AEROJET

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02 August 2005

Mr. Charles Berrey
U.S. EPA (SFD-7-2)
75 Hawthorne Street
San Francisco, CA 94105

Mr. Alexander MacDonald
California Regional Water
Quality Control Board
Central Valley Region
11020 Sun Center Drive #200
Rancho Cordova, CA 95670-6114

Mr. Ed Cargile
National Priority List Unit
Northern California-Central Cleanup
Operations Branch
Site Mitigation Program
Department of Toxic Substances
Control
8800 Cal Center Drive, Suite 350
Sacramento, CA 95826-3200

Re: *Preliminary Response to Agency Comments, February 2005 Final Perimeter Groundwater Operable Unit Remedial Investigation/Feasibility Study*

Dear Mr. Berrey, Mr. MacDonald, and Mr. Cargile:

Attached please find the above-referenced document. This document provides Aerojet's preliminary, written response to the 14 April 2005 Agency comments on the PGOU RI/FS report and contains the elements listed below. (Note, they are provided and listed in the order appropriate for replacement in the original binders for the report.) Attached are the following:

-"Preliminary Response to Agency Comments, 15 February 2005 Perimeter Groundwater Operable Unit Remedial Investigation/Feasibility Study," including attachments providing specific responses to comments

-Part 1

- Figures 1-2, 1-3, 1-5A, 1-5B, 3-1, 7-7, 7-8
- Tables 1-2, 4-2, 6-1
- Appendix A text, Table A-2, Figures A-2, A-7 through A11
- Appendix B text, Table B-2, Figures B-2, B-4 through B-6
- Appendix C text, Table C-2, Figures C-2, C-4 through C-14
- Appendix D text, Table D-2, Figures D-2, D-4 through D-6
- Appendix F, Table F-1
- Appendix H text, Table H2-1
- Appendix I, Detailed cost estimates for Alternative Z1-3

-Part 2

- Figures 6-1A through 6-1D.

In addition to this submittal, Aerojet proposes to submit for Agency review and comment drafts of the risk assessment figures requested by the Agencies in General Comment 6. After submittal, Aerojet proposes to meet with the Agencies to discuss their comments on the figures and all remaining, outstanding issues regarding the PGOU RI/FS, including the evaluation of the impact of VOCs on groundwater and the adequacy of the existing sampling. Aerojet anticipates submittal of the risk

assessment figures within the next 30 days and will schedule a meeting/conference call after delivery of the figures.

As referenced in the attached document, Aerojet will revise Part 1, Appendix E and separately submit a PGOU Groundwater Baseline Risk Assessment that incorporates the revisions discussed herein. In addition, Aerojet will revise Part 2, Section 7 and separately submit a PGOU Lands Baseline Risk Assessment that incorporates the revisions discussed herein. Completion of the risk assessments is dependent upon completion of the vapor intrusion evaluation and Aerojet will work with the Agencies to establish the schedule for the submittal of these documents as it responds to the recently-received Agency comments on the *Field Sampling Plan for Validation of the Johnson & Ettinger Model*. After completion of the baseline risk assessments, Aerojet will revise and provide, as necessary an Executive Summary, Part 1 text, and Part 2 Section 9.0 (Feasibility Study). In addition, Aerojet will submit a technical memo regarding the detections of 1,3-butadiene in soil vapor at the Aerojet site.

Please contact me at (916) 355-2601 with any questions you have regarding this submittal.

Sincerely,

Cindy L. Caulk
Program Coordinator

Attachments

cc: Greg Stuesse, Weston
Robert Swartz, Sacramento Groundwater Authority
Leo Winternitz, Groundwater Forum
Tom Gray, Fair Oaks Water District
Paul Schubert, Southern California Water Service
Jean Young, Sacramento County Water Resources
Janis Heple, Community Advisory Group
Gordon Tornberg, City of Folsom
Bob Jelinek, EMSI
Marc Silva, CVEI
Bruce Lewis, ERM
Robbie Ettinger, GeoSyntec

PRELIMINARY RESPONSE TO AGENCY COMMENTS
15 FEBRUARY 2005
PERIMETER GROUNDWATER OPERABLE UNIT
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

General Comments:

1. Part 1, Vol. 1. The Agencies prefer the alternatives (Z1-3 Altered Figure 7-8, Z2-3, Z3-3 and Z4-3), which allow for additional mass removal via groundwater extraction from existing wells in combination with hydraulic containment of the plumes. Z1-3 Altered Figure 7-8 provides better overall containment. These alternatives allow for increased mass removal and the potential for reduced cleanup times for a reasonable cost increase. In addition these alternatives will provide some source control actions until comprehensive source control activities are implemented in the future.

   Response

   Aerojet notes the Agencies' preference for the alternatives that allow for additional mass removal in combination with hydraulic containment. Aerojet disagrees, however, that Alternatives Z1-3, Z2-3, Z3-3 and Z4-3 provide better overall containment. With the exception of the No Action Alternatives within each zone, all the alternatives provide equal containment within each zone.

2. Part 1, Vol. 1. It is the State's position that in order to comply with the Central Valley Regional Water Quality Control Board's Water Quality Control Plan (Basin Plan) for the Sacramento and San Joaquin River Basins, the remediation/containment goal for TCE should be 0.8 µg/L, the Public Health Goal established by the Office of Health Hazard Assessment of the State of California.

   Response

   We do not believe that the State's position is consistent with the standard for ARARs under CERCLA. We understand USEPA may not agree with the State's position.

3. Part 1, Vol. 2, Tables A-2, B-2, C-2 and D-2. These tables should be reviewed so that the layer designations for the wells are consistent with the layer assignments in the figures. Also wells which are screened across several layers are only assigned to one layer in tables.

   Response

   Comment noted. The tables and figures have been reviewed and updated tables are included with this response to comments document. Wells screened across more than one layer are identified on the well layer designation tables.

However, the data from these wells is not replicated in the data summary tables for each layer.

4. Part 1, Vol. 4, Appendix E and Part 2, Vol.3, Appendix K. CERCLA Baseline Risk Assessment must evaluate the no action alternative. A baseline risk assessment may consider a number of exposure scenarios but by definition must include an evaluation of the "no action alternative." From EPA's perspective, deed restrictions, paving and fencing are considered limited actions and should not be assumed under the no action alternative. The only actions that can properly be considered in establishing the "true" baseline risk during an RI/FS are those actions that have already been taken to reduce or eliminate contaminants as opposed to controlling or precluding potential exposure.

Response

The baseline risk assessment for groundwater, Part 1, Appendix E, of the February 2005, *Perimeter Groundwater Operable Unit Remedial Investigation/Feasibility Study* (PGOU RI/FS) includes an evaluation of the no action alternative, the hypothetical use of groundwater for drinking water. As discussed in the 26 May 2005 meeting, the PGOU baseline risk assessment for soils will be updated in accordance with this response to comments document and will include evaluation of the residential scenario for all exposure areas.

5. Part 1, Vol. 4, Appendix E and Part 2, Vol.3, Appendix K, (The reasonable maximum exposure versus the most realistic exposure.). To develop a conservative yet defensible estimate of upperbound risks, EPA requires analysis of the reasonable maximum exposure (RME) scenario. Usually this means to evaluate residential exposures at a site even if this is considered less likely than some other scenario (e.g. commercial land use). However, the baseline risk assessment should also consider alternative exposure scenarios which reflect a more realistic expectation of site development. These alternative scenarios are useful because they illustrate the benefits of maintaining existing institutional controls (or of proposing new controls).

Response

See response to General Comment 4 above.

6. Part 2, Vol. 3, Appendix K, (Suggested approach for conducting the PGOU Lands Baseline Risk Assessment.). A baseline risk assessment should be conducted that addresses all parcels of land that fall within the boundaries of the Perimeter Groundwater Operable Unit (PGOU) for the Aerojet site. The Agencies recommend that the document be entitled the "PGOU Lands Baseline Risk Assessment" as opposed to a soils risk assessment because both contaminated groundwater and soils could impact indoor air via the vapor intrusion pathway. The approach outlined below is also applicable to additional Aerojet OU's and will ultimately facilitate the

completion of a sitewide risk assessment for the Aerojet Superfund site. EPA recommends that the PGOU Lands Baseline Risk Assessment include the following:

Response

Aerojet agrees to provide a revised baseline risk assessment for the parcels of land that fall within the Perimeter Groundwater Operable Unit (PGOU) and will title it, *Perimeter Groundwater Operable Unit Lands Baseline Risk Assessment* (PGOU Lands BLRA). In addition, in response to the comments in this document and for consistency, Aerojet will update the PGOU groundwater baseline risk assessment and title it, *Perimeter Groundwater Operable Unit Groundwater Baseline Risk Assessment* (PGOU GW BLRA).

A. All relevant figures/tables that support a stand alone risk assessment document together in one (or at most two) binder (s). The reviewer should not have to go in search of a table or figure that supports the risk assessment estimates or conclusions. Figures are to be provided to present all locations where soil gas and soils data have been collected to date. This is important because Aerojet still has not made a compelling case that it has collected sufficient samples to support a risk assessment. For example, Area 49 (Figure 5-6) has numerous contaminant sources (chemical sumps, waste tanks, underground storage tanks) that do not appear to have been adequately sampled for purposes of conducting a risk assessment.

Response

Within the PGOU Lands BLRA, Aerojet agrees to provide all relevant figures/tables to support a stand alone risk assessment. These will include figures which present all locations where soil gas data and soils data have been collected to date.

It is unclear where sufficient samples have not been collected to support a risk assessment. Note, Figure 5-6 displays only the total VOC concentrations from shallow soil vapor sampling conducted in 2003. Other figures provided within the report show additional sampling conducted at the potential source areas. Aerojet proposes to conduct an Agency conference call/meeting to resolve this issue.

B. A 3-dimensional presentation of risk in figures that summarize potential risks associated with 1) direct contact with contaminants in surface and/or shallow soils; 2) indoor/outdoor air that is impacted locally at potential source sites; and 3) indoor air that may be affected as the result of the groundwater-to-indoor air pathway. Presenting data in this manner should minimize any confusion regarding what portions of the Aerojet property need further evaluation, remediation and/or institutional controls.

Response

Aerojet agrees to provide figures that summarize potential risks within the PGOU Lands BLRA. In addition, Aerojet will provide draft figures for Agency review and comment prior to incorporation into the final report.

C. Soils direct contact risks in source areas should be presented in text and figures for all source sites that fail the initial screening. EPA recommends that exposure assumptions match those of the EPA Region 9 Preliminary Remediation Goals ("PRGs") for residents and long-term workers. Also construction and/or trench workers should be evaluated wherever appropriate.

Response

The risks from source area soils through direct contact was evaluated in the text and tables using the USEPA Region IX PRG exposure assumptions for residents and long-term workers within Part 2, Section 7, the Human Health Baseline Risk Assessment. As noted previously in response to General Comment 4, the residential scenario will be included for all exposure areas in the PGOU Lands BLRA. In addition the PGOU Lands BLRA will include figures presenting the soil direct contact risk in the source areas.

D. Indoor/Outdoor air risks in source areas should be presented in text and figures whenever a potential source area fails the initial screening. Residents and office workers are the appropriate receptors to evaluate for indoor air risks. Generally soil gas data should be used for this risk estimation. However, flux chamber data may provide additional useful information when estimating outdoor air risks.

Response

The risks from source area soils through migration of soil vapor into indoor air and/or outdoor air was evaluated in the text and tables within Part 2, Section 7, Human Health Baseline Risk Assessment. As noted previously in response to General Comment 4, the residential scenario will be added to all exposure areas in the PGOU Lands BLRA. In addition, the PGOU Lands BLRA will include figures presenting the inhalation risks in the source areas. Soil gas data (rather than flux data) will be used to estimate the indoor and outdoor risks.

E. Indoor air risks predicted from contaminated groundwater should be presented in figures. Risk contours based on the groundwater-to-indoor air pathway should be generated for the shallow-most layer of groundwater across the PGOU. This approach will provide a much-needed graphical display of where within the PGOU boundary; a vapor intrusion pathway would be predicted to exceed acceptable criteria. Risk contours can be derived for VOCs in shallow groundwater by summing the ratios of measured chemical concentrations in each groundwater well to the corresponding risk-based screening levels for the same chemicals. For more

information on how to do this, please see the description in the Region 9 PRG Table Users' Guide (Section 3.3).

Response

The PGOU Lands BLRA will include figures presenting the risk from the groundwater-to-indoor air pathway in accordance with the Region IX PRG Table Users' Guide.

F. If any source area investigation is not complete, identify the source area/s along with an estimated date for completion clearly indicated in text and figures (e.g., landfill). The risk assessment cannot be considered final until all source areas within the PGOU boundary are addressed so it is best to view the risk assessment as a "living document" that is updated and refined as new information becomes available.

Response

All source area investigations required for completion of a RI/FS have been completed and documented within Part 2 of the PGOU RI/FS with the exception of the landfill. The source area investigation completed for the landfill was documented in the May 2005, *Aerojet Landfill Site RI/FS Workplan.* The source area investigations for Area 39 were delayed, in accordance with USEPA's request, for inclusion in the boundary operable unit RI/FS.

G. A summary of all soil investigations to date that have taken place within the PGOU boundary, including an assessment of data quality for risk assessment. All data that meets appropriate quality control standards should be included in the risk assessment, not just the most recent data.

Response

Sections 4 and 5 of the PGOU RI/FS summarized the soil investigation to date within the PGOU boundary. As presented later in response to Specific Comment 70, an "Evaluation of Analytical Methods" section will be added to the PGOU Lands BLRA to discuss the adequacy of the detection limits and analytical methods.

H. Actual modeling runs using the Johnson and Ettinger ("J&E") Vapor Intrusion Model. There are discrepancies in some of the input parameters the authors state that they are using (e.g., which water filled porosity was used? Aerojet's responses to Agency comments of February 23, 2005, states the water filled porosity to be 0.15, Table C-1 indicates it is 0.24 and Table B-1 indicates it is 0.3 cm^3/cm^3). Table 8 claims the modeling runs are included in Appendix B and C but this appears not to be the case. Please also provide representative boring logs that support the assumption that the most permeable soil type (i.e., the coarsest and/or driest soils) is loamy sand which was assumed in the modeling runs for the Aerojet site.

Response

Modeling runs for the evaluation of VOC migration from groundwater to indoor air were provided as Attachments B and C to Appendix E, rather than Appendices B and C as referenced in Table 8. USEPA and/or DTSC default values for water filled porosity were used for modeling, .15 for soils and .3 for groundwater. Representative boring logs supporting the assumption that loamy sand represented the most permeable soil type at the Aerojet site were previously provided to the Agencies in March 2000 to support modeling performed and approved on the candidate carveout lands.

However, as you are aware, due to the Agency comments received on the evaluation of vapor intrusion conducted on the Aerojet site to date, on 27 June 2005 Aerojet submitted the *Field Sampling Plan for Validation of the Johnson and Ettinger Model* (J&E model) to provide for site specific validation. Aerojet will update the PGOU baseline risk assessments for groundwater and soils based on the results of this validation. Additional modeling performed with the J&E model will use a consistent set of parameters and will be approved by the Agencies prior to implementation.

I. Provide site-specific validation of the J&E model assumptions/attenuation factors that are proposed for the site. Validating the model for specific site use is recommended in EPA's Draft Vapor Intrusion Guidance (2002) when conducting a site-specific Tier 3 assessment. The Agencies disagree with Aerojet that an attenuation factor of 1/2000 is "conservative" because Aerojet has not demonstrated this to be the case. California State's vapor intrusion guidance recommends an attenuation factor of 1/500, which is 4 times more conservative than Aerojet's proposed attenuation factor.

Response

See earlier response to Comment 6 above. Note, California's vapor intrusion guidance recommends an attenuation factor of 1/500 for evaluation of existing residential slab-on-grade and crawl-space construction. For risk evaluation of future residential slab-on-grade and crawl-space construction, the guidance recommends an attenuation factor of 1/1100.

J. A discussion of all risks above 10^{-6} excess lifetime cancer risk. A cancer risk of 10^{-6} is EPA's point of departure, not 10^{-5}. Please note too that an interim action level has been set at 10^{-6} for TCE (based on the California slope factor) at another Superfund site in Northern California, and it would be inconsistent to set an "acceptable level" 10 times higher at the Aerojet site.

Response

Aerojet agrees to discuss all risks above 10^{-6} excess lifetime cancer risk within the PGOU Lands BLRA. Aerojet is unable to respond to the reference of an interim action level set at another Superfund site in Northern California as it is unaware of the specific circumstances. Aerojet does not necessarily agree that it would be "inconsistent."

K. Figures that are understandable. All figures should contain an information key that defines all symbols included in the figure. The reader should not be forced to refer to additional figures to understand the symbols in a given figure. Also the figures should be legible. For example, the highest soil gas concentrations in Figure 4-19 are hidden by other details on the map.

Response

Aerojet agrees to provide figures within the PGOU Lands BLRA that are understandable and with an information key that defines all the symbols. Figure 4-19 will be revised to correct the soil gas concentrations hidden by other details on the map.

L. Consistent designations for source areas throughout text, tables, and figures to facilitate cross-referencing are required.

Response

Aerojet agrees to provide consistent designations throughout the PGOU Lands BLRA.

7. Part 1, Vol. 4, Appendix E and Part 2, Vol.3, Appendix K, 1,3-butadiene. Butadiene is a known human carcinogen that has apparently been measured in soil gas throughout the PGOU lands area. Aerojet should confirm that butadiene is in fact present in soil gas by reviewing the GC/MS data packages. The RI falls short of its objective if it is unable to determine the nature and extent of this compound. Groundwater should also include an analysis for butadiene.

Response

As stated by USEPA in its 1 June 200 email, there is no USEPA-approved analytical method for 1,3-butadiene in groundwater and accordingly Aerojet has not analyzed groundwater within PGOU for 1,3-butadiene. In addition, review of historical data indicates that Aerojet has used products made with 1,3-butadiene and hexachlorobutadiene, but has not engaged in the production of 1,3-butadiene or hexachlorobutadiene.

By separate submittal, Aerojet will provide information on 1,3-butadiene and the results of the soil vapor investigation it has conducted to evaluate the presence of 1,3-butadiene in the soil vapor at the Aerojet site and within the PGOU lands.

8. Part 1, Vol. 4, Appendix E and Part 2, Vol.3, Appendix K. The RAGS Part D Planning Table formats generally should not be altered (i.e., Columns should not be added, deleted, or changed.); however, rows and footnotes should be added as appropriate. Standardization of the Tables is needed to achieve Superfund program-wide reporting consistency. Please follow the instructions provided in RAGS Part D for filling out all RAGS D tables. Revise the RAGS D tables in accordance with the instructions provided in RAGS Part D.

Response

As discussed during the 26 May 2005 meeting, the RAGS D tables provided in the Final PGOU RI/FS report had been modified in response to agency comments received on prior drafts of the report (to present the tables in a format usable for the Record of Decision document). In accordance with the agreement on 26 May 2005, no changes will be made to the RAGS D tables in response to this comment.

9. Part 1, Vol. 4, Appendix E and Part 2, Vol.3, Appendix K. In the uncertainty sections, please discuss the risk results for TCE using the EPA NCEA slope factor.

Response

Aerojet agrees to discuss the risk results for TCE using the USEPA NCEA slope factor in the PGOU baseline risk assessments.

10. Part 1, Vol. 4, Appendix E and Part 2, Vol.3, Appendix K. In the uncertainty analysis, please discuss the uncertainties in the indoor air modeling and the fact that soil gas data were collected in wide-open spaces. For solid building floors in contact with the soil (e.g., concrete slabs), the soil gas directly beneath the floor may be considerably higher than that adjacent to the structure. This is typically due to a vapor pooling effect underneath the near impermeable floor.

Response

The uncertainty sections of the PGOU baseline risk assessments will include a discussion regarding the indoor air modeling and collection of soil gas data in wide-open spaces.

11. Part 2, Vol. 3, Appendix K. In the soil sites risk assessment, residential risks should be calculated for all exposure zones as part of the "no action" alternative.

Response

See earlier response to General Comment 4.

12. Part 1, Vol. 4, Appendix E and Part 2, Vol.3, Appendix K, Risk Tables. A number of the risk calculation tables (e.g., Part 1 - Table 13.1) present columns that are formatted inconsistently. Columns in risk tables should list values with two significant digits, except for the final risk estimate, which should be rounded to one significant digit per Risk Assessment Guidance for Superfund (RAGS Part A, 1989).

Response

The tables provided in the PGOU baseline risk assessments will be revised in accordance with this comment.

13. Part 1, Vol. 4, Appendix E, page ES-2, Executive Summary, first paragraph. It is stated that all inorganic compounds potentially associated with rocket fuels were selected as COPCs. These compounds include nitrate, perchlorate, and NDMA. Based on this statement, it appears that metals, others than those listed above, were not evaluated in the baseline risk assessment ("BLRA"). Other metals should be considered for quantitative evaluation in the BLRA if their concentrations exceed applicable screening values. It's not a baseline risk assessment if these are just excluded. The BLRA needs to present overall risk from all COPCs. This same comment was made to the September 2003 draft PGOU BLRA.

Response

As stated in the 27 June 2004 *Response to Agency Comments on the Draft Perimeter Groundwater Operable Unit Remedial Baseline Risk Assessment* (Comment 8), metals were screened against USEPA Region 9 Tap Water PRGs in the revised report. However, the executive summary was inadvertently overlooked and not updated to reflect this change. The executive summary will be updated in the revised PGOU GW Baseline Risk Assessment.

14. Part 1, Vol. 4, Appendix E, page ES-2, Executive Summary, second paragraph. The text states that there is no known current use of groundwater for residential supply from unmonitored or untreated wells either at or beyond the property boundary within the PGOU. It is requested that a footnote be added to Figure 2 indicating that active drinking water wells located within PGOU Zones 1 through 4 (and at the boundary of these zones) are either monitored or treated.

Response

Part 1, Vol. 4. Appendix E, Figure 2 duplicates Figure 1-5 in Part 1, Vol. 1. Figure 1-5 has been updated and divided into two figures, 1-5A and 1-5B which are included with this response to comments document. The PGOU GW BLRA

will include the updated figures. Note, not all active drinking water wells located within PGOU Zones 1 through 4 (and at the boundary of these zones) are monitored or treated. Therefore, a footnote was not added.

15. Part 1, Vol. 4, Appendix E, page ES-2, Executive Summary, last paragraph. The text states that the hypothetical use of untreated groundwater for residential water supply may result in unacceptable levels of risk. With calculated risk levels in excess of 1E-04 and hazard indices in the thousands, please state that the hypothetical use of untreated groundwater for residential water supply would result in unacceptable levels of risk and noncancer effects.

Response

The text will be clarified to note that the estimated cancer risk and the calculated hazard index associated with the hypothetical use of untreated groundwater for residential water supply exceed USEPA's definitions of acceptable risk/hazard. However, because the true cancer risks and noncancer hazards are unknown, Aerojet does not agree that it is correct to definitively state that "the hypothetical use of untreated groundwater for residential water supply would result in unacceptable levels of risk and noncancer effects."

More specifically, the cancer risk estimates derived in the HRA represent upper bound *estimates* of the true risk (*Risk Assessment Guidance for Superfund/Volume 1: Human Health Evaluation Manual*, EPA/540/1-89/002, December 1989). As the USEPA guidance explains, "[t]his means that [US]EPA is reasonably confident that the 'true risk' will not exceed the risk estimate derived through use of this model [i.e., the linear low-dose risk equation used to calculate cancer risk in the HRA] and is likely to be less than that predicted." (Page 8-6).

Similarly, USEPA states that "[w]hen the hazard index exceeds unity, there *may* [emphasis added] be concern for potential health effects." (Page 8-13). While USEPA notes that "[a]s a rule, the greater the value of E/RfD [i.e., the ratio of the exposure level or intake and the reference dose] above unity, the greater the concern" (Page 8-11), USEPA also notes that "it is important to emphasize that the level of concern does not increase linearly as the RfD is approached or exceeded because RfDs do not have equal accuracy or precision and are not based on the same severity of toxic effects." (Page 8-11).

16. Part 1, Vol. 4, Appendix E, page ES-2, Executive Summary, last paragraph, second bullet. The text states that the inclusion of all COPCs detected, regardless of whether the COPCs were found in the same well or in the same general area is a conservative assumption made to ensure that risks were not underestimated. If a chemical is selected as a COPC, then it should always be included in the BLRA. Please clarify and rephrase this sentence.

Response

The Executive Summary of the PGOU GW BLRA will be clarified as requested.

17. Part 1, Vol. 5, Appendix H. It appears that the program MODFLWT was used in the groundwater modeling. Sections H2.1, H3.1, H4.1, and H5.1 need to reflect in the text the actual program used in the modeling.

Response

Sections H2.1, H3.1, H4.1 and H5.5 have been updated to reflect the program used in the modeling and is provided in the Revised Appendix H, text included with this response to comments document. MODFLWT was used for the groundwater modeling in Zones 1, 2, and 3. Modflow96 was used for the modeling in Zone 4.

18. Part 1, Vol. 5, Appendix H. The modeling analysis does not include any uncertainty analysis. The modeling analysis needs to incorporate an uncertainty analysis to address a safety factor in the design of the containment systems. The concern is that the systems will fail to provide adequate containment if an uncertainty analysis is not taken into account when designing the extraction systems. The uncertainty analysis at a minimum should take into consideration factors such as hydraulic conductivity, and storage values.

Response

The groundwater modeling in Appendix H was intended for comparison of the remedial alternatives in the Feasibility Study (FS), but does not constitute remedial design. The magnitude of the uncertainty in the modeling should be within the tolerances specified for the FS (i.e., +50/–30 percent). Safety factors will be incorporated into modeling conducted for the remedial design.

19. Part 1, Vol. 5, Appendix J, Comment 1 Response. The report must include an Executive Summary with supporting figures.

Response

Once the RI/FS for the PGOU is complete, Aerojet is willing to provide an executive summer, if necessary.

20. Part 1, Vol. 5, Appendix J, Comment 11 Response. Using USGS topographic maps is acceptable for showing the extent of dredged areas, except when a topographic map use does not show the dredged areas (e.g., Figure A-2). It is suggested that an older edition of the Carmichael Quad be used to update Figure A-2. Figures A-2, B-2, C-2 and D-2 should include a legend which shows the pattern used to illustrate dredge areas.

Response

Since the area is now residential, an older edition of the Carmichael Quad would not be accurate today.

Figures A-2, B-2, C-2, and D-2 have been updated to include a legend and are included with this response to comments document.

21. Part 1, Vol. 5, Appendix J, Comment 16 Response. To address the original comment, additional information needs to be provided, preferably in a table which addresses the historical mass removal and pumping rates of the systems and individual extractions wells. The table should summarize pumping rates, concentrations and mass removal rates on an annual basis for each well. This data will be used to evaluate the performance of individual extraction wells.

Response

A discussion and supporting information regarding historical pumping rates and mass removal from groundwater extraction wells associated with GET D, ARGET, GET B, and GET A are provided as an Attachment to this response to comments document.

22. Part 1, Vol. 5, Appendix J, Comment 17 and 18 Responses. Aerojet may not have fully addressed the intent of the original comments but the data provided in the report is the minimum required to address source area concerns. Source areas will also be address in details in future studies. Aerojet needs to acknowledge that there are continuing sources of groundwater contamination that will not be addressed by the PGOU.

Response

As the Perimeter Groundwater Operable Unit addresses only a portion of the Aerojet Superfund site, Aerojet acknowledges that there are likely continuing sources of groundwater contamination on the Aerojet Superfund site that will not be addressed by the PGOU but will be addressed by the source area operable unit remedial investigation/feasibility studies.

23. Part 1, Vol. 5, Appendix J, Comment 19. The response is acceptable. The text and figure captions should describe how the maps were created. If the maps were created from individual points then the points should be located on the map with the values contoured.

Response

The maps were created using the "grid math" feature in SURFER. Individual points were not used and therefore are not shown on the figures. Additional explanation will be added to the revised text of the Part 1 PGOU RI/FS report, submitted later for Agency approval.

24. Part 1, Vol. 5, Appendix J, Specific Comment 71 Response. It is stated that hexavalent chromium has no MCL and is regulated under the total chromium MCL of 0.05 mg/L. This is true; however, other health risk values should be evaluated in order to determine that the 0.05 mg/L is protective of human health at this site.

Response

To demonstrate that the total chromium MCL is protective of human health at this site, the risk associated with a hexavalent chromium concentration of 0.05 mg/L were calculated. Using the exposure assumptions from Appendix E of the PGOU RI/FS, ERM calculated hazard quotients of 0.46 and 1 for adult and child resident, respectively. A table presenting the calculation of risk is attached to this response to comments document.

Specific Comments:

1. Part 1, Vol. 1, Page 4, Section 1.2.1, second paragraph. It should be stated that part of the agreement by the Agencies to remove Area 40 from the PGOU was that additional investigation and potential interim response actions are being contemplated by Aerojet in the near future.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

2. Part 1, Vol. 1, Page 7, Section 1.2.2.3, paragraph 3. What aggregate mining is conducted northeast of the SVRA? We know of aggregate mining northwest and west of the SVRA.

Response

Aerojet was referring to future mining planned by Teichert northeast of the SVRA. The revised text of Part 1 of the PGOU RI/FS report will be updated to remove this reference.

3. Part 1, Vol. 1, Page 8, Section 1.2.2.4, first bullet. Arden-Cordova Water Service is owned by Southern California Water Company and still exists as a water purveyor in the area.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

4. Part 1, Vol. 1, Page 8, Section 1.2.2.4, paragraph 4. Clarke Cattle Company uses groundwater for stock watering at Well 1028 and Well 1029 are currently used for dust control and process water at a trucking/asphalt recycling firm.

Response

Table 1-2 has been updated with this information and is included with this response to comments document. The revised text of Part 1 of the PGOU RI/FS report will be updated with this information.

5. Part 1, Vol. 1, Page 9, Section 1.2.2.4, paragraph 4. How could well 1874 be used for irrigation purposes without treatment? It is in the middle of the Aerojet plume.

Response

Well 1874 is not currently in use. The property owner suggested that he may be interested in using the well for irrigation purposes in the future. This well is included in the Exhibit IV monitoring plan.

6. Part 1, Vol. 1, Page 10, Section 1.2.2.5, paragraph 5. Alder Creek now receives drainage from an urban portion of the City of Folsom.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

7. Part 1, Vol. 1, Page 104, Section 1.2.2.5, paragraph 6. GET A infiltrates in Rebel Hill Ditch in Zone 4.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

8. Part 1, Vol. 1, Page 12, Section 1.2.3, last paragraph. Delete this paragraph. There is no evidence for sources of COCs within the PGOU for activities other than Aerojet operations presented in the RI/FS.

Response

Aerojet does not agree and it has not conducted an exhaustive record review to determine that there are no sources other than the Aerojet Superfund site for COCs within the PGOU boundary.

9. Part 1, Vol.1, page 13, Section 1.2.4, first paragraph. The text implies Aerojet has been treating perchlorate since the mid-1980's which is not correct. It would be better to add "are currently" in front of "designed" in the first sentence.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

10. Part 1, Vol. 1, page 20, Section 1.3.3, second paragraph. Groundwater in the eastern part of the PGOU is only in part to the west. Modify the text to state there is significant flow to the north and south in the eastern portion of PGOU.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

11. Part 1, Vol. 1, Page 21, Section 1.3.4.1, paragraph 2. There should be a figure depicting the extent of contamination in Layer B.

Response

A figure depicting the extent of contamination in Layer B was not included because Layer B is absent or unsaturated over most of the Zone 1 PGOU and chemicals were not detected in the few wells that are screened in Layer B.

12. Part 1, Vol. 1, Page 25, Chart. How is volatilization a destructive effect? If anything, it is the transfer of the VOC from one medium to another.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

13. Part 1, Vol.1, Page 27, Section 1.4.2, second paragraph. The text states that the results of the potential risk from VOC migration into indoor air under current use conditions were within the USEPA risk range. What about potential future use of the property?

Response

Based on the calculations provided in Appendix E of the PGOU RI/FS, both under current and future use conditions, the potential risks from VOC migration into indoor air were within the USEPA range. As you are aware, on 27 June 2005 Aerojet submitted the *Field Sampling Plan for Validation of the Johnson and Ettinger Model* to provide for site specific validation of the J&E model. Aerojet will update the PGOU GW and Lands BLRAs based on the results of this validation.

14. Part 1, Vol. 1, Page 27, Section 1.4.3., first paragraph. The text states that Alder Creek is the only "surface water feature that support ecological receptors that could be affected by this discharge." What is the discharge? The discovery of pollutants in Alder Creek will necessitated an action of some sort as Alder Creek, by being tributary to the American River, is a source of drinking water that needs to be protected (besides the ecological aspects).

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

15. Part 1, Vol. 1, Page 28, Section 2.1, second paragraph. The paragraph states that the future use of groundwater both at and beyond the property boundary is restricted. There is some existing use of groundwater that is not being restricted – private wells at residences and industrial supply. Restrictions would likely be placed on future uses of groundwater within the PGOU. Also, the paragraph states that there is no current use of untreated groundwater for residential supply. That is not the case as Wells 1298 and 1864 are currently being used by residents for domestic supply.

Response

The text states, "There is no known current use of groundwater for residential supply from unmonitored or untreated wells either at the property boundary or beyond the property boundary within the PGOU." This statement is true as written. Well 1298 is not currently in use and Well 1864 is monitored by Aerojet.

16. Part 1, Vol. 1, Page 29, Section 2.1, third bullet. Remove the caveat "to the extent practicable" at the end of the sentence.

Response

The RAO of "Restore groundwater within the PGOU to beneficial uses, to the extent technically practicable" was identified by the Agencies in their comments on the PGOU RI/FS Work Plan. The revised text of Part 1 of the PGOU RI/FS

report will be revised such that the phrase "to the extent technically practicable" has been removed from the RAO identified by the Agencies.

17. Part 1, Vol. 1, Page 44, Section 2.5.9. Not only would senior and environmental rights along the American River between Nimbus Reservoir and the point of discharge need to be evaluated, but the environmental consequences of such a discharge/extraction process would also need to be evaluated for that stretch of the river which would be receive any reduced flow.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

18. Part 1, Vol. 1, Section 2.5.9, Stream flow Augmentation, first paragraph. The discharge to the American River would not require a "water right permit." However, the withdrawal of the discharge water may require such a permit, as stated in the second paragraph. In addition, a proposed discharge to the American River will be required to proceed through the NPDES permitting process.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

19. Part 1, Vol.1, Section 2.5.9, Groundwater Recharge. This section should discuss the discharge of treated groundwater back into the aquifer and not just the affects of the pumping for remediation purposes on the long-term yield of the basin.

Response

Historically, treated groundwater has been recharged back into the aquifer, with Agency consent and oversight. However, in most instances, Aerojet has been required to re-extract and re-treat the recharged groundwater because regulatory limits for perchlorate were reduced. Due to the potential for this to occur again, recharge of treated groundwater is not considered a viable option for treated groundwater disposition. Accordingly, the document has not been modified at this time.

20. Part 1, Vol. 1, page 47 to 57, Section 3. A discussion of the mass removal and pumping rates from existing and past extraction wells should be provided. This information is necessary to evaluate the effectiveness and significance of the existing GETs.

Response

See earlier response to General Comment 21.

21. Part 1, Vol. 1, page 51, Section 3.2. There are no existing interim action remedial systems within the boundaries of Zone 2. Please update the text.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

22. Part 1, Vol.1, page 53, Section 3.3.2, last sentence. Appendix G for GET B lists N-nitrosodimethylamine ("NDMA") effluent readings above 0.012 (e.g., highest reading on 4/03 of 0.0210 ug/L).

Response

Comment noted.

23. Part 1, Vol. 1, page 54, Section 3.3.3, fourth paragraph. Additional monitoring wells need to be installed until the downgradient extent of COCs in Zone 3 has been determined.

Response

Aerojet agrees and accordingly to date has installed three multiple completion monitor wells in Zone 3.

24. Part 1, Vol. 1, page 54, Section 3.3.3 first and second sentences. Is extraction actually occurring in layers A and F? The RI/FS clearly indicates that containment has not been achieved for GET B.

Response

The first sentence in Section 3.3.3 states that the GET B system was designed to provide hydraulic containment, while the second sentence merely indicates to the reader that areas where data suggest that hydraulic containment may not be sufficient are addressed in Section 3.3.3. The first sentence will be revised to indicate that the GET B system was designed to provide hydraulic containment only in Layers B, C, D, E and F (i.e., it was not designed to provide hydraulic containment in Layer A) and will be provided in the revised text of Part 1 of the PGOU RI/FS report.

There are no extraction wells in Layer A because Layer A is dry at and beyond the Aerojet property boundaries in Zone 3. There are two GET B extraction wells located near Gate 8 that are screened in Layer F.

25. Part 1, Vol. 1, page 61, Sections 4.3.1.2 and 4.3.1.3, Alternative Z1-2 and Z1-3. The Agencies are concerned that the proposed Alternatives Z1-2 and Z1-3 extractions system will not provide adequate hydraulic containment in Layers C and D to prevent downgradient migration of COCs. The alternatives depend on a single high capacity pumping well placed at the leading edge of relatively wide plumes. In the past several wells systems were installed to control the leading edge of the plumes. These systems were not successful in preventing the downgradient migration of COCs and the plumes are a potential threat to Fair Oaks water supply wells. The leading edge of the TCE plume in Layer C and D has bifurcated into separate northern and southern lobes probably caused by a combination of pumping and migration along several preferred pathways.

A review of the model used to design the proposed containment system indicates that capture zone of the proposed containment system barely incorporates the limits of the plume. The proposed design also does not account for uncertainties in the design parameters such as hydraulic conductivity, spatial variability in aquifer parameters, and definition of plume boundaries and location of extraction wells which can significantly influence vertical and horizontal extent of containment. Capture zones are particularly sensitive to hydraulic conductivities assigned in the model. Model simulations were conducted assuming a 25% and 50% increase in hydraulic conductivities in Layer C. A variation of up 10 times the assigned hydraulic conductivities is a reasonable range to expect within the Zone 1 groundwater flow system therefore a change of 50% in hydraulic conductivities is not an unreasonable assumption. Capture zones in the simulation using hydraulic conductivities increased by 25% and 50% did not provide adequate containment of the plume. With the hydraulic conductivities increased by 25% and 50%, model simulations were also run using a two extraction well system located at the leading edge of the plume. In each of these model runs the plume was adequately contained without increasing the total extraction rate. There is also a concern that the proposed pumping rates cannot be achieved or sustained in the proposed well locations for the long term, as none of the existing wells have achieved pumping rates greater than 300 gpm. The use of at least two extraction wells at the leading edge of the plume enables a lower extraction rate from each well. In general a two extraction well system located at the leading edge of the plume provides containment under a wider range and combinations of pumping rates, and hydraulic conditions.

The Agencies prefer a containment design with at least two additional extraction wells in Layer C and D at the ending edge of the plumes similar to the system depicted in Figures 7-7 and 7-8. The preferred design provides flexibility and additional capacity for long-term hydraulic containment. The two-well configuration also provides a safety factor in the case model parameters deviate from those used in designing the system. Alternatives Z1-2 (Figure 7-7) and Z1-3 (Figure 7-8) need to

replace Alternative Z1-2 (Figure 4-1) and Z1-3 (Figure 4-2) as the Zone 1 RI/FS 2 listed alternatives.

Response

Aerojet notes the Agencies' preference for the containment with additional mass removal alternatives for Zone 1 that incorporates a two-well extraction system located at the leading edge of the plume and the concern that capture zones are sensitive to hydraulic conductivities assigned in the model. It should be noted that the purpose for which the modeling simulations were conducted was to develop alternatives that could be evaluated and compared in the FS. FS level cost estimates (i.e., +50%/-30% level accuracy) were prepared based on the simulation results and, again, were used as a criterion for evaluation and comparison of alternatives. The purpose of the model simulations was not to design a hydraulic containment system. After the Agencies have selected a remedial alternative, additional modeling will be conducted during the remedial design stage for the purpose of specifying the design criteria (e.g. well location, screened interval[s], depth, diameter and flowrate) for the groundwater extraction system associated with the selected alternative.

Aerojet also notes that the American River Groundwater Extraction and Treatment System (ARGET) was installed as an interim system and the extraction wells were installed at the furthest downgradient locations for which access could be obtained. The locations of the wells were installed after obtaining Agency approval and with the full acknowledgement that chemicals had been detected slightly beyond the anticipated capture system. The effectiveness of the existing containment system at ARGET was included within the Zone 1 evaluation and accordingly the PGOU RI/FS has evaluated the installation of additional extraction wells.

26. Part 1, Vol. 1, page 63, Section 4.3.1.3 first paragraph, third sentence. Provide data to support the selection of extractions wells 4035, 4220 and 4320 as the most appropriate mass removal wells to retain among all the existing GET D extraction wells.

Response

As shown in the Attachment provided in response to General Comment 21, extraction Wells 4035, 4220, and 4320 are the current GET D wells that provide the highest rate of mass removal over the past 10 years for TCE, perchlorate, and 1,4-dioxane given the concentrations of contaminants measured in samples from the wells and their respective pumping rates. Also, it should be noted that extraction Wells 4035, 4220, and 4320 were those instructed by the Agencies to be included in the "additional mass removal" alternative for Zone 1 in their Specific Comment 52 on the February 19, 2004 draft of the PGOU FS.

27. Part 1, Vol. 1, pages 63 last paragraph and 64 second paragraph, Section 4.3.1.3. The extracted groundwater for the proposed new extraction wells Z1-C2 and D2 is anticipated to contain perchlorate and the American River ("AR") Groundwater Extraction and Treatment ("GET") system needs to be sized to treat perchlorate from these wells. The discharge from Z1-C2 and D2 should not be added to separate perchlorate free pipe line but needs to be either added to the existing 20 inch main if it has adequate capacity or be collected in a separate pipe line for conveyance to AR GET.

Response

To address the comment, because it is estimated that groundwater from proposed Wells Z1-C2 and Z1-D2 will contain perchlorate, flow from these two wells will require pretreatment via ion exchange at the ARGET treatment facility along with flow from the GET D extraction, converted GET D recharge, and Fish Hatchery wells. Flow from the GET D extraction, converted GET D recharge, and Fish Hatchery wells is estimated to be approximately 1,460 gpm and would be routed to the ARGET facility via the existing 10-inch secondary-contained pipeline. Since this flow rate would approach the efficient carrying capacity of the existing 10-inch secondary-contained pipeline, a new separate 8-inch diameter pipeline would be required to convey the estimated 500 gpm of groundwater flow from proposed wells Z1-C2 and Z1-D2 to the ARGET facility. Flow from the existing 10-inch secondary-contained pipeline and new separate 8-inch diameter pipeline would be combined at the ARGET facility prior to ion exchange pretreatment. A revised Table 4-2 (Alternative Z1-3 Extraction Well Design and Chemistry Data) and detailed cost estimates, revised to address this comment, are included with this response to comments document. Revised estimated costs for Alternative Z1-3 are as follows.

Estimated capital costs:	**$2,390,000**
Estimated annual monitoring costs:	**$201,000**
Estimated annual O&M costs:	**$1,020,000**
Estimated 30-year present worth costs:	**$17,600,000**
Non-discounted constant dollar costs:	**$160,484,000**

28. Part 1, Vol. 1, page 68, second bullet. There needs to be a discussion of the difficulties of implementing ion exchange at GET B and the high operation and maintenance cost to operate the system.

Response

The influent groundwater to the GET B treatment system contains dissolved iron and manganese. Somewhere within the GET B treatment train prior to the ion exchange contactors, air is introduced such that iron and manganese oxides are formed. The majority of these oxides are removed in the influent bag filters.

However, a small fraction of the oxides is not removed by the bag filters and collects within the ion exchange media (which acts as a filter media), causing a significant increase in differential pressure across the contactors. Since the ion exchange media is not designed to serve as a filter media (i.e., frequently backwashed when differential pressure across the filter media reaches a predetermined level) and is not backwashed, the increase in differential pressure caused by the iron and manganese oxides requires change-out of the ion exchange media at a frequency that is cost-prohibitive.

Aerojet maintains ion exchange treatment processes at four other groundwater treatment facilities where this phenomenon does not occur. It is Aerojet's opinion that the condition described in the previous paragraph is isolated at GET B and should not be encountered under normal groundwater conditions.

29. Part 1, Vol. 1, page 80, Section 5.1.6, top of page. The "cleanup times" assume that there are no ongoing sources of COCs to groundwater. The text needs to clearly state that the cleanup times are represented for comparison purposes only and represent minimum cleanup times neglecting continuing contribution form upgradient sources and that until the sources are controlled or removed the cleanup times may be significantly longer than projected in this RI/FS.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment to state that the cleanup times are represented for comparison purposes only.

30. Part 1, Vol. 1, page 89, Section 5.2.2.5, fourth paragraph. Revise the text to indicate that the existing AR GET and GET D do not fully prevent further downgradient migration of COCs.

Response

Comment noted. The revised text of Part 1 of the PGOU RI/FS report will be updated in response to this comment.

31. Part 1, Vol. 1, page 92, Section 5.2.3.7. The Non-discounted constant dollar cost is listed as $142,000,000 and $147,000,000. Appendix I lists the figure as $142,000,000. The text needs to be consistent.

Response

The text on Page 92 is consistent with the detailed cost estimates presented n Appendix I. The non-discounted constant dollar cost estimate of $142,000,000 is associated with Alternative Z1-3. The non-discounted constant dollar cost estimate of $147,000,000 is associated with Alternative Z1-3 <u>if groundwater from</u>

proposed extraction wells located north of the American River were treated at a location adjacent to Well 1047.

32. Part 1, Vol. 1, Figure 1-2. The Western Groundwater Operable Unit boundary needs to be expanded.

Response

Figure 1-2 has been revised to address the comment and a revised figure is included with this response to comments document.

33. Part 1, Vol. 1, Figure 1-3. American River GET extraction wells 1156 and 4580 are not shown.

Response

Figure 1-3 has been revised to address the comment and a revised figure is included with this response to comments document.

34. Part 1, Vol. 1, Figure 1-5. This figure needs to be divided into two figures. The first figure should show all private (potable and irrigation) and purveyor water supply wells that are known to be in operation or need further investigation to determine they are not in use. The second figure should show destroyed water supply wells, water supply wells assumed destroyed based on field investigation, and water supply wells converted to monitoring wells and no longer used as water supply wells. Table 1-2 lists water supply wells 100, 1025, 1100, 1015, 1016, 2065, 1039, 1821, 1099, 1835, 2069, 2067, 1098, 1366, and 1198 not shown on Figure 1-5. Table 1-2 lists 26 wells abandoned which does not match the number shown on Figure1-5. The symbols should also be modified to identify wells which have been destroyed, were not located, and are used for irrigation purposes only. In the legend, it is believed that "Water Supply Well" refers to public water supply wells, and "Domestic Well" refers to private water supply wells. Please clarify what is meant by these terms and change the legend. For example, if appropriate, change "Water Supply Well" to "Public Supply Well". In addition, Figure 1-5 (as well as Table 1-2) does not include Well 1864 that supplies a residence on Cupp Lane. Well 1045, mentioned in the risk assessment section are not depicted on the figure.

Response

These comments have been noted and Table 1-2 and Figure 1-5 have been updated, as described below and included in this response to comments document. In addition, the text to Appendices A, B, C and D has been updated with the applicable information and included with this response to comments document.

As requested, Figure 1-5 has been divided into two figures: Figure 1-5A and Figure 1-5B. Figure 1-5A, titled "Active Municipal, Industrial, and Domestic Water Supply Well Locations," shows all domestic (potable and irrigation) and non-domestic (municipal/purveyor and industrial) water supply wells that are known to be in operation or need further investigation to determine they are not in use. Figure 1-5B, titled "Abandoned or Destroyed Water Supply Well Locations," presents destroyed water supply wells, water supply wells assumed destroyed based on field investigation, and abandoned wells (wells not used for a minimum of two years). Wells that are abandoned or destroyed but could not be located, are not included on Figure 1-5B because they could not be posted accurately on the figure.

Table 1-2 does not include water supply Wells 100, 1025, 1100, 1015, 1016, 2065, 1039, 1821, 1099, 1835, 2069, 2067, 1098, 1366, or 1198. These wells are included in the Western Groundwater Operable Unit (WGOU) well survey table, and located within a one-mile radius of the WGOU. Accordingly, these wells are not shown on Figures 1-5A or 1-5B. The area of overlap between WGOU and PGOU has been added to Figures 1-5A and 1-5B for clarification. Also, Table 1-2 does not list 26 wells as abandoned; this number may have also come from the WGOU well survey.

Well 1864 has been added to Table 1-2 and Figure 1-5A. Well 1045 has also been added to Figure 1-5A.

The symbols and terminology in the legends on Figures 1-5A and 1-5B, and Table 1-2 have also been revised. Domestic water supply wells are wells that are used for household purposes including irrigation and/or drinking water. These wells are indicated with a black triangle. All other wells are considered non-domestic, and include municipal water supply wells and industrial water supply wells. Non-domestic water supply wells are indicated with a black diamond. Destroyed wells are defined as wells that have been properly destroyed as defined by the California Well Standards Bulletin 74-90, California Department of Water Resources (DWR), June 1991. The location of a destroyed well is indicated by an X with a dashed outline. Table 1-2 and Figure 1-5A and 1-5B have been revised and proofed to follow these definitions.

The tables and figures have been proofed. There are several wells listed in Table 1-2 that do not appear on the figures because the locations are unknown. In addition, Table 1-2 has been updated to include either which figure the well is shown on, or if the well is not on a figure.

35. Part 1, Vol.1, Figure 1-9. This figure depicts the maximum extent of contamination in Layer C. A similar figure should be presented for Layer B.

Response

No chemicals were reported in the few Layer B wells located in Zone 1, hence no

composite maximum extent of contamination map was prepared for Layer B.

36. Part 1, Vol. 1, Figures 1-13 through 1-17. These figures should depict the plume coming from Area 40 onto the Aerojet property and the plumes underlying, and downgradient from, the former White Rock Road North Dump.

Response

Figure 1-13 through 1-17 were prepared to depict the areas of contamination that are within the PGOU. The plume coming from Area 40 will be addressed as part of a separate Operable Unit, and the plumes underlying, and downgradient from, the former White Rock Road North Dump are not being addressed pursuant to the Partial Consent Decre but rather pursuant to the RWQCB Cleanup and Abatement Order 96-150.

37. Part 1, Vol. 1, Figure 3-1. American River GET extraction well 4580 is not shown.

Response

Figure 3-1 has been revised to address this comment and a revised figure is included with this response to comments document.

38. Part 1. Vol. 1, Figure 7-7. This figure does not show extraction well 4580 listed on Table 7-1.

Response

Figure 7-7 has been revised to address this comment and a revised figure is included with this response to comments document.

39. Part 1, Vol. 1, Figure 7-8. This figure title should be Alternative Z1-3 not Z1-2 and extraction well 4580 listed on Table 7-2 is not shown.

Response

Figure 7-8 has been revised to address the comment and a revised figure is included with this response to comments document.

40. Part 1, Vol. 1, Table 6-1. For Alternatives Z3-2 and Z3-3 the existing extraction wells include the White Rock N. Dump extraction wells and should be changed from 6 to 1 and 12 to 7 respectively. Check the Z3-3 and Z4-3 mass removal well listing of 6 vs. 7 and 3 vs. 5 is correct.

Response

Table 6-1 has been revised to address the comment and a revised table is included with this response to comments document.

41. Part 1, Vol. 2, Appendix A, page 11, second paragraph, and Figures A-4, A-5 and A-6. Cross-sections A-A', B-B' and C-C' need to be updated and revised.

Response

Cross-sections A-A', B-B', and C-C' (Figures A-4, A-5, and A-6) were prepared in 1992 for the *GET D Effectiveness Evaluation Report.* Cross-sections D-D', F-F', G-G', and I-I' were constructed to replace the 1992 cross-sections and show the most-recent interpretation of the hydrostratigraphy.

42. Part 1, Vol. 2, Appendix A, page 17, Section A2.3. Document how the head differences were calculated. For example, were head differences calculated at well clusters derived from map data or were they calculated by some other method?

Response

See earlier response to General Comment 23.

43. Part 1, Vol. 2, Appendix A, Page 21, Section A3.2.1, fourth paragraph. Declining concentrations of TCE in well 1475 show that the current GET D extraction system is reducing concentrations migrating off the Aerojet property. It is proposed to discontinue much of the operation of the GET D extraction field. Doing so would lead to higher concentrations of pollutants repopulating the area downgradient of the GET D extraction field. Containment using the GET D system appears to be a prudent choice.

Response

Comment noted. The majority of groundwater containment upgradient of Well 1475 is likely due to extraction Well 4035 pumping approximately 130 gallons per minute (gpm). This extraction well is included in potential remedial alternative Z1-3. The cumulative pumping rate for the remaining GET D extraction wells sidegradient and upgradient of Well 1475 is approximately 100 gpm.

44. Part 1, Vol. 2, Appendix A, Page 21, Section A3.2.1, fourth paragraph. Declining concentrations of TCE in well 1475 show that the current GET D extraction system is reducing concentrations migrating off the Aerojet property. It is proposed to discontinue much of the operation of the GET D extraction field. Doing so would lead to higher concentrations of pollutants repopulating the area downgradient of the

GET D extraction field. Containment using the GET D system appears to be a prudent choice.

Response

This comment duplicates Comment 43 above.

45. Part 1 Vol. 2, Appendix A, Page 26, Section A3.3.4, fourth sentence. Change 230 g/L to 230 ug/L.

Response

Appendix A has been revised to address the comment and a revised Appendix A text is included with this response to comments document.

46. Part 1, Vol. 2, Appendix A, Page 29, Section A3.5.1. In the past, several hundred micrograms per liter TCE were found in samples collected from wells screened in Layer F (Wells 1394 and 1402). Currently low concentrations of TCE are found in samples from those wells. The data would indicate that the high concentrations have migrated past these wells and moved further west. The containment of the plume in Layer F needs to consider and evaluate that contamination has moved further to the west.

Response

The well construction, stratigraphy, and historical TCE data for Wells 1394 and 1402 were reviewed to address this comment. Both wells are screened in a relatively low-permeability plastic clay that contains quartz sand. This lithology suggests that the hydraulic conductivity and groundwater velocity near these wells should be relatively low. However, the elevated TCE concentrations noted in this comment increased and declined over relatively short periods suggesting that either a small "pulse" of TCE migrated to or beyond these wells, or that the analytical data may be suspect. For example, TCE was detected at 0.52 µg/L in November 1991 in Well 1402, but was reported at 117 µg/L two months later in January 1992. The TCE concentration had declined to 4 µg/L by February 1993, 13 months later. Similar trends were observed for TCE in Well 1394.

Regardless of the questions raised by the TCE concentration trends, it appears that groundwater monitored by these wells is hydraulically captured by downgradient Layer E Extraction Well 4585. The elevation of the screened interval for Well 4585 ranges from -131 to -201 foot mean sea level (ft. msl). The elevations of the screened intervals for Wells 1394 and 1402 range from -77.9 to -187.9 ft. msl and from -193.2 to -204.2 ft. msl, respectively. Therefore, the screened elevation of Extraction Well 4585 overlaps the entire screened elevation of Well 1394 and most of the screened interval of Well 1402.

47. Part 1, Vol. 2, Appendix A, Page 29, A3.5.2. This section includes a discussion on concentrations of Butyl benzyl sulfonamide in Layer F (also found in Layers D and E) south of the American River. This pollutant needs to be taken into account when designing the treatment system and performing the risk assessment for Zone 1.

Response

Analytical results for influent samples to the GET D and ARGET treatment facilities indicate that N-Butyl benzene sulfonamide is not present. Therefore, treatment to specifically remove this SVOC has not been included in the Zone 1 alternatives.

As stated in the groundwater risk assessment, no slope factors or surrogates were identified for 1-methyl-2-pyrrolidinone or N-butylbenzenesulfonamide. In addition, the agencies could not suggest a surrogate for those compounds during the 26 May 2005 meeting. Therefore, the risk associated with these two compounds will not be quantitatively assessed. However, 1-methyl-2-pyrrolidinone and N-butylbenzenesulfonamide will be discussed in the uncertainty section.

48. Part 1, Vol. 2, Appendix A, Figure A-2. Add the dredge tailings pattern to the legend. Since the revised topographic maps (Carmichael, Citrus Hill?) do not include the dredge pattern, an older edition of these topographic maps is needed to complete the figure of the spatial extent of dredged areas.

Response

The dredge tailings pattern has been added to the legend in Figure A-2. The older topographic map of the Carmichael area is no longer accurate because most of the area is now residential.

49. Part 1, Vol. 2, Appendix A, Figures A-4 through A-11. Add a note that states the time period the chemical data represents. For example, most recent sample and/or data collected 2004.

Response

Figures A-4 through A-11, B-4 through B-5, C-4 through C-14, and D-4 through D-6 have been revised to include the representative time period of the posted data. The revised figures have been included with this response to comments document.

50. Part 1, Vol.2, Appendix B, Section B1.1.5, first paragraph. The first sentence states that none of the water supply wells within 1 mile of Zone 2 of the PGOU are in use. It is our understanding that Wells 1028 and 1029 are in use. There are several wells just past the one-mile boundary that are used for domestic and industrial purposes.

Response

Comment noted. See earlier response to Specific Comment 34. Wells 1028 and 1029 have been confirmed as being in use. Table 1-2 and Figure 1-5A have been revised to reflect this information and are included in this response to comments document. There are several active wells located within one mile of the PGOU boundary.

51. Part 1, Vol. 2, Appendix B, Figures B-4 and B-5. The cross section should reflect the latest interpretations of hydrostratigraphy. The explanation needs to indicate the sampling period for the chemical data.

Response

The hydrostratigraphy shown on Figures B-4 and B-5 is based on the current hydrostratigraphic interpretation. A note has been added to Figures B-4 and B-5 to indicate the time period for the data posted. The revised figures have been included with this response to comments document.

52. Part 1, Vol. 2, Appendix B, Figure B-6. The contour line values appear to be mislabeled between 100 and 160 feet.

Response

Figure B-6 has been revised and is included with this response to comments document.

53. Part 1, Vol. 2, Figure C-45. The extent of perchlorate in Layer B is not defined south of well 1544.

Response

Layer B is dry in the area south of Well 1544.

54. Part 1, Vol. 2, Figure C-46. The extent of TCE south of Well OS-5C is not defined in Layer C.

Response

This area is part of the White Rock North Dump (WRND) and is not included in the PGOU. Chemical iso-concentration contours were included in this area to present an overall picture of chemical concentrations to the west of the Zone 3 PGOU. Remedial investigation and cleanup for the WRND is addressed separately under Aerojet's actions pursuant to the Regional Board CAO 96-150.

55. Part 1, Vol. 2, Figures C-46 through C-57. These figures indicate that there will be additional monitor wells constructed in Layers C, D, E and F. When will those wells be constructed?

Response

Aerojet began the installation of the additional monitor wells in June 2005.

56. Part 1, Vol. 3, Appendix D, Page 20, Section D3.3, first paragraph. The text discusses the idea that an additional monitor well is planned downgradient in Layer B to help define the plume. A proposed location for the monitor well should be provided.

Response

The text mistakenly refers to the new monitoring well recently installed on Iron Point. No additional monitoring wells within Zone 4 are planned at this time.

57. Part 1, Vol. 3, Appendix D, Page 20, Section D3.5, paragraph 3. The detected concentrations of perchlorate and NDMA in Alder Creek would indicate that there is some groundwater discharging into the surface water pf Alder Creek

Response

Comment noted. It is agreed that some groundwater is probably discharging to Alder Creek, primarily downgradient of the GET A extraction well field.

58. Part 1, Vol. 3, Appendix D, Figures. Where is the figure depicting TCE concentrations in Layer B? TCE has not been sampled for in the Layer B wells since 1995. Additional sampling needs to be performed.

Response

TCE was not detected in Layer B wells during the RI Sampling Period; therefore, a figure was not included in the report. Aerojet agrees to conduct supplemental VOC sampling of the following Layer B Wells: 89, 454, 455, 456, 464, 465, 3379, or 3396.

59. Part 1, Vol. 4, Appendix E. This appendix should be labeled a human health risk assessment.

Response

Appendix E is the Baseline Risk Assessment, which includes both the Human Health Risk Assessment and the Screening Level Ecological Risk Assessment. As stated earlier, Aerojet will submit a PGOU GW BLRA that will include the human health and ecological risk assessment.

60. Part 1, Vol. 3, Appendix D, Figures D-28 and D-29. These figures depict perchlorate and NDMA just south of US50. Given the elevated concentrations of those pollutants in the well south of US50 and the groundwater gradient, it is likely that those pollutants are found on the north side of US50. This needs to be taken into account when designing the remedy for Zone 4.

Response

So noted.

61. Part 1, Vol. 4, Appendix E, Page 1-2, Section 1.1.1.1 and Figure 2. Well 1864 is missing from the figure and is an active water supply well. The boundaries of the PGOU in Zone 1 are different than those depicted on other figures showing Zone 1 (as an example, See Figure A-1). Under the other depictions, Well 2066 in the WGOU. Wells 1045 and 1874, mentioned in Section 1.1.1.1 are not shown on Figure 2. Figure 2 should be identical to Figure 1-5 in Volume 1.

Response

See earlier response to Comment 34.

62. Part 1, Vol. 4, Appendix E, page 1-2, Section 1.1.1, third paragraph and Figure 2. The text states that groundwater on site is not used for any purpose. Figure 2 depicts drinking water wells (e.g., 1028, 1054, etc.) located within the Aerojet property boundary. Figure 2 is titled "Public and Private Water Supply Well Locations". If someone were to look at this figure without reading the report, it would be assumed that active drinking water wells are located on-site. Divide Figure 2 into two figures (see above comment for Part 1, Vol. 1, Figure 1-5).

Judging from Figure 2, there appear to be numerous wells that are currently being used in the PGOU area. Are these wells contaminated? If they are contaminated, current risks should be estimated for these potential receptors. In the legend, using the terms water supply well and domestic well are confusing because they sound the same. In the legend, it is believed that "Water Supply Well" refers to public water supply wells, and "Domestic Well" refers to private water supply wells. Please clarify what is meant by these terms and change the legend. For example, if appropriate, change "Water Supply Well" to "Public Supply Well".

The symbol θ (see well 926 as an example) is not defined in the legend. Please define all symbols used on the map. Part of the one-mile radius is dash. What does the dash designate? Please define it in the legend.

Aerojet's property boundary is not clearly depicted on Figure 2 and needs to be added.

Several wells identified on Table 1 could not be found on Figure 2. These wells included 1861, 1929, 1930, and 1933. Please add these wells to the figure. Several wells on Table 1 did not have an Aerojet Well ID Number. Are these wells depicted on Figure 2? Please assign these wells an ID number and depict them on Figure 2.

Response

See earlier response to Specific Comment 34. The updated Table 1-2 and Figures 1-5A and 1-5B will also be provided in the updated PGOU GW BLRA. In addition, the specific wells noted in the comment above are addressed as follows: Well 1028 is currently used for stock watering. Well 1054 is not in use (Table 1-2). There are no active drinking water wells located onsite. The PGOU boundary is depicted on Figure 1-5A and 1-5B. Well 1861 is a boring and not actually a well; this location is not posted on either Figure. Wells 1929, 1930, and 1933 are posted on Figure 1-5A.

Not all wells identified have been assigned Aerojet Well ID Numbers; wells that were not located were not given a number. The wells that were not located and do not have an Aerojet Well ID Number are not posted on either figure.

63. Part 1, Vol. 4, Appendix E, page 1-3, Section 1.1.1, second paragraph, last sentence. The text states that the well survey identified municipal and domestic water supply wells within 1 mile of the PGOU boundaries. However, in the Figure 2 legend, the terms water supply well and domestic well have been used. The terms used in the text should match the figure as discussed above. The term "water supply well" can be associated with both private domestic or municipal wells. As a result, the location of municipal wells cannot be discerned on Figure 2. Please clarify these terms in Figure 2 and make changes so that the well use designation is clear.

Response

See earlier response to Comment 34 above.

64. Part 1, Vol. 4, Appendix E, Page 1-3, Section 1.1.1, first paragraph. It should be stated that the Consultation Zone restricts the additional use of groundwater off-site. It does not restrict the existing uses of groundwater.

Response

The PGOU BLRA will be updated to reflect this comment.

65. Part 1, Vol. 4, Appendix E, page 1-3 Section 1.1.1.1, first paragraph. This section states that no domestic wells were identified within the boundaries of Zone 2 PGOU, Zone 3 PGOU, and Zone 4 PGOU. However, well 1059 is located in PGOU Zone 3.

According to Table 1, this well is currently in use for irrigation. Well 1159 appears to be right on the border of Zone 3. There also appears to be a private drinking water well that is active. Wells that are located right on the border should be added to the discussions in Section 1.1.1.1. Please review Table 1 and Figure 2 and make corrections to the text presented in Section 1.1.1.1.

Response

See earlier response to Specific Comments 34 and 62. The PGOU GW BLRA will be updated to state "there is no known current use of groundwater for residential supply from unmonitored or untreated wells either at the property boundary or beyond the property boundary within the PGOU."

66. Part 1, Vol. 4, Appendix E, page 1-3, Section 1.1.1.1, second paragraph, and page 1-4, Section 1.1.1.2, second paragraph. In these sections when discussing wells located within the PGOU boundary and within 1 mile of the PGOU boundary, indicate that you are only referring to active wells, and not those that have been abandoned or are not in use.

    Section 1.1.1.1, second paragraph also states that four domestic wells (1024, 1045, 1064, and 1874) not previously monitored under an Aerojet program were identified within Zone 1 PGOU. Please add that Well 1154 is also located within Zone 1. This well is used for irrigation. Why is well 1045 called out in this group? Table 1 indicates that this well was not found in the field in 2004 and was not in use in 1992. However, the text indicates that Well 1045 is located in the California State University – Sacramento Aquatic Center building near Lake Natoma. Please verify the description of Well 1045 in Table 1. Well 1874 is not listed in Table 1. Please add this well to Table 1.

    Response

    See earlier response to Specific Comments 34, 62 and 65 above. In response to the specific wells commented on above: Well 1064 is abandoned (hasn't been used for at least two years with no intention of future use), and the business is on municipal water. Well 1874 has been added to Table 1-2. This well is not currently in use, and will be monitored pursuant to the Exhibit IV monitoring program. Well 1154 is monitored pursuant to Exhibit IV. The status of Well 1045 has been revised to active on the updated Table 1-2.

67. Part 1, Vol. 4, Appendix E, page 1-4, Section 1.1.1.2. This section states that no municipal water supply wells not monitored under an Aerojet program were identified within 1 mile of the PGOU boundary. As stated in Comment 7, the location of municipal wells cannot be discerned on Figure 2. Aerojet needs to discuss the location of all municipal wells (including those that are monitored) that are located within 1-mile of the PGOU boundary.

In the second paragraph of Section 1.1.1.2, second sentence the text discusses four domestic wells (1893, 1929, 1930, and 1933) located north of the American River and near the northern edge of the 1-mile boundary line for Zone 1 PGOU (Figure 2). These wells could not be found on Figure 2. Add these wells to Figure 2.

In the second paragraph of Section 1.1.1.2., fifth sentence the text indicates that Well 1871 is located within 1 mile of the PGOU boundary. However, this well could not be found on Figure 2 and is not presented in Table 1. Please make the necessary corrections.

It appears that drinking water wells 1289, 1299, 1816, 1864, 1368, and 1159 are also located within 1 mile of the PGOU boundary. Well 1368 is located on the one-mile border and should be added to the discussions. Except for Well 1159, add these wells to the discussions in Section 1.1.1.2. Well 1159 should be discussed as being associated with Zone 3 because it is located right on the border.

Wells 1864, 1298, and 1299 need to be included with wells 1031, 1301 and 1917 as wells in use in the vicinity of Zone 3.

It appears that not all of the wells located within 1 mile of the PGOU boundary and depicted on Figure 2 are described in Table 1 (e.g., Well 1047). Table 1 and Table 2 need to review and revised.

Response

See earlier responses to Specific Comments 34, 52, 65 and 66. In response to specific comments from above, Well 1871 has been added to Figure 1-5A and Table 1-2. Well 1289 has been destroyed. Well 1298 has not been used for more than two years, however, is available for use if needed (future use is intended). Wells 1299, 1816, 1864, 1368, and 1159 are used for irrigation and/or drinking water. Well 1368 is located upgradient of the Aerojet Site. The text to the PGOU GW BLRA will be updated to reflect the information provided in the revised table and figures.

68. Part 1, Vol. 4, Appendix E, page 2-2, Section 2.1. This section should be titled "Data Evaluation". Selection of COPCs is one component of the data evaluation step.

Response

The PGOU GW BLRA with be revised in accordance with this comment.

69. Part 1, Vol. 4, Appendix E, page 2-2, Section 2.1.1. This section states that the date range of January 2000 through June 2004 is consistent with the timeframe for the data collection activities presented in the RIs (Appendices A through D). Is this the rationale for including this data in the HRA? Additional rationale should be provided including:

A. Evaluate data from different time periods to determine if concentrations are similar or if changes have occurred between sampling periods. If the concentrations between sampling periods are similar, then the data may be combined for the purposes of quantitative risk assessment (See RAGS A, Section 5.1).

B. If the methods used to analyze samples from different time periods are similar in terms of the types of analyses conducted and the QA/QC procedures followed, then the data may be combined for the purposes of quantitative risk assessment (See RAGS A, Section 5.1).

Response

The water quality data evaluated for the RI was collected between January 2002 and June 2004 (timeframe referred to as RI Sampling Period). As discussed in the RI, the majority of the water quality data was collected based on the Annual Aerojet Site-wide Groundwater Monitoring Plan. Additional sampling for SVOCs, metals, and other compounds was performed based on recommendations in the Agency-approved PGOU RI/FS Work Plan. The types of analyses conducted and the QA/QC procedures for the samples were consistent throughout the RI Sampling Period. In addition, the concentrations were also similar throughout the RI Sampling Period.

The additional rationale for data used in the evaluation, as discussed above, will be included within the PGOU GW BLRA.

70. Part 1, Vol. 4, Appendix E, page 2-2, Section 2.1.1, first paragraph last sentence. Per the text samples were analyzed in accordance with the analytical methods and detection limits identified in the sitewide Quality Assurance Project Plan and as proposed in the USEPA-approved workplan (EMSI et al., 2002). It is assumed that samples collected in 2002 through 2004 were sampled according to the 2002 QAPP. What analytical methods and detection limits were used for data collected in 2000 and 2001? Because the risk assessment should be a stand alone document, the analytical methods used for all sampling data included in the HRA should be summarized in the document. Include in the HRA a section titled "Evaluation of Analytical Methods" in which the adequacy of detection limits and analytical methods are discussed. An evaluation and determination as to whether the analytical methods used to measure concentrations of contaminants in groundwater provided adequate data should be included in the HRA.

Response

The samples collected in 2000 and 2001 were analyzed in accordance with the analytical methods and detection limits presented within the sitewide Quality Assurance Project Plans (17 August 1999, 13 May 2000 and 31 May 2001). As suggested by the commenter, an "Evaluation of Analytical Methods" section will

be added to the PGOU GW BLRA to discuss the adequacy of the detection limits and analytical methods.

71. Part 1, Vol. 4, Appendix E, page 2-2, Section 2.1.1, second paragraph. The HRA needs to include an evaluation of detection limits associated with analytical data used in the BLRA. Were the reporting limits associated with the data adequate for risk assessment? A quantitation limit is considered adequate when it is at or below the levels of concern (i.e., EPA Region 9 PRGs for Tap Water). Did you use quantitation limits or method detection limits when non-detect data were used at half the reporting limit? You should use the quantitation limit.

    Sample results were validated in accordance with the Aerojet Quality Assurance Project Plan (Aerojet, 2002). What procedures were used to validate the 2000 and 2001 data if the QAPP is data 2002? Provide a discussion in the HRA regarding data validation results for the analytical data used in the HRA and whether or not QA/QC parameters were acceptable and whether data quality objectives were achieved.

    Response

    Appendix E utilized the maximum detected concentrations for analysis. Text discussions involving the reporting limit refer to the practical quantitation limit. As discussed in the previous response to Specific Comment 70, the detection limits will be assessed in an "Evaluation of Analytical Methods" section, which will be added to the PGOU GW BLRA.

72. Part 1, Vol. 4, Appendix E, page 2-7, third paragraph, first sentence. Section 2.1.2 states that all positively detected constituents (with the exception of TICs) at concentrations greater than their respective risk-based screening levels were selected as COPCs for evaluation in this HRA, regardless of their frequency of detection. This statement conflicts with the statement made in the executive summary in which it was stated that all inorganic compounds potentially associated with rocket fuels were selected as COPCs. These compounds include nitrate, perchlorate, and NDMA. Please revise the statement made in the executive summary so that it agrees with the statement made in Section 2.1.2.

    Response

    See response to General Comment 13.

73. Part 1, Vol. 4, Appendix E, page 2-8, Section 2.1.3, first paragraph, first sentence. In Section 2.1.3, it states that at a meeting on 9 June 2004, the agencies indicated they believed soil vapor data provide a more accurate assessment of the indoor pathway than the groundwater data. This statement along with the rest of the text in Section 2.1.3 makes it sound like concentrations of volatiles in groundwater were not modeled to indoor air. Please add a sentence indicating the groundwater to indoor air modeling was conducted. In addition, there are areas outside of the source areas

where off-gassing from groundwater would be the only source of VOCs in the vadose zone and at many of those areas no soil vapor sampling were taken. Using groundwater VOC concentration data would be the only VOC input into the model.

Response

As requested, a statement will be added to the PGOU GW BLRA to indicate groundwater to indoor air modeling was conducted. Note, soil vapor samples were collected from the three locations where VOCs were potentially present in groundwater at depths shallower than 100 ft.

74. Part 1, Vol. 4, Appendix E, page 2-8, Section 2.1.3, first paragraph, second sentence. In Section 2.1.3, it states that USEPA Vapor Intrusion Guidance recommends a Tier 3 evaluation in locations where the chemical concentrations in groundwater exceed the screening levels (USEPA, 2002b). Under a Tier 2 secondary generic screening, the guidance indicates that if groundwater concentrations exceed the screening levels, than soil gas samples should be collected. If the soil gas results exceed the screening levels, then proceed to a Tier 3 site specific screening evaluation. The guidance also indicates under Tier 2 (Semi-Site Specific Screening), if groundwater concentrations exceed the screening level by 50 times, then proceed to a Tier 3 site specific screening evaluation. Please incorporate the information presented above in Section 2.1.3 and revise the statement made in Section 2.1.3 which says that a Tier 3 assessment was conducted because groundwater concentrations exceeded screening levels. All of the steps and questions identified in Appendix C of the guidance need to be discussed and addressed in the HRA.

According to the 2003 *User's Guide For Evaluating Subsurface Vapor Intrusion Into Buildings*, it should be understood that soil gas sampling results outside the footprint of a building may or may not be representative of the soil gas concentrations directly below the structure. For solid building floors in contact with the soil (e.g., concrete slabs), the soil gas directly beneath the floor may be considerably higher than that adjacent to the structure. This is typically due to a vapor pooling effect underneath the near impermeable floor. The above should be discussed in the HRA as a significant uncertainty in assessing soil gas concentrations from open spaces and modeling them to indoor air.

Response

Additional information presented above from the Vapor Intrusion Guidance will be incorporated into the PGOU GW BLRA. Note, the approach used within the PGOU RI/FS was consistent with the guidance and the PGOU GW BLRA will be updated to so state. In addition, see earlier response to General Comment 10.

75. Part 1, Vol. 4, Appendix E, page 2-8, Section 2.1.3, first paragraph, third sentence. Three soil gas samples are not adequate to characterize concentrations in soil gas. It would have to be shown that these represent the highest soil gas concentrations at the

site that are attributable to groundwater contamination. Question 4h of the guidance (USEPA, 2002b) needs to be answered and discussed. Is the nature and extent of soil contamination adequately characterized and has an adequate demonstration been made to show that the soil gas sampling techniques used could reasonably detect an elevated concentration of vapors if they were present in the site setting?

Response

The intent of the soil gas sampling was not to delineate vadose zone sources, but to evaluate vapor migration from groundwater sources. The groundwater is sufficiently delineated and the soil gas data were used qualitatively to evaluate the vapor migration pathway.

76. Part 1, Vol. 4, Appendix E, page 2-8, Section 2.1.3, second paragraph. Soil gas data should be discussed in the data evaluation section in terms of analytical methods used, detection limits, qualifiers, the number of samples collected, etc. (same type of discussion as required for groundwater). DQOs should have been established for soil gas and discussed in the data evaluation section.

Response

The data evaluation section of the PGOU GW BLRA will include additional discussion on the soil gas data.

77. Part 1, Vol. 4, Appendix E, page 2-9, Section 2.2.1. Section 2.2.1 discusses exposure pathway information summarized in Table 5. This information should not be altered from the RAGS D format. One column has been added and the information for medium should be presented after the column identified as Scenario Timeframe. The Planning Table formats generally should not be altered (i.e., columns should not be added, deleted, or changed); however, rows and footnotes should be added as appropriate. Standardization of the Tables is needed to achieve Superfund program-wide reporting consistency. Please revise Table 5 and follow the instructions provided in RAGS Part D.

Response

See earlier response to General Comment 8.

78. Part 1, Vol. 4, Appendix E, page 2-10, Section 2.2.2, fourth paragraph. It is stated that under the current conditions, there are not known uses of groundwater from untreated or unmonitored wells for industrial or agricultural supply at the property boundary, on-site, or beyond the property boundary. This statement is true only if wells that have not been monitored are added to the list of wells to be monitored, as proposed.

Response

As identified on the revised Table 1-2, attached to this response to comments document, active wells located downgradient or within the PGOU boundary have been added to the Exhibit IV monitoring plan.

79. Part 1, Vol. 4, Appendix E, page 2-11, Section 2.2.1, third paragraph. This paragraph states that based on the hydrostratigraphic data and the detection of COPCs, the discharge of groundwater to surface water in Alder Creek is considered a potentially complete pathway in this HRA. It is also stated that two COPCs (NDMA and perchlorate) have been positively detected in the creek. This pathway is identified as incomplete on Figure 8; however, it should be identified as complete. Evaluate contact with surface water quantitatively in the HRA. Further discussions related to Alder Creek need to be incorporated in the exposure assessment. Provide information related to beneficial uses associated with the stream and general characteristics of the stream (size, flow rate, where does it feed into). Also provide additional information related to the populations that use the stream (i.e., drinking water, fishing, irrigation, etc.).

All surface water data collected to evaluate the groundwater to surface water pathway should be discussed in the data evaluation section in terms of analytical methods used, detection limits, qualifiers, the number of samples collected, etc. (same type of discussion as required for groundwater). A data summary and screening in RAGS D format should be completed comparing detection limits and concentrations detected in Alder Creek to toxicity screening levels based on human health protection (i.e., ingestion of biota and contact with water). Provide data for all chemicals measured in the stream in the data summary, regardless if it was a non-detect.

Response

As agreed on 26 May 2005, all surface water data will be presented and discussed in the Data Evaluation section in the PGOU Groundwater Baseline Risk Assessment. As part of this presentation/discussion, RAGS/Part D summary tables will be prepared, and surface water data will be screened against tap water PRGs. Constituents which exceed the tap water PRGs will be evaluated further in the PGOU GW BLRA.

A revised Conceptual Site Model (CSM) is provided in response to Specific Comment 100 and attached to this response to comments document. Consistent with the revised CSM, evaluation of those surface water constituents which exceed screening criteria within the PGOU GW BLRA will include a quantitative assessment of potential dermal exposures to surface water under a recreational scenario, as well as qualitative evaluations of the surface water ingestion and fish ingestion exposure pathways. (The inhalation pathway for surface water was considered incomplete because of the absence of VOCs in surface water.)

Quantitative analyses will be presented in the Risk Characterzation, and will utilize RAGS/Part D format tables. Qualitative analyses of the ingestion pathways will be presented in the Exposure Assessment in the PGOU GW BLRA.

80. Part 1, Vol. 4, Appendix E, page 2-12, Section 2.2.1, second paragraph, Note. It is indicated in paragraph that for completeness, ambient air exposures were evaluated in the HRA for PGOU Soils using soil vapor data. The results of the risk analyses for ambient air presented in the HRA for PGOU soils confirmed that ambient air exposures are negligible. As mentioned previously, three soil gas samples are not adequate to characterize concentrations in soil gas as noted previously.

    The second sentence indicates that VOCs in ambient air were considered negligible (Figure 7) and were not evaluated quantitatively in this HRA. Because the soil gas data are considered to be not adequate to characterize the site, include a quantitative evaluation of the groundwater to outdoor air pathway in the HRA.

    Response

    The ambient air analysis for the soils HRA did not utilize data from the three soil vapor samples collected above areas with high levels of VOCs in groundwater. Rather, the ambient air analysis in the soils HRA was performed using soil gas data collected within each of the source areas.
    As shown in the CSM, ambient air exposures to volatile constituents released from groundwater will be evaluated qualitatively in the PGOU Groundwater BLRA.

81. Part 1, Vol. 4, Appendix E, page 2-12, Section 2.2.1, third paragraph, fourth sentence. This paragraph states that because only limited soil vapor data was collected and in accordance with the Vapor Intrusion Guidance (USEPA, 2002b), modeling to evaluate this pathway (i.e., groundwater to indoor air) was conducted. If Aerojet feels that its soil gas data is limited (i.e., not adequate to characterize nature and extent), then any conclusions made based on the soil gas data are viewed as suspect. As previously stated in the general comments, validation of the J&E model is needed to determine if this is a valid approach.

    Response

    See earlier response to General Comment 6H and Specific Comment 75.

82. Part 1, Vol. 4, Appendix E, page 2-13, first paragraph. The restrictions on construction dewatering do not prohibit dewatering. Dewatering and the discharge of the extracted groundwater must be done in an approved manner. Therefore, exposure to the polluted groundwater could occur under the construction scenario, but should be minimal in nature.

Response

The PGOU Groundwater Baseline Risk Assessment will be revised in accordance with this comment.

83. Part 1, Vol. 4, Appendix E, page 2-13, first paragraph. The restrictions on construction dewatering do not prohibit dewatering. Dewatering and the discharge of the extracted groundwater must be done in an approved manner. Therefore, exposure to the polluted groundwater could occur under the construction scenario.

Response

This comment duplicates Comment 82 above.

84. Part 1, Vol. 4, Appendix E, page 2-14, Section 2.2.3,second paragraph, second sentence. The text states that Table 3 summarizes the exposure point concentrations for each zone/location/layer combination. There is no Table 3 in the HRA. However Tables 3.1 to 3.4 contain the data summary tables. RAGS Part D tables for presenting the exposure point concentrations used in the HRS need to be completed.

Response

RAGS Part D Table 3 was not completed for the groundwater risk assessment because the maximum detected concentration for each constituent was evaluated at all locations. Therefore, the exposure point concentrations are listed as the maximum concentration on Table 3.1 thru 3.4. The text of the PGOU GW BLRA will be revised to reflect this comment, but accordingly, RAGS Part D Table 3 will not be completed.

85. Part 1, Vol. 4, Appendix E, page 2-16, Section 2.2.4, first bullet. Soil ingestion rates are described rather than groundwater ingestion rates. The following text describes soil ingestion rates as presented in Section 2.2.4: Ingestion: Soil ingestion rates for the resident were based on USEPA guidance (USEPA, 2004b). Ingestion rates of 100, 200, and 114 milligrams per day (mg/day) were used for adult resident, child resident, and age-adjusted resident, respectively. Please describe exposure assumptions related to groundwater ingestion rates used in the HRA.

Response

The PGOU GW BLRA will be revised in accordance with this comment.

86. Part 1, Vol. 4, Appendix E, page 2-17, Section 2.2.4.1, second paragraph. In Section 2.2.4.1, it is stated that the AFs applied to each depth-to-groundwater interval represent the lowest, most conservative AFs calculated for the nine VOCs using USEPA's Version 3 (USEPA, 2003). It is unclear why these are not chemical

specific. The J&E groundwater screen spreadsheet calculates the AF on a chemical specific basis. In addition, Csource is calculated on a chemical specific basis. The model also presents the source vapor partitioning coefficient which is Csource multiplied by the AF. Rather than presenting separate AFs and Csource values, please use the calculated chemical specific source vapor partitioning coefficient (presented in cell J31 under intercalcs) for calculating risk.

Response

See earlier response to General Comment 6H.

An attenuation factor for each of the 47 VOCs detected in soil vapor was calculated originally and then the list was narrowed down to the nine VOCs with attenuation factors representing the high, low, and middle of the range to simplify the calculations. The initial calculation of attenuation factors for all 47 VOCs was presented in Part 2, Volume 3, Appendix F, Table F-1.

87. Part 1, Vol. 4, Appendix E, page 2-20, Section 2.3.1, second paragraph. This paragraph states the USEPA does not derive dermal RfDs for chemicals. However, recognizing that dermal exposure may add to the overall intake of a chemical, oral RfDs were used in this HRA to evaluate dermal exposures, consistent with current risk assessment guidance (USEPA, 1989; USEPA, ERM 2-21 AEROJET SR10114512 206443.01 02/14/05 2004b). This statement is incorrect. Dermal toxicity values have not been provided in the EPA Region 9 PRG tables; however, the Region 9 PRG User's Guide refers the reader to RAGS Part E for guidance on deriving dermal values. RAGS Part E recommends adjusting the oral toxicity value using an ABSgi for those chemicals listed in Exhibit 4-1. The last column in Exhibit 4-1 provides a recommendation as to whether the oral toxicity value for a chemical needs adjustment. Based on the COPCs listed in Table 9.1, the oral toxicity value for the following chemicals needs to be adjusted in deriving the dermal value: barium, cadmium, Chromium VI, manganese, nickel, silver, and vanadium.

Response

The PGOU GW BLRA will be revised in accordance with this comment.

88. Part 1, Vol. 4, Appendix E, page 2-23, Section 2.4.2. The title of Section 2.4.2 is "Calculation of Potential Cancer Hazard". This would more appropriately be titled "Calculation of Potential Cancer Risk".

Response

The PGOU GW BLRA will be revised in accordance with this comment.

89. Part 1, Vol. 4, Appendix E, page 2-23, Section 2.4.2. This section should describe cancer risk as excess cancer risk. This concept assumes that the risk of cancer from a given chemical is in "excess" of the background risk of developing cancer (i.e.,

approximately 1 in 3 chances during a lifetime according to the American Cancer Society). For example, a risk of 1E-04 equates to approximately one excess cancer case in a population of 10,000 individuals due to exposure to the cancer-causing substance over a 70-year lifetime.

Response

The PGOU GW BLRA will be revised in accordance with this comment.

90. Part1, Vol. 4, Appendix E, page 2-23, Section 2.4.2, last paragraph. The first sentence need to be revised as follows: "USEPA and Cal-EPA have both defined a range of cumulative risk range of 1E-06 to 1E-04 that may be considered acceptable in accordance with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (USEPA, 1990)."

Response

The PGOU GW BLRA will be revised in accordance with this comment.

91. Part 1, Vol. 4, Appendix E, page 2-24, Section 2.4.3.1. Groundwater Migration to Surface Water needs to be evaluated fully in the data evaluation section and identify as a complete pathway in the conceptual site model.

Response

See response to Specific Comment 79.

92. Part 1, Vol. 4, Appendix E, page 2-24, Section 2.4.3.2. Migration of VOCs to Indoor Air risk should be re-calculated using the following: TCE and PCE inhalation RfD = 0.01. Also, in addition to using the Cal EPA value, present the risk using the TCE slope factor of 0.4 $(mg/kg\text{-}d)^{-1}$. All of the cancer risks exceed 1E-04 if the EPA NCEA slope factor for TCE is used. It is noted that the cancer risk for Zone 1 PGOU – Beyond Property Boundary increases to 1E-03 using the EPA NCEA inhalation cancer slope factor for TCE. The noncancer HI for Zone 1 PGOU – Beyond Property Boundary increases to 1.7 if the correct inhalation reference dose is used for TCE and PCE. Incorporate this information, including calculations, into the discussions in Section 2.4.3.2 and into the uncertainty section.

Response

The indoor air risks will be recalculated for PCE using an inhalation reference dose of 0.01. The risks to TCE will be calculated using the California Modified slope factors and reference doses. In addition, for TCE, the risks calculated using the USEPA slope factors and reference doses will be evaluated in the uncertainty section.

93. Part 1, Vol. 4, Appendix E, page 2-25, Section 2.4.3.2, last paragraph. This paragraph states benzene and toluene (which were not analyzed for in the groundwater samples) were the only constituents detected at concentrations above their respective laboratory reporting limits in the three soil vapor samples. Three soil gas samples are not adequate to characterize concentrations in soil gas. It would have to be shown that these represent the highest soil gas concentrations at the site that are attributable to groundwater contamination.

Response

See earlier response to Specific Comment 75.

94. Part 1, Vol. 4, Appendix E, page 2-27, second paragraph. This paragraph discusses constituents exceeding a $1x10^{-5}$ incremental cancer risk. It should be noted that at that additional risk, it cannot be stated that the property will be allowed to have unrestricted use. This comment also applies to the third paragraph on page 2-29.

Response

Comment noted.

95. Part 1, Vol. 4, Appendix E, page 2-29, second paragraph. The evaluation of risk should include that posed by the VOCs in groundwater downgradient from White Rock Road and north upgradient from the planned extraction field.

Response

The evaluation of risk for VOCs in groundwater downgradient from White Rock Road and north upgradient from the planned extraction field was not included as this area is not within the PGOU boundary. The VOCs in groundwater in this area are contributed both from the Aerojet Superfund site and the Inactive Rancho Cordova Test Site.

96. Part 1, Vol. 4, Appendix E, page 2-33, first paragraph. This paragraph states that hypothetical use of untreated groundwater for residential water supply in all zones may result in unacceptable levels of risk. With calculated risk levels in excess of 1E-04 and hazard indices in the thousands, please state that the hypothetical use of untreated groundwater for residential water supply has resulted in unacceptable levels of risk and noncancer effects.

Response

See earlier response to Specific Comment 15.

97. Part 1, Vol. 4, Appendix E, page 2-33, Section 2.4.4.5, second bullet. The text indicates the risks associated with VOCs potentially migrating from groundwater into

indoor air is a very minimal amount of the overall risk at each zone and hydrostratigraphic layer and by itself does not present an unacceptable risk. As discussed in Section 2.4.3, the calculated indoor air risks from groundwater are all within the USEPA range of acceptable risk. These risks should be re-calculated using the following: TCE and PCE inhalation RfD = 0.01. Also, in addition to using the Cal EPA value, present the risk using the TCE slope factor of 0.4 $(mg/kg\text{-}d)^{-1}$. All of the cancer risks exceed 1E-04 if the EPA NCEA slope factor for TCE is used. It is noted that the cancer risk for Zone 1 PGOU – Beyond Property Boundary increases to 1E-03 using the EPA NCEA inhalation cancer slope factor for TCE. The noncancer HI for Zone 1 PGOU – Beyond Property Boundary increases to 1.7 if the correct inhalation reference dose is used for TCE and PCE.

Conclusions cannot be made with regard to the three soil vapor samples collected. Three soil gas samples are not adequate to characterize concentrations in soil gas. It would have to be shown that these represent the highest soil gas concentrations at the site that are attributable to groundwater contamination. In addition, these were collected from open spaces and may underestimate vapor concentrations that would accumulate under a building.

Part 1, Vol. 4, Appendix E, page 2-33, Section 2.4.4.5, last paragraph. It is stated that based on the results of this HRA, the PGOU Groundwater FS will evaluate potential remedial alternatives to ensure the protection of human health and the environment. The baseline risk assessment should include a section that outlines the remedial goal options ("RGOs") for the chemicals and media of concern. This section should include both ARARs and human health-based cleanup goals for all media considered. From the RGOs, risk managers choose Remediation Levels for the Chemicals of Concern, and these numbers, derived from RGOs, are addressed in the Feasibility Study and are included in the Proposed Plan and the Record of Decision.

RGOs should be developed for those exposure pathway scenarios that generated a cumulative cancer risk in excess of 1E-06 or a hazard index ("HI") greater than one. For those scenarios that meet the aforementioned criteria, RGOs should be developed for each of the COPCs which poses a cancer risk equal to or greater than 1E-06 or a hazard quotient ("HQ") equal to or greater than 0.1. RGOs may be calculated based on target cancer risks of 1E-6, 1E-5 and 1E-4, and chemical-specific hazard indices of 0.1, 1, and 3. It is noted that RGOs should be calculated for chemicals that pose an HQ greater than 0.1 to account for cumulative effects. That is, the cleanup level of some COPCs may have to be adjusted below an HQ of 1 to achieve the desired cumulative HI.

Response

As presented in response to Specific Comment 92, the risks to TCE will be calculated using the California Modified slope factors and reference doses. In addition, the risks calculated using the USEPA slope factors and reference doses will be evaluated in the uncertainty section. In addition, risk to PCE will be

calculated using an inhalation reference dose of 0.01.

See discussion for Specific Comment 75 regarding the soil gas data and see response to Specific Comment 74 regarding the uncertainty surrounding the collection of soil gas data in open spaces.

The remedial goal options, as described in the above comment, were addressed within the development of remedial action objectives for the FS. In accordance with the agreement reached during the 26 May 2005 risk assessment meeting, remedial goal options will not be included within the revised report.

98. Part 1, Vol. 4, Appendix E, page 2-33, Section 2.5. The uncertainty analysis is very general and is not considered adequate for a site of this complexity. Much more effort should be provided in discussing site specific uncertainties associated with the HRA.

Response

The PGOU GW BLRA will include a fuller discussion of the uncertainties.

99. Part 1, Vol. 4, Appendix E, page 2-35, Section 2.5, fifth bullet. The uncertainty analysis indicates that the HRA utilized the carcinogenic slope factors for TCE published by Cal-EPA which may have lead to an underestimation of potential risk (OEHHA, 2004). This analysis is included in Attachment E. In addition to Attachment E, a separate discussion of risks using the TCE NCEA slope factor should be incorporated into the HRA.

Response

See earlier response to General Comment 9.

100. Part 1, Vol. 4, Appendix E, Figure 8. It is suggested that conceptual models associated with PGOU Soil and PGOU groundwater be presented as separate figures. Under human receptors, on-site resident should be referred to as future on-site resident. Hypothetical off-site resident should be called a current off-site resident (footnote why you call it hypothetical). For the on-site commercial/industrial worker, change to current commercial/industrial worker and add an additional column for a future commercial/industrial worker (explain that these workers may be exposed in both on- and off-site areas). The future commercial/industrial worker may use groundwater as a potable source in the future. The site visitor/recreator should be called "current". The on-site construction worker should be called future construction worker (explain that this worker may be exposed in both on- and off-site areas). Other comments are as follows:

A. Exposure routes that should be complete for the future on-site resident related to the groundwater PGOU include all those associated with potable and non-potable use, and those associated with soil vapor.

B. For the current off-site resident, include inhalation of soil vapor in outdoor air as complete.

C. For the current on-site industrial worker, include those exposure routes associated with soil vapor as complete.

D. For the future on-site/off-site industrial worker, include the same exposure routes as identified for the resident as complete. It is noted that the more conservative resident is being evaluated quantitatively in the HRA.

E. For the current site visitor/recreator, identify exposure routes (i.e., dermal and inhalation) associated with discharge to surface water as complete. Identify ingestion of surface water as "N". Ingestion of fish may also be evaluated as "N" provided that additional supporting evidence that fishing does not occur in Alder Creek be provided.

F. For the future on-/off-site construction worker, inhalation exposure in a trench should be identified as complete (add a footnote as to how you plan to evaluate this receptor).

Response

The CSM has been revised in accordance with these comments, from comments made at the 26 May 2005 risk assessment meeting and from comments provided on the sitewide risk assessment workplan. The CSM is included with this response to comments document as Figures 6-1A through 6-1D and will be included in the PGOU GW BLRA and the PGOU Lands BLRA.

101. Part 1, Vol. 4, Appendix E, Table 3.1 to 3.4. It appears that only the detected chemicals were presented in the data summary tables (Tables 3.1 to 3.4). Data summary tables (Tables 3.1 to 3.4) should list all chemicals analyzed in groundwater, even the non-detects. Include chemicals that were not positively detected in any wells in the data summary tables. Report the minimum and maximum detection limits for these chemicals. Evaluate whether chemicals not positively detected in groundwater need to be included as COPCs due to high reporting limits.

Tables 3.1 to 3.4 should not be altered from the RAGS D format. Columns have been deleted, named differently, etc. The Planning Table formats generally should not be altered (i.e., columns should not be added, deleted, or changed); however, rows and footnotes should be added as appropriate. Standardization of the Tables is needed to achieve Superfund program-wide reporting consistency. Please revise these tables and follow the instructions provided in RAGS Part D.

Response

As stated in the response to Comment 10 in the 27 June 2004 Response to

Agency Comments on the PGOU Draft Baseline Risk Assessment, non-detects were not included in the PGOU risk assessments. The most sensitive analytical methods were performed. The entire data set, including qualifiers, was provided in the PGOU RI/FS.

See earlier response to General Comment 8 regarding modification of the RAGS Part D tables.

102. Part 1, Vol.4, Appendix E, Tables 6.1 and 6.2. These tables refer to Table 3 for the chemical concentration in groundwater, a table showing exposure point concentration should be referenced. This table should be developed in accordance with RAGS D.

Response

See earlier response to Specific Comment 84.

103. Part 1, Vol. 4, Appendix E, Tables 9.1 and 9.2. The date for both RfD and target organ information should be entered as the date of the IRIS data was searched. Please revise to be consistent with this requirement in RAGS D.

In Table 9.1, please provide the RfC for all chemicals with a listed inhalation RfD.

In Tables 9.1 and 9.2, chemicals without noncancer toxicity values should be indicated with an NTV rather than a dash. NTV stands for "No Toxicity Value Available".

In Table 9.2, the inhalation RfC for Tetrachloroethylene is 0.035 mg/m^3 (source: Cal EPA). The converts to an inhalation RfD of 0.01 mg/kg-day as presented in the EPA 9 PRG table. An RfD of 0.1 is listed for tetrachloroethylene in Table 9.2. Please change this to 0.01.

In Table 9.2, the inhalation RfD for TCE should be 0.01 mg/kg-day as recommended in the EPA Region 9 PRG table. This is an NCEA value. Please use the EPA NCEA recommended value because it is more conservative than the Cal EPA value.

Response

Tables 9.1 and 9.2 will be revised to include the date of the IRIS search and provided within the PGOU GW BLRA.

104. Part 1, Vol. 4, Appendix E, Table 11 through 13. Regarding the risk characterization tables (Table 11, 12, and 13 series), under exposure point, use the term tap water for ingestion and dermal exposure routes.

Response

The Tables will be revised in accordance with this comment and provided in the PGOU GW BLRA.

105. Part 1, Vol. 4, Appendix E, Tables 10.1 and 10.2. Oral carcinogenic toxicity values provided in Table 10.1 should be adjusted as described in Comment 43.

Response

See earlier response to Specific Comment 87.

In Tables 10.1 and 10.2, please provide an explanation in the table as to why TCE is listed twice.

Response

TCE was listed twice because the OEHHA and USEPA slope factors were evaluated separately for this constituent. A footnote will be added to these Tables in the PGOU GW BLRA providing this explanation.

On Table 10.1, please footnote that the arsenic slope factor is an OEHHA recommended value.

Response

The table provided in the PGOU GW BLRA will be revised in accordance with this comment.

On Table 10.1, for chemicals lacking oral toxicity data, rather than using a dash, use an "NC" if the chemical is not classified as a carcinogen, and an "NTV" if it is classified as a carcinogen.

Response

See previous response to Specific Comment 103.

106. Part 1, Vol. 4, Appendix E, Tables 9.1 through 10.2. All toxicity tables 9.1 though 10.2 need to be in RAGS Part D Format. Several columns have been deleted or altered. The Planning Table formats generally should not be altered (i.e., columns should not be added, deleted, or changed); however, rows and footnotes should be added as appropriate. Standardization of the Tables is needed to achieve Superfund program-wide reporting consistency. Please revise these tables and follow the instructions provided in RAGS Part D.

Response

See earlier response to General Comment 8. Tables 9.1 through 10.2 were altered based on USEPA's comments on the draft BLRA dated 28 October 2003, specifically, in response to Comments 30, 44, 50, and 63.

107. Part 1, Vol. 4, Appendix E, Table 9.1. It is stated in Table 9.1 that "USEPA does not derive dermal RfDs for chemicals". This statement is incorrect. It is also stated in Table 9.1 that "Consistent with current risk assessment guidance, oral RfDs were used to evaluate dermal exposures". Dermal toxicity values have not been provided in the EPA Region 9 PRG tables; however, the Region 9 PRG User's Guide refers the reader to RAGS Part E for guidance on deriving dermal values. RAGS Part E recommends adjusting the oral toxicity value using an ABSgi for those chemicals listed in Exhibit 4-1. The last column in Exhibit 4-1 provides a recommendation as to whether the oral toxicity value for a chemical needs adjustment. Based on the COPCs listed in Table 9.1, the oral toxicity value for the following chemicals needs to be adjusted in deriving the dermal value: barium, cadmium, Chromium VI, manganese, nickel, silver, and vanadium.

Response

As stated earlier in response to Specific Comment 87, the PGOU GW BLRA will be revised in response to this comment.

108. Part 1, Vol. 5, Appendix F, Table F-1. In the preliminary ARAR determination column for the ARARs that Aerojet has stated that its interpretation is that the ARAR is a TBC, the initial text should state that it is the State's position that it is an ARAR.

Response

Table F-1 has been revised to reflect this comment and is included with this response to comments document.

109. Part 1, Vol. 5, Appendix F, Tables F-1, F-4, and F-5. Two ARARs, as provided in the ARAR table the State previously provided to Aerojet, were not included in the listing in the Aerojet tables. The ARARs listed as numbers 10 and 12 on the State table should be included in Table F-1.

Response

Table F-1 has been revised to reflect this comment and is included with this response to comments document.

110. Part 1, Vol. 5, Appendix G, AR GET Process Performance Data, page 3 of 8. American River GET Perchlorate and NDMA Average % Removal for 7065/7069 is

misleading in that there is no treatment only blending with the American River. The column heading needs to be changed to Blending Reduction %.

Response

Comment noted.

111. Part 1, Vol. 5, Appendix G, GET B Process Performance Data, page 6 of 8. GET B NDMA Average % Removal for 7060/7061 is misleading in that there is not treatment only blending of north and south pipe lines. The column heading needs to be changed to Blending Reduction %.

Response

Comment noted.

112. Part 1, Vol. 5, Appendix G, GET D Facility Report, page 7, Subparagraph E(1)(e). A footnote needs to be added that Perchlorate is being removed as part of a pilot project.

Response

Appendix G provides a copy of the latest GET D Facility Report submitted in accordance with Exhibit VI(E) of the Partial Consent Decree in May of 1995. Aerojet does not believe the additional work necessary to update the GET D Facility Report at this time is warranted or required.

113. Part 1, Vol. 5, Appendix G, AR GET. Table1 and Figure one need to be updated for all the extraction wells installed.

Response

Appendix G provides a copy of the latest Operation & Maintenance Plan for the ARGET facility submitted in accordance with the RB Cleanup and Abatement Order in January 1998. Aerojet does not believe the additional work necessary to update the O&M Plan at this time is warranted or required.

114. Part 1, Vol. 5, page 3, Appendix H, Section H2.1. The Regional Groundwater Model has only 6 layers, whereas the Zone 1 Model has 8 layers. Therefore it does not appear that the Zone 1 Model can truly be considered to be a nested model within the Regional model. Please clarify the relationship between the Regional and Zone 1 Models.

Response

The constant head boundaries in the "nested" model are taken from the regional model. For each alternative, the same stresses are simulated in regional model, then boundary conditions are taken from the regional model and put into the "nested" model, the same alternative is then run in the nested model. Water levels calculated for each layer from the regional model are assigned to the corresponding layer in the "nested" model. No boundary conditions are assigned to the additional "nested" model layers that represent aquitards. These layers are not represented in the regional model.

115. Part 1, Vol. 5, Appendix H, page 4, Section H2.1, second paragraph. The model layers as assigned represent unconfined conditions, whereas the text states that Model layers 2, 4, 6 and 8 behave it as confined. Please clarify this apparent contradiction.

Response

Although the layers are defined as unconfined, their behavior and response to stresses is calculated as if they're confined under the LAYCON 3, "unconfined, transmissivity varies" option.

116. Part 1, Vol. 5, Appendix H, page 12, Section H3.3. Extraction well 4420 has not been operating for some time and may or may not be usable for Alternative Z2-3.

Response

If Extraction Well 4420 is selected for use during the remedial design, the well can be redeveloped.

117. Part 1, Vol. 5, Appendix H, page 13, Section H4.1. Document the calibration statistics for the Zone 3 Model. There is a concern that the plume orientation does not match groundwater flow patterns simulated by the Zone 3 Model.

Response

The calibration statistics for the Zone 3 model will be provided in a separate submittal.

118. Part 1, Vol. 5, Appendix H, Figure H2-13 and H2-16. The gap in containment between the northern and southern plumes suggests that Alternatives Z1-2 and Z1-3 do not provide adequate containment for Layer E. Please discuss how the alternatives provide adequate containment.

Response

The apparent gap in containment will be addressed during the remedial design phase when the model is updated and improved.

119. Part 1, Vol. 5, Appendix H, Table H2-1. Add the number of points used in calculating the calibration statistics.

Response

There are 81 target locations and 2568 data points used in calculating these statistics. Table H2-1 has been revised in accordance with this comment and is included with the Revised Part 1 Appendix H included with this response to comments document.

120. Part 1, Vol. 5, Appendix I, Z3-1 and 2 estimates. Perchlorate treatment at GET B is based on ion exchange. The ion exchange at GET B under the current pilot for operation and maintenance is much higher than for the GET A pilot. It would appear that even with a higher initial capital cost the GET E/F biological system would be more cost effective than ion exchange at GET B. Please provide the thirty year and non-discounted constant dollar comparisons for biological vs. ion exchange for GET B.

Response

Cost estimates for Alternatives Z3-2 and Z3-3 considering the biological reduction process for perchlorate removal are attached to this response to comments document. However, it should be noted that the decision with respect to the treatment process that will be employed for perchlorate removal at the GET B treatment facility when the selected alternative for Zone 3 is implemented will be made during remedial design.

121. Part 1, Vol. 5, Appendix J, Comment 9 Response. Figure 1-5 still labels one area under Citizens Utilities. This should be California American Water Co.

Response

As stated earlier in this response to comments document, Figure 1-5 has been revised and this error corrected.

122. Part 1, Vol. 5, Appendix J, Comment 11 Response. The response to Comment 11 is missing from the document.

Response

Comment 11 is noted and Section A1.2.3 has been revised.

123. Part 1, Vol. 5, Appendix J, Comment 12 Response. Comment 12 is missing although a response is provided.

Response

Comment noted.

124. Part 1, Vol. 5, Appendix J, Comment 14 Response. The response only partially answers this comment because it does not rule out a pathway. Are there other lines of evidence (e.g. modeling) which address the concern of Layer C contamination discharging to the American River? This discussion should also be incorporated into the text.

Response

Other lines of evidence include unsaturated sediments noted in boring logs from wells drilled adjacent to or near American River. In addition, calibration of the groundwater flow model required that the American River is "losing" in Zone 1. This information has been added to the revised text of Part 1, Appendix A, text included with this response to comments document.

125. Part 1, Vol. 5, Appendix J, Comments 32 and 33 Responses. All geologic cross-sections in the report should be consistent with the current nomenclature. This document will act as the document of record for the PGOU. All information provided in the report should be current with the agreed reporting period for the document. Revise historical cross-sections as needed.

Response

Comment noted. The historical cross sections have been revised, or at a minimum, match the nomenclature presented on the figures for each zone.

126. Part 1, Vol. 5, Appendix J, Comment 42 Response. The response did not address the issue of well treatment for well 1816.

Response

Comment noted. Table 1-2 has been revised to indicate that Well 1816 is equipped with wellhead treatment for TCE removal.

127. Part 1, Vol. 5, Appendix J, Comment 46 Response. In the comment response, Aerojet has not provided adequate information to assess capture by GET E.

Response

The capture provided by the GET E system is part of the Western Groundwater Operable Unit and was not, therefore included in the PGOU RI/FS.

128. Part 1, Vol. 5, Appendix J, Comment 47 Response. The 100 to 160 feet contours lines appear to mislabeled in Figure B-6.

Response

As stated earlier in response to Comment 52, Figure B-6 has been revised and is included within this response to comments document.

129. Part 1, Vol. 5, Appendix J, Comment 56 Response. The referenced figure is actually Figure 1-5 not Figure 1-4.

Response

Comment noted.

130. Part 1, Vol. 5, Appendix J, Comment 57 Response. The referenced figure is actually Figure 1-6 not Figure 1-5.

Response

Comment noted.

131. Part 1, Vol. 5, Appendix J, Comment 87 Response. Cross-section A-A' and B-B' should be updated for this report.

Response

See earlier response to Comment 51.

132. Part 1, Vol. 5, Appendix J, Comment 101 Response. There is inadequate monitoring for COCs downgradient of GET A. The agencies will require additional monitoring locations downgradient of extraction well as part of remedy implementation and monitoring.

Response

So noted.

133. Part 1, Vol. 5, Appendix J, Comment 102 Response. The response does not address the issue of recharge of GET A as a source of 1, 4-dioxane.

Response

Several samples have been collected from the GET A effluent and analyzed for 1,4-dioxane to evaluate the potential for GET A recharge to be a source of 1,4-dioxane. 1,4-Dioxane was not detected (<1.0 µg/L) in the samples collected. Therefore, the GET A recharge does not appear to be a current source of 1,4-dioxane.

134. Part 1, Vol. 5, Appendix J, Comment 105 Response. The concerns outlined in the comment will not be fully addressed until NDMA data is available from the new monitoring well.

Response

Nested monitor Wells 30279 and 30280 were installed off-site in Layers A and B, respectively. TCE was detected in Well 30279 at concentrations of 0.98 and 0.99 µg/L, but was below detection limits (<0.5 µg/L) in Well 30280. Perchlorate has been detected in both wells at concentrations ranging from 7.6 to 10 µg/L. NDMA was detected once in both wells between the PQL and MDL at concentrations of 0.0010 and 0.0013 µg/L, but was not detected in either well (<0.0010 µg/L) during the most recent sampling event.

135. Part 1, Vol. 5, Appendix K, Response to General Comment 2. The response to comment is inadequate. Aerojet needs to provide an estimate of time for contamination to reach wells 1049 and 1059 for COCs. The Agencies expect fate and transport modeling to be used as part of the remedial design.

Response

Comment noted. The remedial alternatives within Zone 1 currently include hydraulic containment of COCs upgradient of Wells 1049 and 1059 to prevent contamination from reaching these wells. Aerojet notes the Agency demand for fate and transport modeling as part of the remedial design.

136. Part 1, Vol. 5, Appendix K, Response to General Comment 4. The proposed alternatives for Zone 2 do not establish an inner groundwater barrier close to the Aerojet property boundary as requested by DTSC. However, it understood that DTSC now accepts the revised approach.

Response

So noted.

137. Part 1, Vol. 5, Appendix K, Response to General Comment 5. 1,4-dioxane was not fully evaluated in Zone 1 and will be deferred to remedial design.

Response

Comment noted.

138. Part 1, Vol. 5, Appendix K, Response to General Comment 9. The Agencies look forward to receiving site wide composite plume maps from Aerojet in the near future.

Response

A site wide composite plume map was provided to the Agencies by Aerojet and Boeing for the Aerojet and IRCTS sites at the May 17 2005 Community Advisory Group meeting.

139. Part 1, Vol. 5, Appendix K, Response to Specific Comment 51. The Agencies believe that data on the historical pumping and mass removal rates is relevant and required for a full evaluation of the GETs. Aerojet shall update the PGOU RI/FS in include such information.

Response

See response to Specific Comment 20 above.

140. Part 1, Vol. 5, Appendix K, Response to Specific Comment 52. Historical information on pumping and historical mass removal rates as requested in Specific Comment 51 will provide relevant information for evaluating the modifications proposed in Alternatives Z1-2 and Z1-3.

Response

See response to Specific Comment 20 above.

141. Part 1, Vol. 5, Appendix K, Response to Specific Comment 53. Aerojet does not address the concern outlined in the comment for containment of COCs in Layer B by pumping in Layer C.

Response

The groundwater flow model suggests that pumping in Layer C should sufficiently reduce the water level elevations in Layer C, and induce a downward vertical gradient that will cause water from Layer B to migrate downward into the proposed Layer C extraction wells.

142. Part 1, Vol. 5, Appendix K, Response to Specific Comment 56. Aerojet should address the issue of COCs reaching well 1049. If containment of COCs is provided by Alternative Z1-2 and Z1-3 then well 1049 should be protected. If protection is not

achieved then Aerojet will need to revise the implemented remedy to provide adequate protection for well 1049 or replace it.

Response

Alternatives Z1-2 and Z1-3 provide for the installation of additional extraction wells to prevent impacts to Well 1049.

143. Part 1, Vol. 5, Appendix K, Response to Specific 57. If GET E/F is to be part of the Zone 2 remedy then effectiveness of containment at GET E/F must be evaluated.

Response

The Zone 2 alternatives evaluated within the PGOU RI/FS include only the treatment plant at GET E/F. Aerojet does not agree this necessitates an evaluation of the containment at GET E/F. Furthermore, the Administrative Order and Statement of Work for WGOU requires the evaluation of the containment provided by GET E/F.

144. Part 1, Vol. 5, Appendix K, Response to Specific Comment 64. The provided tables do not include historical pumping and mass removal for all GET D wells. The mass removal performance of GET D is required to evaluate the Zone 1 alternatives.

Response

See response to Specific Comment 20 above.

145. Part 1, Vol. 5, Appendix K, Response to Specific Comment 103. As listed in the EPA 2004 Edition of the Drinking Water Standards and Health Advisories (EPA 822-R-04-005), the MCL and MCLG for nitrate + nitrite (both as N) is 10 mg/L. The comment regarding the PRG value for PCE was probably made before the October 2004 version was available. The PCE value for tap water is now 0.0001 mg/L. The California PHG is 0.00006 mg/L.

Response

So noted.

146. Part 1, Vol. 5, Appendix K, Response to Specific Comment 105. The Agencies believe that data on the historical pumping and mass removal rates is relative and required for a full evaluation of the GETs. Aerojet shall update the PGOU RI/FS in include such information.

Response

See response to Specific Comment 20 above.

147. Part 1, Vol. 5, Appendix K, Response to Specific Comment 111. Uncertainty analysis should have been addressed in the modeling analysis. Aerojet must address uncertainty analysis and incorporate safety factors during remedy design.

Response

See response to Specific Comment 25 above.

148. Part 1, Vol. 5, Appendix K, Response to Specific Comment 112. Changes to the model were not documented as requested.

Response

The changes to the regional model were documented in Section H3.1 and included revisions to the model layer designations and the addition of stress periods.

149. Part 1, Vol. 5, Appendix K, Response to Specific Comment 125. The question regarding how increasing porosity change the capture analysis was not addressed.

Response

Increasing the effective porosity does not change the hydraulic capture analysis.

150. Part 1, Vol. 5, Appendix K, Response to Specific Comment 129. It is not acceptable to ignore the results of aquifer testing in designing the groundwater model unless adequate justification is provided. Ignoring the results of available aquifer testing suggest that the model may not be reliable for making predictions regarding effectiveness of the Zone 4 remedial alternatives.

Response

Comment noted. The range of hydraulic conductivities from aquifer tests at wells in Zone 4 was 0.13 ft/day to 890 ft/day. The hydraulic conductivities assigned in the model near the proposed extraction wells are within this range. The hydraulic conductivities near existing extraction Wells 4100 and 4110 are lower than the aquifer test results for these wells; however, the model calibration near these wells was based primarily on recreating measured water levels and flow directions, using steady-state average flow rates. Changes to the operation of these wells was not planned, nor simulated in the alternatives. Therefore, the recreation of measure water levels, contours, and flow directions by the model should be sufficient for determining containment, regardless of inconsistencies near the existing extraction wells.

151. Part 2, Vol. 1, page 4-30, Section 4.4.3.1. The text states that only 1 of 16 wells originally completed in perched groundwater layer in Area 20 contained water in

1997. It is further stated that no VOCs, TPH-D or perchlorate were detected in perched groundwater. Is that statement based on information from a single well that contained water in 1997? What is the current depth to perched groundwater? Does the perched groundwater still exist? Were there previously concentrations of VOCs/TPH-D/perchlorate in perched groundwater in samples collected from the auger wells? How does the more recent data compare with historical data from the auger wells and Auger Well 675 in particular? Those pollutants may still be present, albeit, at a deeper depth that the auger wells.

Response

The wells originally completed in the perched groundwater layer in Area 20 in the early 1980's have been monitored for the presence of groundwater twice in the last 20 years. During the Stage 1 RI in 1992 and 1993, four of the 16 wells, including Well 675, were found to contain water during that period and were analyzed for VOCs. No VOCs at concentrations above their respective laboratory detection limits were identified in the samples. Perched groundwater in Area 20 was depleted during the late 1980's as a result of focused groundwater extraction for the remediation of hydrocarbons at Site 51D (not included in PGOU). Currently, the extent and presence of perched groundwater in Area 20, particularly within the boundaries of the PGOU, appears very limited and defined by only one well (675). It is possible that contaminants previously in the perched groundwater have migrated into the underlying groundwater units.

152. Part 2, Vol. 1, page 5-79, Section 5.11.4.1, third bullet. At C-15, chromium concentrations in one sample (880 mg/kg) were detected above residential/industrial PRGs. Although the adjacent samples were below the 90%UCL for the mean background (138 mg/kg), the elevated chromium concentration should not be considered anomalous. The risk assessment needs to justify why the chromium concentrations do not pose a risk to potential receptors.

Response

The chromium concentration of 880 mg/kg was incorrectly compared in the text and tables to the residential PRG of 210 mg/kg for total chromium. The residential PRG for total chromium assumes a 6:1 ratio of trivalent chromium to hexavalent chromium. Because hexavalent chromium was not detected (<0.21 mg/kg) in the sample, the concentration should have been compared to the residential PRG of 100,000 mg/kg for trivalent chromium. The chromium concentration of 880 mg/kg in the sample is significantly less than the PRG.

153. Part 2, Vol. 1, page 6-4, Section 6.2.1 and Table 6-1. Evaluation of the potential impacts of VOCs on groundwater needs to be done on a site-specific basis using a model such as Vapor-T or Vleach. Site-specific factors are needed for inputs that are not accounted for in the SSLs developed using the USEPA PRG tables. Plus,

protection of groundwater does not mean allowing pollutants to increase up to the water quality objective for a particular pollutant. It is not clear from the text what level of protection is provided when using an attenuation/dilution factor of 20. At the SSLs will there still be detectable concentrations of VOCs leaching to groundwater? The SSLs that are listed in Table 6-1 are an order of magnitude higher than those developed at McClellan AFB that has a greater depth to groundwater and generally more fine-grained materials.

Response

The evaluation of the potential impacts of VOCs on groundwater requires additional discussion with the Agencies, specifically the Regional Board. Aerojet is willing to conduct site-specific modeling, as determined necessary, but would want to obtain Agency concurrence on the site-specific factors for input into the model. Aerojet proposes to schedule an Agency conference call/meeting to resolve this issue.

154. Part 2, Vol. 1, page 6-6, Section 6.2.2, third bullet, first paragraph. It is stated that if the constituent concentration in the soil extract was less than or equal to the concentration in the background soil extract, then the constituent is not leaching to groundwater. Actually, if the comparison provides the stated outcome, then the soil of concern is not leaching at greater concentrations than the background soils. Leaching could still be going on, just at levels similar to, or less than background. This comment also applies to the logic presented in the second paragraph.

Response

Noted. The comparison indicates that the leaching of metals from site soil is less than or similar to the leaching occurring from background soil.

155. Part 2, Vol. 1, page 6-9, Section 6.2.2.3. This section states that there was only one metal (zinc) that had concentrations in soil extract above the mean background soil extract concentrations. A review of the data provided in Tables 6-6 and 6-8 raises some concerns. The soluble concentrations of aluminum, barium, manganese, copper, cobalt, nickel, vanadium, chromium and beryllium in the background samples are significantly elevated, especially when compared to those metals that were analyzed from the non-background on-site soils. This is the case even when the total concentrations were close, ore even higher, in the non-background soils compared to the background soils. Of particular concern are the soluble concentrations of barium and manganese in the background samples. The soluble concentrations are more that two orders of magnitude greater than that found in the non-background site soils analysis. The validity of the background soluble concentrations is in question. A second issue is the elevated detection limit of 380 µg/L for lead. With a PHG of 2 µg/L and an MCL of 15 µg/L, it is difficult to ascertain whether or not there are soluble concentrations of lead of concern.

Response

Validation of the analytical data for two of the four background soil samples and the leachates identified no discrepancies or problems with the data. Because soil in the ditches is exposed to more water than the soil in the background sample areas, it is anticipated that soil in the ditches would undergo more leaching over time. The leachability of lead from soil in the ditch was also assessed during the 1997 investigation where soil samples were collected from one boring (10D-SB02) in the bottom of the ditch. Lead concentrations in the samples collected at 0, 2.5, 5, 7.5, and 10 feet bgs were 40, 6.27, <3.16, 4.52, and >4.59 mg/kg. The lower lead concentrations at 2.5, 5, 7.5, and 10 feet bgs indicate that lead is not leaching through the soil column.

156. Part 2, Vol. 1, Section 6.2.3.3. An analysis presenting concentrations of other pollutants from samples collected at S-2 would be useful. These could be concentrations of other pollutants that were found to have soluble concentrations (i.e., PCBs) in samples collected from the ditch.

Response

Other than metals, no other constituents detected in the ditch were found to have soluble concentrations. Samples collected at S-2 are routinely analyzed for metals, ammonia, chemical oxygen demand, chlorine, dissolved oxygen, oil and grease, organic Kjeldahl nitrogen, pH, temperature, total Kjeldal nitrogen, total organic halogen, total suspended and dissolved solids, total hardness (as CaCO3), total dissolved hardness, turbidity, nitrate, perchlorate, and the following VOCs: 1,1,1-trichloroethane; 1,1,2,2-tetrachloroethane; 1,1,2-trichloroethane; 1,1-dichloroethane; 1,1-dichloroethene; 1,2,4-trichlorobenzene; and 1,2-dichlorobenzene. Other than the metals data, the usefulness of the data for S-2 for evaluating potential impacts from the ditches at Sites 11D, 10D, 7D, and 5D is not readily apparent. Additionally, it should be noted that sampling station S-2 is located on a section of ditch which receives storm water runoff from numerous ditches other than Sites 11D, 10D, 7D, and 5D. The results of the Waste Extraction Test (WET) show that PCBs in samples collected from the ditch are not leachable.

157. Part 2, Vol. 1, Section 7, General Comment. The risk assessment is conducted utilizing the current conceptual plan for future use of the property. In most cases, the future use is estimated to be commercial, and therefore the risk assessment did not evaluate potential residential exposure. It makes sense to perform the risk assessment by calculating residential, commercial and construction worker scenarios.

Response

See earlier response to General Comment 4, the residential scenario will be

calculated in addition to the existing commercial and construction worker scenarios in the PGOU Lands BLRA.

158. Part 2, Vol. 1, page 7-2, Section 7.1. This section should be titled "Data Evaluation". Selection of COPCs is one component of the data evaluation step.Evaluation of the adequacy and quality of the analytical data in relation to risk assessment is a requirement in the HRA. Although discussed in a limited sense in the RI, these critical elements of data evaluation need to be discussed in the HRA. This was not included in the Soil Site HRA. If some of it has been previously presented, then refer back to those portions of the RI that present the information (i.e., data validation). The HRA needs to incorporate the following into the data evaluation:

A. The choice of analytical methods is critical to providing high quality data for use in a HRA. An evaluation and determination as to whether the analytical methods used to measure concentrations of contaminants in soil and in soil gas (including lead based paint samples) provided adequate data should be included in the HRA. Describe what analytical methods were used and whether or not the DQOs were met.

B. Provide a separate discussion related to the data set used for risk assessment and why data collected from different time periods were grouped together (in accordance with RAGS Part A). Evaluate data from different time periods to determine if concentrations are similar or if changes have occurred between sampling periods. If the concentrations between sampling periods are similar, then the data may be combined for the purposes of quantitative risk assessment (See RAGS A, Sect. 5.1). If the methods used to analyze samples from different time periods are similar in terms of the types of analyses conducted and the QA/QC procedures followed, then the data may be combined for the purposes of quantitative risk assessment (See RAGS A, Sect. 5.1).

C. The HRA needs to include an evaluation of data qualifiers. How were the data qualified and how were qualified data used in the HRA? Any flagged data used in the HRA must be accompanied by its definition. The definition for each flag must include a statement on the usability and the uncertainty associated with that flag.

Response

The PGOU Lands BLRA will be revised in accordance with this comment.

159. Part 2, Vol. 1, page 7-3, Section 7.1.1, second and third paragraphs. It is stated that analytical results for soil and soil vapor samples collected within the shallow zone (upper 10 feet) were considered in the HRA. Data below 10 feet was not used in the HRA. For future scenarios, the typical depth to consider for direct contact is 0 to 15 feet. A depth of 15 feet would be considered the most likely depth limit encountered during construction activities. According to the City of Sacramento, depths of 15 feet or greater can be encountered during sewer work. It is requested that depths to 15 feet be considered for evaluating future contact with site soil.

Elimination of soil gas data at depths greater than 10 feet below ground surface is an issue. Soil gas data collected at greater than 10-foot depth below ground surface have been excluded in the risk assessment because in the judgment of the authors, these data were "less representative". The use of the 10-foot depth as a cutoff for evaluating the vapor intrusion pathway does not jibe with EPA's draft vapor intrusion guidance that recommends that soil gas/groundwater samples up to a depth of 100 feet below ground surface be considered when evaluating this particular pathway. Please include all soil gas data when estimating human health risks because eliminating specific data sets or data points from the risk assessment have not been justified.

In addition, concentrations of chemicals in soil gas deeper than 10-feet, and volatilization of chemicals from the groundwater, need to be considered in areas where there is no shallow soil gas data. Samples collected at depths much less than 10 feet are suspect due to the potential for ambient air intrusion during collection of the soil gas sample.

A discussion as to what soil depths were evaluated for estimating exposure concentrations related to current and future scenarios, as well as specific exposure routes, needs to be included in the data evaluation section. For example, in what cases did you only look at surficial soil data? What depth interval was considered for surface soil?

Provide in the data evaluation a detailed discussion as to why VOC bulk soil data could not be collected.

Response

In accordance with the agreement reached at the 26 May 2005 PGOU risk assessment meeting, and based on the use by DTSC of 10 feet for evaluation of direct contact with site soils, no change will be made to the document to reflect this comment.

Aerojet agrees that soil vapor samples collected at depths less than 5 feet have a greater potential for ambient air intrusion than those collected at deeper depths. However, we disagree that soil vapor samples collected between 5 and 10 feet should be suspect. Soil vapor probe leak detection monitoring was performed during the collection of all soil vapor samples in accordance with State guidance, and minimal leaking was found.

The PGOU Lands BLRA will include a discussion regarding the soil depths evaluated for estimating exposure concentrations and why VOC bulk soil data cannot be collected from the Aerojet site.

160. Part 2, Vol. 1, page 7-3, Section 7.1.1, first paragraph. The GET D facility was not included in an exposure zone or designated as a separate exposure zone. How will this site be evaluated so that it can be included in the decision documents?

Response

An evaluation of the potential for environmental impacts at the GET D facility and the need for sampling was presented in Part 2, Volume 1, Section 4.11. The evaluation concluded that activities associated with the operation of the GET D facility had not resulted in impacts which required investigation.

161. 2, Vol. 1, page 7-4, Section 7.1.1, Dioxins and Furans. The text states that dioxin and furan results were converted to 2,3,7,8-TCDD equivalents. The method for doing this needs to be discussed in the data evaluation including the list of TEFs that were applied. Also, how were non-detects handled in converting to 2,3,7,8-TCDD equivalents.

Response

The method for converting dioxin and furan results to 2,3,7,8-TCDD equivalents will be described in further detail in the PGOU Lands BLRA. Non-detects were converted using the practical quantitation limits.

162. Part 2, Vol. 1, page 7-4, Section 7.1.1, Perched Groundwater. If there are VOCs in perched groundwater, then an analysis of the potential indoor-air exposure pathway due to those VOCs needs to be conducted.

Response

As discussed in Section 7.7.2, perched groundwater was identified and sampled at only two sites (Former Company Store and Site 35D) addressed in the RI/FS. Previous investigations indicate that the presence of perched groundwater is primarily due to the infiltration of water originating from irrigation or leaking water lines, making it impermanent in nature. The removal or repair of the irrigation and water lines in the future would likely result in a decrease in the presence and extent of perched water. Additionally, soil vapor samples were collected within Former Company Store and Site 35D above where the perched water had been detected. The potential indoor-air pathway was evaluated using this soil vapor data.

163. Part 2, Vol. 1, page 7-6, Section 7.1.2.2, second paragraph. The text states that metals were statistically compared against background using the Mann-Whitney U test to compare the means of the two data sets. The 1994 Site Wide soil background data set has been determined to be not comparable against metals data collected and analyzed using normal EPA protocol and partial digestion methods. In addition, the 1994 background data set has not been validated and is not of known quality and

documentation to EPA. This background data set should be applied in the risk assessment in accordance to EPA's January 5, 2005 letter—regarding the December 1994 background report—to Ms. Cindy Caulk of Aerojet. Therefore, the elimination of metals data based on the background comparison in this HRA needs to be further reviewed. As part of the evaluation outlined in EPA's January 5, 2005 letter, the maximum detected site concentration of aluminum, arsenic, barium, chromium, manganese and vanadium need to be compared against the background 90% UCL. The table below summarizes the exposure zones where the maximum concentrations of these metals exceed the 90% UCL and Screening Toxicity Value (EPA Region 9 PRGs). Based on this evaluation aluminum, arsenic, chromium and manganese need to be retained as chemicals of potential concern in addition to cadmium, copper, lead, mercury, silver and zinc.

Analyte	Exposure Zones Where Maximum Concentrations Exceed 90% UCL and Screening Toxicity Value (EPA Region 9 PRGs)
Aluminum	A20-1, A20-2, A20-3, A20-4, A20-5, A20-6, A49-1, A49-2, A49-3, A49-4, A49-5, A49-6
Arsenic	A20-3, A20-6, A49-1, A49-3, A49-4, A49-5, A49-6
Barium	None
Chromium	A49-6
Manganese	A20-1, A20-2, A20-3, A20-6, A49-1, A49-6
Vanadium	None

Response

This comment was revised to the following by Charles Berrey from USEPA via email on 1 June 2005.

« Comment: Part 2, Vol. 1, page 7-6, Section 7.1.2.2, second paragraph. The text states that metals were statistically compared against background using the Mann-Whitney U test to compare the means of the two data sets. The 1994 Site Wide soil background data set has been determined to be not comparable against metals data collected and analyzed using normal EPA protocol and partial digestion methods. In addition, the 1994 background data set has not been validated and is not of known quality and documentation to EPA. This background data set should be applied in the risk assessment in accordance to EPA's January 5, 2005 letter—regarding the December 1994 background report—to Ms. Cindy Caulk of Aerojet. Therefore, the elimination of metals data based on the background comparison in this HRA needs to be further reviewed. As part of the evaluation outlined in EPA's January 5, 2005 letter, the maximum detected site concentration of aluminum, arsenic, barium, chromium, manganese and vanadium need to be compared against the background 90% UCL. The table below summarizes the exposure zones where the maximum concentrations of these metals exceed the 90% UCL and Screening Toxicity Value (EPA Region 9 PRGs). Based on this evaluation arsenic, chromium and

manganese need to be retained as chemicals of potential concern in addition to cadmium, copper, lead, mercury, silver and zinc."

Analyte	Exposure Zones Where Maximum Concentrations Exceed 90% UCL and Screening Toxicity Value (EPA Region 9 PRGs)
Aluminum	None
Arsenic	A20-1, A20-2, A20-3, A20-4, A20-6, A49-1, A49-2, A49-3, A49-4, A49-5, A49-6
Barium	None
Chromium	A49-6
Manganese	A49-1
Vanadium	none

Response

The maximum detected site concentrations for all metals were compared against their background 90% UCL in tables and discussed in the text. Clearly, the comparison of two data sets derived using differing analytical methods introduces uncertainty into the process of evaluating whether the levels of certain constituents found in the RI/FS are consistent with background. ERM agrees with the general proposition that additional data using comparable methods may be needed to show conclusively that inorganic chemicals at Aerojet are within background concentrations. However, we do not agree with the need for additional data to demonstrate that this is the case at the PGOU, in particular with regard to arsenic concentrations. The comparison of the maximum concentrations in each exposure area to the 90% UCL is not alone sufficient to demonstrate that arsenic is a site related chemical of potential concern. A discussion of the evidence which supports the elimination of arsenic from the risk assessment is attached to this response to comments document.

We also do not agree that chromium and manganese should be included as COPCs. As discussed under Specific Comment 152, the concentration of chromium at 880 mg/kg detected in expsoure zone A49-1 was inappropriately compared to the total chromium PRG of 210 mg/kg. Because hexavalent chromium was not detected in the sample, the result should have been compared to the trivalent chromium PRG of 100,000 mg/kg. With respect to manganese, the table above incorrectly indicates that manganese was detected in exposure zone A49-1 above the 90% UCL and Screening Toxicity Value (USEPA Region 9 PRG). As indicated in Table 5-8, the maximum concentration of manganese detected in soil within exposure zone A49-1 at depths less than 10 feet bgs (the depth of soils considered in the risk assessment) was 700 mg/kg, well below the 90% UCL of 968 mg/kg and PRG of 1,800 mg/kg.

164. Part 2, Vol. 1, page 7-7, Section 7.1.3. The text provides a discussion on detection limits. Be more specific rather using the term detection limit. Detection limits may

include a variety of limits including the quantitation limit and the method detection limit. A quantitation limit is considered adequate when it is at or below the levels of concern (i.e., EPA Region 9 PRGs for residential soil). You should use the quantitation limit.

Response

The text of the PGOU Lands BLRA will be revised to use the term quantitation limit consistently throughout.

165. Part 2, Vol. 1, page 7-8, Table. Based on the table provided on page 7-8, detection limits associated with soil vapor are too high. Based on the text, this is a result of combining historical soil vapor data with more recent data. The historical data had much higher detection limits. This was done for Area 49 because the VOC investigation conducted in the central portion of Area 49 (exposure zone A49-1) was designed to augment the results of the previous investigation and focused on characterizing the lateral extent of the identified VOC plume. Samples were not collected within hot spots identified during previous investigations.

A review of the reporting limits should have been conducted which would have indicated that the hot spots in Area 49 need to be re-characterized with new soil gas data. The high detection limits may have masked the presence of detectable VOCs in the hot spot areas. According to RAGS A, data collected using different analytical methods and/or generating data that are not comparable (significant difference in reporting limits) should not be combined and used in a HRA. Therefore, it is recommended that additional soil gas data be collected from Area 49 and the historical data be eliminated from the quantitative HRA.

Response

The evaluation of the data set for Area 49 concluded that exposures to site soil and soil vapor in exposure Zone A49-1 under <u>unremediated</u> conditions potentially pose an unacceptable risk to commercial and construction worker scenarios. Accordingly the FS evaluated remedial alternatives for A49-1 and assumed additional soil vapor data would be collected during the design of the SVE system. Additional sample collection is not warranted at this time.

166. Part 2, Vol. 1, page 7-12, Section 7.2.4.5, Migration of Soil and Soil Vapor Constituents to Groundwater. This section should be called Section 7.2.1.5.

Response

The Section Number will be corrected in the PGOU Lands BLRA, as necessary.

167. Part 2, Vol. 1, page 7-12, Section 7.2.1.6. The following comments relate to Section 7.2.1.6, Migration of Constituents in Soil to Surface Water.

A. It was stated that as described in Section 6.2.3, this exposure pathway was evaluated by comparing the results of surface water samples collected downstream of the sites addressed in this RI/FS with concentration limits cited in the Revised Waste Discharge Requirements for Aerojet-General Corporation and Aerojet Fine Chemicals (NPDES Permit No. CA0004111) (RWQCB Order No. R5-1999-0016-R01, 2001). Section 6.2.3 describes a comparison between dissolved concentrations of metals in surface water samples collected at sampling Station S-2 downstream of the three sites to those cited in the Revised Waste Discharge Requirements for Aerojet-General Corporation and Aerojet Fine Chemicals National Pollutant Discharge Elimination System [NPDES] Permit No. CA0004111). In the HRA, surface water concentrations should be compared to surface water screening levels based on the protection of human health, not NPDES discharge requirements.

Response

No changes will be made to Section 6. However, as described in response to Specific Comment 79, surface water data will be compared to tap water PRGs in the Data Evaluation section of the PGOU Lands BLRA. Constituents which exceed screening criteria will be evaluated further in the BLRA. Consistent with the revised CSM, this will include qualitative evaluation of the surface water ingestion and fish ingestion pathways, and quantitative evaluation of the dermal pathway, all under a recreational scenario.

B. Further discussions related to surface water bodies near the soil sites need to be incorporated in the exposure assessment. Provide information related to beneficial uses associated with the stream and general characteristics of the stream (size, flow rate, where does it feed into). Also provide additional information related to the populations that use the stream (i.e., drinking water, fishing, irrigation, etc.).

Response

Additional discussions on the surface water bodies will be included within the revised text of the PGOU Lands BLRA.

C. All surface water data collected to evaluate the soil migration to surface water pathway should be discussed in the data evaluation section in terms of analytical methods used, detection limits, qualifiers, the number of samples collected, etc. (same type of discussion as required for groundwater). A data summary and screening in RAGS D format should be completed comparing detection limits and concentrations detected in surface water to toxicity screening levels based on human health protection (i.e., ingestion of biota and contact with water). Provide data for all chemicals measured in the stream in the data summary, regardless if it was a non-detect.

Response

As agreed on 26 May 2005, the surface water data will be summarized within the Data Evaluation section of the PGOU Lands BLRA; also as part of this discussion, surface water data will be screened against tap water PRGs (please see response to Specific Comment 79).

D. An assessment of non-metals at S-2, not just metals, needs to be conducted.

Response

See earlier response to Specific Comment 156.

168. Part 2, Vol. 1, page 7-14, Section 7.2.2, first paragraph, second sentence. The text states that for the exposure zones that are vacant, this HRA did not evaluate any exposure scenarios under current conditions. It is further indicated in Tables 7-1 and 7-2, the anticipated future land use is commercial for all exposure zones that are currently used by commercial workers. For areas located on the Aerojet property that are currently vacant, an evaluation of current conditions is still required. It is expected that current industrial workers may access vacant properties located on the Aerojet site to conduct maintenance or other work related activities.

Response

As stated in the subsequent sentences of that section, the anticipated future land use is commercial for all exposure zones that are currently used by commercial workers. Therefore, one analysis for the commercial worker was evaluated for both current and future land use. The potential for current industrial workers accessing vacant properties is minimal and therefore not evaluated quantitatively in the HRA. Moreover, the residential and/or commercial scenarios used for the future land use in the HRA are considered more protective.

169. Part 2, Vol. 1, page 7-15, third paragraph. Additional information is needed to clarify how all of exposure zone A49-1 (500' by 1100') will only be used as a roadway. Commercial remedial goals should be used for this area if commercial activities will occur.

Note, if other zones are located directly adjacent to this area, they may warrant an evaluation of current conditions. It could be assumed that the current industrial worker may visit other zones during the day.

Response

The risk assessment considered commercial use of A49-1. Remedial goals for

commercial worker were established. However, since this area will be used as a roadway, the FS cost estimate considered cleanup to roadway worker standards.

170. Part 2, Vol. 1, page 7-16, Section 7.2.3, first paragraph, third sentence. Why are the maximum detected soil concentrations used as the exposure point concentration? Please discuss the amount of data available in terms of its appropriateness in estimating an exposure point concentration using a UCL. Did you only have biased sampling results or limited amounts of data that made it inappropriate statistically evaluate the data?

Response

Maximum concentrations were used for ground water exposures and for indoor air exposures to soil vapor (i.e., vapor intrusion) since these exposures are likely to be associated with a single well or a single building. Because averaging data from multiple wells or across areas that will be occupied by multiple buildings may result in an underestimation of the potential risk, UCLs were not used in the estimation of risks/hazards from groundwater and from vapor intrusion into indoor air. Maximum concentrations were used for soil and ambient air exposures to soil vapor for simplicity and for consistency with the ground water and indoor air analyses. Given the generally low levels of risk/hazard associated with exposures to soil and ambient air, the additional level of statistical analysis and calculation needed to derive UCLs is not warranted. In cases where the risks were elevated, the variability of the data yields UCLs that are similar to the maximum concentrations.

171. Part 2, Vol. 1, page 7-21, Section 7.3.1, second paragraph, first sentence. It is stated that "USEPA does not derive dermal RfDs for chemicals". This statement is incorrect. Dermal toxicity values have not been provided in the EPA Region 9 PRG tables; however, the Region 9 PRG User's Guide refers the reader to RAGS Part E for guidance on deriving dermal values. RAGS Part E recommends adjusting the oral toxicity value using an ABSgi for those chemicals listed in Exhibit 4-1. The last column in Exhibit 4-1 provides a recommendation as to whether the oral toxicity value for a chemical needs adjustment. Please identify those chemicals in which oral toxicity factors need adjustment in deriving the dermal values.

Don't create separate toxicity tables for inhalation soil and inhalation soil vapor. Modify the tables to present one full list of COPCs and identify appropriate inhalation toxicity values.

Response

See earlier response to Specific Comment 87. The tables will be revised in the PGOU Lands BLRA in accordance with this comment.

172. Part 2, Vol. 1, page 7-24 through 7-28. Section 7.4. The baseline risk assessment should include a section that outlines the remedial goal options ("RGOs") for the chemicals and media of concern. This section should include both ARARs and human health-based cleanup goals for all media considered. From the RGOs, risk managers choose Remediation Levels for the Chemicals of Concern, and these numbers, derived from RGOs, are addressed in the Feasibility Study and are included in the Proposed Plan and the Record of Decision.

Response

See earlier response to specific comment 97.

A. RGOs should be developed for those exposure pathway scenarios that generated a cumulative cancer risk in excess of 1E-06 or a HI greater than one. For those scenarios that meet the aforementioned criteria, RGOs should be developed for each of the COPCs which poses a cancer risk equal to or greater than 1E-06 or a HQ equal to or greater than 0.1. RGOs may be calculated based on target cancer risks of 1E-6, 1E-5 and 1E-4, and chemical-specific hazard indices of 0.1, 1, and 3. It is noted that RGOs should be calculated for chemicals that pose an HQ greater than 0.1 to account for cumulative effects. That is, the cleanup level of some COPCs may have to be adjusted below an HQ of 1 to achieve the desired cumulative HI.

Response

See earlier response to Specific Comment 97.

B. Part 2, Vol. 1, page 7-24, Section 7.4.2. In Section 7.4.2, describe cancer risk as excess cancer risk. This concept assumes that the risk of cancer from a given chemical is in "excess" of the background risk of developing cancer (i.e., approximately 1 in 3 chances during a lifetime according to the American Cancer Society). For example, a risk of 1E-04 equates to approximately one excess cancer case in a population of 10,000 individuals due to exposure to the cancer-causing substance over a 70-year lifetime.

Response

The PGOU Lands BLRA will be revised in accordance with this comment.

173. Part 2, Vol. 1, page 7-25, Section 7.4.2, last paragraph, first sentence. Revise the first sentence as follows: USEPA and Cal-EPA have both defined a range of cumulative risk range of 1E-06 to 1E-04 that may be considered acceptable in accordance with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (USEPA, 1990).

Response

See earlier response to Specific Comment 90.

174. Part 2, Vol. 1, page 7-30, Section 7.5, first paragraph, first two bullets. The text states that the inclusion of all COPCs detected in a given exposure zone, regardless of whether all the COPCs were detected in the same boring, is likely to lead to an overestimation of potential risk. This sentence needs to be revised. If a chemical is selected as a COPC, then it should be included in the quantitative risk assessment regardless of whether the sample was collected from the same boring.

Response

The PGOU Lands BLRA will be revised in accordance with this comment.

175. Part 2, Vol. 1, page 7-30, Section 7.5 first paragraph, third bullet. The text states that the use of 1991 and 1992 data in the evaluation of the sites included in exposure zone A49-1 is likely to lead to an overestimation of potential risk because concentrations of the VOCs detected in this exposure zone would be expected to decrease over time. Are you talking about bulk soil or soil vapor data? The use of the historical soil vapor to characterize hot spots in Area 49 may have lead to an underestimation of soil vapor concentrations in these areas due to the high detection limits. These area need to be re-characterized and incorporated in the risk assessment.

Response

See earlier response to Specific Comment 164.

176. Part 2, Vol. 1, page 7-30, Section 7.5, first paragraph, forth bullet. Dermal exposures were assessed using toxicity indices developed for oral exposures. RAGS Part E recommends adjusting the oral toxicity value using an ABSgi for those chemicals listed in Exhibit 4-1. The last column in Exhibit 4-1 provides a recommendation as to whether the oral toxicity value for a chemical needs adjustment. Please identify those chemicals in which oral toxicity factors need adjustment in deriving the dermal values.

Response

The PGOU Lands BLRA will be revised in accordance with this comment.

177. Part 2, Vol. 1, page 7-30, Section 7.5, first paragraph, fifth bullet. The text states that HRA included a second evaluation of the carcinogenic risks associated with soil vapor including the NCEA slope factors. This analysis is included in Appendix N. These risks should be discussed in the uncertainty analysis rather than referring the reader to an appendix. Are the risks in excess of 1E-04 using the EPA NCEA slope factor for TCE?

Response

See earlier response to Specific Comment 92.

178. Part 2, Vol. 1, page 7-31, Section 7.5, first bullet. The text states that elevated detection limits (i.e., detection limits above risk-based screening levels) were limited to a small portion of the total samples (see Section 7.1.3). A review of the reporting limits should have been conducted which would have indicated that the hot spots in Area 49 need to be re-characterized with new soil gas data. The high detection limits may have masked the presence of detectable VOCs in the hot spot areas. According to RAGS A, data collected using different analytical methods and/or generating data that are not comparable (significant difference in reporting limits) should not be combined and used in a HRA. Therefore, it is recommended that additional soil gas data be collected from Area 49 and the historical data be eliminated from the quantitative HRA.

Response

See earlier response to Specific Comment 165.

179. Part 2, Vol. 1, page 7-31, Section 7.6. Based on the Agencies' comments regarding the PGOU soil sites HRA, conclusions made in the risk assessment summary will need to be reevaluated. Risks need to be determined for future residents for all exposure zones, metals need to be re-screened against background using the conservative approach lined out in EPA's EPA's January 5, 2005 letter—regarding the December 1994 background report—to Ms. Cindy Caulk of Aerojet, dermal toxicity values need to be adjusted, etc. Please revise the risks based on all comments that have been made.

Response

The PGOU Lands BLRA will be revised in accordance with the previous responses.

180. Part 2, Vol. 1, page 7-39, Section 7.6.2.9. How was the HRA performed for Area A49-9 since there were no samples collected within that area? This comment also applies to Section 7.6.2.10 that discusses Area A49-10.

Response

Lead based paint samples were collected in Area 49-9 and A49-10 and the risk assessment was performed on that data.

181. Part 2, Vol. 1, page 8-20, Section 8.2.2, second paragraph. Sites 10D and 11D were not evaluated since there was little potential for common wildlife to be present. As the contaminants of concern are metals and PCBs and 10D and 11D are ditches, there

is the potential for the movement of those pollutants to areas where there may be wildlife exposure, this comment also applies to page 8-32, Section 8.3.1.8, second bullet.

Response

Current development plans provide for sites 10D and the portions of the 11D ditch within PGOU to be eliminated to support the development of land in this area. This would alleviate any potential for the movement of these pollutants to areas where there may be wildlife exposure.

182. Part 2, Vol. 1, page 8-34, Section 8.3.1.10, second paragraph. The theme of this paragraph is that there should not be a concern for ecological receptors since the development will likely eliminate the habitat. Some areas of Fremont cottonwood-oak woodland and emergent marsh may be required to be maintained (C15 as an example). In addition, migration of pollutants at some sites via stormwater to other areas may provide sufficient justification for removal of the pollutants.

Response

Aerojet will consider these comments in its revision to the PGOU Lands BLRA. It may be appropriate to schedule a conference call with the ecological risk assessors to discuss this issue.

183. Part 2, Vol. 1, page 9-1, Section 9.0. Based on the Agencies' comments regarding the PGOU soil sites Health Risk Assessment ("HRA"), the approach presented in this section will need to be reevaluated after the risk assessment comments are addressed. For example, the results of the revised HRA will be used to determine if: sites 7D, 5D, FCS and C29 should be excluded from the feasibility study; the grouping of exposure zones needs to be revised; and the listing of COCs and their selected remedial goals needs to be modified.

Response

Once the PGOU Lands BLRA is revised Aerojet will review Section 9.0 and make any necessary revisions.

184. Part 2, Vol. 1, page 9-2, Section 9.1.1. The risks from soils and the vadose zone need to be combined with that associated with volatilization of VOCs from groundwater into indoor-air in order to get a complete risk assessment of the site. In addition, it needs to be understood that if there are risks greater than 10^{-6} incremental cancer risk, then appropriate deed restrictions and other institutional controls may be required. Those covenants could restrict the property to commercial/industrial use.

Response

So noted.

185. Part 2, Vol. 1, page 9-12, Section 9.2.4. RAOs for soil and soil vapor should include the protection of ground and surface water quality for beneficial uses from not just VOCs, but SVOCs, metals, PCBs and other such pollutants. This goes for all of the soil sites, not just those that are listed as being above some threshold.

Response

So noted.

186. Part 2, Vol. 1, page 9-13, Section 9.2.5.2, first paragraph. The extent of VOCs exceeding cleanup goals is based on future potential use being a roadway. At a minimum the extent also needs to include areas exceeding the commercial scenario because Section 7.2.2 (page 7-15) states this scenario is also evaluated.

Response

It is unclear why the FS needs to evaluate a commercial scenario. The FS states that a deed restriction will be in place to ensure a roadway worker scenario.

187. Part 2, Vol. 1, page 9-26, Section 9.5.2.2, . This alternative assumes that no additional SVE wells are needed to extract the estimated extent of VOCs exceeding the cleanup goals. The assumed radius of influence for the existing SVE wells needs to be documented in the feasibility study to show why the cost of additional wells and piping should not be included in the cost estimate.

Response

The cost estimate is a FS level (i.e., +50/-30 percent) estimate, adequate for remedy selection and assumed that a soil vapor extraction pilot study would need to be performed to support the design of an SVE system and the appropriate number of wells.

188. Part 2, Vol. 1, page 9-27, Section 9.5.2.2, third paragraph, fourth sentence. Does the estimated SVE operation time of approximately 2 years account for the potential presence of DNAPL?

Response

The SVE operation time of approximately two years was estimated using the maximum detected values in soil vapor and typical SVE concentration decreases (based on the results of a six-site study by the Army Corps of Engineers). This estimate was used to determine the duration of SVE for cost estimating purposes. As presented in the RI/FS, the SVE system would remain in operation

until either the compound-specific remedial goals are achieved for the planned use of the system reaches a point of diminishing returns (e.g., when the expense of continued operation is not justified by the insignificant additional mass of contaminant removed from the ground). Aerojet understands that if the system reaches a point of diminishing returns and compound specific concentrations remain above remedial goals, development plans would need to be modified accordingly.

189. Part 2, Vol. 2, Figure 1-1. Revise the figure to show OU Zones, Areas, and Source Sites on one map. A revised figure needs to be included in the risk assessment report. Also "exposure zones" as they relate to OU Zones, Areas, and Sites needs to be clearly displayed on additional maps in support of the risk assessment.

Response

Figure 1-1 will be revised in accordance with this comment and included in the PGOU Lands BLRA.

190. Part 2, Vol. 2, Figure 4-4. The highest reported concentration for lead on the map (11D-SNSO4) is above the State's screening level for lead. However, based on the information provided, we cannot tell whether this is a lead hotspot or not because there are no additional data points that bound the result. Please evaluate the result and indicate how Aerojet plans to resolve this data gap.

Response

Lead was not detected in the soil sample collected at 11D-SNS04 at a depth of 3 feet bgs. Sample location 11D-SNS04 is bounded to the north, south, and west by the presence of pavement and to the east by sample location 11D-SNS011, with lead at 87 mg/kg. Therefore, the sample represents a hotspot and is not indicative of widespread contamination.

191. Part 2, Vol. 2, Figure 4-5. This figure should identify on the map which PCB concentrations exceed the screening values for PCBs. The same Figure also lists a result 720,000 ug/kg PCB further up the ditch which is indicated not to be part of the PGOU. Based on the direction of drainage flow indicated on the figure Aerojet needs identifying the extent of PCBs contamination in this area. The EPA would not delete portion of a ditch down gradient from source up gradient in the same ditch. Provide a symbol on the figure that indicates where transformers were historically located on the Aerojet property so that the reader can evaluate whether these potential PCB source sites have been properly evaluated.

Response

A figure identifying samples with PCBs above the screening levels will be included in the PGOU Lands BLRA. The source of the PCBs was an above-

ground storage tank for PCB-oil used in machinery and not from transformers. The source area of the PCBs is not included in the PGOU but is covered by the Boundary Operable Unit RI/FS.

A transformer survey was conducted in accordance with the Agency approved approach and no transformers above 3,000-KVA were identified within the PGOU lands.

Aerojet currently anticipates that development would eliminate the portions of the 10D and 11D ditches included within the PGOU. Runoff from the ditch near the source of the PCBs would be directed elsewhere.

192. Part 2, Vol. 2, Figure 5-9 and related figures. These figures are very confusing. Soil gas concentrations need to be clearly distinguished from other numerical values on the figure. The numbers do not appear to correspond with Table 7-4. Figures in the revised risk assessment should present all soil gas data, not just those limited to one sampling event. Indicate the locations where 1, 2 DCE was measured at 10,590,340 ug/m^3, PCE at 667,670 ug/m^3, TCE at 26,647,000 ug/m^3 and vinyl chloride at 9,676,080 ug/m^3.

Response

Figures 5-4 through 5-10 will be revised to include boxes for the soil vapor data at each sampling location to eliminate interference from objects in the aerial photograph base map. Additionally, the boundaries of the designated exposure zones will be shown on the figures. These revised figures will be provided with the PGOU Lands BLRA.

193. Part 2, Vol. 2, Figure 6-1. Figure 6-1 needs to only show the conceptual site model applicable to the Soil Sites PGOU (Areas 20, 21, and 49). The soils model on Figure 6-1 (sheet 1) appears to be the same as the soils model depicted on Figure 6-1 (sheet 2). Separate ecological and human health CSMs should be generated.

Under human receptors, on-site resident should be referred to as future on-site resident. For the on-site commercial/industrial worker, change to current/future commercial/industrial worker. Indicate what soil depths were used to evaluate the current and future industrial/commercial worker. The site visitor/recreator should be called "current". The on-site construction worker should be called future construction worker. Additional comments are provided as follows:

A.For the future site resident, include ingestion of garden produce as a complete pathway. The site is being evaluated under the "no action" alternative and significant land preparation may not occur prior to establishing a food plot.

B. Was sediment associated with the surface water bodies ever sampled for risk assessment? Sediment is an exposure medium included in the CSM. Please discuss any sediment or lack of sediment data in the HRA

Response

See earlier response to Specific Comment 100.

Projected residential redevelopment at Aerojet is not likely to include land-intensive pathways, such as in-situ gardening. The naturally occurring soil at Aerojet is not suited for this type of activity. Significant land preparation activities (i.e., addition of topsoil and nutrients) would be required prior to growing fruits or vegetables.

As noted on the CSM, no sediment was identified in the potential source sites within Area 20, 21, and 49 and was therefore, not sampled. Samples collected from man-made ditches were designated as surface soil samples because they are 1) exposed (i.e., not covered by water); 2) dry (unsaturated); 3) sufficiently fine-grained such that they may become airborne; and 4) will be mixed in with shallow soil during site grading.

194. Part 2, Vol. 2, Figure 7-1 through 3. One soil gas sample per location is not sufficient to conclude that there are no TCE vapors migrating from groundwater. Is this the purpose of the figure? Also, this figure is unclear as to which numbers represent soil gas samples vs. groundwater samples and which numbers represent sample IDs.

Response

The purpose of these figures is to identify the Exposure Zones used in the HRA. There is no soil gas or groundwater sample data on the figures.

195. Part 2, Vol. 2, Figure 9-1. VOC concentrations need to be added to the figure to show how estimated extent of VOCs above cleanup goals was determined. Were the 2003 soil vapor sample results used for estimating the extent of VOC exceeding the cleanup goals (the 1992 soil vapor sample locations are shown on Figure 9-1)? A figure showing the aerial extent of elevated SVOCs exceeding the commercial scenario is also needed because Section 7.2.2 (page 7-15) states this scenario is also evaluated.

Response

Yes, the 1992 and 2003 soil vapor results were used for estimating the extent of VOCs. No SVOCs exceeded the initial screening levels (Residential PRGs) in Areas 20, 21, or 49.

196. Part 2, Vol. 2, Figure 9-2. This figure should show the assumed radius of influence for the SVE wells.

Response

Figure 9-2 will be revised in response to this comment and provided to the Agencies after completion of the PGOU Lands BLRA and any necessary changes to the FS.

197. Part 2, Vol. 2, Table 4 series. The intake tables (Table 4 series) include a maintenance worker. A maintenance worker is not included on the CSM. Please include the receptor on Figure 6-1. Are there current maintenance activities occurring at the site? Please discuss. If there are current activities, then include evaluate this receptor based on surficial soil data (for direct contact) as discussed for the current industrial/commercial worker.

Response

This scenario was developed to address the occasional maintenance of future subsurface infrastructure components such as sewer lines and telephone cables, where intrusive activities may result in exposure to subsurface soil and soil vapor. Exposures under this scenario would be expected to be less than exposures to these same media under a construction worker scenario.

Currently, there is no maintenance work within the PGOU Lands. Recognizing the infrequent nature of future maintenance worker exposures, the future maintenance worker scenario will be eliminated from the PGOU Lands BLRA, as recommended by the agencies in Specific Comment 202.

198. Part 2, Vol. 2, Table 6-2. The units for fraction organic carbon are not cm^3/gm and should be unitless.

Response

Table 6-2 will be revised in response to this comment and provided to the Agencies after completion of the PGOU Lands BLRA and any necessary changes to the FS.

199. Part 2, Vol. 3, Appendix C, Table C-1. Table C-1 presents the parameters used in the groundwater to indoor air modeling. An SCS soil type of loamy sand was used. Why wasn't the SCS soil type used to estimate the soil vapor permeability rather than using the value of 1E-08 cm^2? Why wasn't the SCS soil type used to estimate the vadose zone soil total porosity and the soil dry bulk density? The site-specific values should be used in the modeling where they are available; otherwise, the recommended values associated with the selected SCS soil type should be used.

In Table C-1, it is indicated that a site-specific value of 0.24 cm^3/cm^3 was selected as the water-filled porosity. However, a value of 0.3 cm^3/cm^3 was used in the modeling. Use the value of 0.24 cm^3/cm^3 since it is site specific.

Response

The agencies' reference for this comment appears to be in error. Part 2, Volume 3, Appendix C provides a list of samples submitted for data validation. Part 2, Volume 3, Appendix F contains a table presenting the parameters used in the soil vapor to indoor air modeling and the modeling runs (on disk) and not the parameters used in the groundwater to indoor air modeling. Table C-1 which presents parameters and assumptions used in the groundwater to indoor air modeling was included in Part 1, Volume 4, Appendix E, Attachment C.

The SCS soil type was not used to estimate the vadose zone total porosity and soil dry bulk density because site-specific data was available for those parameters.

See earlier response to General Comment 6H and 6I.

200. Part 2, Vol. 3, Appendix K. Exclusion of RI data in the risk assessment. The risk calculation tables presented in Appendix K do not appear to incorporate all data from the 1993 Stage 1 RI. For example, the 1993 data set was omitted in the risk evaluation of the former company store site. This site is intended for residential development and one might conclude from the Appendix K tables that this is a clean site. However, Freon 113 up to 18,400,000 ug/m^3, TCE up to 325,000 ug/m^3, PCE up to 34,900 ug/m^3, 1,2-DCE up to 32,600 ug/m^3, and vinyl chloride up to 4,500 ug/m^3 were all measured at this same site (see Part 2, Vol. 1, page 4-44). The only chemical in this group that is listed as a chemical of potential concern in the risk tables is PCE. It is also noteworthy that the former company store site shows measurable releases (fluxes) of TCE, 1,2-DCE, and a number of other volatiles to outdoor air (see Part2, Vol. 3, Table G-2).

Response

As discussed in the RI, the Former Company Store site was completely recharacterized for VOCs in 2003 and 2204. The data supersedes the historical data and therefore the historical data was not included in the risk assessment.

201. Part 2, Vol. 3, Appendix K, Table 4.1. Table 4.1 in Appendix K shows that the exposure frequency for the construction worker is 250 days/year. Was this assumption made because for a site of this size, a construction worker may not work at other projects on the site? This is more conservative than what is used for a standard industrial/commercial worker scenario. Please clarify your rationale for using 250 days per year.

Response

An exposure frequency of 250 days per year was utilized, recognizing the size of the Aerojet site and the fact that, over the course of his or her career, a construction worker may work in more than one part of the site. The rationale for this assumption will be presented in the PGOU Lands BLRA.

202. Part 2, Vol. 3, Appendix K, Table 4.1. In Table 4.1 of Appendix K, the exposure frequency for a maintenance worker was only estimated to be 10 days per year. This is considered too low. The EPA 2002 Supplemental Soil Screening Guidance (OSWER 9355.4-24) does not specifically address a maintenance worker, so please don't cite this guidance when discussing this receptor. Please incorporate site-specific information regarding the exposure assumptions of a maintenance worker. Sometimes maintenance workers (permanently assigned to a site) may be at the site at an exposure frequency similar to commercial workers (250 days per year). The same soil ingestion rate was used for the maintenance worker as was used for the construction worker (330 mg/day). This is considered too conservative. It would be assumed that a maintenance worker is not involved with significant intrusive activities as is a construction worker. It is suggested that an evaluation of commercial/industrial and construction workers is sufficient as risks from a maintenance worker may be similar (or less than) to that of an industrial/commercial worker. So, it is not recommended that a separate maintenance worker be evaluated in the HRA.

For the construction worker, estimate the PEF using guidance provided in the EPA 2002 Supplemental Soil Screening Guidance (OSWER 9355.4-24) Equation 5-5.

Response

Noted. The maintenance worker scenario was developed to address the occasional maintenance of future subsurface infrastructure components such as sewer lines and telephone cables, where intrusive activities may result in exposure to subsurface soil and soil vapor. Exposures under this scenario would be expected to be less than exposures to these same media under a construction worker scenario. For this reason, the maintenance worker scenario will be eliminated from consideration in the PGOU Lands BLRA (please see the response to Specific Comment 197).

As discussed with the agencies on 26 May 2005, the construction worker scenario will utilize a PEF of 2E+6 m^3/kg. Considerable detail characterizing future construction activities is needed in order to utilize Equation 5-5. In the absence of detailed knowledge about future construction activities, a PEF of 2E+6 m^3/kg provides a conservative estimate of fugitive dust exposures under a construction scenario. This assumption is consistent with discussions held with the agencies on 26 May 2005.

203. Part 2, Vol. 3, Appendix K, Table 4.2. In Table 4.2 of Appendix K (presenting fugitive dust intakes), include the term PEF rather than VF in the intake equation. VF stands for volatilization factor. The PEF indicated for the construction worker in Table 4-2 is 2E+6 and 2E+7 is cited in the text. Again, calculate this using the EPA 2002 Supplemental Soil Screening Guidance (OSWER 9355.4-24) Equation 5-5.

Response

Consistent with the discussions held with the agencies on 26 May 2005, the PGOU Lands BLRA will be revised to reflect this discrepancy. However, given the level of detail about future construction activities needed to estimate fugitive dust exposures using Equation 5-5, the HRA will utilize a PEF of 2E+6 m^3/kg.

Response to General Comment 21

The historical volume of groundwater pumped as well as mass of TCE, NDMA, perchlorate, and 1,4-dioxane removed for groundwater extraction wells associated with GET D, ARGET, GET B, and GET A are provided in the following tables. The data are summarized by year and summary tables are included for each well. Cumulative historical volume and mass for each GET system are also included in separate tables.

Volume information was derived from individual flow meters associated with each extraction well. Each flow meter provides an instantaneous flow reading and includes a counter that indicates the total volume pumped. Operators record instantaneous flow and totalizer values on a regular basis. For most extraction wells, records exist in the Aerojet database for these values. For some wells, during various timeframes, instantaneous readings were not recorded.

Samples of groundwater were collected from each extraction well (1) during well development, and (2) at required frequencies during the period the well was operated. The mass amounts shown on the following tables were calculated by multiplying the concentration of the chemical of concern by the volume of groundwater pumped during the prior period of time between sample dates. If a flow meter totalizer value was not collected on the date the well was sampled, a totalizer value was calculated for the sample date using interpolation.

For almost all wells, there is a period of time between initial well development and when the well was operated continuously since all wells associated with a particular GET were started-up at the same time. Thus, there may be analytical data associated with a well but no mass removal since the well was not pumping groundwater.

The following assumptions were used in developing the tables:

- Estimated "J" values were used in the mass calculations.
- All "<" results were assumed to be zero.
- Where duplicate samples were obtained and one of the results is reported as a "<" value, the analytical result that was not reported as a "<" value was used in the mass calculation.

When reviewing the tables, the following should be taken into consideration:

- Analytical detection limits have been lowered significantly over the 1980 to 2005 time period that extraction wells have been operating. Therefore, the amount of mass removed may be overstated.
- A value of zero in any table indicates that flow may have not been recorded or samples may have not been taken in a particular year.
- Only partial information was available in the database for 2005.