Pacific Gas and Electric Company

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4 February 2009

Mr. Aaron Yue
Chief Permitting Unit
California Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

Pamela S. Innis
Office of Environmental Policy and Compliance
U.S. Department of Interior
P.O. Box 25007 (D-108)
Denver, CO 80225-0007

Subject: ***Revised Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan (August 2008)***
Pacific Gas and Electric Company
Topock Compressor Station
Needles, California

Dear Mr. Yue and Ms. Innis:

This letter transmits the *Revised Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan* (Revised Addendum) Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California. **The Revised Addendum provides documentation of technical decisions and direction that is integral to the Revised RAWP; the Revised RAWP and the Revised Addendum together provide the work plan for the forthcoming groundwater and soil risk assessments. The only change to the Revised Addendum from the December 23, 2008 version that the U.S. Department of Interior (USDOI) approved is the inclusion of responses to additional California Department of Toxic Substances Control (DTSC) comments dated January 14, 2009.**

Details of the pertinent correspondence is as follows. The *Revised Human Health and Ecological Risk Assessment Work Plan* (Revised RAWP) was submitted by PG&E on August 25, 2008. This Revised Addendum was prepared by PG&E and its consultants (ARCADIS) based on the agreements reached during the risk assessment technical meeting on November 6, 2008 and subsequent teleconference calls in December 2008, and electronic mail correspondence in January 2009. During these discussions, the DTSC and the USDOI requested that PG&E submit an Addendum to the Revised RAWP instead if submitting a revised version of the RAWP.

PG&E, DTSC, and USDOI agreed that this Revised Addendum would include:

- The final responses to the comments on the Revised RAWP provided by DTSC (September 24 and October 17, 2008) and USDOI (October 1 and October 16, 2008), and
- Additional information on spatial analysis techniques.

Based on DTSC's verbal direction on February 2, 2009, the Revised Addendum now includes:

- Responses to DTSC comments dated 14 January 2009.

A response to comments letter was submitted by PG&E on December 9, 2008 for agency approval. Agency concurrence on the revised response to comments was received on December 18, 2008 from USDOI. Direction on the revised response to comments was received on December 23, 2008 from DTSC. DTSC provided additional comments and direction in a memorandum dated January 14, 2009. USDOI approved the Risk Assessment Workplan and Addendum on January 13, and that content remains unchanged from the December 23 version, except that PG&E has included additional responses to DTSC comments dated January 14, 2009.

The agencies also requested additional detail about other spatial-weighting techniques as well as more information on how spatial analysis fits into the ecological risk assessment process for Topock. Information on this topic was previously provided to the agencies as an attachment to the meeting notes from the November 6, 2008 risk assessment technical meeting. This information was expanded as requested during the teleconference call on December 5, 2008 and is included in this Revised Addendum. This information remains unchanged from the December 23, 2008 version of the Addendum.

Please review the additional responses to DTSC comments dated January 14, 2009 in this Revised Addendum to the Revised RAWP and provide concurrence or direction by February 9, 2009, if possible.

We note that this document is being submitted two days ahead of its due date of February 6, 2009 and we thank you for your effort in moving this critical task forward. If you have any questions regarding this letter, please call me at (805) 234-2257.

Sincerely,

Yvonne Meeks
Topock Project Manager

cc: Mike Eichelberger, DTSC
Shukla Roy-Semmen, DTSC
Carrie Marr, USFWS
Karen Baker, DTSC
Dennis Smith, SAIC

RESPONSE TO COMMENTS ON THE REVISED HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN (ARCADIS, AUGUST 2008)

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9 December 2008

Mr. Aaron Yue
Chief Permitting Unit
California Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

Subject: Response to Comments on the *Human Health and Ecological Risk Assessment Work Plan (August 2008)*
Pacific Gas and Electric Company
Topock Compressor Station
Needles, California

Dear Mr. Yue:

Pacific Gas and Electric Company (PG&E) and its consultants (ARCADIS) submit this letter in response to comments on the *Human Health and Ecological Risk Assessment Work Plan* (RAWP) dated August 25, 2008. Comments were provided by the California Department of Toxic Substances Control (DTSC), and Department of the Interior (USDOI). PG&E and ARCADIS have considered each of the concerns raised by each party and provide the responses in subsequent paragraphs.

As agreed in discussions between PG&E and the regulatory agencies on November 6, many of the detailed changes requested by the agencies do not substantively change the approach to the risk assessment or its likely outcome. Therefore, it was agreed that revision of the text and figures of the RAWP would not be required so that impact to the overall project progress and schedule can be avoided. Instead, PG&E and the agencies agreed that the responses to comments provided below would clarify the approach and agreements on the remaining technical questions, and that the responses to agency comments would be incorporated into the RAWP via an addendum.

We have reprinted each of the comments and associated questions below in italics, and our response to each comment is provided immediately following the comment. In addition, we have numbered each of the specific comments for ease of reference.

Mike Eichelberger, DTSC HERD (September 24, 2008 memorandum to Aaron Yue/DTSC)

General Comment: The report incorporates the parameters required for the Predictive Ecological Risk Assessment (PERA) presented in the Ecological Technical memorandums. However, there are some outstanding issues remaining to be clarified, including the definition of exposure areas and an agreement on exposure point concentration calculation based on exposure depth. Please see the specific comments below.

General Response: PG&E agrees that there were issues articulated in the DTSC comments dated September 24, 2008 and the DOI comments dated October 1, 2008. These issues were resolved in a technical planning meeting between PG&E and the agencies on November 6, 2008. The resolution of the issues and action items were recorded in draft meeting notes provided to the agencies on November 14 for their review and concurrence. For the project record, the agreements reached at the meeting are also summarized in the responses to agency comments below.

Specific Comment 1: Page 2-5, Section 2.2.1, Biological Assessment, paragraph at the top of the page. Please provide the reasoning for the conclusion "One species, bonytail chub (Gilia elegans), was concluded to have a critical habitat effect determination of 'may affect, but not likely to adversely affect.'"

Specific Response 1**:** The text in Section 2.2.1, Biological Assessment, summarizes the results of the Programmatic Biological Assessment (PBA; a previous investigation) (CH2M HILL, 2007). The conclusion referenced in the comment is relevant to potential effects on special status species as a result of the planned investigation and remediation tasks; the forthcoming risk assessment will include separate conclusions regarding potential risks to special status species. Please see the Final PBA for a discussion of wildlife species within the area of potential effects (APE) (CH2M HILL, 2007). No changes to the RAWP are proposed in response to this comment.

*Specific Comment 2***:** *Page 2-16, Section 2.5.1, Uplands. The report should reference Figure 2-26 for the location of the salt bush scrub plant communities. The statement "Creosote bush and salt bush scrub plant communities comprise approximately 974 acres within the site" is a little misleading. First, the Topock site is 65-acres, so the 974 acres is apparently referring to the much larger Area of Potential Effects (APE) rather than the 65-acre site proper. Second, the wording of the report makes it appear that salt bush scrub is a major vegetative component of the Topock site. HERD does not recall seeing significant salt bush (Atriplex polycarpa) on the 65-acre Topock site and indeed, Figure 2-26 shows only two small areas associated with sand along the Colorado River and rather remote from the AGCs of the Topock site. The report should be revised to reflect that the salt bush community is a minor component of the Topock site.*

Specific Response 2**:** The text referenced in the comment refers to the APE defined for the PBA (CH2M HILL, 2007). DTSC is correct in interpreting "the site" as the APE in this context.

PG&E agrees that this is unclear. As agreed in the meeting on November 6, 2008, PG&E will avoid using the word “site” in future ecological risk assessment (ERA) documents unless it is clearly defined.

PG&E agrees that there is relatively little salt bush near the compressor station (Figure 2-26 of the RAWP). While the text states that “creosote bush scrub is the dominant upland plant community” (Section 2.5.1), PG&E agrees that the remainder of the text is less clear on this point.

As agreed in the meeting on November 6, 2008, PG&E will provide a combined figure showing the location of SWMUs, AOCs, and other undesignated areas (as shown on Figure 2-1 of the RAWP) and the plant communities (as shown on Figure 26) in future ERA documents. No changes to the RAWP are proposed in response to this comment.

Specific Comment 3: Page 6-5, Section 6.1, Purpose and Objectives, first paragraph of page. The report states "These objectives will be met by conducting a scoping ERA, Phase I Predictive ERA, and developing site-specific ECVs for use in site characterization ***and other decision making processes****." The acronym ECV refers to Ecological Comparison Value. The phrase "and other decision making processes" needs to be stricken from the report. The Topock Compressor Station –Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil (June 13, 2008) specifies that the ECVs will be used only to aid in sampling. Phrases such as "and other decision making processes" are inherently vague and should not be used in environmental reports.*

Specific Response 3**:** PG&E will use more definitive language in future ERA documents. The phrase referenced in the comment, "other decision-making processes", refers to activities such as establishing detection limits for the soil investigation,these specifics will be spelled out in future discussions. The intent of the text in the RAWP and TM 3 is identical; the ECVs were developed to support the soil investigation data gaps assessment and are specifically not to be used to screen chemicals of potential ecological concern (COPECs) for the ERA.

*Specific Comment 4**:** Page 6-7, Section 6.2.1.1, Soil, paragraph at the top of the page. The report proposes conducting sampling to determine ambient concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) in order to compare PAH concentrations to determine if PAHs are Chemicals of Potential Ecological Concern (COPECs). Referring to the February 28, 2005 Draft RCRA Facility Investigation and Remedial Investigation Report, two AOCs were sampled and showed detectable levels of PAHs, the Debris Ravine and Railroad Debris Area. Only the Railroad Debris site is located close to a potential source of PAHs not associated with site activities (i.e., the railroad line). Although samples were taken from several areas of the Railroad Debris Area, the PAHs that were detected were only associated with the railroad ties; they were not detected in soils or even in the asphalt. It seems to HERD that there is a clear source of the detected PAHs in the Railroad Debris Area, and it is not related to the railroad line. Therefore, HERD questions the need to perform separate sampling to determine ambient concentrations of PAHs. This additional sampling will require additional expenditure of time and money and will provide little useful information.*

Specific Response 4**:** This comment is relevant to the *Draft RCRA Facility Investigation/ Remedial Investigation Soil Investigation Work Plan Part A* that was submitted in a separate document (CH2M HILL, 2006) for review. The ambient samples have been collected and the results are forthcoming. The results of the PAH sampling and analysis will be reviewed and discussed with the agencies in the context of data gaps evaluation for the Part A, Phase II Soil sampling plan. No changes to the RAWP are proposed in response to this comment.

*Specific Comment 5**: Page 6-13, Section 6.2.4, Summary of Conceptual Site Models, first paragraph at the top of the page. HERD has not agreed to combine AOC 4, the Debris Ravine and Bat Cave Wash as a single exposure area. Please see Specific Comment number 17 below.*

Specific Response 5**:** The question of exposure areas was revisited in the November 6, 2008 meeting. At the meeting, the agencies and PG&E again agreed to AOC-by-AOC risk estimates for small home range receptors. The agencies clarified that, for large home range receptors, they had no objection to the use of exposure units that included a combination of AOCs, but were interested in seeing the contribution of the individual AOCs to the risks reported for the exposure units.

For large home range receptors, draft figures were reviewed and discussed that showed the home ranges of the red-tailed hawk and desert kit fox overlying two exposure units. In the discussion, the agencies and PG&E agreed to evaluate the following exposure areas for large home range receptors:

- Exposure Area 1: AOC-4, AOC-1, and Bat Cave Wash north of AOC-1 up to the wetland area.
- Exposure Area 2: All remaining AOCs and undesignated areas within the scope of the ERA.

In addition, PG&E agreed to provide information on the spatial distribution of significant risks if they are identified in the ERA. PG&E proposed that the minimum risk that could trigger spatial analysis would be the conservative estimate of the average daily dose (ADD) exceeding the no-observed adverse effect (NOAEL)-based toxicity reference value (TRV). That is, spatial analysis of risks would not be conducted unless the conservative estimate of the ADD for the exposure unit at least exceeds the TRV_{low}. The agencies concurred with this approach (Eichelberger, 2008). The spatial risk analysis step would occur after the Predictive ERA, which may include exposure point concentrations that are spatially-weighted as a refinement of the initial risk estimates. The spatial risk analysis may also be deferred until a validation study can be completed, if warranted. The spatial distribution of risks will be provided in the form of Thiessen polygon maps. These maps illustrate the distribution of risks for each area (i.e., polygon) representing a given sample point. This will provide relative risk information on an even smaller scale than AOC-by-AOC and can aid remedial decision-making. Areas driving risk can be easily visualized using the relative risk information on the maps. Additional information on the Thiessen polygon technique was provided to DTSC as an attachment to the November 6 meeting notes.

*Specific Comment 6**: Page 6.3.3.2, Direct Exposure. Although the report describes in detail exposure contact points based on soil depths, HERD and DTSC staff have determined that there is considerable uncertainty regarding the potential exposure of ecological receptors to concentrations of COPECs at all sample depths due to the location of these samples in potentially high erosion areas. According to the DTSC geologist, PG&E has not provided convincing evidence that erosion events due to flash floods could not erode the wash bed to the 6 foot maximum ecological soil sampling depth in Bat Cave Wash. Further, PG&E plans to remove a dam in the East Ravine and does not plan to reconstruct it. HERD, following consultation with the DTSC geologist and project manager, believes that the risk assessment needs to use the maximum concentration from the three different depth intervals as the exposure point concentration (EPC) for all of the exposure calculations in the risk assessment.*

Specific Response 6**:** The question of how best to calculate exposure point concentrations (EPCs) was revisited in the November 6, 2008 meeting. At the meeting, the agencies and PG&E agreed to calculate EPCs and risks for three scenarios:

- Current scenario (baseline) assuming no scouring – use exposure depth intervals to calculate receptor-specific EPCs as illustrated in revised Figure 3-1 but assume no scouring at any of the AOCs including Bat Cave Wash (BCW). This approach will use current data from 0-0.5 ft bgs, 0-3 ft bgs, and 0-6 ft bgs (see attached Figure 3-1 Revised)..

- Scouring down to 2 ft bgs – use exposure depth intervals to calculate receptor-specific EPCs assuming the top 2 feet of soil will be scoured away (i.e., removed). This approach will use current data from 2-3 ft bgs as the new surface soil (0-1 ft bgs); the current data from 2-6 ft bgs as the new shallow soil (0-4 ft bgs); and the current data from 2-10 ft bgs (where available) as the new subsurface I soil (0-8 ft bgs) (see attached Figure 1).

- Scouring down to 5 ft bgs – use exposure depth intervals to calculate receptor-specific EPCs assuming the top 5 feet of soil will be scoured away (i.e., removed). This approach will use current data from 5-6 ft bgs as the new surface soil (0-1 ft bgs); the current data from 5-10 ft bgs (where available) as the new shallow soil (0-5ft bgs); and the current data from 5-15 ft bgs (where available) as representative of the new subsurface I soil (0-10 ft bgs) (see attached Figure 2).

*Specific Comment 7**: Page 6-30, Section 6.3.3.3.13, Bioaccumulation Factors. Bioaccumulation is a general term referring to accumulation of COPECs by ecological receptors from their environment. Bioconcentration is the accumulation of COPECs in receptor tissue greater than the environment and biomagnifications is in effect bioconcentration of COPECs at increasing tissue concentrations up the food chain through the trophic levels.*

Specific Response 7**:** Comment noted. PG&E agrees that bioaccumulation refers to accumulation of COPECs by ecological receptors from their environment. This is consistent with the definition provided in the RAWP. The text states "Bioaccumulation in animal tissue or uptake in plants is the process where COPECs in the surrounding media are accumulated within

the tissues of ecological receptors, especially to concentrations higher than in the surrounding media." Bioaccumulation typically refers not just to uptake, but to uptake at a rate that outpaces the organism's ability to metabolize the chemical resulting in sequestering of the chemical in the organism's tissues. The U.S. Geological Survey (USGS) definition of bioaccumulation includes "The sequestering results in the organism having a higher concentration of the substance than the concentration in the organism's surrounding environment" (see http://toxics.usgs.gov/definitions/bioaccumulation.html).

The USGS also defines bioconcentration as uptake specifically from water into an organism (see http://toxics.usgs.gov/definitions/bioconcentration.html). Yet USEPA uses a similar definition of bioconcentration to that in the DTSC HERD comment above: the accumulation of a chemical in tissues of a fish or other organism to levels greater than in the surrounding medium. This illustrates a common problem in ERA: definition of technical terms sometimes varies with the organization defining them. No changes to the RAWP are proposed.

*Specific Comment 8***:** *Page 2-16, Section 2.5.1, Uplands. The report states "The creosote bush and salt bush scrub plant communities comprise approximately 974 acres within the site." Please explain what 974 acres this sentence is referring to. In the introduction to the report on page 1-1, in the second paragraph the report states that "The compressor station occupies approximately 15 acres of a 65-acre parcel of PG&E-owned land." Also, please explain the statement that wildlife diversity is low because of "the incomplete wildlife corridor." The PG&E property is bounded by undeveloped land free of roads or railroads, to the west and the south. Also, the property is open to the Colorado River to the southeast. HERD does not recall from site visits the presence of salt bush communities (Atriplex polycarpa). Please describe where these are located on the property.*

Specific Response 8**:** For the first part of the comment regarding the creosote bush and salt bush scrub plant communities comprising of approximately 974 acres within the site, please see response to Specific Comment 2 above. The comment refers to information summarized from the Final PBA, documenting a previous investigation (CH2M HILL, 2007). For the second part of the comment regarding the wildlife diversity, please see the Draft RCRA Investigation/Remedial Investigation (RFI) Report (CH2M HILL, 2005). For the last part of the comment regarding presence of salt bush communities near the compressor station, please see response to Specific Comment 2 above. No changes to the RAWP are proposed in response to this comment; however, future ERA documents will be clear in specifying geographic areas.

*Specific Comment 9**:** Page 6-2, Section 6, Ecological Risk Assessment Approach for Soil, second paragraph of page. Please see Specific Comment 17 below.*

Specific Response 9**:** Please see response to Specific Comment 17 below.

*Specific Comment 10**:** Page 6-48, Section 6.3.5.1, Risk Estimation. The report states "The following standard HQ equation (USEPA [1997a)) will be used to estimate risks to wildlife:" HERD would like the section in the above EPA document where the equation below could be found identified in the report. HERD has previously commented that these equations are not*

correct (HERD memo to Tech Memo 3) and provided an appropriate calculation to use. The report needs to be revised to include the correct equation for calculating the Average Daily Dose (ADD). HERD will not accept the equations below as standard HQ equations.

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

$$\frac{(C_{soil} * SIR) + (C_{soil} * BAF * FIR) * SUF}{TRV * BW} = 1$$

The report identifies following inputs to the equations.
HQ = hazard quotient (unitless)
Dose = exposure dose (mg/kg bw-day)
TRV = Toxicity reference value (mg/kg bw-day)
C_{soil} = Concentration of constituent in soil (mg/kg soil)
SIR = Soil ingestion rate (kg soil/day)
C_{tissue} = Concentration of constituent in biota or tissue (mg/kg tissue)
FIR = Food or biota ingestion rate (kg tissue/day)
SUF = Site Use Factor
BW= Body weight of receptor (Kg)
BAF = Bioaccumulation factor or regression for media-to biota uptake (kg soil/kg tissue)

Specific Response 10**:** The general form of the equation above is correct as HERD concurred in the November 6 meeting. In addition, PG&E agrees that including "=1" in the equation above is a typographical error. Future ERA documents will eliminate that typographical error and present the HQ equation in a form that explicitly defines ADD and TRV without simplification. Further, the ERA will include the total ADD in tables for transparency. No changes to the RAWP text are proposed in response to this comment.

*Specific Comment 11**: Page 6-49, Section 6.3.5.2, Risk Description and Lines of Evidence, Second bullet. Provide a clear statement of what is meant by "TRVs are thresholds with an interval that is an artifact of the dosing regime used in the toxicity study." HERD is specifically interested in an explanation of what is meant by 'artifact.' Also, please provide a literature reference for this statement.*

Specific Response 11**:** Toxicity studies are conducted with a series of doses, but not all possible doses can be included in a study. Therefore, the no-observed adverse effect level (NOAEL) in a given study may be lower than the actual NOAEL if all possible doses could be included in the study. Similarly, the lowest observed adverse effect level (LOAEL) may be higher than the actual LOAEL if all possible doses could be included in the study. The text on page 6-49 is meant to highlight this uncertainty. No changes to the RAWP are proposed in response to this comment.

Specific Comment 12: *Page 6-49, Section 6.3.5.2, Risk Description and Lines of Evidence, third bullet. Referring to the statements "There is potential for adverse ecological effects for individuals with estimated exposures resulting in HQs greater than one based on the LOAEL or high TRV. However, the magnitude of such effects is uncertain. Therefore, risk managers should consider multiple lines of evidence, the level of conservatism and uncertainty in the assessment, and sensitivity of receptor populations when making risk management decisions." These statements fail to recognize that the range of the average daily dose between the TRV_{low} and the TRV_{high} possess potential hazard to ecological receptors, and therefore derived hazard quotients greater than one in the interval between the TRV_{low} and the TRV_{high} are subject to risk management decisions. It should not be considered that hazard quotients greater than one in the interval between the TRV_{low} and TRV_{high} pose no hazard and therefore should be considered 'safe.' DTSC guidance states "A chemical with a TRV-Low hazard quotient or hazard index greater than one and TRV-High less than one (i.e., the "gray area') suggests further site-specific information (e.g., to refine exposure and bioavailability assumptions) should be collected to reduce the uncertainty and obtain a more site-specific estimate of the potential for ecological risk."*
The report also implies that further evaluation of other lines of evidence may be used to aid the risk manager in the event that a hazard quotient greater than one is found. Comparisons to other lines of evidence are not done in a Predictive Ecological Risk Assessment (PERA). TRV_{high} hazard quotients greater than one are considered to pose an unacceptable hazard to ecological receptors. DTSC guidance further specifies that "A TRV-High hazard quotient or index greater than one suggests unacceptable ecological risk, which can be confirmed or determined to be not applicable to the specific site by the validation study." Please see http://www.dtsc.ca.gov/AssessingRisk/eco.cfm.

Specific Response 12: On page 7 of the cited guidance the text states “In order to allocate resources in proportion to potential ecological threats, a phased approach is suggested, with progression to the subsequent phases dependent, in part, on the results of the preceding phase” and “As a general approach, an individual or population-level effect will generally be assumed to have ramifications at higher levels of ecological organization (e.g. at the community or ecosystem level) *unless there is evidence to the contrary*” (emphasis added). Further, on page 72 of the guidance, DTSC addresses the issue of uncertainty in extrapolating to higher levels of organization saying “Adverse biological effects on individuals are more important in evaluating the potential threat to rare, threatened or endangered species, where protection of individual organisms is critical to survival of the species. The extrapolation from demonstrated individual or population effects to community level or ecosystem level is a site-specific conclusion arrived at by a weight-of-evidence approach, and therefore no specific criteria can be presented which would cover all types of facilities or sites.” In stating this, it appears that DTSC is acknowledging the utility of a weight-of-evidence approach in coping with the substantial uncertainty in the ERA process.

PG&E proposed a series of general interpretations for the risk estimates in the bulleted list on page 6-49. PG&E agrees that the range of the average daily dose between the TRV_{low} and the TRV_{high} may pose a hazard to ecological receptors, however, in our experience, *initial* risk estimates in this “gray area” are unlikely to result in significant risks to ecological receptors. This

is because a series of conservative assumptions used in the initial risk estimates often result in an overestimate of risk, and because bioaccumulation factors obtained from the literature also typically result in an overestimate of risk that is revealed during a validation study. Therefore, initial estimates are often refined using spatially-weighted EPCs, or site-specific bioaccumulation factors calculated in a validation study. Refined ADD estimates often result in doses below the TRV_{low}. If (1) initial risk estimates are in the gray area, (2) the dose approaches the TRV_{low}, and (3) there is clear evidence that the risk estimates are very conservative, then it may be more appropriate to focus additional study on other COPECs which clearly pose a risk. PG&E will provide a transparent risk characterization in the Predictive ERA that interprets the risk estimates and facilitates agency review. PG&E suggests a meeting with the agencies to provide template risk tables and figures for agency review prior to the full implementation of the risk assessment. No changes to the RAWP are proposed in response to this comment.

*Specific Comment 13**: Page 6-49, Section 6.3.5.2, Risk Description and Lines of Evidence, paragraph following the bullets. The assumption that risk (hazard) estimates may be altered by redefining the exposure areas presumes that the regulatory agencies and resource trustees approve this action. Identification of hotspots by using Theissen polygons will need to be approved by the regulatory agencies prior to implementation. The presentation of the Theissen polygon method in Appendix A is not adequately described. A thorough description, along with literature references, will need to be supplied to HERD for review.*

The paragraph states "Other lines of evidence that may be considered, in addition to the risk estimates and spatial distribution of risks, include direct field observations (i.e., evidence of stressed vegetation) and literature-derived information on the bioavailability of specific metals." The Latin abbreviation i.e., represents 'that is.' Therefore, the sentence implicitly states that the conditions of plants in the field may be used as an aid in risk (hazard) estimates. This implies that a thorough understanding of edaphic factors influencing plant health are sufficiently understood or characterized at specific locations of the site. It also implies that you have knowledge of which COPECs are present and understand how these COPECs would influence the appearance of the plants. However, it would not be wise to assume that impacts to plants are necessarily of the same significance or greater significance to other ecological guilds. Lines of evidence, such as literature-derived bioavailability studies would need to be verified in a validation study.

Specific Response 13**:** PG&E understands that changes to the exposure areas in order to refine risk estimates would best be accomplished through coordination with the regulatory agencies. Further, PG&E understands that identification of hotspots by using Thiessen polygons needs to be approved by the regulatory agencies prior to implementation. Toward that end, a thorough description of the Thiessen polygon spatial weighting technique, along with literature references, was provided to HERD as an attachment to the November 6 meeting notes.

With regard to the use of field observations, field observations are one line of evidence that may be used in interpreting risk estimates and those field observations may include observations of plant health/condition. PG&E agrees that it would not be wise to assume that impacts to plants are necessarily of the same significance or greater significance to other ecological guilds. Nor

would it be wise to assume that the presence or absence of stressed vegetation is relevant without a thorough understanding of the nature and extent of contamination and the toxic effects on plants associated with those COPECs. No changes to the RAWP are proposed in response to this comment.

Specific Comment 14: Page 7-4, Section 7.2.2, Exposure Pathways. HERD would agree that over the long term that surface water runoff to the Colorado River is not significant. However, the report should acknowledge that short term events from heavy thunderstorms can transport significant sediment loads, and therefore can potentially transport COPECs into the river during short time periods.

Specific Response 14**:** Comment noted. PG&E acknowledges that short-term heavy rainfall events can transport significant sediment loads. There is a potential for transport of COPECs to the river during these short time periods; however, transport of COPECs via this pathway is unconfirmed. PG&E is currently investigating sediment at the mouth of Bat Cave Wash to provide some additional basic information about the sediment concentrations near the river. Concentrations detected in sediment to date are low relative to protective ecological screening concentrations. The results of the Part A, Phase I Soil Investigation, including the sediment sampling results, will be discussed with the regulatory agencies in a series of meetings to define data gaps. No changes to the RAWP are proposed in response to this comment.

*Specific Comment 15**:** Page 7-5, Section 7.2.2, Exposure Pathways, first line item. In regards to the continuous Criterion Concentration (CCC), the term 'unacceptable effect' should be replaced by 'deleterious effect.'*

Specific Response 15**:** While PG&E does not object to this text change, in the interest of the overall project schedule PG&E proposes to let the text stand as written.

Specific Comment 16: Appendix A, page 2, paragraph at top of the page. Although the report indicates that it will consider both the gradient approach (potentially decreasing concentrations of COPECs down channel away from the contaminant source) and comparison of wetland sediment concentrations to ecological screening levels to determine if a pathway to ecological receptors is complete. HERDs position on this matter has not changed. If sediment concentrations are found in the wetland at the mouth of Bat cave Wash which exceed sediment screening concentrations, ambient or background sediment concentrations must also be determined. If background concentrations are exceeded then the pathway of COPECS from the site to the sediment to ecological receptors must be considered complete.

Specific Response 16**:** This comment was a topic at the November 6 RAWP technical planning meeting. PG&E and the agencies agreed that a conceptual site model (CSM) of contaminant transport (including site history and chemical use) would be developed using the historical soil and sediment data combined with the results of the Part A Phase I Soil Investigation. The CSM and the results of the agreed upon sediment screening would be presented to the agencies at a scientific management decision point (SMDP) meeting. PG&E and agencies agreed that the language “gradient approach” appears to place too much emphasis on a single line of evidence.

PG&E further agreed to provide data to the agencies in advance of the SMDP meeting to facilitate decision-making. In the interest of the overall project schedule, no changes to the RAWP are proposed in response to this comment.

Specific Comment 17: Appendix A, Section 2. Exposure Area Definition. HERD has not agreed to the evaluation of large and small home range receptors differently in regard to the exposure areas. HERD has directed that each exposure area be evaluated as distinct Areas of Concern (AOC). HERD is not opposed to evaluating large home range receptors over multiple AOCs if the home range encompasses an area larger than the individual AOC and the intervening land between the AOCs. However, HERD does not agree with the Arcadis assumption that ecological receptors utilize all portions of the site equally. Therefore, HERD would like to also see large home range receptors evaluated for the individual AOCs as well as for multiple AOCs.

Specific Response 17**:** PG&E acknowledged on page 3-3 of the RAWP that ecological receptors tend to inhabit areas or at least forage in areas that provide for better habitat or better access to prey. Please see response to specific comment 5. No changes to the RAWP are proposed in response to this comment.

References Cited:

CH2M HILL. 2006. Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A, PG&E Topock Compressor Station, Needles, California. November.

CH2M HILL. 2007. Final Programmatic Biological Assessment for Pacific Gas and Electric, PG&E Topock Compressor Station Remedial and Investigation Actions, Needles, California. January.

Eichelberger, James Michael. 2008. Telephone communication between Mike Eichelberger/DTSC HERD and Kim Walsh/ARCADIS regarding the minimum risks that would trigger spatial analysis of ecological risks. November 17.

Pamela Innis, DOI (October 1, 2008 letter to Yvonne Meeks/PG&E)

Specific Comment 1: Page 3-5, Section 3.1.1.1. Evaluate all receptors on an Area of Concern (AOC) by AOC basis. The same comment applies to Page 6-16, Section 6.3.3.1. The Department of Interior has provided clear direction to PG&E that it is not acceptable to combine AOCs.

Specific Response 1**:** This comment was discussed at the November 6 meeting between PG&E and the regulatory agencies and an agreement was reached to combine AOCs into exposure units for large home range receptors. In addition, PG&E agreed to provide spatial analysis of significant risks to support risk management for individual AOCs. Please see response to DTSC Specific Comment 5.

*Specific Comment 2**: Page 3-9, Section 3.1.2. If concentrations of constituents in site soil decrease down slope and become less than or equal to background before reaching the sediment in the riparian area, DOI directs PG&E to collect 2 additional samples down slope to confirm this finding. DOI also expects that PG&E shall evaluate the sediments deposited in AOC 1 and AOC 10 separately to determine if sediments should be considered separately as their own exposure areas. If the sediments in AOC 1 and AOC 10 exceed sediment threshold effect concentrations and background, DOI will require this to be a separate exposure area, regardless of the result of the soil downgradient analyses.*

Specific Response 2**:** This comment was discussed at the November 6 meeting between PG&E and the regulatory agencies and an agreement was reached to develop a CSM, conduct the sediment screening, and discuss the results in an SMDP meeting to agree upon appropriate next steps. Please see response to DTSC Specific Comment 16.

*Specific Comment 3**: Page 6-18, Section 6.3.3.2. Use the maximum concentration from the three different exposure depth intervals as the exposure point concentration for the exposure calculations in Bat Cave Wash and the East Ravine.*

Specific Response 3**:** This comment was discussed at the November 6 meeting between PG&E and the regulatory agencies and an agreement was reached to provide risk estimates for the baseline conditions (per Figure 3-1 in the RAWP), and two scouring scenarios. Please see response to DTSC Specific Comment 6.

*Specific Comment 4**: Page 7-7, Section 7.2.3. The text describing native fish species in the lower Colorado River was not included in this section. Include it in the text, not by reference only.*

Specific Response 4**:** PG&E agrees. However, in the interest of the overall project schedule, no changes to the RAWP are proposed in response to this comment. PG&E proposes to incorporate the requested text change as applicable in future ERA documents.

Aaron Yue, DTSC (October 17, 2008 in a letter to Yvonne Meeks/PG&E)

General Comment excerpted from letter: DTSC will provide approval of the final RAWP pending resolution of the remaining comments transmitted on September 30, 2008 and the documentation of agreements with respect to; 1) the approach for use of filtered versus unfiltered river water data for the risk assessment as documented in our letter to PG&E dated July 28, 2008; 2) the evaluation of general chemicals and essential nutrients in the groundwater risk assessment as outlined in PG&E's email dated September 26, 2008; and 3) any modifications necessary as part of the response to the remaining comments.

General Response: The approach for the use of filtered versus unfiltered surface water was agreed to in email correspondence between DTSC and PG&E. PG&E and the agencies agreed to use filtered data for the purpose of initial evaluation of incidental ingestion risk to recreational users in the risk assessment. However, if the surface water exposure pathway is determined to have significant contribution to the human health risk, then PG&E will evaluate the risk based on

unfiltered data which would represent a more conservative scenario. To ensure we have sufficient sampling data, in the event that it is necessary, PG&E began collecting and analyzing unfiltered samples along with the normal filtered samples. This agreement and approach was confirmed in the meeting between PG&E and the agencies on November 6, 2008.

PG&E also agreed to evaluate potential risks associated with 13 additional chemicals that are broadly classified as general chemicals and essential nutrients. The approach to evaluating these chemicals was provided in an email dated September 26, 2008. The following screening approach was agreed to:

1. The screening-analysis would be limited to the following 13 compounds, and the screening analysis would become an appendix to the risk assessment.
    - Sodium
    - Potassium
    - Calcium
    - Magnesium
    - Fluoride
    - Chloride
    - Bicarbonate
    - Sulfate
    - Nitrate
    - Ammonia
    - Manganese
    - Iron
    - Sulfide
2. Compare the maximum concentration of the chemical to the average background concentration. If the maximum detected concentration is below the mean background concentration, the chemical is not of concern.
3. Compare the maximum concentration to a primary MCL. If the maximum concentration is below the MCL, the chemical is not of concern.
4. For those chemicals that don't have primary MCLs, turn to the standard agency databases (i.e., databases cited in the RAWP) to see if there are available relevant toxicity criteria. If relevant toxicity criteria are available for the compounds that do NOT have primary MCLs, then we would develop risk-based drinking water criteria for these chemicals, and compare the maximum detected concentrations to the risk-based criteria. If the maximum concentration is below the risk-based concentration, then the chemical is not of concern.
5. If there are no MCLs, and no toxicity values (available on the standard agency databases), then the chemical is not of concern.
6. We would conduct a similar screen on these 13 chemicals for ecological risk purposes, by comparing maximum concentrations to available ambient surface water criteria (using the same general logic/approach set forth in the RAWP).
7. Any of the 13 chemicals that are not screened out during this process will be carried through the quantitative risk assessment, consistent with the approach in the RAWP.

The agreement on this approach was confirmed in the meeting on November 6, 2008.

Pamela Innis, DOI (October 16, 2008 in a letter to Yvonne Meeks/PG&E)

General Comment 1 excerpted from letter: Resolve the agencies' comments on the RAWP that have been submitted formally by DOI and the Department of Toxic Substances Control (DTSC) and modify the work plan accordingly. It is our expectation that PG&E will work closely with the agencies to ensure amicable resolution to the issues and agreement on the proposed language.

General Response 1: PG&E has worked closely with DTSC and DOI to resolve the remaining issues on the RAWP as reflected in the response to comments above and the November 6 meeting notes provided for agency review. We believe that all remaining comments have been resolved and that adequate documentation of the resolution of the comments is provided in this response to comments.

General Comment 2 excerpted from letter: Solidify the agreements on the screening approach for general chemical parameters and essential nutrients in the groundwater risk assessment by specifying the approach and constituents in the work plan. DOI agrees with the screening approach provided by PG&E in the e-mail dated September 26, 2008 and again on October 6, 2008 [RE: Follow up on Nutrients, common chemicals, etc.].

General Response 2: PG&E has provided documentation of the agreements relevant to this comment. Please see response to General Comment excerpted from DTSC's letter above. In the interest of the overall project schedule, PG&E respectfully submits that (1) the response to comments is sufficient to document the agreements and resolution of the comments, and (2) no further revision to the RAWP is necessary beyond including these responses as an addendum to that document.

General Comment 3 excerpted from letter: Document the agreements made with the agencies regarding the approach for the collection and analysis of filtered and unfiltered river water.

General Response 3: PG&E has provided documentation of the agreements relevant to this comment. Please see response to General Comment excerpted from DTSC's letter above. In the interest of the overall project schedule, PG&E respectfully submits that (1) the response to comments is sufficient to document the agreements and resolution of the comments, and (2) no further revision to the RAWP is necessary beyond including these responses as an addendum to that document.

Thank you again for submitting your comments on the Risk Assessment Work Plan. If you have any questions regarding this letter, please call me at (805) 234-2257.

Sincerely,

Yvonne Meeks
Topock Project Manager

cc: Pam Innis, DOI
Mike Eichelberger, DTSC
Shukla Roy-Semmen, DTSC
Carrie Marr, USFWS
Karen Baker, DTSC
Dennis Smith, SAIC

FIGURES

Figure 3-1 Revised
Sampling and Exposure Depth Interval for Soil
PG&E Topock, Needles, California
Human Health and Ecological Risk Assessment Work Plan

Depth for Current Conditions (feet bgs)	Assumed Sampling Depth Interval - Site	Assumed Sampling Depth Interval - Background	Proposed Soil Exposure Intervals			
			surface	shallow	subsurface I	subsurface II
Ground Surface (0 feet)						
0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0						
Ecological Receptors-outside the compressor station[a,b]			**1. Plant Uptake** = highest EPC from the three exposure depth intervals[c] for all AOCs.			NA
			2. Soil Invertebrate Uptake = 0-0.5 foot bgs for all AOCs	NA	NA	NA
			3. Granivorous Bird (Gambel's quail): (i) incidental ingestion of soil = 0-0.5 feet bgs for all AOCs (ii) plant (food) concentration (soil-to-plants) = highest EPC from the three exposure depth intervals[c] for all AOCs.			NA
			4. Insectivorous Bird (cactus wren): (i) incidental ingestion of soil = 0-0.5 feet bgs for all AOCs (ii) prey concentration (soil-to-prey) = 0-0.5 feet bgs for all AOCs .	NA	NA	NA
			5. Carnivorous Bird (red-tailed hawk): (i) incidental soil ingestion = 0-0.5 feet bgs for all AOCs (ii) prey concentration (soil-to-prey) = 0-0.5 feet bgs for all AOCs.	NA	NA	NA
			6. Granivorous Mammal (kangaroo rat): (i) incidental soil ingestion = highest EPC from the three depth intervals[c] for all AOCs (ii) prey (food) concentration (soil-to-plants) = highest EPC from the three exposure depth			NA
			7. Insectivorous Mammal (desert shrew): (i) incidental soil ingestion = 0-0.5 feet bgs for all AOCs (ii) prey concentration (soil-to-prey) = 0-0.5 feet bgs for all AOCs.	NA	NA	NA
			8. Carnivorous Mammal (desert kit fox): (i) incidental soil ingestion = highest concentration from the three exposure depth intervals[c] for all AOCs (ii) prey concentration (soil-to-prey) = 0-0.5 feet bgs for all AOCs.			NA
Ecological Receptors-inside the compressor station			NA	NA	NA	NA

Notes:
a. See Table 6-3 for details.
b. Exposure point concentrations for ecological receptors will be represented by both the maximum detected concentation and the 95 percent upper confidence limit on the mean.
c. The 3 exposure depth intervals for ecological receptors for the current conditions include:
Surface Soil = 0 - 0.5 feet below ground surface (bgs).
Shallow Soil = 0 - 3 feet bgs.
Subsurface Soil I = 0 - 6 feet bgs.

AOC = includes areas of concern and undesignated areas
bgs = below ground surface
BCW = Bat Cave Wash
NA = not applicable

Figure 1
Sampling and Ecological Receptor Exposure Depth Intervals for Soil
2 feet Scouring Scenario for AOC 1/BCW and AOC 10
PG&E Topock, Needles, California
Human Health and Ecological Risk Assessment Work Plan

Depth for Current Conditions (feet bgs)	Assumed Sampling Depth Interval - Site	Assumed Sampling Depth Interval - Background	Depth after 2 feet Scouring (feet bgs)	Proposed Soil Exposure Intervals for Ecological Receptors		
				surface	shallow	subsurface I
Ground Surface (0 feet)						
0.5 1.0 1.5				Assuming 2 feet of soil scoured in the future.		
2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0			0.0 1.0 4.0 8.0			
Ecological Receptors-outside the compressor station[a,b]				**1. Plant Uptake** = highest EPC from the three exposure depth intervals[c] for AOC 1/BCW and AOC 10.		
				2. Soil Invertebrate Uptake = 0-1 foot bgs for AOC 1/BCW and AOC 10.	NA	NA
				3. Granivorous Bird (Gambel's quail): (i) incidental ingestion of soil = 0-1 foot bgs for AOC 1/BCW and AOC 10 (ii) plant (food) concentration (soil-to-plants) = highest EPC from the three exposure depth intervals[c] for AOC 1/BCW and AOC 10.		
				4. Insectivorous Bird (cactus wren): (i) incidental ingestion of soil = 0-1 foot bgs for AOC 1/BCW and AOC 10 (ii) prey concentration (soil-to-prey) = 0-1 foot bgs for AOC 1/BCW and AOC 10.	NA	NA
				5. Carnivorous Bird (red-tailed hawk): NA; scouring scenarios will not be evaluated for large home ranging receptors.		
				6. Granivorous Mammal (kangaroo rat): (i) incidental soil ingestion = highest EPC from the three depth intervals[c] for AOC 1/BCW and AOC 10 (ii) prey (food) concentration (soil-to-plants) = highest EPC from the three exposure depth intervals[c] for AOC 1/BCW and AOC 10.		
				7. Insectivorous Mammal (desert shrew): (i) incidental soil ingestion = 0-1 foot bgs for AOC 1/BCW and AOC 10 (ii) prey concentration (soil-to-prey) = 0-1 foot bgs for AOC 1/BCW and AOC 10.	NA	NA
				8. Carnivorous Mammal (desert kit fox): NA; scouring scenarios will not be evaluated for large home ranging receptors.		
Ecological Receptors-inside the compressor station				NA	NA	NA

Notes:
a. See Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (RAWP; ARCADIS, August 2008) for details.
b. Exposure point concentrations for ecological receptors will be represented by both the maximum detected concentation and the 95 percent upper confidence limit on the mean.
c. The 3 exposure depth intervals for ecological receptors for the 2 feet scouring scenario include:
Surface Soil = the current 2 to 3 feet below ground surface (bgs) as the new 0 -1 foot bgs exposure depth.
Shallow Soil = the current 2 to 6 feet bgs as the new 0 - 4 feet bgs exposure depth.
Subsurface Soil I = the current 2 to10 feet bgs as the new 0 - 8 feet bgs exposure depth.

AOC = includes areas of concern and undesignated areas
bgs = below ground surface
BCW = Bat Cave Wash
NA = not applicable

Figure 2
Sampling and Ecological Receptor Exposure Depth Intervals for Soil
6 feet Scouring Scenario for AOC 1/BCW and AOC 10
PG&E Topock, Needles, California
Human Health and Ecological Risk Assessment Work Plan

Depth for Current Conditions (feet bgs)	Assumed Sampling Depth Interval - Site	Assumed Sampling Depth Interval - Background	Depth after 5 feet Scouring (feet bgs)	Proposed Soil Exposure Intervals		
				surface	shallow	subsurface I
Ground Surface (0 feet)						
0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5				Assuming 5 feet of soil scoured in the future.		
5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0			0.0 1.0 5.0 10.0			
Ecological Receptors-outside the compressor station[a,b]				**1. Plant Uptake** = highest EPC from the three exposure depth intervals[c] for AOC 1/BCW and AOC 10.		
				2. Soil Invertebrate Uptake = 0-1 foot bgs for AOC 1/BCW and AOC 10.	NA	NA
				3. Granivorous Bird (Gambel's quail): (i) incidental ingestion of soil = 0-1 foot bgs for AOC 1/BCW and AOC 10 (ii) plant (food) concentration (soil-to-plants) = highest EPC from the three exposure depth intervals[c] for AOC 1/BCW and AOC 10.		
				4. Insectivorous Bird (cactus wren): (i) incidental ingestion of soil = 0-1 foot bgs for AOC 1/BCW and AOC 10 (ii) prey concentration (soil-to-prey) = 0-1 foot bgs for AOC 1/BCW and AOC 10.	NA	NA
				5. Carnivorous Bird (red-tailed hawk): NA; scouring scenarios will not be evaluated for large home ranging receptors.		
				6. Granivorous Mammal (kangaroo rat): (i) incidental soil ingestion = highest EPC from the three depth intervals[c] for AOC 1/BCW and AOC 10 (ii) prey (food) concentration (soil-to-plants) = highest EPC from the three exposure depth intervals[c] for AOC 1/BCW and AOC 10.		
				7. Insectivorous Mammal (desert shrew): (i) incidental soil ingestion = 0-1 foot bgs for AOC 1/BCW and AOC 10 (ii) prey concentration (soil-to-prey) = 0-1 foot bgs for AOC 1/BCW and AOC 10.	NA	NA
				8. Carnivorous Mammal (desert kit fox): NA; scouring scenarios will not be evaluated for large home ranging receptors.		
Ecological Receptors-inside the compressor station				NA	NA	NA

Notes:
a. See Table 6-3 of the *Human Health and Ecological Risk Assessment Work Plan* (RAWP; ARCADIS, August 2008) for details.
b. Exposure point concentrations for ecological receptors will be represented by both the maximum detected concentation and the 95 percent upper confidence limit on the mean.
c. The 3 exposure depth intervals for ecological receptors for the 5 feet scouring scenario include:
Surface Soil = the current 5 to 6 feet below ground surface (bgs) as the new 0 -1 foot bgs exposure depth.
Shallow Soil = the current 5 to 10 feet bgs as the new 0 - 5 feet bgs exposure depth.
Subsurface Soil I = the current 5 to 15 feet bgs as the new 0 - 10 feet bgs exposure depth.

AOC = includes areas of concern and undesignated areas
bgs = below ground surface
BCW = Bat Cave Wash
NA = not applicable

THIESSEN POLYGON SPATIAL-WEIGHTING TECHNIQUE

GENERAL INFORMATION

THIESSEN POLYGON SPATIAL-WEIGHTING TECHNIQUE – GENERAL INFORMATION

Pacific Gas and Electric Company

Topock Compressor Station, Needles, California

Addendum to the Human Health and Ecological Risk Assessment Work Plan

1. Introduction

After completing the Phase II Part A Soil Investigation for the Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California (the site), soil data will be used to calculate exposure point concentrations (EPCs) following the methodology described in the revised Human Health and Ecological Risk Assessment Work Plan (RAWP) (ARCADIS, August 25, 2008). The EPCs, along with other exposure and toxicity parameters, will be used in the risk characterization step to estimate potential risks to receptors. Additionally, the RAWP (ARCADIS, August 25, 2008) proposed the Thiessen Polygon approach as a method for calculating area-weighted EPCs.

Consistent with United States Environmental Protection Agency (USEPA) guidance, the applicability of spatial-weighting methods will be explored as a refinement to the risk characterization at the site. Specifically, spatial-weighting methods will be used to develop EPCs if marginally significant risks are estimated. If the most conservative risk estimates result in acceptable risks (i.e., a hazard quotient less than one using the no-observed adverse effects level- [NOAEL-] based toxicity reference value [TRV] and a site use factor of one), then spatial-weighting techniques will not be needed. Conversely, if the least conservative of the risk estimates results in potentially significant risks calculated (for example, a hazard quotient greater than 100 using the lowest-observed adverse effect- [LOAEL-] based TRV and a site use factor calculated from the receptor's home range), then refinement using spatial weighting may be deferred until other refinements are complete (e.g., validation of bioaccumulation factors).

To further illustrate the Thiessen Polygon methodology and its applications in the risk assessment process, PG&E and its consultant (ARCADIS) have agreed to meet with the Department of Toxic Substances Control (DTSC) and the United States Department of Interior (USDOI) risk assessors in early 2009. The purpose of this meeting will be to demonstrate and discuss the application of spatial analyses techniques and to increase transparency in the process.

Figure 1 represents the simple decision flow diagram for a general ecological risk assessment (ERA) process and illustrates when spatial analysis (i.e., Thiessen Polygon approach) will be applied. The process shown on Figure 1 is intended to be interactive, as indicated by the incorporation of Scientific Management Decision Points (SMDP) encouraging agency input. The flow diagram provides a general tool that can be used for discussion during the planned technical meeting between PG&E and the agencies in early 2009. As shown on Figure 1, spatial-weighting techniques can be applied at various points in the process depending on preliminary risk estimates. Spatial-weighting techniques are discussed below.

The USEPA (2001 and 2005) recommends considering the use of spatial-weighting techniques to calculate EPCs when concentrations across the site exhibit positive spatial autocorrelation, meaning that samples located near each other have more similar concentrations than samples located further apart. Common spatial-weighting techniques include Thiessen Polygons, Inverse Distance Weighting (IDW) and kriging. The USEPA facilitated the application of these methods by developing public domain software, including GEO-EAS[1], SADA[2] and FIELDS[3]. An overview of the advantages and limitations of Thiessen Polygons compared to IDW and kriging methods is provided in Section 2.

There are numerous examples of applications of spatial-weighting techniques at hazardous waste sites. Sites in USEPA Regions IV, V, VII and X are posted on the USEPA SADA website (http://www.tiem.utk.edu/~sada/applications.shtml). In 2005, the California DTSC approved the use of Thiessen Polygons to define EPCs for the Santa Susana Field Laboratory in Ventura County, California[4]. There are also numerous examples of applications and overviews of geostatistical methods for calculating spatially weighted upper confidence limits on the mean (95UCLs) available in the peer-reviewed literature. Two examples demonstrating approaches to calculating 95UCLs for constituents in surface soil using Thiessen Polygons are provided by Clifford et al. (1995) and Burmaster and Thompson (1997).

2. Thiessen Poloygon Method for Calculating 95UCLs

Of the available spatial-weighting techniques applied to risk assessments, Thiessen Polygons is perhaps the most common because it requires the fewest assumptions. Its popularity is likely because it is relatively easy to understand and implement, and it can yield more reliable (accurate) estimates of 95UCLs than nonspatial-weighting techniques, particularly if the sampling design is nonrandom. The Thiessen polygon spatial-weighting method is planned for the Topock risk assessment, if calculated risk estimates are marginally significant. The method is described in detail in this section. Section 3 includes an overview of the advantages and limitations of Theissen Polygons compared to other spatial-weighting methods.

2.1 Thiessen Polygon Concept for Spatial Weighting

Thiessen Polygons are conceptually straight forward. An area under consideration is divided into polygons such that every polygon is associated with one and only one point sample. The unsampled area contained within each polygon is nearest to the associated sample and, therefore, the concentration for

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[1] Geostatistical Environment Assessment Software (GEO-EAS; Englund and Sparks, 1988).

[2] Spatial Analysis and Decision Assistance (SADA). Funded by USEPA Region V and the United States Nuclear Regulatory Commission. http://www.tiem.utk.edu/~sada/index.shtml

[3] Field Environmental Decision Support (FIELDS). Funded by USEPA Region V. http://www.epa.gov/region5fields/

[4] Final work plan for risk assessment for Santa Susana Field Laboratory Site is posted on the DTSC website: http://www.dtsc.ca.gov/HazardousWaste/Projects/upload/SSFL_SRAM_Vol_1_2005_SRAM_Rev2_TXT_TBLS_FIGS_to_1_5-2.pdf

the entire area contained by the polygon is assumed to be equal to that of the associated sample. A weighting factor is then applied to a sample based on the proportion of the total exposure unit that is represented by the polygon associated with the sample. Samples located within areas of dense point sampling are associated with smaller polygons than samples located in less dense sampling areas. This method is sometimes considered a "declustering" technique because it effectively associates smaller polygon areas and weighting factors to samples in clusters.

Once a polygon network is established for a site, additional post-processing of the areas can be done to provide improved estimates of area averages (and 95UCLs). For example, subareas of the polygons can be "clipped" to reflect habitat boundaries (e.g., roadways or changes in habitat type), footprints of large structures or water bodies not included in the exposure unit, or subareas (e.g., hot spots) that will undergo a future remedy. An example of this concept, using polygons to highlight subareas where arsenic concentrations may exceed a low and high risk-based screening level (RBSL), was submitted to the agencies as an attachment to the November 6, 2008 risk assessment technical meeting notes. A site-wide Thiessen Polygon network was developed for arsenic concentrations in surface soil, and then post-processed to exclude a major roadway and several presumptive remedy areas (see polygons with cross-hatches on the northeastern portion of Exposure Unit 2). In this example, it is also informative to note that the samples located inside the presumptive remedy areas can still contribute to the estimates of unsampled areas on the edges of the presumptive area boundaries (see polygons shaded in brown).

2.2 Calculation of 95UCLs with Thiessen Polygons

While the calculation of the spatially-weighted arithmetic mean concentration within an exposure unit is relatively straightforward, it can be more challenging to calculate the 95UCL. The following steps will be used in order to ensure that the ProUCL-based decision rules for identifying the most robust statistical method are consistently applied:

1. Identify all polygons (or portions of polygons) that are contained within the boundaries of an exposure unit. Note that the polygon may "originate" from a sample obtained outside the exposure unit.

2. Identify the concentration associated with each polygon and calculate the corresponding weighting factor, equal to the area of the polygon divided by the area of the exposure unit.

3. Use bootstrap resampling (i.e., resample with replacement) to generate a data set of equal sample size to the original data set in Step 2. Further details regarding bootstrap resampling techniques are provided in USEPA guidance (USEPA, 2001; USEPA, 2007). Use the spatial-weighting factor to determine the probability that any given sample is selected for the bootstrap sample.

4. Repeat Step 3 many times (e.g., 250 or more) to generate an array of different bootstrapped data sets, all with sample sizes equal to the original data set (Step 2).

5. Import the entire database of bootstrapped data sets from Step 4 into ProUCL 4; use ProUCL 4 to calculate 95UCLs. This is facilitated by using the "group by" run option in ProUCL 4. This step will yield as many estimates of 95UCLs as bootstrapped datasets (e.g., 250 or more).

6. Calculate summary statistics for the distribution of 95UCLs. Select the arithmetic mean of the 95UCLs to represent the final, spatially weighted 95UCL (i.e., the EPC). If the original data set includes nondetects, this method can yield asymmetric (right-skewed) distributions of 95UCLs such that the arithmetic mean is greater than the median. Use of the arithmetic mean 95UCL also more closely approximates the 95UCL for a data set that has equal weighting factors for all samples.

3. Comparison of Thiessen Polygons, Inverse Distance Weighting and Kriging

There are benefits and limitations to Thiessen Polygons, IDW and kriging. As with most models, it is unreasonable to expect that one spatial interpolation approach is superior for every data set and application. USEPA (2004) provides a complete overview of the benefits and limitations of spatial interpolation methods and recommends a method that is "appropriate dependent upon the data, the purpose of the analysis, and the planned use of the predicted surface." Many of these concepts are summarized below.

3.1 Benefits and Limitations of the Thiessen Polygon Method

One major advantage of the Thiessen Polygon approach is that it does not require the use of substitution methods for nondetects, which have been shown to introduce bias in estimates of 95UCLs (USEPA, 2007). The Thiessen Polygon approach allows for use of the USEPA's ProUCL v.4 software, which provides the most robust estimates of 95UCLs for left-censored data (USEPA, 2007). By contrast, both IDW and kriging methods require the use of proxy values for nondetects (e.g., half reporting limits), thereby introducing uncertainty in the interpolated surface and summary statistics.

Thiessen Polygons also do not require that the surface exhibit any spatial structure. The polygons effectively "decluster" areas of dense sampling, but the method does not require a specific relationship among neighboring samples to yield reliable summary statistics. By contrast, probability-based methods (kriging) require a set of assumptions regarding the variance in concentrations in different directions and spatial scales. A systematic process for determining whether the spatial structure may support IDW interpolation or probability-based methods (kriging) is proposed in a poster presented by ARCADIS at recent Society of Environmental Toxicology and Chemistry (SETAC) North America and Northern California SETAC meetings (Orr, et.al., 2007; a copy of this poster was previously submitted to the agencies as an attachment to the November 6, 2008 risk assessment technical meeting notes). This process can support the use of different methods for different constituents of potential concern (COPCs) at the same site. For simplicity, Thiessen Polygons are planned for calculating 95UCLs for all COPCs and exposure units for this site.

Although the Thiessen polygon approach is conceptually simple, easily implemented and generally yields more reliable estimates of EPCs than nonspatial methods, there are some limitations of the approach. Thiessen polygons generally do not result in a smoothly contoured surface because the polygons can be

large in areas of less dense sampling, and only one value contributes to the concentration for the areas within the polygon. Other interpolation methods incorporate more information from neighboring samples, resulting in smoother and often more realistic estimates of concentrations at unsampled areas. Therefore, if Thiessen Polygon methods are used, and relatively large polygons are generated in areas of sparse sampling, additional effort may be required to characterize these areas (e.g., collect additional data; confirmatory sampling following implementation of the remedy). However, risk assessment for the site will be conducted after completion of site characterization and significant data gaps would have been identified in the data evaluation between Phase I and Phase II Part A Soil Investigations. These activities are planned prior to commencement of the EPC calculations for the risk assessment.

3.2 Benefits and Limitations of the Inverse Distance Weighting Method

IDW is a technique used to estimate concentrations in unsampled areas based on the weighted average concentration of neighboring sampling locations. Two key assumptions are involved in using IDW:

1. method used to determine the number of samples that contribute to the estimated concentration

2. value of exponent used to determine how strongly the weighting is affected by distance.

While there are standard assumptions, these are generally based on historical practice rather than a clear and transparent scientific rationale. For example, typically a “neighborhood” is defined with a fixed radius, rather than arbitrarily assigning a specific number of neighbors; however, the size of the radius is generally selected arbitrarily. Also, typically an exponent of “2” is used as a weighting factor, although values of 1.5 and 3 are not uncommon. A sensitivity analysis is generally recommended to evaluate the sensitivity of the estimated concentrations and final decision to the choice of modeling approaches.

IDW is used to compute a grid of concentrations across the exposure unit. The interpolated value at each node in the grid represents an estimate for the concentration at that location. The grid of concentrations is assumed to represent the spatial variation of concentrations in the exposure unit. The next step is to calculate 95UCLs using an appropriate number of estimated concentrations. One challenge with the IDW approach is to determine the appropriate degrees of freedom for the calculation, because it is clear that using all of the estimated concentrations would greatly overestimate the original sample size and, therefore, greatly underestimate the 95UCL. One approach is to estimate the sample mean and standard deviation using the full set of interpolated concentrations in the exposure unit, but rely on the original empirical sample size to define the other terms in the UCL equation (e.g., sample size [n] and degrees of freedom for the t-statistic). An alternative approach is to use bootstrap sampling of the estimated concentrations, with sample size for each bootstrapped data set equal to the sample size of the original empirical data. The routine could be automated to use ProUCL’s decision rules for 95UCL calculation, similar to the method described for Thiessen Polygons.

The key benefit to the IDW approach is that it yields a smooth interpolated surface that facilitates identification of small subareas that may exceed a threshold concentration of concern. The key limitation of the IDW approach is that it requires user-specified parameters that are difficult to support based on scientific principles. In addition, IDW can be biased by use of substitution methods for non-detects.

3.3 Benefits and Limitations of the Kriging Methods

Like IDW, kriging methods are used to estimate concentrations in unsampled locations based on the weighted average of neighboring concentrations. The key difference between IDW and kriging is that kriged estimates require a more complex model that describes the variance, with assumptions that the variance is independent of location and direction. A semi-variogram plot is generated to represent the relationship between measured concentrations as a function of distance between sampling locations. If a reasonable fit can be achieved, then the geostatistical model may provide reliable estimates of concentrations at unsampled locations.

Estimates of the EPC can be obtained with sequential simulation by averaging the values of all grid points that fall within the exposure unit. A nonparametric distribution for the 95UCL can then be obtained by repeating the process many times (Thayer et al., 2003). Alternatively, a bootstrap technique similar to the IDW approach described above can be used to incorporate ProUCL's decision rules explicitly.

One advantage of kriging techniques is that diagnostics and cross-validation techniques are available to indicate the goodness-of-fit of the model to observed data. The major limitation of kriging is that, generally, a large data set of samples collected with a random sampling scheme is needed to achieve a reliable semi-variogram model. In addition, kriging can be biased by use of substitution methods for non-detects.

3.4 Comparison of 95UCLs Using Different Methods

In general, there is no theoretical basis to suggest that one spatial interpolation method will systematically yield higher (or lower) 95UCLs than other methods. However, a 95UCL calculated using Thiessen Polygons can sometimes be higher than one might expect, given the sample size and spatially weighted variance of the concentrations. This is particularly true for left-censored data, and reflects the fact that the USEPA has adopted decision rules in selecting the most robust 95UCL statistics that tend to be conservative. That is, the decision rules will generally result in a nonparametric statistic that yields *at least* 95 percent coverage of the mean (and often higher than 95 percent) when the degree of censoring is relatively high (e.g., >50 percent; USEPA, 2007). This same observation does not apply to IDW and kriging approaches that use ProUCL in resampling of the estimated grid concentrations because the use of substitution methods for non-detects results in a final data set of estimated concentrations that all appear to be "detects."

4. Other Applications of Spatial Analysis

If potentially significant risks are estimated, additional evaluation or action will result and spatial analysis of risk-driving chemicals may be conducted. For ecological risk assessments, spatial analysis is typically used if risks are estimated after a validation study. Spatial analysis of risks using Thiessen polygon maps has proved useful for risk managers evaluating remediation scenarios at sites under DTSC oversight. Risk assessors and managers can review the relative risks posed by chemicals at various locations within an exposure unit. Relative hazard quotients can be calculated for individual polygons and thereby identify risk-based hot spots. Another example of this application was presented at the SETAC North America

Meeting in 2005 (Pattanayek, et. al., 2005; previously submitted to the agencies as an attachment to the November 6, 2008 risk assessment technical meeting notes).

5. References

ARCADIS. 2008. *Revised Human Health and Ecological Risk Assessment Work Plan*. Pacific Gas and Electric (PG&E) Topock Compressor Station, Needles California. August 25.

Burmaster, D.E. and K.M. Thompson. 1997. Estimating exposure point concentrations for surface soils for use in deterministic and probabilistic risk assessments. HERA, 3(3): 363-384.

Clifford, P.A., D.E. Barchers, D.F. Ludwig, R.L. Sielken, J.S. Klingensmith, R.V. Graham and M.I. Banton. 1995. An Approach to Quantifying Spatial Components of Exposure for Ecological Risk Assessment. *Environ. Tox. Chem.* 14(5): 895-906.

Englund, E. and A. Sparks. 1988. GEO-EAS (Geostatistical Environmental Assessment Software) User's Guide. EPA 600/4-88/033, ENMSL, Las Vegas.

Orr, T.B., P.E. Goodrum, T. Negley, M. Kohberger, B. DeShields and J. Gleason. 2007. *A Practical Decision Process for Calculating Exposure Point Concentrations for Spatially Explicit Risk Assessments.* Presented at Society of Environmental Toxicology and Chemistry (SETAC) North America 28th Annual Meeting November 11-15, 2007. Milwaukee, WI.

Pattanayek M., B.R. DeShields, G.M. DiMundo and N. Navarro. 2005. *Evaluation of Remedial Scenarios for Metal Exposures at a Small Arms Firing Range in Central California.* SETAC North America 26th Annual Meeting. November 14, 2005. Baltimore, Maryland.

Thayer, W.C., D.A. Griffith, P.E. Goodrum, G.L. Diamond and J.M. Hassett. 2003. Application of Geostatistics to Risk Assessment. Risk Anal. 23(5): 945-960.

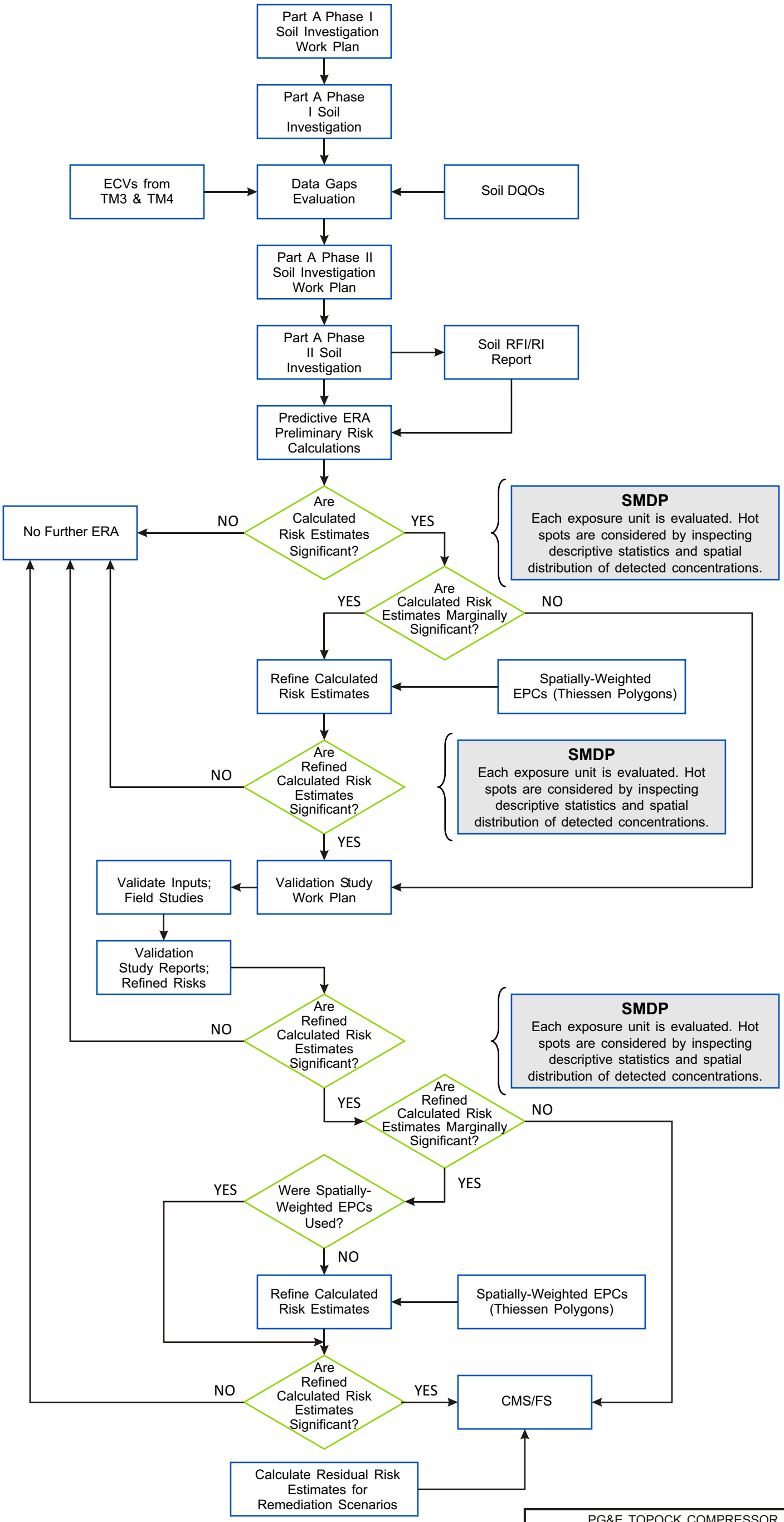
USEPA. 2001. RAGS Volume III (Part A), Process for Conducting Probabilistic Risk Assessment. United States Environmental Protection Agency. Office of Solid Waste and Emergency Response, Washington DC. EPA/540/R-02/002. December.

USEPA. 2004. Developing Spatially Interpolated Surfaces for Estimating Uncertainty. United States Environmental Protection Agency. Office of Air and Radiation, and Office of Air Quality Planning and Standards. EPA-454/R-04-004. November.

USEPA. 2005. Guidance on Surface Soil Cleanup at Hazardous Waste Sites: Implementing Cleanup Levels. Peer Review Draft. United States Environmental Protection Agency. Office of Emergency and Remedial Response. EPA 9355.0-91. April.

USEPA. 2007. ProUCL Version 4.0 Technical Guide. United States Environmental Protection Agency. Office of Research and Development. EPA/600/R-07/041. April.

FIGURE



NOTES:

1. CMF/FS: Corrective Measures/Feasibility Study
2. DQOs: Data Quality Objectives
3. ECV: Ecological Comparision Values
4. EPC: Exposure Point Concentration
5. ERA: Ecological Risk Assessment
6. RFI/RI: RCRA Facility Investigation/Remedial Investigation
7. SMDP: Scientific Management Decision Point
8. TM: Technical Memorandum

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN ADDENDUM

GENERAL APPROACH FOR ECOLOGICAL RISK ASSESSMENT

ARCADIS

FIGURE
1

12/19/08 SYR-141ENV-DJH
RC000689/0002/00002/CDR/00689F01.CDR

RESPONSE TO COMMENTS ON THE ADDENDUM TO THE REVISED HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN (ARCADIS, DECEMBER 2008)

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4 February 2009

Mr. Aaron Yue
Chief Permitting Unit
California Department of Toxic Substances Control
5796 Corporate Avenue
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Subject: Response to Comments on the *Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan (August 2008; Addendum dated December 23, 2008).*
Pacific Gas and Electric Company
Topock Compressor Station
Needles, California

Dear Mr. Yue:

Pacific Gas and Electric Company (PG&E) and its consultants (ARCADIS) submit this letter in response to comments on the *Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan* (RAWP Addendum) dated December 23, 2008. As agreed in discussions between PG&E and the regulatory agencies on November 6, the responses to agency comments would be incorporated into the RAWP via the work plan addendum. On January 14, 2009, Department of Toxic Substances Control (DTSC) Human and Ecological Risk Division (HERD) made additional comments on the addendum which are addressed herein.

Consistent with DTSC HERD's comment memorandum dated January 14, 2009, we have reprinted each of the comments and responses contained in the RAWP Addendum. The new comments and our response to each comment are provided immediately following each original comment. In addition, we have labeled or numbered each of the original and new comments for ease of reference.

Original Comment from Mike Eichelberger, DTSC HERD (September 24, 2008 memorandum to Aaron Yue/DTSC)

Original General Comment: The report incorporates the parameters required for the Predictive Ecological Risk Assessment (PERA) presented in the Ecological Technical memorandums. However, there are some outstanding issues remaining to be clarified, including the definition of

exposure areas and an agreement on exposure point concentration calculation based on exposure depth. Please see the specific comments below.

Original General Response: PG&E agrees that there were issues articulated in the DTSC comments dated September 24, 2008 and the DOI comments dated October 1, 2008. These issues were resolved in a technical planning meeting between PG&E and the agencies on November 6, 2008. The resolution of the issues and action items were recorded in draft meeting notes provided to the agencies on November 14 for their review and concurrence. For the project record, the agreements reached at the meeting are also summarized in the responses to agency comments below.

New General Comment: Please see HERD comments to the PG&E Response to Comments below.

New General Response: Acknowledged.

Original Specific Comment 1: Page 2-5, Section 2.2.1, Biological Assessment, paragraph at the top of the page. Please provide the reasoning for the conclusion "One species, bonytail chub (Gilia elegans), was concluded to have a critical habitat effect determination of 'may affect, but not likely to adversely affect.'"

Original Specific Response 1**:** The text in Section 2.2.1, Biological Assessment, summarizes the results of the Programmatic Biological Assessment (PBA; a previous investigation) (CH2M HILL, 2007). The conclusion referenced in the comment is relevant to potential effects on special status species as a result of the planned investigation and remediation tasks; the forthcoming risk assessment will include separate conclusions regarding potential risks to special status species. Please see the Final PBA for a discussion of wildlife species within the area of potential effects (APE) (CH2M HILL, 2007). No changes to the RAWP are proposed in response to this comment.

New Specific Comment 1: HERD Response: HERD accepts the PG&E response.

New Specific Response 1: Acknowledged.

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*Original Specific Comment 2**:** Page 2-16, Section 2.5.1, Uplands. The report should reference Figure 2-26 for the location of the salt bush scrub plant communities. The statement "Creosote bush and salt bush scrub plant communities comprise approximately 974 acres within the site" is a little misleading. First, the Topock site is 65-acres, so the 974 acres is apparently referring to the much larger Area of Potential Effects (APE) rather than the 65-acre site proper. Second, the wording of the report makes it appear that salt bush scrub is a major vegetative component of the Topock site. HERD does not recall seeing significant salt bush (Atriplex polycarpa) on the 65-acre Topock site and indeed, Figure 2-26 shows only two small areas associated with sand along the Colorado River and rather remote from the AGCs of the Topock site. The report*

should be revised to reflect that the salt bush community is a minor component of the Topock site.

Original Specific Response 2**:** The text referenced in the comment refers to the APE defined for the PBA (CH2M HILL, 2007). DTSC is correct in interpreting "the site" as the APE in this context. PG&E agrees that this is unclear. As agreed in the meeting on November 6, 2008, PG&E will avoid using the word “site” in future ecological risk assessment (ERA) documents unless it is clearly defined.

PG&E agrees that there is relatively little salt bush near the compressor station (Figure 2-26 of the RAWP). While the text states that “creosote bush scrub is the dominant upland plant community” (Section 2.5.1), PG&E agrees that the remainder of the text is less clear on this point.

As agreed in the meeting on November 6, 2008, PG&E will provide a combined figure showing the location of SWMUs, AOCs, and other undesignated areas (as shown on Figure 2-1 of the RAWP) and the plant communities (as shown on Figure 26) in future ERA documents. No changes to the RAWP are proposed in response to this comment.

New Specific Comment 2: **HERD Response: HERD is satisfied with the response.**

New Specific Response 2: Acknowledged.

Original Specific Comment 3: Page 6-5, Section 6.1, Purpose and Objectives, first paragraph of page. The report states "These objectives will be met by conducting a scoping ERA, Phase I Predictive ERA, and developing site-specific ECVs for use in site characterization ***and other decision making processes****." The acronym ECV refers to Ecological Comparison Value. The phrase "and other decision making processes" needs to be stricken from the report. The Topock Compressor Station –Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil (June 13, 2008) specifies that the ECVs will be used only to aid in sampling. Phrases such as "and other decision making processes" are inherently vague and should not be used in environmental reports.*

Original Specific Response 3**:** PG&E will use more definitive language in future ERA documents. The phrase referenced in the comment, "other decision-making processes", refers to activities such as establishing detection limits for the soil investigation,these specifics will be spelled out in future discussions. The intent of the text in the RAWP and TM 3 is identical; the ECVs were developed to support the soil investigation data gaps assessment and are specifically not to be used to screen chemicals of potential ecological concern (COPECs) for the ERA.

New Specific Comment 3: HERD Response: The sentence in question should be revised to stale: "The objectives will be met by conducting a scoping ERA, Phase I Predictive ERA, and developing site-specific ECVs for use in site characterization. "

New Specific Response 3: PG&E concurs.

Original Specific Comment 4: Page 6-7, Section 6.2.1.1, Soil, paragraph at the top of the page. The report proposes conducting sampling to determine ambient concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) in order to compare PAH concentrations to determine if PAHs are Chemicals of Potential Ecological Concern (COPECs). Referring to the February 28, 2005 Draft RCRA Facility Investigation and Remedial Investigation Report, two AOCs were sampled and showed detectable levels of PAHs, the Debris Ravine and Railroad Debris Area. Only the Railroad Debris site is located close to a potential source of PAHs not associated with site activities (i.e., the railroad line). Although samples were taken from several areas of the Railroad Debris Area, the PAHs that were detected were only associated with the railroad ties; they were not detected in soils or even in the asphalt. It seems to HERD that there is a clear source of the detected PAHs in the Railroad Debris Area, and it is not related to the railroad line. Therefore, HERD questions the need to perform separate sampling to determine ambient concentrations of PAHs. This additional sampling will require additional expenditure of time and money and will provide little useful information.

Original Specific Response 4**:** This comment is relevant to the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A* that was submitted in a separate document (CH2M HILL, 2006) for review. The ambient samples have been collected and the results are forthcoming. The results of the PAH sampling and analysis will be reviewed and discussed with the agencies in the context of data gaps evaluation for the Part A, Phase II Soil sampling plan. No changes to the RAWP are proposed in response to this comment.

New Specific Comment 4: HERD RESPONSE: HERD accepts the PG&E response.

New Specific Response 4: Acknowledged.

Original Specific Comment 5: Page 6-13, Section 6.2.4, Summary of Conceptual Site Models, first paragraph at the top of the page. HERD has not agreed to combine AOC 4, the Debris Ravine and Bat Cave Wash as a single exposure area. Please see Specific Comment number 17 below.

Original Specific Response 5**:** The question of exposure areas was revisited in the November 6, 2008 meeting. At the meeting, the agencies and PG&E again agreed to AOC-by-AOC risk estimates for small home range receptors. The agencies clarified that, for large home range receptors, they had no objection to the use of exposure units that included a combination of AOCs, but were interested in seeing the contribution of the individual AOCs to the risks reported for the exposure units.

For large home range receptors, draft figures were reviewed and discussed that showed the home ranges of the red-tailed hawk and desert kit fox overlying two exposure units. In the discussion,

the agencies and PG&E agreed to evaluate the following exposure areas for large home range receptors:

- Exposure Area 1: AOC-4, AOC-1, and Bat Cave Wash north of AOC-1 up to the wetland area.
- Exposure Area 2: All remaining AOCs and undesignated areas within the scope of the ERA.

In addition, PG&E agreed to provide information on the spatial distribution of significant risks if they are identified in the ERA. PG&E proposed that the minimum risk that could trigger spatial analysis would be the conservative estimate of the average daily dose (ADD) exceeding the no-observed adverse effect (NOAEL)-based toxicity reference value (TRV). That is, spatial analysis of risks would not be conducted unless the conservative estimate of the ADD for the exposure unit at least exceeds the TRV_{low}. The agencies concurred with this approach (Eichelberger, 2008). The spatial risk analysis step would occur after the Predictive ERA, which may include exposure point concentrations that are spatially-weighted as a refinement of the initial risk estimates. The spatial risk analysis may also be deferred until a validation study can be completed, if warranted. The spatial distribution of risks will be provided in the form of Thiessen polygon maps. These maps illustrate the distribution of risks for each area (i.e., polygon) representing a given sample point. This will provide relative risk information on an even smaller scale than AOC-by-AOC and can aid remedial decision-making. Areas driving risk can be easily visualized using the relative risk information on the maps. Additional information on the Thiessen polygon technique was provided to DTSC as an attachment to the November 6 meeting notes.

New Specific Comment 5: HERD RESPONSE: HERD accepts the PG&E response.

New Specific Response 5: Acknowledged.

Original Specific Comment 6: Page 6.3.3.2, Direct Exposure. Although the report describes in detail exposure contact points based on soil depths, HERD and DTSC staff have determined that there is considerable uncertainty regarding the potential exposure of ecological receptors to concentrations of COPECs at all sample depths due to the location of these samples in potentially high erosion areas. According to the DTSC geologist, PG&E has not provided convincing evidence that erosion events due to flash floods could not erode the wash bed to the 6 foot maximum ecological soil sampling depth in Bat Cave Wash. Further, PG&E plans to remove a dam in the East Ravine and does not plan to reconstruct it. HERD, following consultation with the DTSC geologist and project manager, believes that the risk assessment needs to use the maximum concentration from the three different depth intervals as the exposure point concentration (EPC) for all of the exposure calculations in the risk assessment.

Original Specific Response 6**:** The question of how best to calculate exposure point concentrations (EPCs) was revisited in the November 6, 2008 meeting. At the meeting, the agencies and PG&E agreed to calculate EPCs and risks for three scenarios:

- Current scenario (baseline) assuming no scouring – use exposure depth intervals to calculate receptor-specific EPCs as illustrated in revised Figure 3-1 but assume no scouring at any of the AOCs including Bat Cave Wash (BCW). This approach will use current data from 0-0.5 ft bgs, 0-3 ft bgs, and 0-6 ft bgs (see attached Figure 3-1 Revised)..

- Scouring down to 2 ft bgs – use exposure depth intervals to calculate receptor-specific EPCs assuming the top 2 feet of soil will be scoured away (i.e., removed). This approach will use current data from 2-3 ft bgs as the new surface soil (0-1 ft bgs); the current data from 2-6 ft bgs as the new shallow soil (0-4 ft bgs); and the current data from 2-10 ft bgs (where available) as the new subsurface I soil (0-8 ft bgs) (see attached Figure 1).

- Scouring down to 5 ft bgs – use exposure depth intervals to calculate receptor-specific EPCs assuming the top 5 feet of soil will be scoured away (i.e., removed). This approach will use current data from 5-6 ft bgs as the new surface soil (0-1 ft bgs); the current data from 5-10 ft bgs (where available) as the new shallow soil (0-5ft bgs); and the current data from 5-15 ft bgs (where available) as representative of the new subsurface I soil (0-10 ft bgs) (see attached Figure 2).

New Specific Comment 6: HERD RESPONSE: HERD accepts the PG&E response.

New Specific Response 6: Acknowledged.

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*Original Specific Comment 7***:** *Page 6-30, Section 6.3.3.3.13, Bioaccumulation Factors. Bioaccumulation is a general term referring to accumulation of COPECs by ecological receptors from their environment. Bioconcentration is the accumulation of COPECs in receptor tissue greater than the environment and biomagnifications is in effect bioconcentration of COPECs at increasing tissue concentrations up the food chain through the trophic levels.*

Original Specific Response 7**:** Comment noted. PG&E agrees that bioaccumulation refers to accumulation of COPECs by ecological receptors from their environment. This is consistent with the definition provided in the RAWP. The text states "Bioaccumulation in animal tissue or uptake in plants is the process where COPECs in the surrounding media are accumulated within the tissues of ecological receptors, especially to concentrations higher than in the surrounding media." Bioaccumulation typically refers not just to uptake, but to uptake at a rate that outpaces the organism's ability to metabolize the chemical resulting in sequestering of the chemical in the organism's tissues. The U.S. Geological Survey (USGS) definition of bioaccumulation includes "The sequestering results in the organism having a higher concentration of the substance than the concentration in the organism's surrounding environment" (see http://toxics.usgs.gov/definitions/bioaccumulation.html).

The USGS also defines bioconcentration as uptake specifically from water into an organism (see http://toxics.usgs.gov/definitions/bioconcentration.html). Yet USEPA uses a similar definition of bioconcentration to that in the DTSC HERD comment above: the accumulation of a chemical in

tissues of a fish or other organism to levels greater than in the surrounding medium. This illustrates a common problem in ERA: definition of technical terms sometimes varies with the organization defining them. No changes to the RAWP are proposed.

New Specific Comment 7: HERD RESPONSE: HERD agrees that unfortunately different definitions of the term bioaccumulation exist However, the Human Health and Ecological risk Assessment Work Plan (HHERAWP) (the addendum is to be attached to this document) cites regulator guidance for preparation of the HHERAWP. The guidance cited is either from CALEPA or USEPA, the USGS is not included. It seems logical to follow the guidance chosen to direct writing the report rather than choosing a secondary source such as the USGS. That being said, HERD would prefer to put this issue to rest and does not require a further change to the report.

New Specific Response 7: PG&E concurs.

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*Original Specific Comment 8***:** *Page 2-16, Section 2.5.1, Uplands. The report states "The creosote bush and salt bush scrub plant communities comprise approximately 974 acres within the site." Please explain what 974 acres this sentence is referring to. In the introduction to the report on page 1-1, in the second paragraph the report states that "The compressor station occupies approximately 15 acres of a 65-acre parcel of PG&E-owned land." Also, please explain the statement that wildlife diversity is low because of "the incomplete wildlife corridor." The PG&E property is bounded by undeveloped land free of roads or railroads, to the west and the south. Also, the property is open to the Colorado River to the southeast. HERD does not recall from site visits the presence of salt bush communities (Atriplex polycarpa). Please describe where these are located on the property.*

Original Specific Response 8**:** For the first part of the comment regarding the creosote bush and salt bush scrub plant communities comprising of approximately 974 acres within the site, please see response to Specific Comment 2 above. The comment refers to information summarized from the Final PBA, documenting a previous investigation (CH2M HILL, 2007). For the second part of the comment regarding the wildlife diversity, please see the Draft RCRA Investigation/Remedial Investigation (RFI) Report (CH2M HILL, 2005). For the last part of the comment regarding presence of salt bush communities near the compressor station, please see response to Specific Comment 2 above. No changes to the RAWP are proposed in response to this comment; however, future ERA documents will be clear in specifying geographic areas.

New Specific Comment 8: HERD RESPONSE: HERD cannot find reference to the "incomplete wildlife corridor" in the PBA. Unless PG&E can provide the specific location within the PBA where this is cited and described, please remove the reference to the biological corridor from the paragraph.

New Specific Response 8: PG&E concurs with removing the reference to the "incomplete wildlife corridor" from the RAWP. The statement appeared in the approved revised final RFI/RI Volume 1 (CH2M HILL, 2007) but not the PBA.

Original Specific Comment 9: Page 6-2, Section 6, Ecological Risk Assessment Approach for Soil, second paragraph of page. Please see Specific Comment 17 below.

Original Specific Response 9**:** Please see response to Specific Comment 17 below.

New Specific Comment 9: HERD RESPONSE: HERD accepts the PG&E response.

New Specific Response 9: Acknowledged.

Original Specific Comment 10: Page 6-48, Section 6.3.5.1, Risk Estimation. The report states "The following standard HQ equation (USEPA [1997a)) will be used to estimate risks to wildlife:" HERD would like the section in the above EPA document where the equation below could be found identified in the report. HERD has previously commented that these equations are not correct (HERD memo to Tech Memo 3) and provided an appropriate calculation to use. The report needs to be revised to include the correct equation for calculating the Average Daily Dose (ADD). HERD will not accept the equations below as standard HQ equations.

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

$$\frac{(C_{soil} * SIR) + (C_{soil} * BAF * FIR) * SUF}{TRV * BW} = 1$$

The report identifies following inputs to the equations.
HQ = hazard quotient (unitless)
Dose = exposure dose (mg/kg bw-day)
TRV = Toxicity reference value (mg/kg bw-day)
C_{soil} = Concentration of constituent in soil (mg/kg soil)
SIR = Soil ingestion rate (kg soil/day)
C_{tissue} = Concentration of constituent in biota or tissue (mg/kg tissue)
FIR = Food or biota ingestion rate (kg tissue/day)
SUF = Site Use Factor
BW= Body weight of receptor (Kg)
BAF = Bioaccumulation factor or regression for media-to biota uptake (kg soil/kg tissue)

Original Specific Response 10**:** The general form of the equation above is correct as HERD concurred in the November 6 meeting. In addition, PG&E agrees that including "=1" in the equation above is a typographical error. Future ERA documents will eliminate that typographical error and present the HQ equation in a form that explicitly defines ADD and TRV without

simplification. Further, the ERA will include the total ADD in tables for transparency. No changes to the RAWP text are proposed in response to this comment.

New Specific Comment 10: HERD RESPONSE: HERD believes this matter has been adequately addressed by the PG&E response.

New Specific Response 10: Acknowledged.

Original Specific Comment 11: Page 6-49, Section 6.3.5.2, Risk Description and Lines of Evidence, Second bullet. Provide a clear statement of what is meant by "TRVs are thresholds with an interval that is an artifact of the dosing regime used in the toxicity study." HERD is specifically interested in an explanation of what is meant by 'artifact.' Also, please provide a literature reference for this statement.

Original Specific Response 11**:** Toxicity studies are conducted with a series of doses, but not all possible doses can be included in a study. Therefore, the no-observed adverse effect level (NOAEL) in a given study may be lower than the actual NOAEL if all possible doses could be included in the study. Similarly, the lowest observed adverse effect level (LOAEL) may be higher than the actual LOAEL if all possible doses could be included in the study. The text on page 6-49 is meant to highlight this uncertainty. No changes to the RAWP are proposed in response to this comment.

New Specific Comment 11: HERD RESPONSE: HERD accepts the PG&E response.

New Specific Response 11: Acknowledged.

Original Specific Comment 12: Page 6-49, Section 6.3.5.2, Risk Description and Lines of Evidence, third bullet. Referring to the statements "There is potential for adverse ecological effects for individuals with estimated exposures resulting in HQs greater than one based on the LOAEL or high TRV. However, the magnitude of such effects is uncertain. Therefore, risk managers should consider multiple lines of evidence, the level of conservatism and uncertainty in the assessment, and sensitivity of receptor populations when making risk management decisions." These statements fail to recognize that the range of the average daily dose between the TRV_{low} and the TRV_{high} possess potential hazard to ecological receptors, and therefore derived hazard quotients greater than one in the interval between the TRV_{low} and the TRV_{high} are subject to risk management decisions. It should not be considered that hazard quotients greater than one in the interval between the TRV_{low} and TRV_{high} pose no hazard and therefore should be considered 'safe.' DTSC guidance states "A chemical with a TRV-Low hazard quotient or hazard index greater than one and TRV-High less than one (i.e., the "gray area') suggests further site-specific information (e.g., to refine exposure and bioavailability assumptions) should be collected to reduce the uncertainty and obtain a more site-specific estimate of the potential for ecological risk."

The report also implies that further evaluation of other lines of evidence may be used to aid the risk manager in the event that a hazard quotient greater than one is found. Comparisons to other lines of evidence are not done in a Predictive Ecological Risk Assessment (PERA). TRV_{high} hazard quotients greater than one are considered to pose an unacceptable hazard to ecological receptors. DTSC guidance further specifies that "A TRV-High hazard quotient or index greater than one suggests unacceptable ecological risk, which can be confirmed or determined to be not applicable to the specific site by the validation study." Please see http://www.dtsc.ca.gov/AssessingRisk/eco.cfm.

Original Specific Response 12: On page 7 of the cited guidance the text states "In order to allocate resources in proportion to potential ecological threats, a phased approach is suggested, with progression to the subsequent phases dependent, in part, on the results of the preceding phase" and "As a general approach, an individual or population-level effect will generally be assumed to have ramifications at higher levels of ecological organization (e.g. at the community or ecosystem level) *unless there is evidence to the contrary*" (emphasis added). Further, on page 72 of the guidance, DTSC addresses the issue of uncertainty in extrapolating to higher levels of organization saying "Adverse biological effects on individuals are more important in evaluating the potential threat to rare, threatened or endangered species, where protection of individual organisms is critical to survival of the species. The extrapolation from demonstrated individual or population effects to community level or ecosystem level is a site-specific conclusion arrived at by a weight-of-evidence approach, and therefore no specific criteria can be presented which would cover all types of facilities or sites." In stating this, it appears that DTSC is acknowledging the utility of a weight-of-evidence approach in coping with the substantial uncertainty in the ERA process.

PG&E proposed a series of general interpretations for the risk estimates in the bulleted list on page 6-49. PG&E agrees that the range of the average daily dose between the TRV_{low} and the TRV_{high} may pose a hazard to ecological receptors, however, in our experience, *initial* risk estimates in this "gray area" are unlikely to result in significant risks to ecological receptors. This is because a series of conservative assumptions used in the initial risk estimates often result in an overestimate of risk, and because bioaccumulation factors obtained from the literature also typically result in an overestimate of risk that is revealed during a validation study. Therefore, initial estimates are often refined using spatially-weighted EPCs, or site-specific bioaccumulation factors calculated in a validation study. Refined ADD estimates often result in doses below the TRV_{low}. If (1) initial risk estimates are in the gray area, (2) the dose approaches the TRV_{low}, and (3) there is clear evidence that the risk estimates are very conservative, then it may be more appropriate to focus additional study on other COPECs which clearly pose a risk. PG&E will provide a transparent risk characterization in the Predictive ERA that interprets the risk estimates and facilitates agency review. PG&E suggests a meeting with the agencies to provide template risk tables and figures for agency review prior to the full implementation of the risk assessment. No changes to the RAWP are proposed in response to this comment.

New Specific Comment 12: HERD RESPONSE: Revise the third bullet to read: "Adverse effects are possible for individuals with estimated exposures resulting in HQs greater than one

based on the NOAEL or low TRV, but less than one based on the LOAEL or high TRV." The words 'but unlikely' have been removed from the sentence.

<u>New Specific Response 12:</u> It appears that HERD is requesting a revision to the second bullet on Page 6-49 of the RAWP. Our collective experience clearly indicates that Predictive ERA exposure estimates (i.e., ADDs) between the NOAEL and the LOAEL are unlikely to correspond to significant risks for local populations. Nevertheless, to move the project forward, PG&E agrees to the following language for the second bullet which removes the words "but unlikely":

- **Adverse effects are possible for individuals with estimated exposures resulting in HQs greater than one based on the NOAEL or low TRV, but less than one based on the LOAEL or high TRV. TRVs are thresholds with an interval that is an artifact of the dosing regimen used in the toxicity study. Therefore, the nature and magnitude of effects, if any, that may occur to individuals at exposures between these values is unknown. Further, the potential effect on survival, growth, and reproduction of the local population, the assessment endpoint of interest, is unknown. In accordance with DTSC guidance (EcoNote 4; Cal/EPA, 2000), supporting evidence for risk estimates in this "gray area" will be presented to the risk managers for decision regarding the implementation or scope of a validation study.**

Agreement was reached on the above language in an electronic mail message from Aaron Yue/DTSC to Yvonne Meeks/PG&E on Friday January 30, 2009.

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*<u>Original Specific Comment 13</u>**:** Page 6-49, Section 6.3.5.2, Risk Description and Lines of Evidence, paragraph following the bullets. The assumption that risk (hazard) estimates may be altered by redefining the exposure areas presumes that the regulatory agencies and resource trustees approve this action. Identification of hotspots by using Theissen polygons will need to be approved by the regulatory agencies prior to implementation. The presentation of the Theissen polygon method in Appendix A is not adequately described. A thorough description, along with literature references, will need to be supplied to HERD for review.*

The paragraph states "Other lines of evidence that may be considered, in addition to the risk estimates and spatial distribution of risks, include direct field observations (i.e., evidence of stressed vegetation) and literature-derived information on the bioavailability of specific metals." The Latin abbreviation i.e., represents 'that is.' Therefore, the sentence implicitly states that the conditions of plants in the field may be used as an aid in risk (hazard) estimates. This implies that a thorough understanding of edaphic factors influencing plant health are sufficiently understood or characterized at specific locations of the site. It also implies that you have knowledge of which COPECs are present and understand how these COPECs would influence the appearance of the plants. However, it would not be wise to assume that impacts to plants are necessarily of the same significance or greater significance to other ecological guilds. Lines of

evidence, such as literature-derived bioavailability studies would need to be verified in a validation study.

Original Specific Response 13**:** PG&E understands that changes to the exposure areas in order to refine risk estimates would best be accomplished through coordination with the regulatory agencies. Further, PG&E understands that identification of hotspots by using Thiessen polygons needs to be approved by the regulatory agencies prior to implementation. Toward that end, a thorough description of the Thiessen polygon spatial weighting technique, along with literature references, was provided to HERD as an attachment to the November 6 meeting notes.

With regard to the use of field observations, field observations are one line of evidence that may be used in interpreting risk estimates and those field observations may include observations of plant health/condition. PG&E agrees that it would not be wise to assume that impacts to plants are necessarily of the same significance or greater significance to other ecological guilds. Nor would it be wise to assume that the presence or absence of stressed vegetation is relevant without a thorough understanding of the nature and extent of contamination and the toxic effects on plants associated with those COPECs. No changes to the RAWP are proposed in response to this comment.

New Specific Comment 13: HERD RESPONSE: HERD accepts the PG&E response.

New Specific Response 13: Acknowledged.

Original Specific Comment 14: Page 7-4, Section 7.2.2, Exposure Pathways. HERD would agree that over the long term that surface water runoff to the Colorado River is not significant. However, the report should acknowledge that short term events from heavy thunderstorms can transport significant sediment loads, and therefore can potentially transport COPECs into the river during short time periods.

Original Specific Response 14**:** Comment noted. PG&E acknowledges that short-term heavy rainfall events can transport significant sediment loads. There is a potential for transport of COPECs to the river during these short time periods; however, transport of COPECs via this pathway is unconfirmed. PG&E is currently investigating sediment at the mouth of Bat Cave Wash to provide some additional basic information about the sediment concentrations near the river. Concentrations detected in sediment to date are low relative to protective ecological screening concentrations. The results of the Part A, Phase I Soil Investigation, including the sediment sampling results, will be discussed with the regulatory agencies in a series of meetings to define data gaps. No changes to the RAWP are proposed in response to this comment.

New Specific Comment 14: HERD RESPONSE: The sentence "Surface water runoff to the Colorado river is expected to be an insignificant transport pathway due to the infrequent nature of storm events and the short·term discharge of surface water runoff to the water column" tends to minimize the potential for sediment loads containing site-related COPECs during flood events associated with thunder storms. The report should also contain a statement

'Significant movement of sediment during storm events could potentially transport site-related COPECs to the Colorado River.'

New Specific Response 14: PG&E agrees to include the following language provided by DTSC in an electronic mail message from Aaron Yue/DTSC to Yvonne Meeks/PG&E on Friday January 30, 2009. "Although PG&E disagrees, DTSC postulates that significant movement of sediment during storm events could potentially transport site-related COPECs to the Colorado River."

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*Original Specific Comment 15***:** *Page 7-5, Section 7.2.2, Exposure Pathways, first line item. In regards to the continuous Criterion Concentration (CCC), the term 'unacceptable effect' should be replaced by 'deleterious effect.'*

Original Specific Response 15**:** While PG&E does not object to this text change, in the interest of the overall project schedule PG&E proposes to let the text stand as written.

New Specific Comment 15: HERD RESPONSE: Although the California Toxic Rule (http://www.epa.gov/fedrgstr/EPA-WATER/2000/May/Day-18/w111 06.pdQ) Defines the CCC using the term "deleterious" but the National Recommended Water Quality Criteria (http://www.epa.gov/watersciencelcriteria/wgctable/nrwgc-2006.pdf) uses the term "unacceptable." HERD therefore does not object to the terminology chosen for the addendum.

New Specific Response 15: PG&E concurs and offers the following corrected link to the "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" for the project record: http://www.epa.gov/fedrgstr/EPA-WATER/2000/May/Day-18/w11106.htm.

Original Specific Comment 16: Appendix A, page 2, paragraph at top of the page. Although the report indicates that it will consider both the gradient approach (potentially decreasing concentrations of COPECs down channel away from the contaminant source) and comparison of wetland sediment concentrations to ecological screening levels to determine if a pathway to ecological receptors is complete. HERDs position on this matter has not changed. If sediment concentrations are found in the wetland at the mouth of Bat cave Wash which exceed sediment screening concentrations, ambient or background sediment concentrations must also be determined. If background concentrations are exceeded then the pathway of COPECS from the site to the sediment to ecological receptors must be considered complete.

Original Specific Response 16**:** This comment was a topic at the November 6 RAWP technical planning meeting. PG&E and the agencies agreed that a conceptual site model (CSM) of contaminant transport (including site history and chemical use) would be developed using the historical soil and sediment data combined with the results of the Part A Phase I Soil Investigation. The CSM and the results of the agreed upon sediment screening would be

presented to the agencies at a scientific management decision point (SMDP) meeting. PG&E and agencies agreed that the language "gradient approach" appears to place too much emphasis on a single line of evidence. PG&E further agreed to provide data to the agencies in advance of the SMDP meeting to facilitate decision-making. In the interest of the overall project schedule, no changes to the RAWP are proposed in response to this comment.

New Specific Comment 16: HERD RESPONSE: HERD accepts the PG&E response.

New Specific Response 16: Acknowledged.

Original Specific Comment 17: Appendix A, Section 2. Exposure Area Definition. HERD has not agreed to the evaluation of large and small home range receptors differently in regard to the exposure areas. HERD has directed that each exposure area be evaluated as distinct Areas of Concern (AOC). HERD is not opposed to evaluating large home range receptors over multiple AOCs if the home range encompasses an area larger than the individual AOC and the intervening land between the AOCs. However, HERD does not agree with the Arcadis assumption that ecological receptors utilize all portions of the site equally. Therefore, HERD would like to also see large home range receptors evaluated for the individual AOCs as well as for multiple AOCs.

Original Specific Response 17**:** PG&E acknowledged on page 3-3 of the RAWP that ecological receptors tend to inhabit areas or at least forage in areas that provide for better habitat or better access to prey. Please see response to specific comment 5. No changes to the RAWP are proposed in response to this comment.

New Specific Comment 17: HERD RESPONSE: HERD accepts the PG&E response.

New Specific Response 17: Acknowledged.

Original References Cited:

CH2M HILL. 2006. Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A, PG&E Topock Compressor Station, Needles, California. November.

CH2M HILL. 2007. Final Programmatic Biological Assessment for Pacific Gas and Electric, PG&E Topock Compressor Station Remedial and Investigation Actions, Needles, California. January.

Eichelberger, James Michael. 2008. Telephone communication between Mike Eichelberger/DTSC HERD and Kim Walsh/ARCADIS regarding the minimum risks that would trigger spatial analysis of ecological risks. November 17.

New Reference Cited:

CH2M HILL, 2007. Revised Final RCRA Facility Investigation/Remedial Investigation, Volume 1—Site Background and History Report, Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California. Page 2-15.

Thank you again for submitting your comments on the RAWP Addendum. If you have any questions regarding this letter, please call me at (805) 234-2257.

Sincerely,

Yvonne Meeks
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cc: Pam Innis, DOI
Mike Eichelberger, DTSC
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