alternate BAFs, supported by current science, were applied in the ERAs. These cases are limited to dioxin/furans in the RBRG calculations. All forward calculations were conducted using the BAFs presented in the RAWP documents (Arcadis 2008, 2009, 2015) to minimize changes in the risk assessment methodology agreed to in the approved RAWP by agencies and stakeholders. See also responses to Comment DOI-23 and Comment DTSC-20.		Update HHERA as reported in PG&E's response.
495	DOI-23	ERA		6.6.2.1.1.	Baseline Scenario – Desert Shrew	Dioxins and the Shrew seem to dominate the baseline scenario. Are we looking at a realistic expression of reality where the shrew is the only receptor with risk, especially in a non-aquatic/drainage area?	In the RAWP (Arcadis 2008), the desert shrew was selected as a conservative receptor to evaluate invertivorous small mammals at the site. Due to its diet and small home range, shrews are often the most sensitive receptor in ERAs. At the Topock site, other receptors have much lower exposure, either due to limited dietary uptake of COPECs into food items or limited use of site areas due to a large home range. Dioxin/furans dominate as risk drivers for shrew due to the screening-level BAFs selected for these COPECs (based on a single congener: 2,3,7,8-TCDD), which overestimate uptake into invertebrate prey (assumed to be worms, which are also unlikely to be present). The risk estimates presented in the ERA for dioxin and shrew are considered to overestimate potential risk, primarily due to the selected BAF. See also the response to Comment DTSC-20. However, to account for the overly conservative parameters used to estimate risk to the shrew, potential risk drivers were identified when LOAEL HQ > 10. This limited the potential exposure areas where unacceptable risk to invertivorous small mammals were identified. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.

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496	DOI-24	ERA		7.2.4	Risk Conclusions for Special Status Species	The ring-tailed cat has been documented on site. It is correct in saying it is a California Fully Protected species. As such it needs to be protected to the level of the individual. That means NOAELs. Also, it is stated that the Nelson's Bighorn is fully protected while they actually are not. The Sierra Nevada Bighorns (a different subspecies) are the only bighorns in California that are California fully protected species. The peninsular range Nelson's bighorns are listed as endangered but not California fully protected. The Nelson's bighorns at Topock are neither Fully Protected nor listed as endangered. The ring-tailed cat's range may negate its potential risk at the NOAEL but as a Fully Protected species it should be evaluated, and the evaluation should be at the NOAEL.	The ERA text (Sections 2.4.1, 2.4.5, 6.3.1.2, 6.6.2.15, 6.6.2.16, 7.2.4, and appropriate appendices) will be corrected to specify that Nelson's Desert Bighorn Sheep are not a state fully protected or endangered species. For ringtail cat, the discussions in the ERA and appropriate appendices will be updated to clarify that protection at the NOAEL level is warranted. The qualitative evaluations for ringtail cat were conducted at the NOAEL level for surrogate receptors, as presented in Section 6.6.2.15 and Appendix BCW.		Update HHERA as reported in PG&E's response.
497	DOI-25	HHERA			Figure 2-2 Main Report	Identifies consumption of groundwater as a completed pathway for the hypothetical future groundwater user. Under CERCLA, DOI will need to address cumulative risk. Is there a reason why this was not addressed and added to the hypothetical future resident? See OSWER Directive 9355.0-30. Are there scenarios in the ERA risk where affected groundwater can impact (add to computed risk) to the ecological receptor exposures? DOI would like to have the integrated soils and groundwater risk associated with groundwater, when groundwater cleanup goals are attained, addressed.	The consumption of groundwater pathway was evaluated in the GWRA for the hypothetical future groundwater user. The conclusions of the GWRA will be summarized in Section 2.2 of the HHERA Report. A summary of the cumulative risks (soil and groundwater) will be included in a post-remediation HHERA, after groundwater cleanup goals are attained. The GWRA concluded no significant ecological exposure pathway for contact with impacted site groundwater and there are no ecological receptors currently at risk of adverse effects due to the presence of COPCs in the groundwater. Therefore, there is no added risk to ecological receptors from groundwater.		Update HHERA as reported in PG&E's response.

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498	DOI-26	HHERA			Section 8 Risk-Based Remediation Goals for Risk Drivers in Soil	This section is well done and informative to risk managers. It could be strengthened with a brief description of how the data and risk results were used to determine that Dioxin TEQ, Cr VI, (HH) and Total Cr. Cu and Dioxin TEQ were the risk-driving constituents (e.g., why not PAHs?). Could this approach be applied to hot spots (Re comment 15, et al.,)? Can these two concepts be tied together in this section and soils impacting groundwater comments above?	Section 8.1 text will be updated to clarify how the risk results were used to identify risk drivers for development of human health RBRGs. Specifically, the identification of the risk drivers in the HHRA was based on the summary of results and overall conclusions of the HHRA as presented in Section 7.1.3. and Table 5-6; in other words, the HHRA results support that the soil COPCs driving risks or hazards above *de minimis* levels[1] are CrVI and dioxin TEQ. Accordingly, CrVI and dioxin TEQ are the compounds for which human health RBRGs were developed. Footnote 1: in accordance with the RAWP (Arcadis 2008), the conclusions and recommendations for this HHRA are based on the risks estimated for the ICS and OCS potential exposure areas. Section 8.2 of the HHERA Report will be updated to include discussion from Section 6.6.2 as follows: "For COPECs with HQs greater than 1 using the most refined exposure and effects assumptions (i.e., area-weighted EPCs, selected screening levels/TRVs, and site-specific SUFs), a WOE assessment was used to draw risk conclusions and identify potential risk drivers for each potential exposure area. The various LOEs considered in the WOE assessment and risk conclusions were presented in Table 6-11 of the HHERA Report". See the response to Comment DOI-18. As a final check on the potential for hot spots, selected AOCs and potential risk drivers at the site driving potentially unacceptable risk were further evaluated using an iterative approach to identify the samples contributing most to that risk in Section 8 of the HHERA Report. This evaluation also constitutes a hot spot analysis in that it identifies the locations with elevated COPC/COPEC concentrations associated with unacceptable risk for an area. At these locations, deep impacts that potentially represent a threat to groundwater will be further identified in the forthcoming RFI/RI Report. This statement will be added to Section 8 of the HHERA Report.		Update HHERA as reported in PG&E's response.
499	DOI-27	HHERA			Figures 2-2 and other CSMs Main Report	Subsurface soil is identified as a Secondary Source Media. DOI would like to see an assessment of the secondary source acting as a continuing source of contamination potentially impacting groundwater in the SWMU 1 and TCS4 areas. See comments on hot spots, soils to groundwater, and erosional impacts.	An assessment of the leaching from soil to groundwater pathway will be provided in the forthcoming RFI/RI Report (see the response to Comment DOI-9 for details). No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
500	DOI-28	HHERA	Section 8		Risk-Based Remediation Goals for Risk Drivers	This section is generally well done and will serve as a starting point for developing remedial action objectives (RAOs) for protecting human health and the environment. Per the NCP, RAOs should specify contaminants and media of concern, potential exposure pathways, and preliminary remediation goals. Note the NCP recognizes that remediation goals are revised throughout the RI/FS process as additional information becomes available. are not necessarily the final cleanup goals, and that factors including practicability and stakeholder input are considered in setting final cleanup goals.	Comment acknowledged. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.

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501	DOI-29	HHERA	Appendix OCS Page 4-4		Discussion of the influence of SWMU 1 and TCS-4 results.	Since the HHERA is a standalone document, this discussion would help the reader understand their significance if PG&E would include a map of data postings of the CrVI and TEQ results.	The relative ranges of CrVI and TEQ concentrations at sampling locations within the OCS potential exposure area are present in the Thiessen polygon figures for area-weighting included in Attachment OCS-A3. Specifically, the CrVI concentration ranges are presented on Figures OCS-A3.9, OCS-A3.54, OCS-A3.105, and OCS-A3-157 for the 0 to 0.5 feet bgs, 0 to 3 feet bgs, 0 to 6 feet bgs, and 0 to 10 feet bgs exposure scenario depths, respectively. For TEQ, the concentration ranges are presented on Figures OCS-A3.3, OCS-A3.48, OCS-A3.97, and OCS-A3-148 for the 0 to 0.5 feet bgs, 0 to 3 feet bgs, 0 to 6 feet bgs, and 0 to 10 feet bgs exposure scenario depths, respectively. These figures show the general locations of the highest levels of CrVI and TEQ within the OCS potential exposure area. References to these figures will be added to the discussion of the influence of SWMU 1 and TCS-4 results on page 4-4 of Appendix OCS.		Update HHERA as reported in PG&E's response.
502	DOI-30	HHERA	Appendix OCS Page 4-7		Sensitivity analysis of depth weighting.	This is informative. DOI recommends that PG&E consider expanding the sensitivity analysis to include exposure factors (Table 5-1, main report which are basically Reasonable Maximum Exposure {RME} factors) and provide a "central tendency {CT}" sensitivity case, if necessary, for risk management decision making.	As stated in the Section 5.3.4 of the HHERA Report, the intent of the RME approach is to estimate the highest exposure level that could be reasonably expected to occur, but not the worst possible case (USEPA 1989a, 1991c). In keeping with USEPA guidance, variables chosen for a baseline RME scenario for intake or contact rate, exposure frequency, and exposure duration are generally upper bounds. Note that CT values are not available for all exposure parameters and for all receptors evaluated in the HHERA. This is likely the case for the recreational users where the exposure assumptions were provided by DOI. Although a CT sensitivity analysis would provide additional information to inform risk management decisions, the uncertainties associated with selection of CT values, particularly for the recreational scenarios, are likely to be high. Therefore, the CT results would have limited value for risk management decision making. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
503	DOI-31	HHERA	Appendix OCS Page 5-8		Inclusion of chlorinated pesticides (4,4-DDE, DDT, etc.,) as COPECs	Given the rural setting and the wide spread use of chlorinated pesticides in 1940 through the early 1970's, is there a chance that these may not be TCS related? If so, should this be discussed in the uncertainties?	There is no available information regarding the use of certain types of pesticides and/or whether pesticides were used at the at the site. No additional discussion will be added to the uncertainties. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
504	DOI-32	HHERA	Appendix SWMU 1 Soil HHERA for SWMMMU 1 and TCS Exposure Area		Overall	This aggregation of data is most informative and reveals the impact that these localized higher contamination areas have on both the HH and ERA. Very well done.	Comment acknowledged. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.

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505	DOI-33	HHERA	Appendix OCS NORR C Exposure Area Page 5-12 & 5-16		Desert Shrew TEQ HQ Wren Lead HQ	See previous comment on uncertainty and confidence in the TEQ risk assessment. Are the BTAG NOAELs widely regarded as conservative?	For TEQ, see the responses to Comment DOI-23 and Comment DTSC-20. For BTAG NOAEL TRVs, it is correct that these TRVs are conservative. The degree of conservatism depends on the specific COPEC. For example, with respect to lead, the BTAG avian NOAEL TRV is based on lead acetate, a highly bioavailable form relative to the inorganic lead detected onsite. Risk-based concentrations estimated using the BTAG NOAEL TRV fall well below background concentrations at the site. Due to the high degree of conservatism in the lead TRVs, BTAG (2000) recommends collecting site-specific bioaccessibility information to adjust the EPC based on soil solubility relative to lead acetate. For perspective, Section 6.7.5.2.3 discusses the selected avian lead TRV, which is based on the EcoSSL (USEPA 2005) and is more than two orders of magnitude greater than the BTAG TRV. The EcoSSL NOAEL TRV also predicts risk at soil concentrations below the 50th percentile background concentration in the United States. Site risks estimated for lead using the BTAG TRVs are substantially overestimated. According to the RAWP (Arcadis 2008), the BTAG TRVs are presented in the ERA but are not used to draw risk conclusions. Risks estimated using BTAG TRVs were for documentation purposes only. See the response to Comment DTSC-23. The TRVs selected in the RAWP (Arcadis 2008) were used to characterize risk at the site. BTAG TRVs were used only when USEPA Eco-SSL based TRVs were not available (i.e., mercury and PCBs for birds and mammals and thallium for mammals). No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
506	DOI-34	HHERA	Appendix NORR C Page 4-1		Exposure Pathways	We need to address exposure to groundwater in this somehow. DOI has to evaluate cumulative risk. The CSM indicates GW exposure and there are no physical or institution barriers.	The GWRA results and their contribution to the overall cumulative risks will be summarized in a post-remediation HHRA Report as recommended in Comment DOI-25. However, there are institutional controls that limit the use of groundwater until the groundwater remedy has been completed and the goals attained.		No changes to the HHERA Report.
507	DOI-35	HHERA	Appendix NORR C Page 4-4		Effect of CrVI on consumption of produce	The Cr VI contribution seems inordinately high.	Comment acknowledged. See the response to Comment DOI-36 for a full response to this comment.		See final resolution for DOI-36.

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508	DOI-36	HHERA	Appendix NORR C		Effect of CrVI on consumption of produce	Is the Cal Air Toxics Hot Spots model. Is the Ctrans = UF x CS equation (Table NORR-C.1a) the driver? If yes, is it the CS or UF that is high? Does the Arroweed plant uptake work shed any light on this? Recall we presented that inorganic plant uptake, the chemical must 1st go into solution, then be taken up. Does Ctrans equation reflect this? Also, there may be other UF's to consider (e.g., EPA's Combustor Risk Assessment, Baes & Sharp, DOE's RESRAD code).	The Ctrans = UF x Cs equation is the driver for exposure to CrVIin produce, where UF equals CrVI default values for root uptake by produce, and Cs equals CrVI soil concentration. Specifically, the default UFs for CrVI are equal to 3 for root produce, 0.3 for leafy produce, 0.02 for exposed produce, and 0.07 for protected produce. The depth-specific Cs for CrVI detected in the NORR potential exposure area range from 0.2 to 0.43 mg/kg. Per the RAWP Addendum 2 (Arcadis 2015), uptake of COPCs into homegrown produce and animal products were evaluated using the uptake model from the OEHHA Toxic Hot Spots Program (OEHHA 2012, 2015). Additional sources of uptake parameters were not used as reference. As discussed in detail in the RAWP Addendum 2 (Arcadis 2015), in response to agency direction resulting from stakeholder comments, a literature search was conducted to understand the potential for hexavalent and/or trivalent chromium to be taken up into plant tissue (referred to as the "Arrowweed Memo"; ARCADIS 2013b). Section 4.6.3 (Uncertainties in the Risk Assessment) of Appendix NORR discusses the uncertainty associated with the estimation of the magnitude of hexavalent chromium absorption by plants. According to OEHHA (2012), it appears that most of the CrVI absorbed by root tissues is reduced to CrIII and retained by the roots in a tightly bound or insoluble form, or in a soluble complex that is not translocated to a large degree to the aboveground plant parts. This is consistent with the information presented in the Arrowweed Memo. However, due to the difficulty in estimating speciation of chromium in biological tissues, analytical methods used to measure chromium uptake in plants generally only measure total chromium. Accordingly, OEHHA developed plant uptake factors for CrVI under the conservative assumption that chromium found in crop studies due to root uptake is in the form of CrVI only, resulting in default root uptake factors that conservatively overestimate CrVI concentrations in plant parts. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.

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509	DTSC-1	General Comment				In general, HERO concurs with the methodology and assumptions used to evaluate risks and hazards to potential workers, recreational receptors and tribal users at the site. Of the various approaches used to calculate EPCs and subsequently risks/hazards at the site (see above), HERO recommends that the results used to evaluate individual AOCs be used to make decisions at the site	Comment acknowledged. Per the RAWP (Arcadis 2008) and RAWP Addendum 2 (Arcadis 2015), the OCS potential exposure area was identified as the most reasonable potential exposure area and the AOC-specific analysis were completed at the direction of DTSC (which was received 6 years after the approval of the RAWP and RAWP Addendum). The HHERA Report provides the results of the AOC-specific and OCS HHRA, all of which provide valuable perspective on the range of potential risk for site receptors. There are uncertainties associated with both the OCS potential exposure area and the specific AOC risk estimates. Considering all the information provided in the HHERA Report allows a more balanced perspective of potential site risks and associated risk management needs. Given the RME approach presented in this HHERA (see the response to Comment DOI-30), the receptor-specific exposure assumptions and concentration components are consistently upper bound values throughout the HHRA. Using the OCS potential exposure area as the most likely representation of potential exposure to soil allows for the variability and range of activity that are likely for the human recreational receptors evaluated. Receptors are unlikely to have a lifetime of exposure associated with the restricted area that comprises only one AOC. This is especially true as the individual AOCs have no visible boundaries or access restrictions. Relying only upon AOC-specific risk estimates for risk management decision making adds an excessive degree of conservatism that unnecessarily compounds the nature of overestimating risk with the RME approach. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
510	DTSC-2	General Comment				The Risk Assessment is comprehensive and overall well done. However, ERAS notes that many aspects of the risk assessment procedures deviate considerably from the original work plan. For instance, many different toxicity reference values (TRVs) have been selected and used in the hazard estimates. Nonetheless ERAS believes the conclusions of the risk assessment are reasonable. Additional comments on the TRVs are provided below.	Comment acknowledged. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
511	DTSC-3	General Comment		Section ES.5.1.1	The potential soil exposure pathways evaluated for Tribal users include inhalation of particulates from ambient air and inhalation of VOCs that may volatilize from the soil.	As mentioned in an earlier memo (Review of a Risk Assessment Work Plan Addendum 2, PG&E Topock Compressor Station, Needles, California, dated June 18, 2014), HERO recommends evaluating exposures of tribes to contaminants in soils via the ingestion, dermal and inhalation pathways. In the report pursuant to Tribal preference, only the inhalation pathway was evaluated, which may have resulted in underestimation of total risks and/or hazards to the receptors. However, we note that risks/hazards estimated for a tribal user are unlikely to affect the conclusions of the risk assessment.	Comment acknowledged. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.

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512	DTSC-4	General Comment		Section 3.1.5/ Page 38	Other matrices such as debris and tar are not included in the datasets used I the quantitative risk assessment because these materials are generally larger in particle size and potential exposures to these materials would not be expected to be similar to potential exposures to surrounding soil.	The draft HHERA states that it excluded waste material such as debris and tar from the risk assessment. Although DTSC believes that excluding some of the debris and waste material may be appropriate, DTSC notes that some waste samples are powdery and soil-like in nature and may be appropriate to include in the risk assessment. At present, it is difficult to identify which of those samples were included in the HHERA. DTSC believes that the excluded samples should be clearly and transparently identified. DTSC recommends that a list of the excluded samples should be tabulated and identified on a figure or figures so that moving forward, risk managers can better understand what was excluded. All chemical data associated with those samples should also be tabulated to allow evaluation of the data set for any high concentrations of COCs or COPECs for proper risk management.	A table summarizing analytical results, along with location figures of waste material samples that were excluded from the HHERA dataset, will be included in the HHERA Report in a new Appendix. WMS, Waste Material Samples. Appendix WMS table and figures are provided as an attachment to the Responses to Comments.		Update HHERA as reported in PG&E's response.
513	DTSC-5	RA		ES.1/ **Page ES-2**	All potential exposure pathways for ecological receptors are considered incomplete inside the TCS fencing (Eichelberger 2006).	The report states 'all potential exposure pathways for ecological receptors are considered incomplete inside the TCS fencing (Eichelberger 2006).' ERAS does not recall its exact comment from 2006 but since the area within the fence line is considered the active industrial portion of the Topock site, does not consider it viable habitat at this time.	Comment acknowledged. ES.1 and other relevant sections will be updated to state that the area within the fenceline is considered the active industrial portion of the Topock site and is not considered a viable habitat at this time.		Update HHERA as reported in PG&E's response.
514	DTSC-6	RA		**Section ES.2.3.1**	Special Status Species	The risk assessment indicates that the Nelson's bighorn sheep is fully protected. This is not the case. California Fish and Game Code (2018) 4700 (2) designates bighorn sheep (Ovis canadensis), except Nelson bighorn sheep (subspecies Ovis canadensis nelsoni) as a fully protected species. Subdivision (b) of Section 4902 provides for the limited take of a number Nelson's bighorn sheep rams by hunters. The Sierra Nevada Bighorn sheep (Ovis canadensis sierrae) is fully protected (http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/fully_pro.html) but Nelson's bighorn sheep (ssp. Ovis canadensis nelsoni) is not (https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=84012&inline). The Peninsular Range Bighorn sheep once considered the subspecies (O.c. cremnobates) has been recently combined with O.c. nelsoni and is listed as a California threatened and Federal endangered subspecies. The peninsular subspecies of Nelson's bighorn sheep's range does not extend to Topock and the O.C. nelson sheep in the Topock region are not listed as endangered or threatened. (https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=113835&inline). This clarification of the protection status of the Nelson's bighorn sheep does not affect the conclusions of the report and ERAS comments are provided only for clarification.	Comment acknowledged. See the response to Comment DOI-24.		See final resolution for DOI-24.
515	DTSC-7	RA		**Section ES.2.3.1**	Special Status Species	The ring-tailed cat is noted as being observed on site and is a fully protected species. No take is allowed for fully protected species and risk estimates for the ring-tailed cat were not provided in the risk assessment. However, the reasoning for assuming de minimis risk on pdf page 302 of 559 is reasonable and it seems unlikely that site-related chemicals of concern would pose a significant risk to the ring-tailed cat.	Comment acknowledged. See the response to Comment DOI-24.		See final resolution for DOI-24.

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516	DTSC-8	RA		Section ES.7.1/ **Page ES-27**	While AOC specific evaluations provide useful information regarding limited areas or areas of highest impact, they are not suitable as the sole basis for the conclusions of the HHRA	HERO notes that it is just as unlikely that people (especially the same individual) will randomly roam about the entire 65-acre area of the site and come in contact with contaminants in all of the various AOCs equally throughout such large area, during their lifetimes. People may have preference for visiting certain areas of the site over others. HERO also notes that in order to make risk management decisions at the site, it is necessary to determine which of the AOCs are contributing significantly to the risk; therefore, an AOC by AOC evaluation is necessary and may provide useful information in making risk management decisions at the site.	Comment acknowledged. It is agreed that it is difficult to predict the behavior of recreational users throughout a lifetime of visiting the site. While there may be preferential use for some areas by some individuals, it is unlikely that a receptor's entire exposure would be limited to one AOC for a lifetime, especially since there are no visible physical boundaries other than topography for AOCs. In addition, other AOCS must be crossed for access. As stated in the approved RAWP (Arcadis 2008): "For purposes of the HHRA, all AOCs outside the TCS (excluding BCW) will be initially considered as one exposure area because, as mentioned earlier, all areas outside the TCS are equally accessible for future human use." The OCS potential exposure area (i.e., all AOCs outside the TCS including BCW) was added after the approval of the RAWP at the suggestion of DOI and discussed in the April 2015 Risk Assessment Forum. As stated in the approved RAWP Addendum 2 (Arcadis 2015), the OCS potential exposure area was added to provide additional perspective on the influence of BCW to individual's overall exposure. All the potential exposure area evaluations for both individual and combined potential exposure areas provided in the HHERA Report offer useful information for making risk management decisions. Note that the results of the OCSxBCW potential exposure area evaluation as well as an iterative approach to identify the samples contributing most to that risk in Section 8 of the HHERA Report also provide useful information for making risk management decisions. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
517	DTSC-9	RA		**Section 3.1.4**	Porewater	The report states that sixteen porewater samples were collected from sediments at the mouth of East Ravine in the Colorado River. It also states 'As concluded in Section 2.5.2.5, the potential transport of indicator chemicals and other constituents from surface water entrained in runoff from upland areas at AOC 10 to the East Ravine sediment area may potentially be complete; however, this pathway is not considered significant. Therefore, an evaluation of the porewater data collected at the mouth of East Ravine in the HHERA was not conducted, as subsequent potential exposure pathways would be insignificant'. ERAS recalls that the reason the porewater samples were collected was due to significant chromium VI concentrations in shallow groundwater at the mouth of the East Ravine. Overland transport of soil from the East Ravine may not be significant but ERAS does not recall that the porewater data was ever compared to ambient water quality criteria. The criterion continuous concentration is 11 µg/L. The Third Quarter 2018 Interim Measures Performance Monitoring and Site-Wide Groundwater and Surface Water Monitoring Report shows three wells at the mouth of the East Ravine show well concentrations of 540 µg/L (MW-62-065), 91 µg/L (MW-72-080), and 36 µg/L (MW-72-080). The groundwater wells and porewater may not be part of the soil risk assessment but possible exposure of riverine receptors via groundwater-porewater at this location should not be forgotten.	Transport of constituents to sediments can occur by surface water entrained in runoff from upland areas and can eventually reach interstitial spaces (i.e., porewater). However, if the surface soil transport pathway indicates this pathway as insignificant, then constituents reaching porewater is unlikely or insignificant. Potential transport of constituents from the site to the river is primarily through groundwater. Because groundwater was not evaluated as part of this soil HHERA, porewater data collected from the mouth of East Ravine were not evaluated. Evaluation of the porewater data collected from the mouth of East Ravine will be presented in the forthcoming RFI/RI Report. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.

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518	DTSC-10	RA		Section 4.1/ **Page 54**	For the area-weighted EPCs, one of the methods in ProUCL, the BCa bootstrap, was applied to the data using different software and data handling to allow for incorporation of area-weighting factors	HERO did not evaluate the exposure point concentrations (EPCs) obtained using the area-weighted averaging approach, since the software/programs used to derive these values were not evaluated or approved for use by the DTSC and Department of Interior (DOI). Although there were discussions as to how area-weighted averaging would be conducted (during face-to-face meetings with PG&E), the software/programs were not made available to the agencies or tribes for use/evaluation. HERO recommends that a discussion on uncertainties associates with the "area-weighting factors" be included in the Uncertainty Section (5.6.3.4).	As the comment notes, the R subroutine for the BCa bootstrap analyses was discussed with the DTSC and DOI. A link to download that program was provided in the references and below: "Ripley. 2017. R subroutine "boot", V. 1.3.20. Revised July 30, 2017. Available online at: https://cran.r-project.org/web/packages/boot/index.html. Retrieved July 31, 2017." The download link enables DTSC and DOI to download and evaluate the same subroutine used in the HHERA. A discussion will be included in the uncertainty section. Given the QA testing of the bootstrap subroutine against ProUCL and algebraic solutions for a test data set presented in Appendix BCa, the uncertainty associated with using this program in place of ProUCL is minimal. Furthermore, as stated in Comment DOI-18, the area-weighted EPCs control for the effect of potential hotspots and the effect of biased sampling. The area-weighted EPCs are an important method for reducing uncertainty in the exposure and risk estimates and should not be ignored. See also the full response to Comment DOI-18.	The area-weighted approach with R programming still appears to be a black box without reviewing the codes. There are other methods on the USEPA's website (SADA, for example), but that's not what was used. DTSC's comment remains.	Comment acknowledged. Clarification on how the OCS area-weighting was done (combination of AOCs, no new areas/spaces were created) will be added to the HHERA in Sections 3.3.1 and 5.3.2 and reference to the combined exposure area Figures 3-4a (for human health) and 3-4b (for ecological receptors) will be added to these sections as well. The OCS Thiessen Polygon figure (Figure OCS.A3-1 from the Draft HHERA) is included here as Attachment DTSC-10 Figure OCS-A3-1 as an example of how the area-weighting was conducted for the OCS area.
519	DTSC-11	RA		Section 4.2.1/ **Page 55**	USEPA (1996 a,b) guidance recommends depth-weighting to account for uneven sampling. Specifically, the guidance recommends that the average concentration at a sample location in the representative exposure interval accounts for the different lengths of the sample core segments	In order to perform depth-weighted averaging, samples from each unique location in the HHERA datasets were combined into a single depth-weighted value. A value of ½ the detection limit (DL/2) value was assigned to samples with ND values, even in instances where only the shallowest depth was evaluated (0-6 inches). According to the report, "USEPA (1996 a,b) guidance recommends depth-weighting to account for uneven sampling. Specifically, the guidance recommends that the average concentration at a sample location in the representative exposure interval accounts for the different lengths of the sample core segments." More recent guidance from the USEPA, specifically the 2015 ProUCL Software User's Guide, does not recommend substituting DL/2 values for samples designated as non-detect. On page 58 of the document, it is stated that "Based upon the results of the report by Singh, Maichle, and Lee (2006), it is recommended to avoid the use of the DL/2 substitution method when performing a GOF test, and when computing the summary statistics and various other limits (e.g., UCL, UPL, UTLs) often used to estimate the EPC terms and BTVs. Until recently, the substitution method has been the most commonly used method for computing various statistics of interest for data sets which include NDs. The main reason for this has been the lack of the availability of the other rigorous methods and associated software programs that can be used to estimate the various environmental parameters of interest". However, HERO recognizes that the Agencies and Tribes agreed to this approach as presented in the Work Plan. HERO recommends adding a discussion on the uncertainties associates with DL/2 substitution for ND samples in the Uncertainty Section (5.6.3.4).	In the depth-weighting procedure, non-detect (ND) values were replaced with ½ their report limits (RLs) – this is not a "substitution" approach as defined by the ProUCL guidance but is part of the data processing steps prior to using ProUCL. This approach was presented in the agreed-upon RAWP Addendum 2 for calculation of depth-weighted averages; these averages represent the concentration at a given sampling location. A collection of depth-weighted averages forms a data set used to estimate a given EPC in ProUCL. The comment and cited guidance are relevant to the calculation of the EPC (UCL calculated in ProUCL) from the depth-weighted dataset, not the depth-weighting procedure itself. As correctly noted, UCL-calculation methods that use substitution are no longer recommended in ProUCL guidance. The "substitution methods" noted in the ProUCL guidance document refer specifically to a set of UCL calculation approaches that use replacement of ND samples with a proxy value, such as DL/2, that is treated as a ***detected*** concentration for calculation of the 95UCL. As noted in the ProUCL guidance, more rigorous UCL calculation methods that account for NDs without substituting a proxy detect value are available. The estimates from these other non-substitution techniques provided in ProUCL – e.g., Kaplan-Meier, Chebyshev's – were used in this HHERA, as recommended by ProUCL, for a given data set. Substitution methods were not used in the calculation of EPCs in this report. No changes to the HHERA are proposed in response to this comment.	DTSC does not agree with PG&E's response. ½ DL was a substitution approach, since number all feed into the EPC calculations using the ProUCL software. Use of ½ DL is not approved by ProUCL.	A qualitative discussion in the uncertainty analysis in Section 5.6.3.4 on how use of ½ DL impacts the EPCs will be added to the HHERA. Examples will be provided where the approach could over or underestimate EPCs.

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520	DTSC-12	RA		Section 4.2.1/ **Page 56**	Depth-weighting Approach, final sentence of the page	The report states that non-detect values were replaced with one half the reporting limit. Please explain why the risk assessment did not follow the ProUCL recommendation not to use ½ the detection limit for non-detects, and why the methods recommended by ProUCL were ignored.	See the response to Comment DTSC-11.	Same comment as above.	A qualitative discussion in the uncertainty analysis on how use of ½ DL impacts the EPCs will be added to the HHERA. Examples where the approach could over or underestimate EPCs will be provided.
521	DTSC-13	RA		Section 6.3/ **Page 159**	The surface soil transport pathway analyses, as described in Section 2.5, concluded potentially complete but insignificant transport pathways for surface soil entrained in runoff to reach the sediment areas near the river downgradient of BCW and AOC 10 and therefore, quantitative evaluation of these sediment areas was not required	In the case of AOC 10 (East Ravine), pore-water sampling was prompted by the finding that elevated hexavalent chromium concentrations were detected in shallow groundwater adjacent to the river. Granted, this does not logically belong in the soil risk assessment, however, the porewater concentrations should be evaluated at some point by comparison to ambient water quality criteria.	This evaluation will be included in the forthcoming RFI/RI Report. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
522	DTSC-14	RA		Section 6.5.2/ 173	Toxicity Reference Values, First paragraph of page	The PG&E Soil Ecological Risk Assessment has applied the interspecies allometric scaling factors (1.2 for birds, 0.94 for mammals) from Sample and Arenal (1999). ERAS has not seen the use of allometrically adjusted TRVs in risk assessments for several years. Supporting data for allometric scaling were originally developed for anticancer drugs and the models for both human and wildlife risk assessments are based on acute toxicity data. ERAS acknowledges that HERD (now HERO) Ecological Risk Assessment Note 2 (EcoNote 2), allows the use of interspecies allometric scaling where body weight varies by more than a factor of two. However, EcoNote 2 is old, and based on more recent literature (Allard et al. 2009), ERAS has not supported their use for some time. Allard et al., state that extrapolation from laboratory animal test data to wildlife lack a robust technical basis and they do not recommend allometric scaling of TRVs. The modes of action between acute and chronic exposures vary for many chemicals. Since ecological risk assessments are based on chronic exposure the use of allometric scaling based on acute data, is not necessarily sound science. Even Sample and Arenal in 1999 recommended caution in using allometric scaling factors in ecological risk assessments because of their derivation from acute data. The USEPA (2005) does not recommend their use for ecological risk assessments. Please note that Dr. Brad Sample who was the lead author of the 1999 paper is a coauthor of the Allard et al 2009 paper. The risk assessment TRVs need to be non-allometrically adjusted.	In the ERAs, HQs were calculated using methodology presented in the approved RAWP documents, including the use of allometrically adjusted TRVs (and other approaches not supported by current science; see the response to Comment DOI-22). PG&E recognizes that allometric TRV adjustments are no longer typically conducted, because it is unlikely that this approach reduces uncertainty in the risk estimates. The effect of the allometric conversions on the TRVs is presented on RTC Table 1. The effect of the allometric conversions on the HQs for the desert shrew and the kangaroo rat are presented on RTCs Tables 2a and 2b, respectively. No bird TRVs were allometrically adjusted. For Nelson's desert bighorn sheep, allometric adjustments were conducted for most COPECs and result in lower TRVs and higher HQs than using unadjusted TRVs. Thus, risk for this receptor is likely overestimated in the ERA. For small mammals (including desert shrew and Merriam's kangaroo rat), allometric TRVs were applied for a few COPECs only (arsenic, copper, selenium, and silver), resulting in higher TRVs and lower HQs for these COPECs than using unadjusted TRVs. The magnitude of the change in TRVs and HQs is relatively small and does not affect risk conclusions based on a target LOAEL HQ = 1 except for the following cases: Desert Shrew – • AOC 27 Arsenic LOAEL HQ changes from 0.8 to 1.0 ~~No changes to the HHERA calculations are proposed in response to this comment.~~ The text in Sections 6.5.2 and 6.7.5.4 will be updated to acknowledge the increased uncertainty due to the use of allometric adjustments and summarize the expected result on risk estimates (i.e., low magnitude of change to the HQs, no substantial change to risk conclusions)		Update HHERA as reported in PG&E's response.
523	DTSC-15	RA		**Section 6.7.5.4/ Page 266**	Species-to Species Toxicity Extrapolations, second paragraph of page	The report states "For mammals, allometric adjustments are expected to reduce uncertainty in the risk estimates". Contrary to the quote, allometric adjustments increase the uncertainty in the risk estimates and should be removed from the report. Please see Specific Comment above.	Comment acknowledged. See the response to Comment DTSC-14.		See final resolution for DTSC-14.
524	DTSC-16	RA		**Section 6.7.6**	Uncertainty in the Risk Characterization	Uncertainties associated with the area-weighted averaging and depth-weighted averaging approach should be included in the Uncertainty section.	Comment acknowledged. These uncertainties are discussed in Section 5.6.3.4. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.

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525	DTSC-17	RA		**Section 7**	Post remediation risk assessment	HERO recommends that a post-remediation risk assessment, using confirmatory soil samples, be used to evaluate specific AOCs, if excavation of contaminated soils from the most heavily impacted areas is conducted. Please include this discussion in the document. In the report, an approach is proposed where the sampling locations "with the highest concentrations are iteratively removed from the baseline soil dataset" and the EPCs recalculated until the EPCs are at or below the RBCGs. While this approach is acceptable to HERO for the purposes of making decisions in the field during excavation, a post-remediation risk evaluation is recommended to demonstrate that residual contamination in the area is not of concern.	Comment acknowledged. The information referenced was included as an example of how RBRGs could be used to identify potential hot spots/elevated concentration locations that are candidates for consideration for action. It was not intended as a remediation recommendation or a post remediation risk evaluation. The text will be modified to clarify that confirmation sampling and a post-remediation risk assessment may be necessary to demonstrate that residual contamination is not of concern if excavation and removal of soil is implemented as a remedial and risk management decision at the site.		Update HHERA as reported in PG&E's response.
526	DTSC-18	RA		Section 7.2.4/ **Page 283**	Risk Conclusions for Special-Status Species	The report refers to special-status species at or near the site. Please better define what is meant by special-status. ERAS requires protection to the level of the individual for fully protected, threatened and endangered species.	The text of Sections 2.4.5 and 7.2.4 and relevant appendices will be updated to clarify that special status species include both State and Federally listed fully protected threatened and endangered species, state/federal species of concern, and traditional culturally significant plants but that protection at the NOAEL level is warranted only for fully protected species.		Update HHERA as reported in PG&E's response.
527	DTSC-19	RA		**Section 8**	Risk-based remediation goals for risk drivers in soil	HERO concurs with the RBCGs derived for a recreational receptor, for hexavalent chromium and dioxins (2,3,7,8-TCDD TEQ) corresponding to the 10-6 (100 ng/kg for dioxins and 3.1 mg/kg for hexavalent chromium) and 10-5 (1,000 ng/kg for dioxins) incremental cancer risk level. RBCGs corresponding to a cancer risk of 10-4 and hazard quotient of 1, should also be included in the report to aid risk management decisions on the site. HERO defers to DTSC's project management to determine the appropriate cleanup target goal for the site, in areas with the highest estimated risks/hazards (e.g., SWMU1, AOC9, AOC10). Although NORR was identified as having unacceptable risks/hazards to a potential future resident who may be consuming home grown produce, DTSC notes that the USDOI has concluded the project area will not be developed for residential use; therefore, remediation for this area was not discussed (communications with DTSC's project manager). HERO defers to DTSC/DOI/BLM management to address this issue. However, it should be noted that HERO does not agree with the following statement on page 285 of the report, "For dioxins TEQ, DTSC's HERO supports the use of residential and indoor commercial worker remedial goals equal to a theoretical potential cancer risk of 1x10-5". This statement is incorrect, as DTSC's HHRA Note 2 specifically states that the remediation goals are based on a cancer risk endpoint of 1 in a million (200 ng/kg) and a non-cancer hazard of 1 (1,000 ng/kg). The 10-6 risk-based goals are multiplied by 10 to account for bioavailability of dioxins, not to meet a cleanup goal of 10-5. Revise the text (pages 285 and 286) of the report to accommodate this correction.	Comment acknowledged. Additional clarification text will be incorporated into the revised HHERA to specify that the acceptable risk management range is 1 x 10^{-6} to 1 x 10^{-4} and can be considered in making remedial and risk management decisions on the site. RBRGs corresponding to the acceptable risk management range of 1 x 10^{-6} to 1 x 10^{-4} and to a hazard quotient of 1 will be presented in Section 8 of the report. Text on pages 285 and 286 will be revised/clarified by stating: "For dioxins TEQ, DTSC's Human Health and Ecological Risk Office (HERO) supports the use of residential and indoor commercial worker remedial goals equal to 10 times the theoretical potential cancer risk of 1 x 10^{-6} (equal to that associated with a theoretical potential cancer risk of 1 x 10^{-5}). This regulatory approach is based on studies of bioavailability of dioxins that demonstrate exposure to soil under normal residential and indoor commercial conditions has minimal influence on the serum of exposed individuals……..As such, the RBRGs for recreational users equal to 10 times the theoretical potential cancer risk of 1 x 10^{-6} may be appropriate for the site."		Update HHERA as reported in PG&E's response.

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528	DTSC-20	RA		Section 8.2.1/ **Page 292**	Inserted Table, Dioxin TEQ	The Dioxin TEQ LOAEL-Based Mammalian TRV ecological risk-based remedial goal (RBRG) of 360 ng/kg seems high, but based on the approach described in the text, this concentration appears acceptable to ERAS. The high RBRG is based on the use of bioaccumulation factors (BAFs) for individual dioxin congeners rather than using the conservative single BAF for 2,3,7,8 tetrachlorodibenzo-para-dioxin (dioxin) which has one of the highest BAFs of all congeners. However, to pen a colloquial phrase – 'the fly in the ointment' is that the BAF's are based on uptake by earthworms and it is a foregone conclusion that the presence of earthworms in the dry desert soils at Topock is remote, "to the say least." However, ERAS does not know of any dioxin BAFs for arthropods. Since dioxins are lipophilic and partition to the organic fraction of soil, and earthworms are detritivores that consume decaying vegetable and animal matter and have intimate contact with the soil, it is ERAS's 'guess' that earthworm bioaccumulation of dioxins would be high relative to other invertebrates, such as the arthropods found at Topock. ERAS therefore believes the earthworm model, if anything, over-estimates dioxin uptake by invertebrates. ERAS accepts the PG&E description of the uncertainties regarding the uptake of dioxins and supports the RBRG of 360 ng/kg.	Comment acknowledged. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
529	DTSC-21	General Comment		**Key Findings**	Hotspots analysis and evaluation of acute hazards	For AOCs with significantly high concentrations of contaminants in one or more locations (for example, SWMU1-25 (dioxin TEQ of 12,000 ng/kg)), HERO recommends that a hotspot analysis be included in the report, where, for example, the extent of the contamination is discussed (in test and figures) along with associated risks/hazards to potential receptors. Acute risk and hazards to potential receptors should be included, to demonstrate that very short-term or one-time exposures to contaminants in these locations are not of concern to potential receptors.	Comment acknowledged. A hot-spot analysis that address the comment is provided in Section 8 of the HHERA Report. See also the response to Comment DOI-18. Receptor-specific acute soil screening levels will be calculated for each soil COPC included in the HHRA for which acute toxicity values are available. The following databases will be searched for acute toxicity values to be used as input values in the calculation of acute soil screening levels, in order: 1) CalEPA OEHHA Toxicity Criteria Database (https://oehha.ca.gov/chemicals) 2) USEPA PPRTV Assessments 3) ATSDR Minimal Risk Levels (https://www.atsdr.cdc.gov/mrls/mrllist.asp) 4) USEPA Health Effects Assessment Summary Tables (https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=2877) 5) USEPA Acute Exposure Guideline Levels (https://www.epa.gov/aegl/access-acute-exposure-guideline-levels-aegls-values#chemicals). Acute soil screening levels will be compared on a sample by sample basis to soil concentrations detected at the site. Exceedances of acute soil screening levels would indicate that acute (or short-term) exposure may be of concern for potential receptors evaluated in the HHRA. For areas of the site where exceedances are identified, if any, a discussion of the extent of the contamination and the associated acute noncancer hazards will be included in the HHRA.		Update HHERA as reported in PG&E's response.
530	DTSC-22	RA		**Table 2-2**	Upland Avian, Mammalian, and Reptilian Species	Please see Comment #6	Comment acknowledged. See the responses to Comment DTSC-6 and Comment DOI-24.		See final resolution for DTSC-6 and DOI-24.

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531	DTSC-23	RA		**Table 6-8**	Toxicity Reference Values for Wildlife – DTSC Recommended Values	ERAS has entered into an agreement with California Fish and Wildlife to use Biological Technical Assistance Group (BTAG) TRV-Lows and the no-effect risk estimates based on these TRVs must be presented in a risk assessment. However, the agreement also allows the proponent to propose alternate TRV-Lows and present them in the risk assessment and this has been done and presented in this report. Since there are no small home range endangered or threatened species within the AOCs, ERAS does not believe it is necessary at this time to calculate hazard quotients based on BTAG TRV-Lows. BTAG highs are not Lowest Observable Adverse Effect Levels (LOAEL's) as indicated in the table; they are mid-range effects and are not considered protective of receptor populations. Mid-range TRV-highs connotate a chemical dose that is deleterious to half the population, as such, they cannot be considered LOAEL's. DTSC/ERAS does not accept the use of BTAG TRV highs for establishing cleanup criteria and determining the boundaries of contaminated areas requiring remedial action. PG&E has presented the BTAG TRV-highs only as a comparison and has appropriately presented alternate TRV-highs based on LOAELs for hazard calculation.	Comment acknowledged. No changes to the HHERA Report are proposed in response to this comment.		No changes to the HHERA Report.
532	DTSC-24	RA		**Table 6-9**	Selected Allometrically Converted TRV for Wildlife	Do not use allometrically adjusted TRVs for calculating hazard quotients. The allometrically converted TRVs have increased the uncertainty of the hazard quotients. Hazard quotients need to be re-calculated based on non-allometrically adjusted TRVs.	See the response to Comment DTSC-14.		See final resolution for DTSC-14.
533	DTSC-25	RA		**Table 6-11**	Risk Conclusions and Lines of Evidence Summary	In all instances where plant HQs exceed unity and the 'Additional Lines of Evidence' support the 'Risk Conclusion' that the Chemical of Concern (COC) is identified as a 'Risk Driver', ERAS recommends that plant vigor and abundance be considered. ERAS does not favor habitat disruption for cleanup based on plant HQs if it can be avoided. As the Oak Ridge National Laboratory (https://rais.ornl.gov/documents/tm85r3.pdf) states, *'If chemical concentrations reported in field soils that support vigorous and diverse plant communities exceed one or more of the benchmarks presented in this report or if a benchmark is exceeded by background soil concentrations, it is generally safe to assume that the benchmark is a poor measure of risk to the plant community at that site'*.	PG&E agrees that the plant HQs based on ORNL screening levels are uncertain and that the overall health of the plant community should be considered as a strong LOE for drawing risk conclusions to plants. The discussion in Sections 6.5.1 and 6.7.5.1 will be expanded to include the recommended ORNL statement, and plant vigor and abundance information will be incorporated, in the WOE evaluation for plants throughout Sections 6.6, 7.2.1, and 8.2 and supporting appendices, as appropriate. See the response to Comment FMIT-85.		See final resolution for FMIT-85.

Acronyms & Abbreviations

2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin	CrIII	trivalent chromium	HHERA	Human Health and Ecological Risk Assessment
AOC	area of concern	CrVI	hexavalent chromium	HHRA	Human Health Risk Assessment
ATSDR	Agency for Toxic Substances Disease Registry	CT	central tendency	HI	hazard index
BAF	bioaccumulation factor	DOI	U.S. Department of the Interior	HQ	hazard quotient
BCa	bias-corrected accelerated	DTSC	Department of Toxic Substances Control	ICS	inside the compressor station
BCW	Bat Cave Wash	Eco-SSL	Ecological Soil Screening Level	ILCR	incremental lifetime cancer risk
bgs	below ground surface	EE/CA	Engineering Evaluation/Cost Analysis	LOAEL	lowest observed adverse effects level
BRA	baseline risk assessment	EPC	exposure point concentration	LOE	line of evidence
BTAG	Biological Technical Assistance Group	ER	East Ravine	m^3	cubic meter
BTV	background threshold value	ERA	Ecological Risk Assessment	mg/kg	milligram per kilogram
CalEPA	California Environmental Protection Agency	FEIR	Final Environmental Impact Report	N/A	not applicable
CH2M	CH2M Hill	FMIT	Fort Mojave Indian Tribe	NOAEL	no observed adverse effect level
CO	Colorado	GANDA	Garcia and Associates	NORR	north of railroad
COC	constituent of concern	GWRA	Groundwater Risk Assessment	OCS	outside the compressor station
COPC	constituent of potential concern	HAZWOPER	Hazardous Waste Operations and Emergency Response	OEHHA	Office of Environmental Health Hazard Assessment
COPEC	constituent of potential ecological concern	HERO	Human and Ecological Risk Office	OHV	off-road vehicle

ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon
PARCCS	precision, accuracy, representativeness, comparability, completeness and sensitivity
PBA	Programmatic Biological Assessment
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
PPRTV	Provisional Peer-Reviewed Toxicity Value
QA	quality assurance
QAPP	Quality Assurance Project Plan
RAWP	Human Health and Ecological Risk Assessment Work Plan
RBC	risk-based concentration
RBRG	risk-based remedial goal
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RME	reasonable maximum exposure
RPD	relative percent different
SSTPA	Surface Soil Transport Pathway Analysis
SUF	site use factor
SWMU	solid waste management unit
T&E	threatened or endangered
TCS	Topock Compressor Station
TEQ	toxicity equivalent
TRV	toxicity reference value
TWG	Technical Workgroup
UCL	upper confidence limit
USEPA	U.S. Environmental Protection Agency
WOE	weight-of-evidence

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ATTACHMENTS
Comment FMIT-54 Figures 1 through 10
Comment DTSC-4 Appendix WMS Table and Figures
Comment DTSC-14 RTC Tables 1 through 2b
Comment DTSC-10 Figure OCS.A3-1

FMIT-54

RTC Figures

Figure 1
Bat Cave Wash − 1,2,3,4,6,7,8−HpCDD

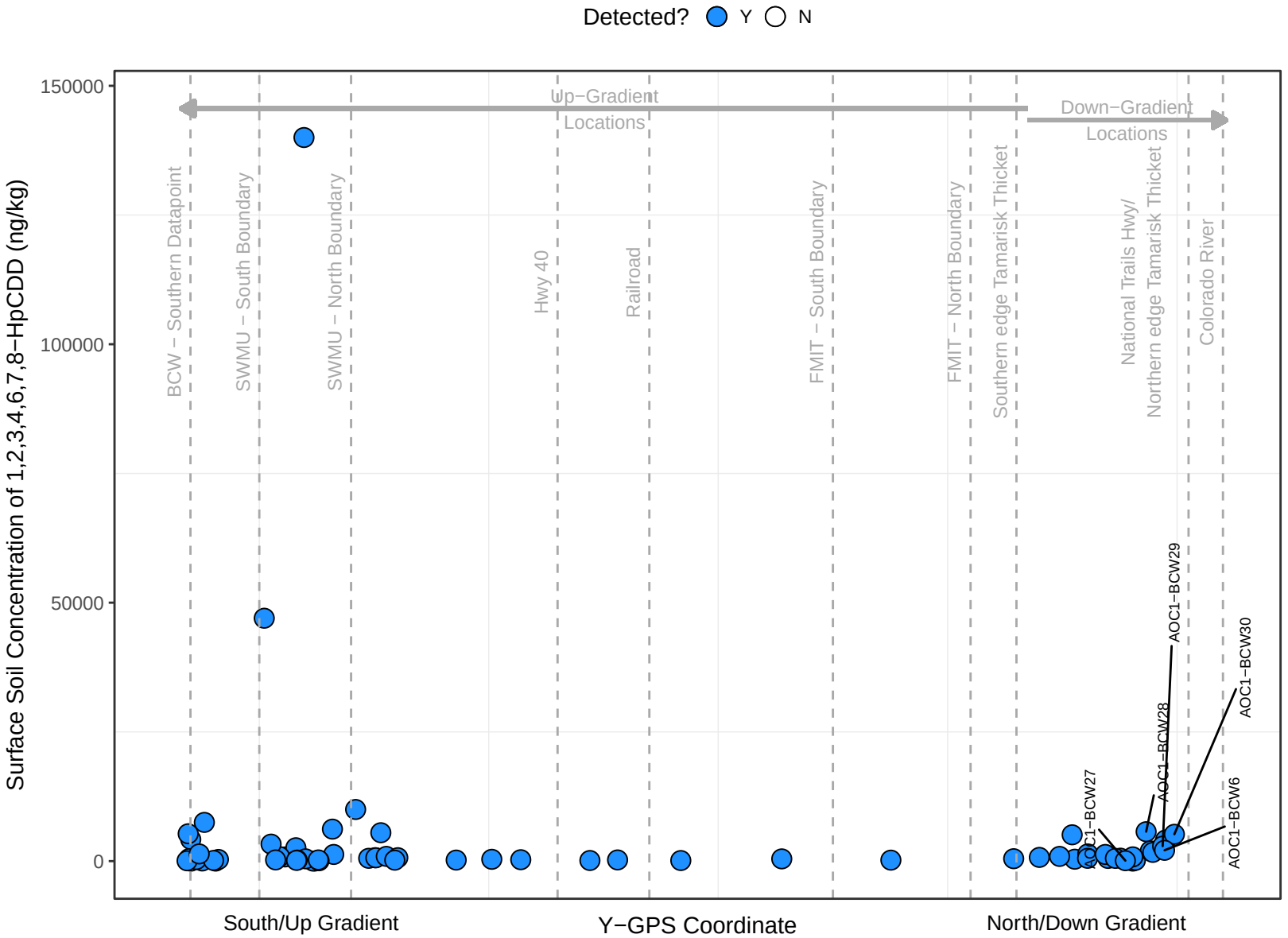


Figure 2
Bat Cave Wash − 1,2,3,4,6,7,8−HpCDF

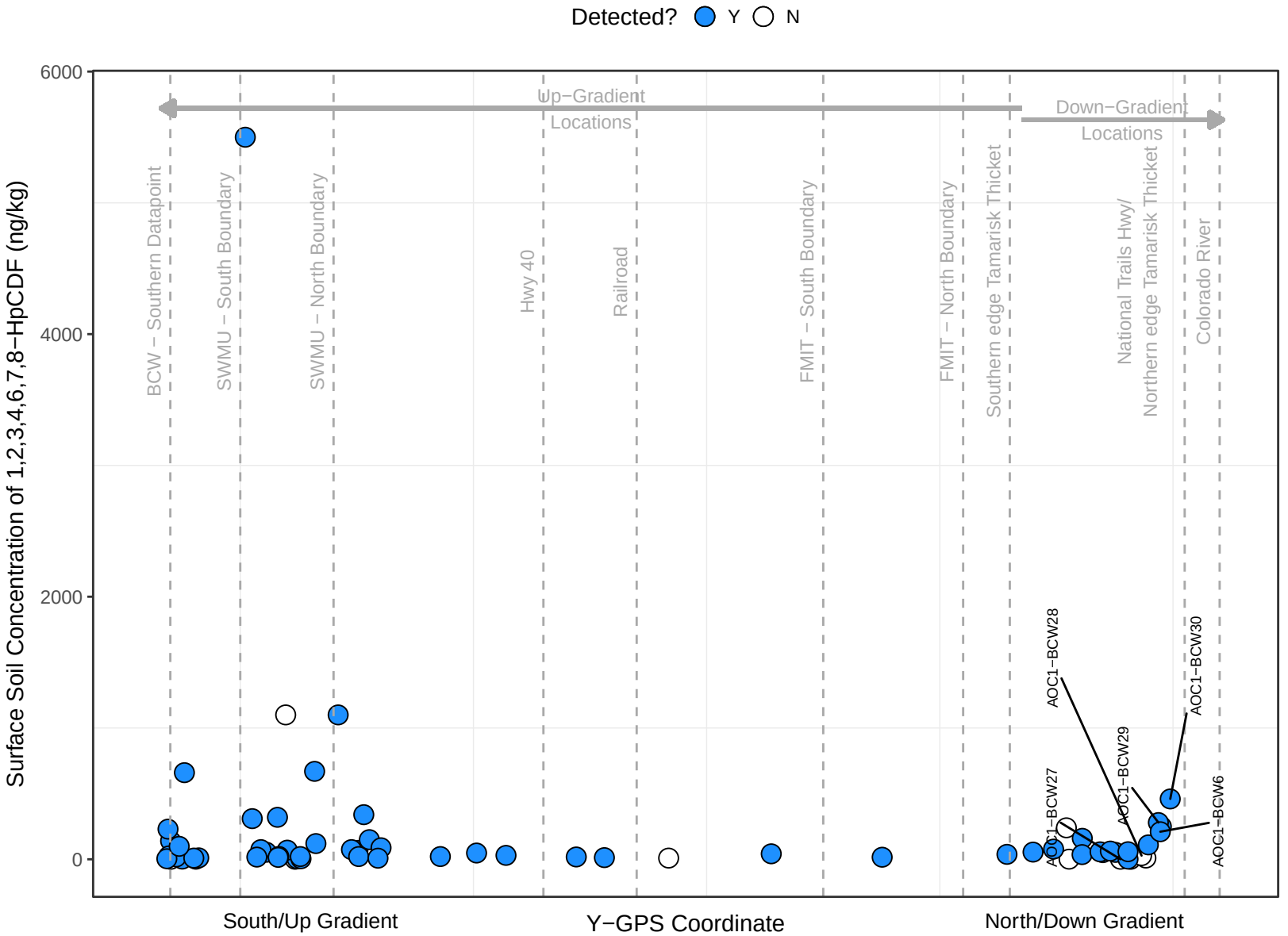


Figure 3
Bat Cave Wash − 1,2,3,4,7,8,9−HpCDF

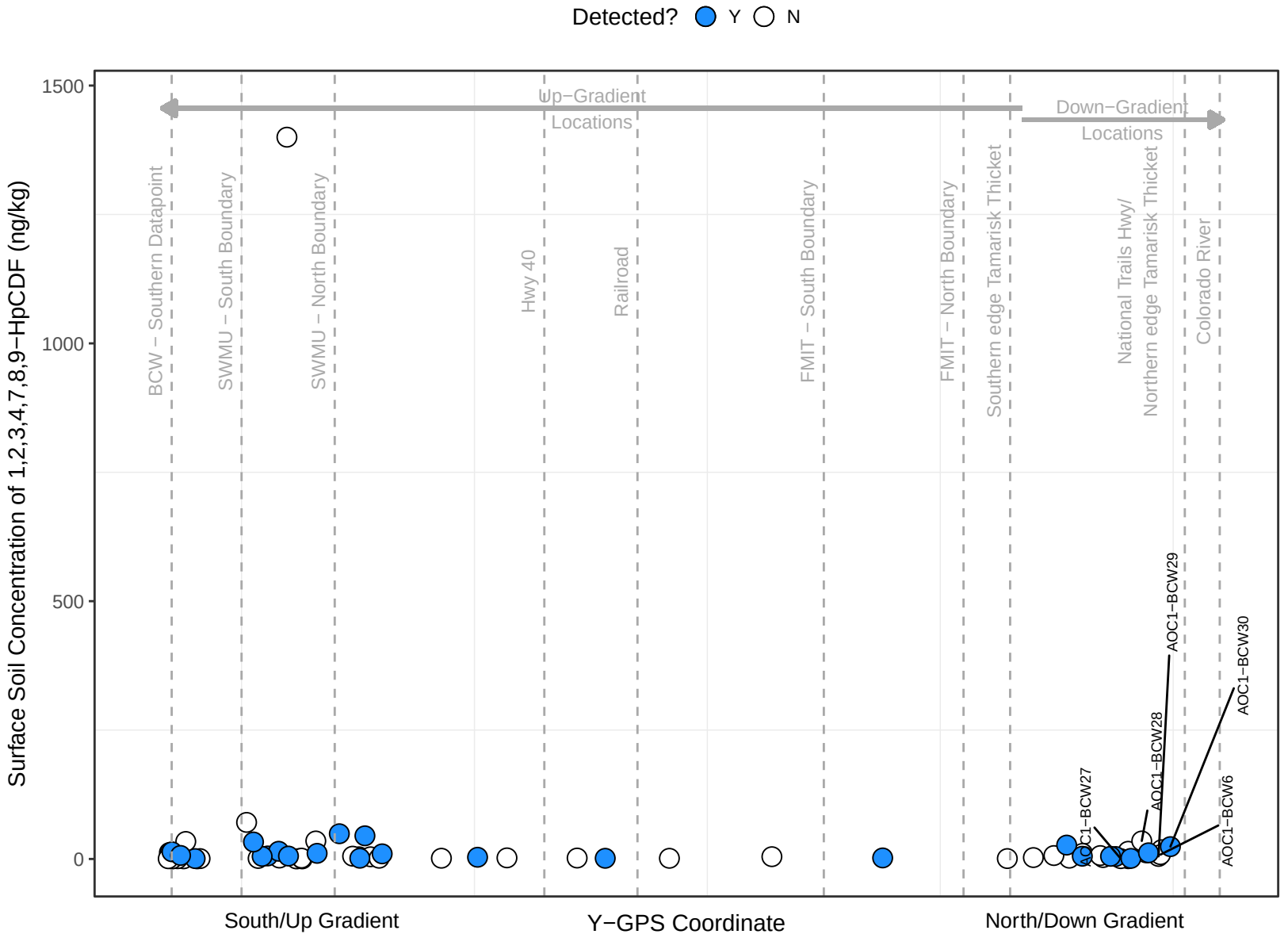


Figure 4
Bat Cave Wash − OCDD

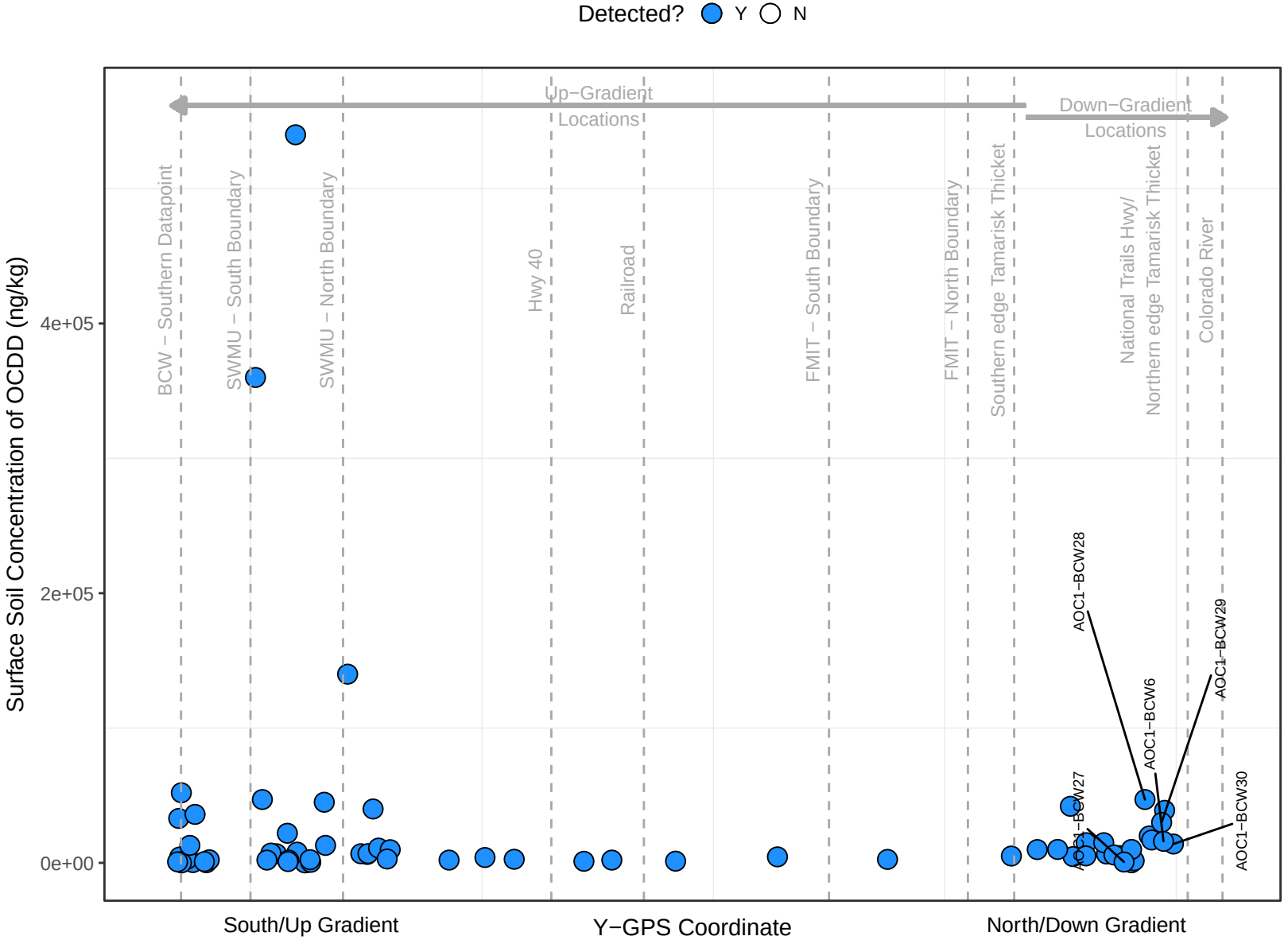


Figure 5
Bat Cave Wash − OCDF

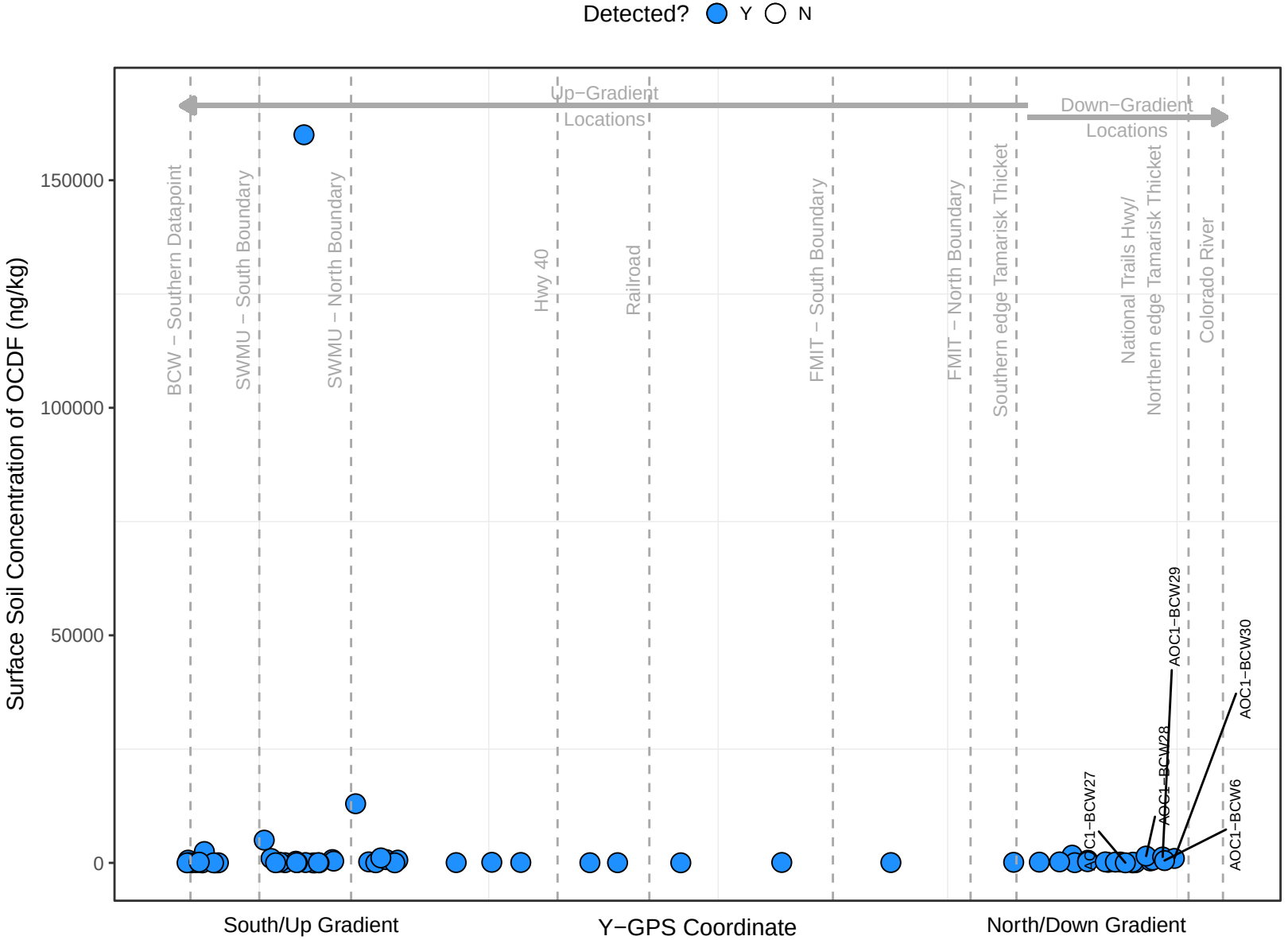


Figure 6
AOC 10 − 1,2,3,4,6,7,8−HpCDD

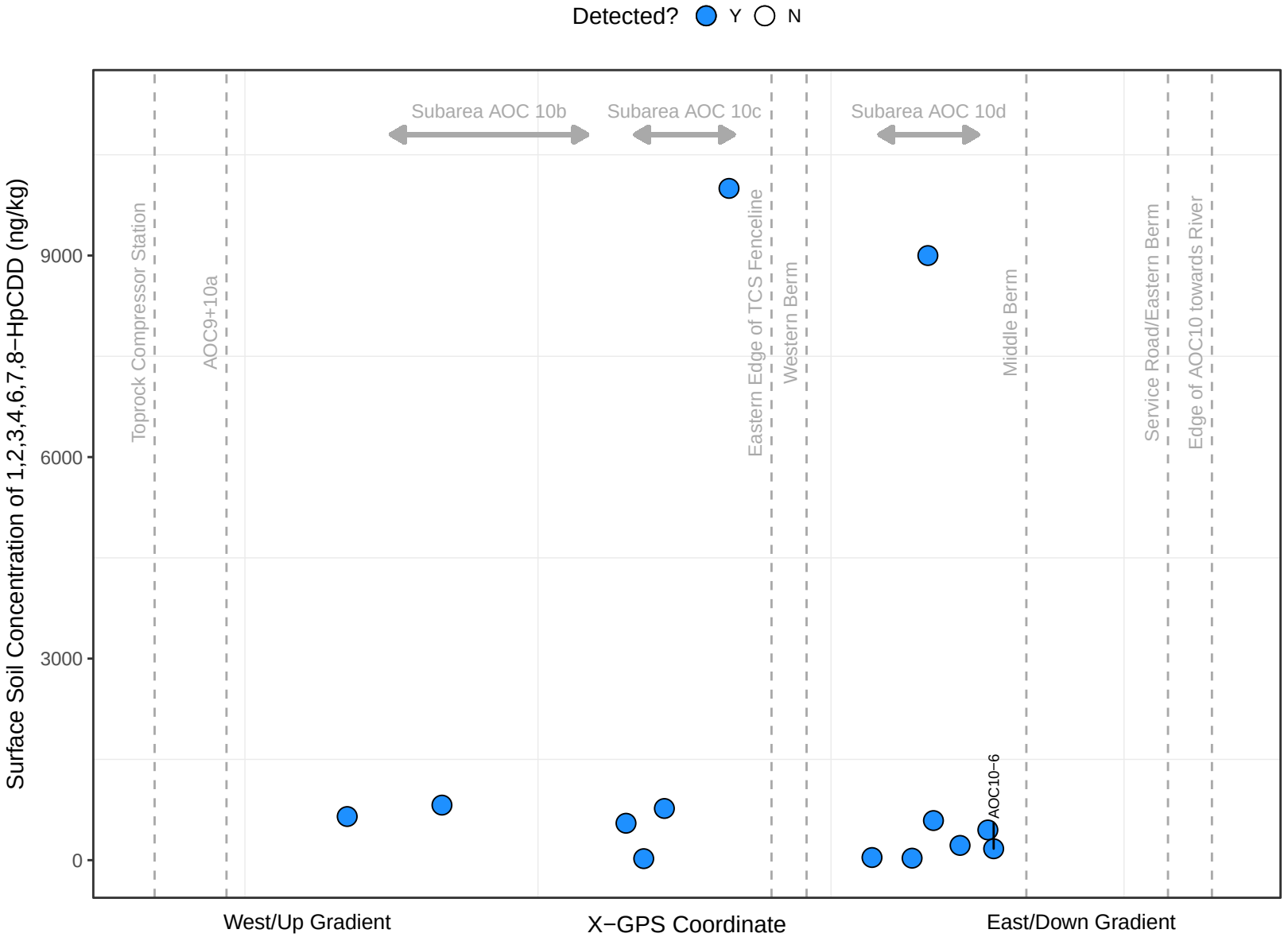


Figure 7
AOC 10 − 1,2,3,4,6,7,8−HpCDF

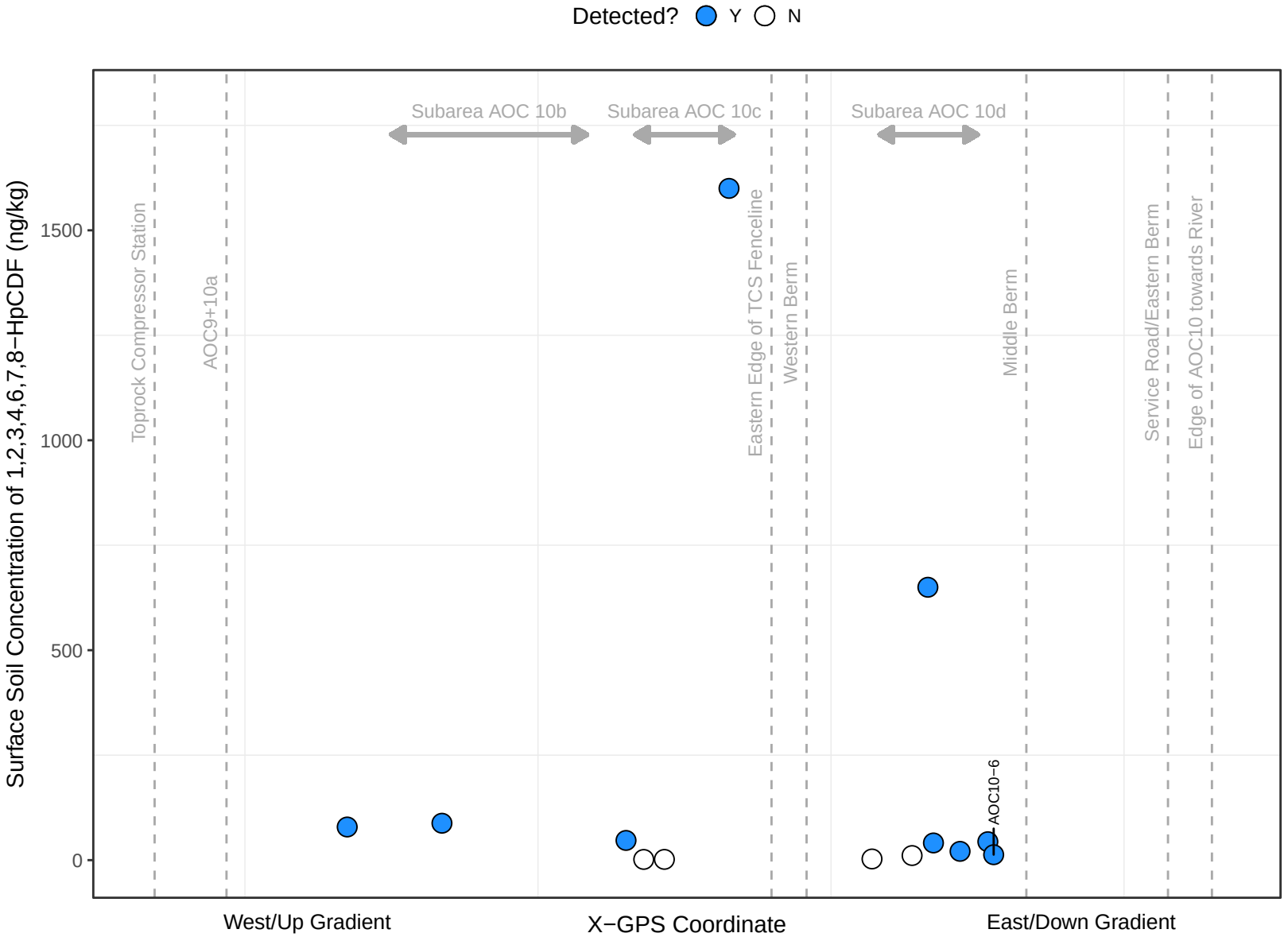


Figure 8
AOC 10 − 1,2,3,4,7,8,9−HpCDF

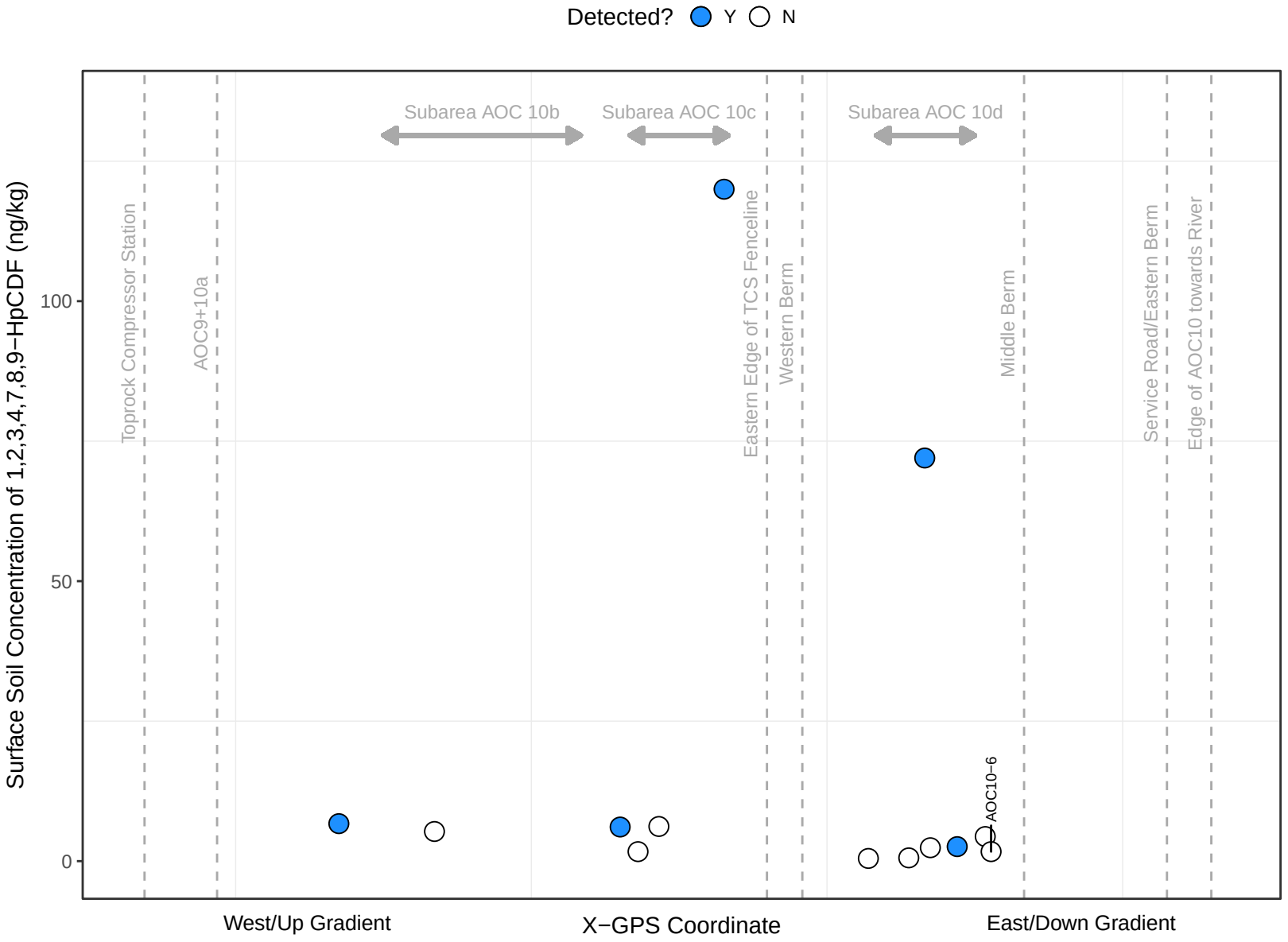


Figure 9
AOC 10 − OCDD

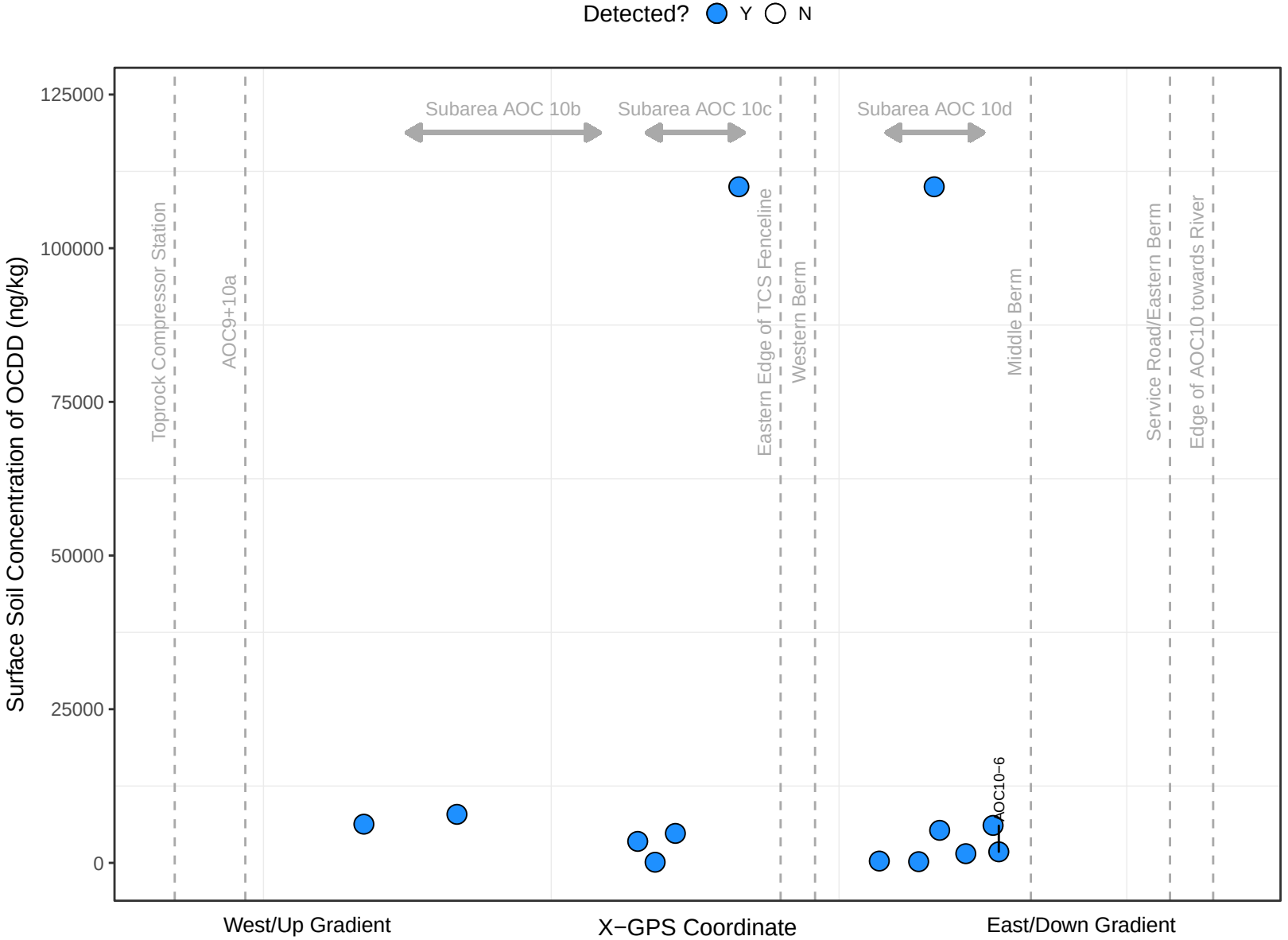
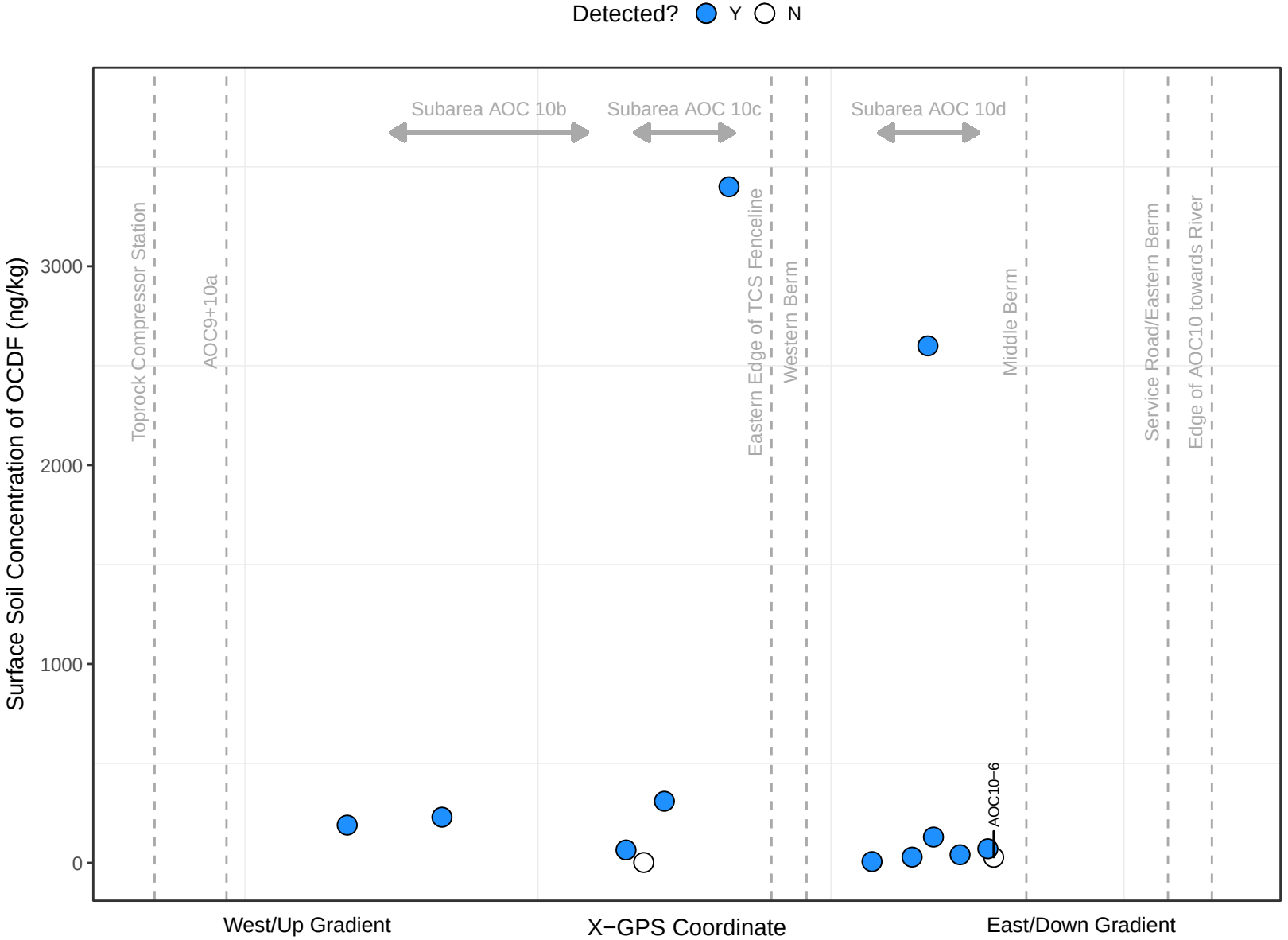


Figure 10
AOC 10 − OCDF



DTSC-4
APPENDIX WMS

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
Asbestos											
Asbestos	percent	--	--	--	--	--	--	--	--	--	--
Dioxins/Furans											
1,2,3,4,6,7,8-HpCDD	ng/kg	--	--	--	1900	--	--	240 UJ	1600 UJ	1100000 J	4600 J
1,2,3,4,6,7,8-HpCDF	ng/kg	--	--	--	9.2 U	--	--	19.0 UJ	470 UJ	110000 J	310 UJ
1,2,3,4,7,8,9-HpCDF	ng/kg	--	--	--	10.0 U	--	--	21.0 UJ	260 J	9600 J	350 UJ
1,2,3,4,7,8-HxCDD	ng/kg	--	--	--	7.8 U	--	--	19.0 UJ	240 UJ	3400 J	170 UJ
1,2,3,4,7,8-HxCDF	ng/kg	--	--	--	12.0 U	--	--	27.0 UJ	220 UJ	7600 J	320 UJ
1,2,3,6,7,8-HxCDD	ng/kg	--	--	--	7.8 U	--	--	26.0 UJ	240 UJ	45000 J	170 UJ
1,2,3,6,7,8-HxCDF	ng/kg	--	--	--	11.0 U	--	--	25.0 UJ	350 UJ	1800 UJ	300 UJ
1,2,3,7,8,9-HxCDD	ng/kg	--	--	--	7.5 U	--	--	25.0 UJ	230 UJ	5600 J	170 UJ
1,2,3,7,8,9-HxCDF	ng/kg	--	--	--	13.0 U	--	--	30.0 UJ	240 UJ	3600 J	360 UJ
1,2,3,7,8-PeCDD	ng/kg	--	--	--	16.0 U	--	--	42.0 UJ	440 UJ	1300 J	320 UJ
1,2,3,7,8-PeCDF	ng/kg	--	--	--	7.1 U	--	--	16.0 UJ	150 UJ	1600 J	95.0 UJ
2,3,4,6,7,8-HxCDF	ng/kg	--	--	--	12.0 U	--	--	120 J	440 UJ	700000 UJ	1200 UJ
2,3,4,7,8-PeCDF	ng/kg	--	--	--	7.3 U	--	--	16.0 UJ	170 UJ	3000 J	98.0 UJ
2,3,7,8-TCDD	ng/kg	--	--	--	4.8 U	--	--	18.0 UJ	180 UJ	140 UJ	120 UJ
2,3,7,8-TCDF	ng/kg	--	--	--	6.1 U	--	--	12.0 UJ	160 UJ	730 J	78.0 UJ
OCDD	ng/kg	--	--	--	20000	--	--	2200 UJ	22000 J	550000 J	43000 J
OCDF	ng/kg	--	--	--	340	--	--	73.0 UJ	1800 UJ	250000 J	2200 UJ
TEQ Avian	ng/kg	--	--	--	24.0	--	--	63.0	570	45000	450
TEQ Human	ng/kg	--	--	--	41.0	--	--	55.0	460	56000	440
TEQ Mammals	ng/kg	--	--	--	41.0	--	--	55.0	460	56000	440
General Chemistry											
pH	PHUNITS	--	--	--	--	--	--	--	--	7.1	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
Metals											
Antimony	mg/kg	--	--	--	--	2.1 U	2.2 U	--	--	23.0	--
Arsenic	mg/kg	--	--	--	--	1.9	21.0	--	--	38.0	--
Barium	mg/kg	--	--	--	--	280	170	--	--	640	--
Beryllium	mg/kg	--	--	--	--	1.1 U	1.1 U	--	--	1.1 U	--
Cadmium	mg/kg	--	--	--	--	1.1 U	2.6	--	--	1.1 U	--
Chromium, Hexavalent	mg/kg	--	--	--	--	0.21 U	3.9	--	--	7.7 J	--
Chromium, total	mg/kg	--	--	--	--	47.0	110	--	--	3800	--
Cobalt	mg/kg	--	--	--	--	2.6	5.0	--	--	3.4	--
Copper	mg/kg	--	--	--	--	44.0	470	--	--	140	--
Lead	mg/kg	--	--	--	--	110	170	--	--	62.0	--
Mercury	mg/kg	--	--	--	--	0.11 U	0.11 U	--	--	3.7	--
Molybdenum	mg/kg	--	--	--	--	1.1 U	2.8	--	--	16.0	--
Nickel	mg/kg	--	--	--	--	4.2	19.0	--	--	11.0	--
Selenium	mg/kg	--	--	--	--	1.1 UJ	1.1 UJ	--	--	1.1 U	--
Silver	mg/kg	--	--	--	--	1.1 U	1.1 U	--	--	1.1 U	--
Thallium	mg/kg	--	--	--	--	2.1 UJ	2.2 UJ	--	--	2.1 U	--
Vanadium	mg/kg	--	--	--	--	10.0	10.0	--	--	61.0	--
Zinc	mg/kg	--	--	--	--	73.0	720	--	--	1800	--
Organics											
1,2,4-Trichlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
1,2-Dichlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
1,3-Dichlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
1,4-Dichlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2,4,5-Trichlorophenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2,4,6-Trichlorophenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
2,4-Dichlorophenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
2,4-Dimethylphenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2,4-Dinitrophenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
2,4-Dinitrotoluene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2,6-Dinitrotoluene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2-Chloro naphthalene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2-Chlorophenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2-Methylphenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
2-Nitroaniline	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
2-Nitrophenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
3,3-Dichlorobenzidene	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
3/4-Methylphenol	ug/kg	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
4,6-Dinitro-2-methylphenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
4-Bromophenyl phenyl ether	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
4-Chloro-3-methylphenol	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
4-Chloroaniline	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
4-Chlorophenyl phenyl ether	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
4-Methylphenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
4-Nitroaniline	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
4-Nitrophenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
Benzoic acid	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
Benzyl alcohol	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
bis (2-chloroethoxy) methane	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
bis (2-chloroethyl) ether	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
bis (2-chloroisopropyl) ether	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
bis (2-ethylhexyl) phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Butylbenzylphthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Carbazole	ug/kg	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Diethyl phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Dimethyl phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Di-n-butyl phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Di-n-octyl phthalate	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Hexachlorobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Hexachlorobutadiene	ug/kg	--	--	--	3500 U	--	--	3300 U	3600 U	--	3500 U
Hexachlorocyclopentadiene	ug/kg	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Isophorone	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Nitrobenzene	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
n-Nitroso-di-n-propylamine	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
N-nitrosodiphenylamine	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Pentachlorophenol	ug/kg	--	--	--	8800 U	--	--	8300 U	9100 U	--	8600 U
Phenol	ug/kg	--	--	--	1800 U	--	--	1700 U	1800 U	--	1700 U
Polycyclic Aromatic Hydrocarbons											
1-Methyl naphthalene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	5.3 U	26.0 U
2-Methyl naphthalene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	5.7	26.0 U
Acenaphthene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	40.0	26.0 U
Acenaphthylene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	6.8	26.0 U
Anthracene	ug/kg	--	--	--	27.0 U	54.0 U	25.0	25.0 U	28.0 U	150	26.0 U
B(a)P Equivalent	ug/kg	2900 U	2900 U	140000 U	31.0	76.0	150	500	740	2600	30.0
Benzo (a) anthracene	ug/kg	--	--	--	27.0 U	160 J	200 J	540 J	410 J	2200	26.0 U

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
Benzo (a) pyrene	ug/kg	--	--	--	27.0 U	54.0 U	95.0	430 J	680 J	2000 J	26.0 U
Benzo (b) fluoranthene	ug/kg	--	--	--	27.0 U	54.0 U	280	25.0 U	28.0 U	2700 J	26.0 U
Benzo (ghi) perylene	ug/kg	--	--	--	37.0 J	54.0 U	22.0 J	38.0 J	55.0 J	940 J	26.0 U
Benzo (k) fluoranthene	ug/kg	--	--	--	27.0 U	54.0 U	87.0	25.0 U	28.0 U	1000 J	26.0 U
Chrysene	ug/kg	--	--	--	27.0 U	79.0 J	200	87.0 J	28.0 U	1700	26.0 U
Dibenzo (a,h) anthracene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	5.3 U	26.0 U
Fluoranthene	ug/kg	--	--	--	27.0 U	54.0 U	790	49.0 J	28.0 U	2600	26.0 U
Fluorene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	26.0	26.0 U
Indeno (1,2,3-cd) pyrene	ug/kg	--	--	--	27.0 U	54.0 U	25.0 J	25.0 U	28.0 U	980 J	26.0 U
Naphthalene	ug/kg	--	--	--	27.0 U	54.0 U	5.5 U	25.0 U	28.0 U	8.5	26.0 U
PAH High molecular weight	ug/kg	--	--	--	37.0	303	2300	1460	1220	16800	--
PAH Low molecular weight	ug/kg	--	--	--	0.0	0.0	405	64.0	0.0	1130	--
Phenanthrene	ug/kg	--	--	--	27.0 U	54.0 U	380	64.0 J	28.0 U	890	47.0 J
Pyrene	ug/kg	--	--	--	27.0 U	64.0 J	600	320 J	77.0 J	2700	26.0 U
Polychorinated Biphenyls											
Aroclor 1016	ug/kg	--	--	--	18.0 UJ	18.0 U	18.0 U	17.0 UJ	18.0 UJ	18.0 UJ	17.0 U
Aroclor 1221	ug/kg	--	--	--	35.0 UJ	35.0 U	36.0 U	33.0 UJ	36.0 UJ	35.0 U	35.0 U
Aroclor 1232	ug/kg	--	--	--	18.0 UJ	18.0 U	18.0 U	17.0 UJ	18.0 UJ	18.0 U	17.0 U
Aroclor 1242	ug/kg	--	--	--	18.0 UJ	18.0 UJ	18.0 UJ	17.0 UJ	18.0 UJ	18.0 U	17.0 U
Aroclor 1248	ug/kg	--	--	--	18.0 UJ	18.0 U	18.0 U	17.0 UJ	18.0 UJ	18.0 U	17.0 U
Aroclor 1254	ug/kg	--	--	--	30.0 J	18.0 U	150	17.0 UJ	18.0 UJ	2800	59.0
Aroclor 1260	ug/kg	--	--	--	18.0 UJ	18.0 U	120	17.0 UJ	18.0 UJ	1200	17.0 U
Total PCBs	ug/kg	--	--	--		36.0 U	288	--	--	4020	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	24debris-01	24debris-02	24debris-03	AOC13-33-Asphalt	AOC13-33-DEBRIS	AOC13-33-SCALE	AOC13-Asphalt1	AOC13-Asphalt2	AOC13-Debris	AOC13-Putty
	Sample Matrix:	Concrete	Wood	Tar	ASPHALT	Debris	Scale	ASPHALT	ASPHALT	DEBRIS	PUTTY
	Sample Depth (ft):	--	--	--	--	--	--	--	--	--	--
	Sample Date:	1/18/2008	1/18/2008	1/18/2008	4/26/2017	2/18/2017	2/18/2017	4/26/2017	4/26/2017	4/26/2017	4/26/2017
	Units										
Total Petroleum Hydrocarbons											
TPH as diesel	mg/kg	--	--	--	--	--	--	--	--	--	--
TPH as gasoline	mg/kg	--	--	--	--	--	--	--	--	--	--
TPH as motor oil	mg/kg	--	--	--	--	--	--	--	--	--	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
Asbestos									
Asbestos	percent	--	--	--	--	--	--	--	12
Dioxins/Furans									
1,2,3,4,6,7,8-HpCDD	ng/kg	520 UJ	--	--	130 SJ	--	--	--	2400 J
1,2,3,4,6,7,8-HpCDF	ng/kg	480 UJ	--	--	15.0 SJ	--	--	--	620 U
1,2,3,4,7,8,9-HpCDF	ng/kg	240 UJ	--	--	8.2 R	--	--	--	130 J
1,2,3,4,7,8-HxCDD	ng/kg	690 UJ	--	--	6.7 R	--	--	--	120 U
1,2,3,4,7,8-HxCDF	ng/kg	760 UJ	--	--	8.7 SJ	--	--	--	160 U
1,2,3,6,7,8-HxCDD	ng/kg	690 UJ	--	--	11.0 R	--	--	--	250 J
1,2,3,6,7,8-HxCDF	ng/kg	710 UJ	--	--	8.9 R	--	--	--	220 U
1,2,3,7,8,9-HxCDD	ng/kg	670 UJ	--	--	15.0 R	--	--	--	180 J
1,2,3,7,8,9-HxCDF	ng/kg	840 UJ	--	--	9.6 R	--	--	--	91.0 U
1,2,3,7,8-PeCDD	ng/kg	1200 UJ	--	--	12.0 R	--	--	--	260 U
1,2,3,7,8-PeCDF	ng/kg	790 UJ	--	--	15.0 R	--	--	--	230 J
2,3,4,6,7,8-HxCDF	ng/kg	770 UJ	--	--	14.0 R	--	--	--	1400 U
2,3,4,7,8-PeCDF	ng/kg	820 UJ	--	--	1.8 R	--	--	--	150 U
2,3,7,8-TCDD	ng/kg	520 UJ	--	--	3.2 R	--	--	--	90.0 U
2,3,7,8-TCDF	ng/kg	990 UJ	--	--	2.2 R	--	--	--	84.0 J
OCDD	ng/kg	5000 UJ	--	--	6300 SJ	--	--	--	18000
OCDF	ng/kg	1200 UJ	--	--	200 R	--	--	--	450 U
TEQ Avian	ng/kg	2000 U	--	--	15.0 SJR	--	--	--	480
TEQ Human	ng/kg	1300 U	--	--	16.0 SJR	--	--	--	390
TEQ Mammals	ng/kg	1300 U	--	--	16.0 SJR	--	--	--	390
General Chemistry									
pH	PHUNITS	--	5.8	--	--	--	--	--	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
Metals									
Antimony	mg/kg	--	78.0	--	2.0 U	2.9 U	1.1 J	0.43 J	--
Arsenic	mg/kg	--	12.0	--	5.6	4.6	2.6	4.3	--
Barium	mg/kg	--	96.0	--	52.0	220	72.2	154	--
Beryllium	mg/kg	--	1.1 U	--	1.0 U	1.4 U	0.89 U	0.19 J	--
Cadmium	mg/kg	--	1.1 U	--	1.0 U	1.4 U	0.89 U	0.83 U	--
Chromium, Hexavalent	mg/kg	--	4.1	--	0.20 U	0.79			--
Chromium, total	mg/kg	--	9700	--	75.0	64.0	72.7	28.7	--
Cobalt	mg/kg	--	1.1 U	--	4.9	14.0	5.9	8.4	--
Copper	mg/kg	--	2400	--	7.5	16.0	22.2	14.3	--
Lead	mg/kg	--	23.0	--	19.0	5.4	7.9	12.5	--
Mercury	mg/kg	--	0.47	--	0.10 U	0.14 U	0.046 J	0.092 J	--
Molybdenum	mg/kg	--	15.0	--	1.0 U	1.4 U	0.86 J	0.42 J	--
Nickel	mg/kg	--	1.2	--	21.0	39.0	47.0	21.0	--
Selenium	mg/kg	--	1.1 U	--	1.0 UJ	1.4 UJ	0.99 J	0.59 J	--
Silver	mg/kg	--	1.1 U	--	1.0 U	1.4 U	2.2 U	2.1 U	--
Thallium	mg/kg	--	2.5	--	2.1	2.9 UJ	22.0 U	21.0 U	--
Vanadium	mg/kg	--	7.6	--	9.4	48.0	39.2	36.4	--
Zinc	mg/kg	--	630	--	35.0	48.0	29.3 U	57.0	--
Organics									
1,2,4-Trichlorobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
1,2-Dichlorobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
1,3-Dichlorobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
1,4-Dichlorobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2,4,5-Trichlorophenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2,4,6-Trichlorophenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
2,4-Dichlorophenol	ug/kg	17000 UJ	--	--	17000 U	--	550 U	21000 U	--
2,4-Dimethylphenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2,4-Dinitrophenol	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
2,4-Dinitrotoluene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2,6-Dinitrotoluene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2-Chloro naphthalene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2-Chlorophenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2-Methylphenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
2-Nitroaniline	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
2-Nitrophenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
3,3-Dichlorobenzidene	ug/kg	6700 UJ	--	--	67000 U	--	1100 U	21000 U	--
3/4-Methylphenol	ug/kg	--	--	--	--	--	550 U	21000 U	--
3-Nitroaniline	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
4,6-Dinitro-2-methylphenol	ug/kg	17000 UJ	--	--	170000 U	--	2800 U	100000 U	--
4-Bromophenyl phenyl ether	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
4-Chloro-3-methylphenol	ug/kg	6700 UJ	--	--	6700 U	--	1100 U	42000 U	--
4-Chloroaniline	ug/kg	6700 UJ	--	--	6700 U	--	1100 U	42000 U	--
4-Chlorophenyl phenyl ether	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
4-Methylphenol	ug/kg	3300 UJ	--	--	3400 U	--	--	--	
4-Nitroaniline	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
4-Nitrophenol	ug/kg	17000 UJ	--	--	17000 U	--	2800 U	100000 U	--
Benzoic acid	ug/kg	17000 UJ	--	--	17000 U	--	--	--	--
Benzyl alcohol	ug/kg	6700 UJ	--	--	6700 U	--	--	--	--
bis (2-chloroethoxy) methane	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
bis (2-chloroethyl) ether	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
bis (2-chloroisopropyl) ether	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
bis (2-ethylhexyl) phthalate	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Butylbenzylphthalate	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Carbazole	ug/kg	--	--	--	--	--	550 U	21000 U	--
Dibenzofuran	ug/kg	3300 UJ	--	--	130000	--	550 U	21000 U	--
Diethyl phthalate	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Dimethyl phthalate	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Di-n-butyl phthalate	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Di-n-octyl phthalate	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Hexachlorobenzene	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Hexachlorobutadiene	ug/kg	6700 UJ	--	--	6700 U	--	550 U	21000 U	--
Hexachlorocyclopentadiene	ug/kg	--	--	--	--	--	550 U	21000 U	--
Hexachloroethane	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Isophorone	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Nitrobenzene	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
n-Nitroso-di-n-propylamine	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
N-nitrosodiphenylamine	ug/kg	3300 UJ	--	--	34000 U	--	550 U	21000 U	--
Pentachlorophenol	ug/kg	17000 UJ	--	--	170000 U	--	2800 U	100000 U	--
Phenol	ug/kg	3300 UJ	--	--	3400 U	--	550 U	21000 U	--
Polycyclic Aromatic Hydrocarbons									
1-Methyl naphthalene	ug/kg	51.0 UJ	--	--	230 J	--	--	--	--
2-Methyl naphthalene	ug/kg	51.0 UJ	--	--	250 J	--	550 U	21000 U	--
Acenaphthene	ug/kg	51.0 UJ	--	--	43000	--	550 U	21000 U	--
Acenaphthylene	ug/kg	51.0 UJ	--	--	4800	--	550 U	21000 U	--
Anthracene	ug/kg	51.0 UJ	--	--	2700000	--	550 U	21000 U	--
B(a)P Equivalent	ug/kg	98.0	--	18.0	4700000	--	640 U	24000 U	--
Benzo (a) anthracene	ug/kg	400 J	--	--	6900000	--	550 U	21000 U	--

Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
Benzo (a) pyrene	ug/kg	51.0 UJ	--	--	3000000	--	550 U	21000 U	--
Benzo (b) fluoranthene	ug/kg	51.0 UJ	--	--	6700000	--	550 U	21000 U	--
Benzo (ghi) perylene	ug/kg	51.0 UJ	--	--	990000	--	550 U	21000 U	--
Benzo (k) fluoranthene	ug/kg	51.0 UJ	--	--	2900000	--	550 U	21000 U	--
Chrysene	ug/kg	1900 J	--	--	6900000	--	550 U	21000 U	--
Dibenzo (a,h) anthracene	ug/kg	51.0 UJ	--	--	210000 J	--	550 U	21000 U	--
Fluoranthene	ug/kg	140 J	--	--	27000000	--	550 U	21000 U	--
Fluorene	ug/kg	51.0 UJ	--	--	37000	--	550 U	21000 U	--
Indeno (1,2,3-cd) pyrene	ug/kg	51.0 UJ	--	--	1000000	--	550 U	21000 U	--
Naphthalene	ug/kg	51.0 UJ	--	--	140 J	--	550 U	21000 U	--
PAH High molecular weight	ug/kg	3350	--	--	75600000	--	0.0	0.0	--
PAH Low molecular weight	ug/kg	130	--	--	23800000	--	0.0	0.0	--
Phenanthrene	ug/kg	130 J	--	--	21000000	--	550 U	21000 U	--
Pyrene	ug/kg	910 J	--	--	20000000	--	550 U	21000 U	--
Polychorinated Biphenyls									
Aroclor 1016	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1221	ug/kg	67.0 UJ	--	--	67.0 U	--	--	--	--
Aroclor 1232	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1242	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1248	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1254	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Aroclor 1260	ug/kg	33.0 UJ	--	--	34.0 U	--	--	--	--
Total PCBs	ug/kg	66.0 U	--	--	68.0 U	--	--	--	--

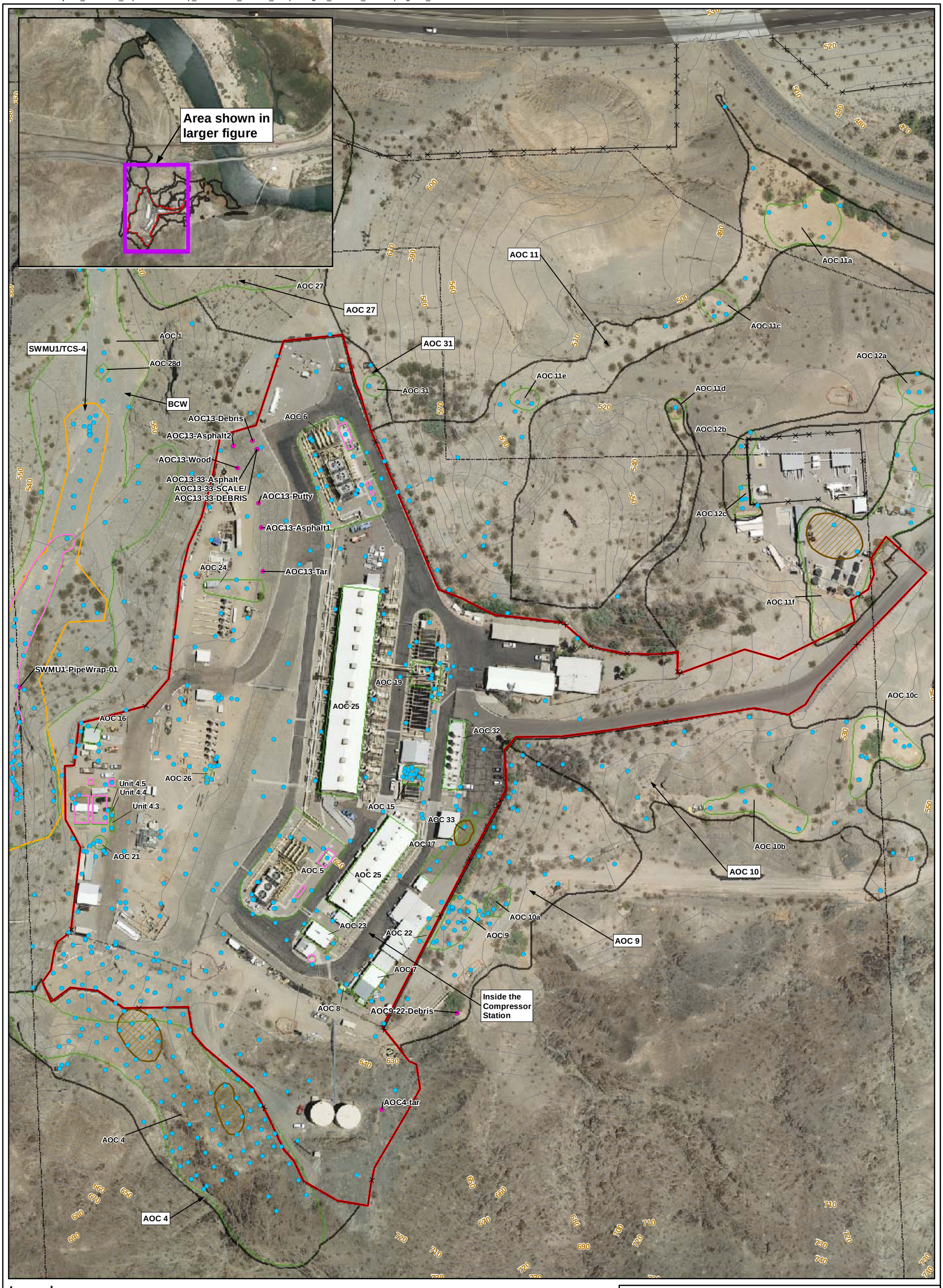
Table WMS-1
Analytical Data for Waste Material Samples

Soil Human Health and Ecological Risk Assessment
PG&E Topock Compressor Station
Needles, CA

Analyte	SampleID:	AOC13-Tar	AOC13-Wood	AOC14-13-8089	AOC4-tar	AOC9-22-Debris	S2-62-3	S8-23-3	SWMU1-PipeWrap-01
	Sample Matrix:	TAR	WOOD	Debris	TAR	Debris	Asphalt	Asphalt	Solid
	Sample Depth (ft):	--	--	0.5 - 1.5	--	2.5 - 2.6	3 - 3	3 - 3	--
	Sample Date:	4/26/2017	4/26/2017	10/1/2008	2/6/2017	1/4/2017	11/1/1998	11/1/1998	2/26/2014
	Units								
Total Petroleum Hydrocarbons									
TPH as diesel	mg/kg	--	--	--	--	--	11.0 U	15000	--
TPH as gasoline	mg/kg	--	--	--	--	--	1.1 U	1.0 U	--
TPH as motor oil	mg/kg	--	--	--	--	--	2.0 J	17000	--

Notes:
-- = not applicable
% = percent
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
ug/kg = micrograms per kilogram
J = estimated value
U = not detected at specified reporting limit
UJ = not detected at specified reporting limit; reporting limit
AOC = area of concern
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyls
TPH = total petroleum hydrocarbons

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Legend:

- Soil Sampling Location
- Waste Material Sampling Location
- Area of Concern
- Exposure Area
- Solid Waste Management Unit
- SWMU1 Exposure Area
- Potential Burning Related Location
- Fencing
- Property Boundaries
- Contour Line (10 feet interval)
- Inside the Topock Compressor Station boundary, as defined by current fenceline
- AOC 4 — Label for Exposure Area
- AOC 4 — Label for Area of Concern

0 140 280

SCALE IN FEET

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

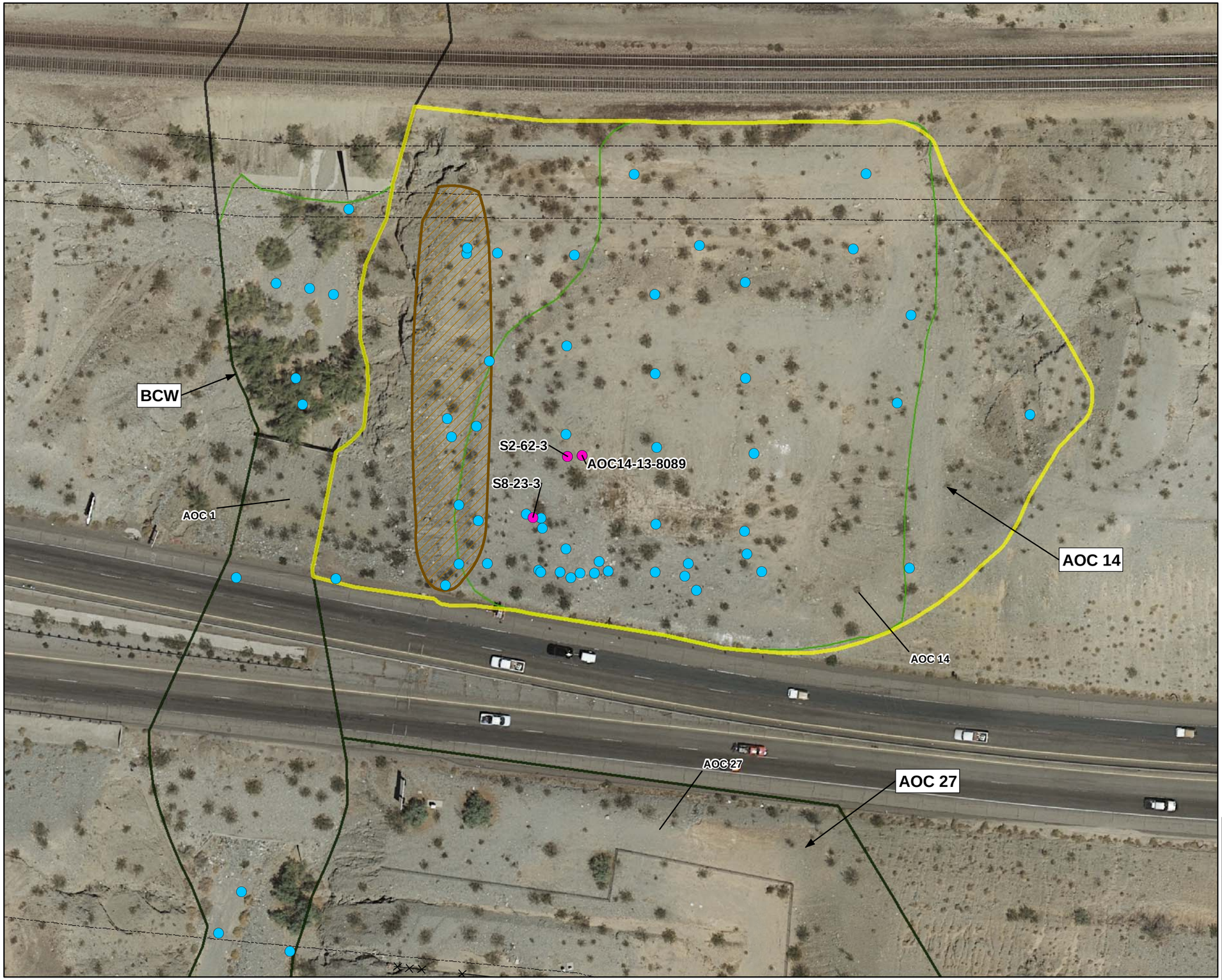
WASTE MATERIAL SAMPLING LOCATIONS INSIDE AND OUTSIDE THE COMPRESSOR STATION EXPOSURE AREA

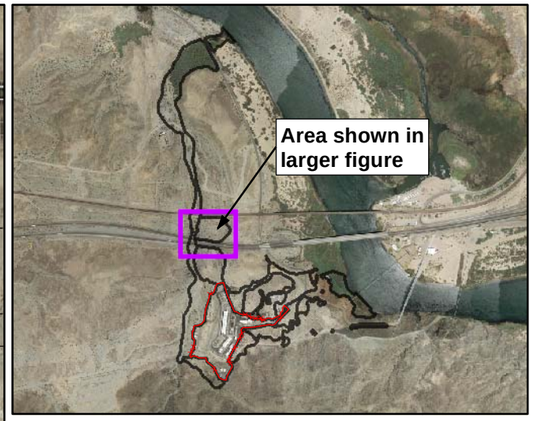
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FIGURE

WMS-1a

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Legend:

- Soil Sampling Location
- Waste Material Sampling Location
- Area of Concern
- Potential Burning Related Location
- AOC 14 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

0 60 120

SCALE IN FEET

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

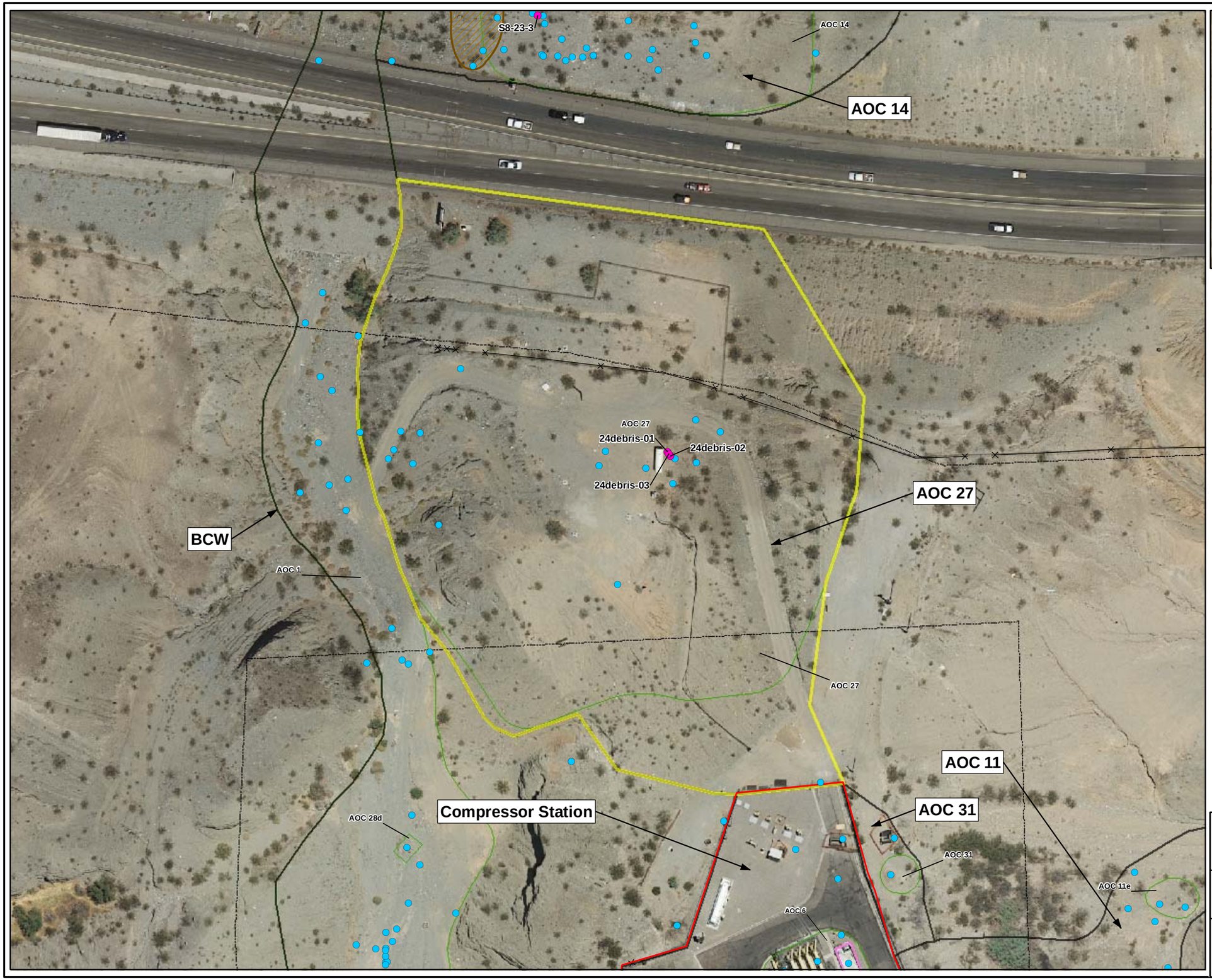
SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

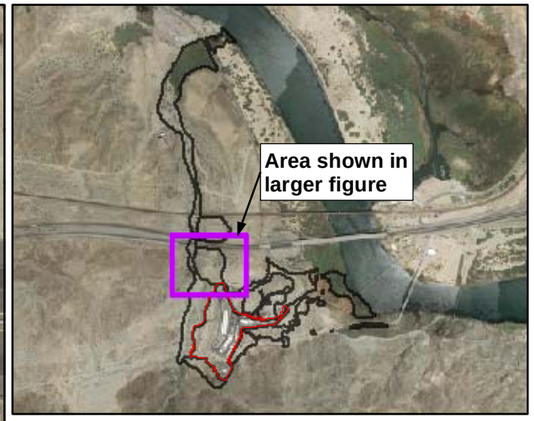
WASTE MATERIAL SAMPLING LOCATIONS INSIDE AND OUTSIDE THE COMPRESSOR STATION EXPOSURE AREA

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FIGURE
WMS-1b

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Legend:

- Soil Sampling Location
- Waste Material 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

0 80 160

SCALE IN FEET

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

WASTE MATERIAL SAMPLING LOCATIONS INSIDE AND OUTSIDE THE COMPRESSOR STATION EXPOSURE AREA

ARCADIS Design & Consultancy for natural and built assets

FIGURE
WMS-1c

DTSC-14

RTC Tables

RTC Table 1
TRV Summary for Wildlife (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	Selected TRVs (Mammals)														DTSC-Recommended TRVs (Mammals)					
	Original		Desert Shrew				Merriam's Kangaroo Rat				Nelson's Desert Bighorn Sheep				Original		Nelson's Desert Bighorn Sheep			
	TRV		TRV		Percent Difference		TRV		Percent Difference		TRV		Percent Difference		TRV		TRV		Percent Difference	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	%	%	mg/kg-d	mg/kg-d	%	%	mg/kg-d	mg/kg-d	%	%	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	%	%
Inorganics																				
Antimony	0.059	0.59	--	--	--	--	--	--	--	--	0.043	0.43	38	38	0.059	0.59	--	--	--	--
Arsenic	1.04	1.66	1.5	2.4	-32	-32	1.5	2.3	-29	-29	--	--	--	--	0.32	4.7	0.23	3.4	37	37
Beryllium	0.532	0.63	--	--	--	--	--	--	--	--	0.40	0.42	34	49	0.53	0.63	--	--	--	--
Cadmium	0.77	7.7	--	--	--	--	--	--	--	--	0.57	5.7	35	35	0.060	2.6	0.038	1.7	59	59
Cobalt	7.33	18.8	--	--	--	--	--	--	--	--	--	--	--	--	1.2	20	0.88	15	37	37
Copper	5.6	9.34	9.4	16	-41	-41	9.0	15	-38	-38	--	--	--	--	2.7	632	1.7	461	59	37
Cyanide	4.5	12.5	--	--	--	--	--	--	--	--	3.3	9.1	37	37	4.5	13	--	--	--	--
Lead	4.7	8.9	--	--	--	--	--	--	--	--	3.4	6.4	38	38	1.0	241	0.73	152	37	59
Manganese	51.5	146	--	--	--	--	--	--	--	--	--	--	--	--	14	159	8.6	100	59	59
Mercury	0.25	4	--	--	--	--	--	--	--	--	0.18	2.9	37	37	0.25	4.0	0.18	2.9	37	37
Molybdenum	0.26	2.6	--	--	--	--	--	--	--	--	0.16	1.6	59	59	0.26	2.6	--	--	--	--
Nickel	1.7	3.4	--	--	--	--	--	--	--	--	1.1	2.1	61	61	0.13	32	0.10	23	37	37
Selenium	0.143	0.215	0.23	0.35	-39	-39	0.21	0.31	-31	-31	--	--	--	--	0.050	1.2	0.031	0.76	59	59
Silver	6.02	60.2	8.8	88	-31	-31	8.4	84	-28	-28	--	--	--	--	6.0	60	--	--	--	--
Thallium	0.48	1.43	--	--	--	--	--	--	--	--	0.35	1.0	37	37	0.48	1.4	0.35	1.0	37	37
Vanadium	4.16	8.31	--	--	--	--	--	--	--	--	2.7	5.4	55	55	4.2	8.3	--	--	--	--
Zinc	75.4	298	--	--	--	--	--	--	--	--	--	--	--	--	9.6	411	6.0	300	59	37
Volatile Organic Compounds																				
Acetone	10	50	--	--	--	--	--	--	--	--	7.3	36	37	37	--	--	--	--	--	--
Chloroform	15	41	--	--	--	--	--	--	--	--	11	30	37	37	--	--	--	--	--	--
Ethyl- benzene	29.1	291	--	--	--	--	--	--	--	--	21	212	37	37	--	--	--	--	--	--
Methyl acetate	90	360	--	--	--	--	--	--	--	--	66	263	37	37	--	--	--	--	--	--
Methyl ethyl ketone	1771	4571	--	--	--	--	--	--	--	--	1292	3333	37	37	--	--	--	--	--	--
Methylene chloride	5.85	50	--	--	--	--	--	--	--	--	4.3	36	37	37	--	--	--	--	--	--
Toluene	26	260	--	--	--	--	--	--	--	--	16	164	59	59	--	--	--	--	--	--
Xylene, m,p-	2.1	2.6	--	--	--	--	--	--	--	--	1.3	1.6	59	59	--	--	--	--	--	--
Xylene, o-	2.1	2.6	--	--	--	--	--	--	--	--	1.3	1.6	59	59	--	--	--	--	--	--
Xylenes, total	2.1	2.6	--	--	--	--	--	--	--	--	1.3	1.6	59	59	--	--	--	--	--	--
Semi-Volatile Organic Compounds																				
Benzoic acid	500	750	--	--	--	--	--	--	--	--	365	547	37	37	--	--	--	--	--	--
Bis (2-ethylhexyl) phthalate	18.3	183	--	--	--	--	--	--	--	--	12	115	59	59	18	183	--	--	--	--
Dibenzofuran	3	30	--	--	--	--	--	--	--	--	2.2	22	37	37	--	--	--	--	--	--
Di-n-butyl phthalate	550	1833	--	--	--	--	--	--	--	--	346	1154	59	59	550	1833	--	--	--	--
Hexachlorocyclopentadiene	3.8	38	--	--	--	--	--	--	--	--	2.8	28	37	37	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons																				
PAH Low molecular weight	65.6	328	--	--	--	--	--	--	--	--	--	--	--	--	50	150	36	109	37	37
PAH High molecular weight	0.615	3.07	--	--	--	--	--	--	--	--	--	--	--	--	1.3	33	0.82	21	59	59

RTC Table 1
TRV Summary for Wildlife (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	Selected TRVs (Mammals)														DTSC-Recommended TRVs (Mammals)					
	Original		Desert Shrew				Merriam's Kangaroo Rat				Nelson's Desert Bighorn Sheep				Original		Nelson's Desert Bighorn Sheep			
	TRV		TRV		Percent Difference		TRV		Percent Difference		TRV		Percent Difference		TRV		TRV		Percent Difference	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	%	%	mg/kg-d	mg/kg-d	%	%	mg/kg-d	mg/kg-d	%	%	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	%	%
Pesticides																				
4,4-DDT	0.147	0.735	--	--	--	--	--	--	--	--	0.10	0.49	51	51	0.80	16	0.58	12	37	37
4,4-DDE	0.147	0.735	--	--	--	--	--	--	--	--	0.10	0.49	51	51	0.80	16	0.58	12	37	37
Alpha-Chlordane	4.6	9.2	--	--	--	--	--	--	--	--	2.9	5.8	59	59	4.6	9.2	--	--	--	--
Dieldrin	0.015	0.03	--	--	--	--	--	--	--	--	0.010	0.021	44	44	0.015	0.030	--	--	--	--
Gamma-Chlordane	4.6	9.2	--	--	--	--	--	--	--	--	2.9	5.8	59	59	4.6	9.2	--	--	--	--
Polychlorinated Biphenyls																				
Total PCBs	0.36	1.28	--	--	--	--	--	--	--	--	0.23	0.81	59	59	0.36	1.3	0.23	0.81	59	59
Dioxins (presented in ng/kg)																				
TEQ Mammals	1	10	--	--	--	--	--	--	--	--	0.73	7.3	37	37	1.0	10	--	--	--	--
Miscellaneous																				
Nitrate	507	1130	--	--	--	--	--	--	--	--	390	870	30	30	--	--	--	--	--	--

Notes:
Percent Difference (%) = ((Allometric TRV-Original TRV)/Allometric TRV)*100

"--" = not applicable
% = percent
LOAEL = lowest observed adverse effects level
mg/kg-d = milligrams per kilogram per day
NOAEL = no observed adverse effects level
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
TEQ = toxic equivalent
TRV = toxicity reference value

RTC Table 2a
HQ Summary for Desert Shrew (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	TRVS						Desert Shrew				Desert Shrew				Desert Shrew			
	Original TRV		Allometric TRV		RPD		HQs (AOC 1)				HQs (AOC 1 - Scour 2)				HQs (AOC 1 - Scour 5)			
							Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	%	%	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Inorganics																		
Arsenic	1.0E+00	1.7E+00	1.5E+00	2.4E+00	3.8E+01	3.8E+01	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--
Copper	5.6E+00	9.3E+00	9.4E+00	1.6E+01	5.1E+01	5.1E+01	2E-01	9E-02	3E-01	2E-01	1E-01	8E-02	2E-01	1E-01	1E-01	8E-02	2E-01	1E-01
Selenium	1.4E-01	2.2E-01	2.3E-01	3.5E-01	4.8E+01	4.8E+01	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--
Silver	6.0E+00	6.0E+01	8.8E+00	8.8E+01	3.7E+01	3.7E+01	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--

RTC Table 2a
HQ Summary for Desert Shrew (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	Desert Shrew				Desert Shrew				Desert Shrew				Desert Shrew				Desert Shrew			
	HQs (SWMU 1)				AOC1xSWMU1/TCS4				Tamarisk Thicket				AOC 4				HQs (AOC 9)			
	Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Inorganics																				
Arsenic	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	1E-01	7E-02	2E-01	1E-01
Copper	1E-01	9E-02	2E-01	1E-01	2E-01	9E-02	3E-01	2E-01	2E-01	1E-01	3E-01	2E-01	6E-01	3E-01	1E+00	6E-01	**3E+00**	**2E+00**	**5E+00**	**3E+00**
Selenium	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--
Silver	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--

RTC Table 2a
HQ Summary for Desert Shrew (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	Desert Shrew HQs (AOC 10)				Desert Shrew HQs (AOC 10 - Scour 2)				Desert Shrew HQs (AOC 10 - Scour 5)				Desert Shrew HQs (AOC 11)				Desert Shrew HQs (AOC 12)			
	Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Inorganics																				
Arsenic	1E-01	8E-02	2E-01	1E-01	1E-01	7E-02	2E-01	1E-01	1E-01	8E-02	2E-01	1E-01	1E-01	8E-02	2E-01	1E-01	NC	NC	--	--
Copper	3E-01	2E-01	5E-01	3E-01	6E-01	4E-01	**1E+00**	6E-01	2E-01	1E-01	4E-01	2E-01	1E-01	9E-02	2E-01	1E-01	NC	NC	--	--
Selenium	**4E+00**	**3E+00**	**7E+00**	**5E+00**	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	--	--	--	--
Silver	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--

RTC Table 2a
HQ Summary for Desert Shrew (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	Desert Shrew HQs (AOC 14)				Desert Shrew HQs (AOC 27)				Desert Shrew HQs (AOC 28)				Desert Shrew HQs (AOC 31)				Desert Shrew HQs (UA2)			
	Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Inorganics																				
Arsenic	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	2E-01	1E-01	3E-01	2E-01
Copper	1E-01	8E-02	2E-01	1E-01	**1E+00**	8E-01	**2E+00**	**1E+00**	NC	NC	--	--	7E-01	4E-01	**1E+00**	7E-01	NC	NC	--	--
Selenium	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--
Silver	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--

Notes:
"--" = not applicable
% = percent
HQ = hazard quotient
LOAEL = lowest observed adverse effects level
mg/kg-d = milligrams per kilogram per day
NC = not a COPEC for this exposure area
NOAEL = no observed adverse effects level
TRV = toxicity reference value

RPD (%) = ((MaxTRV-MinTRV)/(average(MaxTRV+MinTRV)))*100
Where:
RPD = relative percent difference
MaxTRV = maximum of the original and allometrically converted TRV
MinTRV = minimum of the original and allometrically converted TRV

RTC Table 2b
HQ Summary for Merriam's Kangaroo Rat (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	TRVS						Merriam's Kangaroo Rat				Merriam's Kangaroo Rat				Merriam's Kangaroo Rat				Merriam's Kangaroo Rat			
	Original TRV		Allometric TRV		RPD		HQs (AOC 1)				HQs (AOC 1 - Scour 2)				HQs (AOC 1 - Scour 5)				HQs (SWMU 1)			
							Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	%	%	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Inorganics																						
Arsenic	1.0E+00	1.7E+00	1.5E+00	2.3E+00	3.4E+01	3.4E+01	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--
Copper	5.6E+00	9.3E+00	9.0E+00	1.5E+01	4.7E+01	4.7E+01	5E-02	3E-02	8E-02	5E-02	5E-02	3E-02	8E-02	5E-02	5E-02	3E-02	8E-02	5E-02	5E-02	3E-02	8E-02	5E-02
Selenium	1.4E-01	2.2E-01	2.1E-01	3.1E-01	3.7E+01	3.7E+01	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--
Silver	6.0E+00	6.0E+01	8.4E+00	8.4E+01	3.3E+01	3.3E+01	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--

RTC Table 2b
HQ Summary for Merriam's Kangaroo Rat (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	Merriam's Kangaroo Rat				Merriam's Kangaroo Rat				Merriam's Kangaroo Rat				Merriam's Kangaroo Rat				Merriam's Kangaroo Rat			
	AOC1xSWMU1/TCS4				Tamarisk Thicket				AOC 4				HQs (AOC 9)				HQs (AOC 10)			
	Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Inorganics																				
Arsenic	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	2E-02	1E-02	2E-02	1E-02	2E-02	1E-02	3E-02	2E-02
Copper	5E-02	3E-02	8E-02	5E-02	6E-02	3E-02	9E-02	5E-02	9E-02	6E-02	2E-01	9E-02	2E-01	1E-01	4E-01	2E-01	9E-02	6E-02	2E-01	9E-02
Selenium	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	**2E+00**	**2E+00**	**3E+00**	**2E+00**
Silver	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--

RTC Table 2b
HQ Summary for Merriam's Kangaroo Rat (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	Merriam's Kangaroo Rat HQs (AOC 10 - Scour 2)				Merriam's Kangaroo Rat HQs (AOC 10 - Scour 5)				Merriam's Kangaroo Rat HQs (AOC 11)				Merriam's Kangaroo Rat HQs (AOC 12)				Merriam's Kangaroo Rat HQs (AOC 14)			
	Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Inorganics																				
Arsenic	2E-02	1E-02	3E-02	2E-02	2E-02	1E-02	3E-02	2E-02	2E-02	1E-02	3E-02	2E-02	NC	NC	--	--	NC	NC	--	--
Copper	1E-01	6E-02	2E-01	9E-02	6E-02	4E-02	1E-01	6E-02	5E-02	3E-02	8E-02	5E-02	NC	NC	--	--	2E-01	9E-02	2E-01	1E-01
Selenium	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	6E-01	4E-01	8E-01	6E-01	NC	NC	--	--
Silver	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--

RTC Table 2b
HQ Summary for Merriam's Kangaroo Rat (Original and Allometrically Converted TRVs)

Soil Human Health and Ecological Risk Assessment
PGE Topock Compressor Station
Needles, California

Constituent	Merriam's Kangaroo Rat HQs (AOC 27)				Merriam's Kangaroo Rat HQs (AOC 28)				Merriam's Kangaroo Rat HQs (AOC 31)				Merriam's Kangaroo Rat HQs (UA2)			
	Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV		Allometric TRV		Original TRV	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless	unitless
Inorganics																
Arsenic	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	5E-02	3E-02	8E-02	5E-02
Copper	1E-01	8E-02	2E-01	1E-01	NC	NC	--	--	9E-02	5E-02	1E-01	9E-02	NC	NC	--	--
Selenium	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--
Silver	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--	NC	NC	--	--

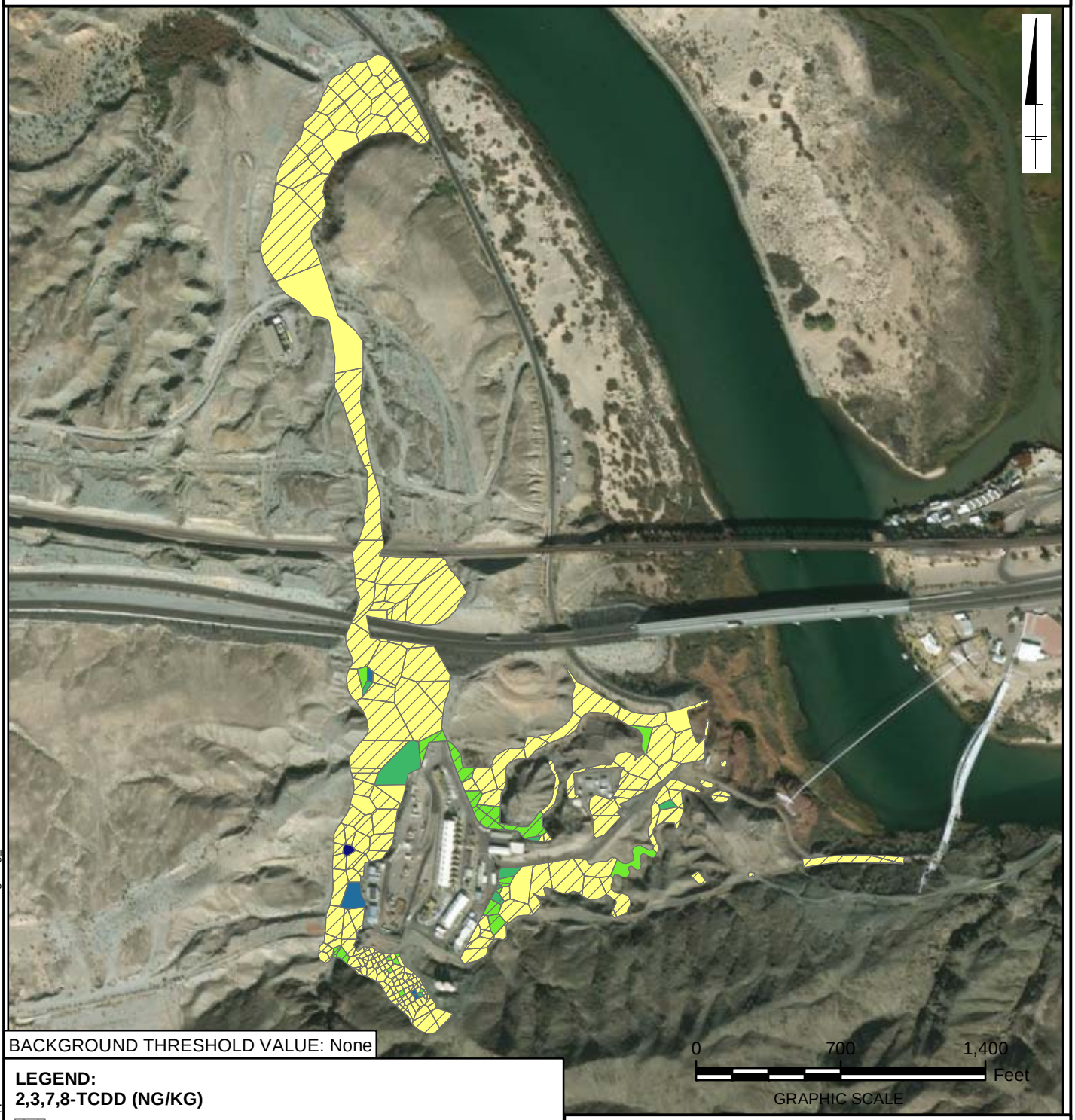
Notes:
"--" = not applicable
% = percent
HQ = hazard quotient
LOAEL = lowest observed adverse effects level
mg/kg-d = milligrams per kilogram per day
NC = not a COPEC for this exposure area
NOAEL = no observed adverse effects level
TRV = toxicity reference value

RPD (%) = ((MaxTRV-MinTRV)/(average(MaxTRV+MinTRV)))*100
Where:
RPD = relative percent difference
MaxTRV = maximum of the original and allometrically converted TRV
MinTRV = minimum of the original and allometrically converted TRV

DTSC-10

Figure OCS.A3-1

OUTSIDE THE COMPRESSOR STATION (INCLUDING BCW)
0 - 0.5 FEET BELOW GROUND SURFACE
2,3,7,8-TCDD



BACKGROUND THRESHOLD VALUE: None

LEGEND:
2,3,7,8-TCDD (NG/KG)

- NOT DETECTED
- 0.01 - 0.85
- ≥0.85 - 2.70
- ≥2.70 - 6.40
- ≥6.40 - 19.00
- ≥19.00 - 67.00

SAMPLE LOCATIONS FOR ALL COPCS/COPECS AND ALL EXPOSURE DEPTHS EVALUATED FOR THIS EXPOSURE AREA ARE PRESENTED IN FIGURE OCS-1.1A AND OCS-1.1B.
DEPTH-WEIGHTED CONCENTRATIONS ARE DISPLAYED FOR EACH LOCATION.
REPORTING LIMITS USED FOR DISPLAY COLOR OF NON-DETECT RESULTS.

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

SOIL HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

THIESSEN POLYGONS FOR AREA WEIGHTING

ARCADIS Design & Consultancy for natural and built assets

FIGURE
OCS-A31

City: SYR Div/Group: IM/DV Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
PGE Topock (RC000753.0040.00003)
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