Environmental
Resources
Management

2525 Natomas Park Drive
Suite 350
Sacramento, CA 95833
(916) 924-9378
(916) 920-9378 (fax)

9 July 2004

ERM

Mr. Charles S. Berrey
United States Environmental Protection Agency
Region IX, SFD-7-2
75 Hawthorn Street
San Francisco, CA 94105-3901

Subject: Response to Agency Comments on the *Draft Baseline Risk Assessment for the Perimeter Groundwater Operable Unit (OU-5)*, Aerojet Superfund Site, Sacramento, California

Dear Mr. Berrey:

On behalf of Aerojet General Corporation (Aerojet), ERM-West, Inc., (ERM) is providing the following responses to agency comments on the *Draft Baseline Risk Assessment for the Perimeter Groundwater Operable Unit (OU-5)*, September 2003 (BLRA), provided in the United States Environmental Protection Agency's (USEPA) letter dated 28 October 2003. This written response to comments is provided in accordance with our agreement at the 9 June 2004 risk assessment meeting. The text of each comment is repeated verbatim below in bold italics followed by Aerojet/ERM's response.

Executive Summary

1. ***Until the 1991 survey is updated and the privately owned wells water uses are reviewed it is not appropriate to state in the first bullet of page ES-2 that "... there is no current or likely future use of untreated groundwater for residential water supply." As just one example, there is groundwater used for domestic purposes south and southwest of Zone 3.***

   Noted.

Section 1: Introduction

1. ***The BLRA has to cover both soil and groundwater if soil is to be part of the PGOU.***

   The Perimeter Groundwater Operable Unit (PGOU) Remedial Investigation/Feasibility Study (RI/FS) Report (RI/FS Report) will include risk assessment for both soil and groundwater.

2. ***The BLRA provides a list of existing water supply wells within 1-mile of the PGOU, and the current operational status of each well is provided in Table 1. These wells are reportedly presented on Figure 2. However, the wells provided in Table 1 could not be located on the figure and visa versa and some wells were omitted both on Table 1 and on Figure 2. For example, wells 1008, 1019, 1031, 1035, 1064, 1084, 1161, 1028, 1298, 1864, and 1301 need to be shown on Figure 2 and wells 1002, 1003, 1021, 1027, 1035, 1964, 1028, 1019, 2064, 1884, 1896 and 1161 need to be shown on Table 1. Also, well 1013 is in the former Arden-Cordova Well 9 which was destroyed many years ago. All of the wells shown on Table 1 need to be depicted on Figure 2. Corrected Table 1, Figure 2 in the BLRA and Figure 2-3 in RI Volume 1 need to be in agreement. Many of the water wells listed on Table 1 indicate that the current use has not been confirmed. This is a data gap that needs to be filled as indicated in the RI Recommendation Section for each Zones. Also on Figure 2, the designation "*" adjacent to selected wells is not defined? If it means the well is not in service, then the "*" next to Well 2066 should be removed.***

   Table 1 and Figure 2 will be revised with the results of the updated 1991 well survey; Table 1 and Figure 2 will be checked for consistency.

3. ***The difference between a water supply well and a domestic well is not clear in Figure 2. The destination does not appear to be helpful since the majority of wells indicated as water supply wells are water purveyor wells in which the water is served for domestic use. The Figure 2 well destination would be better as private and public water supply wells with Table 1 indicating private wells with human exposure or no human exposure. The type of human exposure needs to be indicated (e.g., dermal, oral or inhalation). This comment applies to RI Volume 1 Figure 2-3 well designation also.***

As stated above, Table 1 and Figure 2 will be revised with the results of the updated 1991 well survey; Table 1 and Figure 2 will be checked for consistency.

4. *For public it needs to be made clear what terms at the property boundary and beyond the property boundary mean in Table 2, as well as upgradient and downgradient with regard to Zones 1, 2, 3, and 4.*

The revised BLRA to be provided in the RI/FS Report will include a figure delineating the exposure area boundaries.

Section 2: Data Collection and Evaluation

5. *Evaluation of the adequacy and quality of the analytical data used in the BLRA was to be performed in accordance with the final work plan. This was not included in the BLRA. The BLRA needs to incorporate the following into the data evaluation:*

5a. *Provide more information regarding the selection of groundwater data that was evaluated as part of the BLRA (data from Jan. 2000 to April 2003). This amount of data seems acceptable, however, build a better rationale for limiting groundwater data to just this time period.*

The Remedial Investigation (RI) for the PGOU included the sampling period from January 2000 through April 2003. The data collected during that period were evaluated in the BLRA. Additional text will be added to the revised BLRA to provide better rationale for the selection of groundwater data.

5b. *Describe how groundwater data were collected. For example, does the data set include groundwater data collected from both temporary wells and permanent monitoring wells? Were any groundwater data collected using direct push methods? Were the same sampling techniques used in every sampling event?*

The revised groundwater RI to be provided as part of the RI/FS Report will provide a detailed description of the groundwater data collection activities.

5c. *Only validated data should be used in a BLRA. Provide a discussion in the BLRA regarding data validation results for the analytical data*

used in the BLRA and whether or not QA/QC parameters were acceptable and whether data quality objectives were achieved.

In accordance with the sitewide Quality Assurance Project Plan, 10 percent of the groundwater data were validated. The results of the data validation will be included in the RI/FS Report.

5d. ***The choice of analytical methods is critical to providing high quality data for use in a BLRA. 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 BLRA. Describe what analytical methods were used for each set of groundwater data used in the BLRA. Were the analytical method used the most sensitive method promulgated by EPA?***

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 (*Perimeter Groundwater Operable Unit Final RI/FS Work Plan,* Aerojet, 13 June 2002).

5e. ***The BLRA 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).***

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.

5f. ***The BLRA needs to include an evaluation of data qualifiers. How were the data qualified and how were qualified data used in the BLRA? Any flagged data used in the BLRA 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.***

Data qualifiers for the minimum and maximum concentrations were included on Table 3 with definitions. The entire data set, including qualifiers, will be provided in the RI/FS Report.

6. *The BLRA does not contain any figures depicting the locations of monitoring wells. The reader does not know how many wells were used from each zone and layer to generate EPCs and COPCs in groundwater. Also, based on the figures presented in the BLRA, it is not clear where the boundaries are to distinguish areas considered at the property boundary from areas that are considered to be beyond the property boundary. Provide figures separate for each zone depicting groundwater wells used to develop COPCs and EPCs at the property boundary and beyond the property boundary. Distinguish between those wells that were identified as being at the property boundary and those wells that are beyond the property boundary.*

   The RI/FS Report will include figures showing the study area limits (including at the property boundary and beyond the property boundary). A list of wells designated as being "at the property boundary" and "beyond the property boundary" was provided in Appendix A of the BLRA. Figures showing the locations of all monitoring wells were presented in the *Perimeter Groundwater Operable Unit Draft Remedial Investigation,* September 2003, and will be provided in the RI/FS Report.

7. *Organize chemicals presented in the data summary tables (Tables 3.1 to 3.4) by chemical class (i.e., metals, VOCs, etc.).*

   During a teleconference discussion on 12 February 2004, it was agreed among the parties that the order of the chemicals did not need to be modified.

8. *According to the BLRA, "naturally occurring inorganic constituents were not included as COPCs, based on their generally low detection in perimeter groundwater and on the absence of an on-site source for these constituents." This is not an acceptable rationale for excluding a chemical as a COPC. What is meant by generally low detection in perimeter groundwater? Does generally low mean below EPA Region 9 residential tap water PRGs? If so, than use this rationale for excluding these metals as COPCs. These 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 a cumulative risk for all COPCs including tentatively identified compounds. These could potentially be backed out if proven to be within background. No comparison to background was conducted in the BLRA.*

The revised BLRA will include a screening of metals data against the USEPA Region 9 Tap Water Preliminary Remediation Goals (PRGs) published in the October 2002 tables. If the maximum concentration of dissolved metal is above the Tap Water PRG, the metal will be retained as a constituent of potential concern (COPC).

With respect to tentatively identified compounds (TICs), the revised BLRA will include additional discussion in the text reflecting the resolution reached with the agencies during the conference call on 12 February 2004. TICs will not be included within the quantitative evaluation.

9. ***Although Appendix A provides a listing of wells used in the BLRA, it is requested that the number of detections (i.e., 1 out of 10, etc.) associated with each chemical be provided as part of the data summary tables (Tables 3.1 to 3.4) per OSWER 9335.5-5 on Record of Decision format dated July 1999 "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents." This would provide the reader with a quick assessment of the number of data points associated with each chemical for each zone and layer. Include this information in Tables 3.1 to 3.4.***

The number of detections and total number of samples will be added to Table 3 in the revised BLRA.

10. ***Data summaries 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.***

Nondetects were not included in the BLRA. The entire data set, including qualifiers, will be provided with the RI/FS Report.

11. ***Don't report a chemical in the data summary tables if it was never measured in groundwater (e.g., trans-1,2-Dichloroethene). Use the most conservative screening value between cis- and trans-1,2-Dichloroethene as the screening toxicity value for total 1,2-Dichloroethene. Cis-1,2-Dichloroethene is included twice in many of the data summary tables. Only include this chemical if it was measured in groundwater.***

The tables to be provided in the revised BLRA will be revised in accordance with this comment.

12. *Why is the CAS number for nitrate as presented in the data summary tables the same as the CAS number presented for methylene chloride? Correct this in all tables where this occurs.*

The tables to be provided in the revised BLRA will be revised in accordance with this comment.

Section 3: Exposure Assessment

13. *According to EPA risk assessment guidance, the Site Conceptual Model (SCM) diagram should present a complete picture of the linkages among contaminant sources, release mechanisms, exposure pathways and routes to current and potential future receptors that may be exposed at the site. In this respect, the SCM presented as Figure 4 in the BLRA needs much more detail explaining all possible pathways and why they were eliminated. Figure 4 is oversimplified and does not adequately reflect what is presented in the exposure assessment. Specific comments are provided below.*

On 20 April 2004, and again on 14 June 2004, Aerojet transmitted a revised Site Conceptual Model (SCM) to the agencies and its consultant by email.

14. *The BLRA makes the following comment regarding ecological receptors: Evaluation of potential risks to ecological populations is not considered necessary at this time because no discharge of impacted perimeter groundwater to surface water has been identified. Aerojet is currently in the process of collecting additional data to confirm that understanding. "Evaluation of potential risks to ecological receptors is deferred, pending the collection of the additional data. Based on this, a connection between groundwater and surface water may exist, but has not been confirmed. This is not reflected in the SCM. Groundwater flow migration should also be identified as a release mechanism and surface water/sediment should be identified as potential pathways of exposure, as ecological or human receptors may be exposed to both of these media. A note could be provided in the SCM that would indicate the current understanding of this potential pathway and that additional data are being collected.*

Surrounding surface water bodies and associated use were not described as part of the exposure assessment. The exposure assessment should provide a

complete description of the land and water use. The exposure assessment should provide a discussion of surface water use and a better rationale as to why groundwater does not impact surface water.

On 20 April 2004, and again on 14 June 2004, Aerojet transmitted a revised SCM to the agencies and its consultant by email.

15. *The SCM indicates that ecological receptors are exposed directly to groundwater. Ecological receptors should be linked to the surface water and sediment pathways (see above). Make this correction in the SCM. Expand the list of ecological receptors to include: birds, mammals, plants, fish, amphibians/reptiles, and invertebrates. In addition to exposure via direct contact pathways, indicate that ecological receptors may be exposed via the food-chain (ingestion of plants or animals).*

The revised SCM, referenced in the previous response, includes an SCM for human receptors and an SCM for ecological receptors. The ecological SCM includes birds, mammals, plants, fish, amphibians/reptiles, and invertebrates.

16. *It is recommended that two SCMs be provided in the BLRA, one for human receptors, and one for ecological receptors.*

As stated above, the revised SCM includes an SCM for human receptors and an SCM for ecological receptors.

17. *For each human receptor listed in the SCM, indicate whether they are based on current, future or current/future exposure.*

See response to comment 13 above.

18. *Define what "X" means in the receptor box. Also, what does it mean if a box is empty?*

See response to comment 13 above.

19. *The SCM, as presented in Figure 4 of the BLRA, should reflect all potential human receptors (current and future) and the rationale as to why they are included (or not included) for quantitative evaluation in the BLRA. The following changes are recommended for human receptors:*

19a. Change "Area Residents" to "Current/Future Off-Site Child and Adult Resident." Note in the SCM that the off-site groundwater is currently used for domestic purposes, but all current use is expected to be monitored and treated if necessary. As such, groundwater exposure to future off-site child and adult residents is based on consumption of untreated groundwater. A potential current exposure exists to off-site residents based on migration of VOCs in groundwater to outdoor and indoor air. Clarify in the SCM that these exposure routes were evaluated for residents living over contaminated groundwater. The SCM contains an "X" for inhalation exposure associated with residents. Explain that inhalation exposure includes inhalation of volatile chemicals while showering and inhalation of volatile chemicals migrating from groundwater to indoor/outdoor air.

See response to comment 13 above.

19b. Revise the "Site Visitor/Worker" to be "Current/Future Industrial/Commercial Worker". A visitor and a worker are two separate receptor populations and should be split out in the SCM. The worker should be called "current/future" because inhalation of VOCs in indoor/outdoor air is a current scenario. The SCM should reflect that off-site groundwater is currently used for industrial purposes, but all current use is expected to be monitored and treated if necessary. Indicate in the SCM that future exposure from groundwater to industrial/commercial workers is a complete pathway, but has not bee quantitatively evaluated in the BLRA through ingestion, dermal/inhalation while showering, and migration of volatiles to indoor/out air because risks based on future residents is more conservative and will generate lower cleanup concentrations. You can use a different symbol (i.e., other than "X") to indicate a completed pathway, but not quantitatively evaluated in the BLRA.

See response to comment 13 above.

19c. Add a "Current Site Visitor" as a separate human receptor in the SCM. Indicate that the current site visitor may be exposed from inhalation of VOCs in outdoor air. Indicate that this receptor was not quantitatively evaluated in the BLRA because risks based on exposure to the current/future child and adult residents from inhalation of VOCs in indoor and ambient outdoor air are conservative and thus

any cleanup concentrations generated based on this scenario will be more restrictive.

See response to comment 13 above.

19d. *Revise the exposure routes to include: groundwater ingestion, non-ingestion use of groundwater, inhalation of volatile emissions in outdoor air, and inhalation of volatile emissions in indoor air. Explain that non-ingestion groundwater use for the current/future child and adult resident and current/future industrial/commercial worker includes dermal contact and inhalation of volatiles while showering. Also, in addition to showering, non-ingestion groundwater for residents includes inhalation of VOCs from cooking, laundering, and dishwashing.*

See response to comment 13 above.

19e. *Exposure routes for sediment and surface water should include direct contact (ingestion/dermal contact) and food-chain ingestion as routes for ecological receptors.*

See response to comment 13 above.

19f. *Explain why a human receptor such as a trespasser has not been considered for current/future exposure to surface water and sediment. Indicate that this is a potentially complete pathway but may be evaluated if additional data suggests that surface water/sediment are being impacted.*

A human receptor such as a trespasser was not considered because security measures at the site, including a fence installed at the facility boundary, prevent trespassers.

20. *On page 3-2, Section 3.1, second paragraph, it is stated that the wells used for residential supply are monitored according to the Partial Consent Decree (PCD). Not all wells are monitored pursuant to the PCD. Examples of wells not monitored are 1864, 1298, 1299, and 1301.*

The text provided in the revised BLRA will be revised in accordance with this comment.

21. *On page 3-2, Section 3.2, third paragraph, it should be noted that home gardens are irrigated using groundwater at Wells 1864, and 1298/99. This comment, and the preceding comment, also apply to page 5-2, Section 5-3, paragraph 1.*

Noted. The use of groundwater from those wells will be confirmed as part of the update to the 1991 Well Use Survey.

22. *Section 3.4 – Exposure Assumption And Intake Calculations*

22a. Section 3.4 needs much more detail. This section should discuss exposure assumptions separately for each receptor evaluated in the BHHRA. Each exposure route evaluated should be discussed individually within this section. Don't just refer the reader to a table (i.e., Table 5.1) to explain all this. For example, under the dermal contact scenario explain how you determined the surface area to be used for the child and adult and how you obtained Kp values. Did you have to calculate any Kp values? What model was used for the showering scenario? Is the model based on showering alone, or really for general household use? Note that the model is meant to be applied to household non-ingestion use in general and not specifically to showering. Based on this, and the fact that the receptor populations are current/future child and adult residents, the exposure scenario needs to be changed from inhalation of volatiles while showering to inhalation of volatile chemicals during household noningestion use of groundwater (e.g., showering, cooking, laundering, and dishwashing). What criteria was used to select volatile chemicals for evaluation based on inhalation during household noningestion use of groundwater?

Section 3.4 of the revised BLRA will be expanded to provide more detail and to discuss the exposure assumptions for each receptor.

22b. Equations used to estimate <u>carcinogenic</u> intakes for the current/future child and adult residents need to incorporate age-adjusted factors for ingestion and inhalation as presented in the EPA Region 9 PRG User's Guide. Use the following intake equations to estimate ingestion and inhalation cancer intakes from exposure to groundwater. Use the exposure assumptions recommended in the EPA Region 9 PRG User's Guide.

$$Intake_{ingestion} = \frac{Cw \times EFr \times IFWadj}{ATc \times CF}$$

$$Intake_{inhalation} = \frac{Cw \times EFr \times VFw \times InhFadj}{ATc \times CF}$$

Where:

Cw = EPC in groundwater (µg/L)
EFr = Exposure Frequency (350 days/year)
IFWadj = Age-adjusted ingestion rate (1.1 L-yr/kg-day)
InhFadj = Age-adjusted inhalation rate (11 m^3-yr/kg-day)
ATc = Averaging time for cancer intakes (25,550 days)
CF = Conversion Factor (1,000 ug/mg)
VFw = Volatilization Factor (0.5 L/m^3)

As the parties agreed during the 12 February 2004 conference call, USEPA Region 9 PRG User's Guide age-adjusted equations will be used for carcinogenic intakes in the revised BLRA.

23. ***To estimate noncancer intakes for child and adult receptors from ingestion and inhalation exposure, use the exposure assumptions presented in Equation 4-6 of the EPA Region 9 PRG User's Guide. Rearrange the EPA Region 9 PRG equation to calculate noncancer intakes for ingestion and inhalation exposure from groundwater. Use the exposure assumptions identified in the EPA Region 9 PRG User's Guide. Inhalation exposure should reflect exposure not just from showering but from household noningestion use (as previously discussed).***

Equation 4-6 of the USEPA's Region PRG User's Guide will be used to calculate noncancer intakes for ingestion and inhalation exposures from groundwater in the revised BLRA.

24. ***Along with the intake equations for ingestion, dermal contact, and inhalation during noningestion household use (Tables 5.1 and 5.2), present intake equations and assumptions for inhalation of volatiles in groundwater migrating to indoor and outdoor ambient air.***

An evaluation of the potential migration of volatile organic compounds (VOCs) into indoor and outdoor air and potential risks will be included in the revised BLRA in the RI/FS Report.

25. *State in the exposure assessment the criteria that was used to identify a chemical as volatile. For example, 1,4 Dioxane was not evaluated based on inhalation exposure. Explain why in the report.*

The following explanation was provided in Table 7.2:

"1,4-Dioxane and N-nitrosodimethylamine have inhalation slope factors, however, these constituents are listed as nonvolatile in the USEPA Region IX Preliminary Remediation Goals tables. Therefore, the inhalation slope factors have been listed as not applicable in the risk calculation tables."

A similar discussion will be added to the text of the revised BLRA.

25a. *Bromoform and phenol were both evaluated as being volatile and risks were estimated based on inhalation. These chemicals have a Henry's Law constant greater than 10^{-5} (atm-m^3/mol) and a molecular weight less than 200 g/mole and don't need to be evaluated based on the inhalation exposure route.*

Bromoform and phenol will be excluded from the evaluation of potential risk from inhalation in the revised BLRA.

26. *Kp values are presented in Table 6.1 of the BLRA. These values should be presented in a separate table along with any other chemical specific constants used in the BLRA. Kp values for COPCs were generally obtained from EPA's 1992 Dermal Exposure Assessment Guidance. RAGS Part E, published in September 2001 contains updated predicted Kp values for organic contaminants in water. These values are recommended over those published in EPA's 1992 Dermal Exposure Assessment Guidance document. Specific comments regarding Kp values used are as follows:*

RAGS Part E Kp values will be used in the revised BLRA. These values will be presented in a separate table.

26a. *There is no mention of the use of Kp values in Section 3 of the BLRA and there are no references associated with the values listed in Table 6.1. Provide a discussion on Kp values used in Section 3 and identify all references used to obtain these values.*

A reference will be added to the text and table of the revised BLRA.

26b. The Kp value listed in the 1992 EPA Dermal Exposure Assessment Guidance document for dibromochloromethane is 0.0039 rather than 1:2E-02 as presented in Table 6.1.

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

26c. The Kp value listed in the 1992 EPA Dermal Exposure Assessment Guidance document for N-Nitrosodimethylamine is 0.00027 rather than 1:2E-03 as presented in Table 6.1.

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

26d. Identify that the Kp value used for total and cis-1,2-Dichloroethene is based on trans-1,2-Dichloroethene.

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

26e. There are no Kp values listed for acetone, diesel, Freon 113, kerosene, nitrate, nitrate (as N), and perchlorate. Identify the source of Kp values for these chemicals and provide this in the report. Were these calculated based on prediction equations?

ERM utilized 1.6E-04 for these constituents. 1.6E-04 is the Kp value listed for water in the *Preliminary Endangerment Assessment Guidance Manual.*

26f. Why is there not a Kp value assigned for N-Butylbenzenesulfonamide. Explain in the report why a Kp value for this chemical was not estimated.

No Kp value was assigned to n-butylbenzenesulfonamide because there is currently no toxicity information for that chemical.

26g. Identify all surrogate chemicals used in identifying Kp values.

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

27. *Table 2. The depth to water at the property boundary in Zone 1 could be less than 50 feet. Risk consideration for off-gassing of VOCs from the groundwater needs to consider potential perched water zones in Zone 1. As presented in the table, the depth to groundwater in Layer D for Zone 1 is less than the depth to groundwater for Layer C.*

The migration of VOCs from groundwater into indoor and outdoor air is currently being evaluated and this evaluation will be incorporated into the revised BLRA included in the RI/FS Report. The depth to groundwater in Layer D in Zone 1 is less than the depth to groundwater for Layer C because Layer D is confined.

28. *Tables 3-1 through 3.4. The rationale for deletion of selected metals is that the metal is commonly detected in regional water supply wells and considered naturally occurring. What are the background concentrations of metals in groundwater? All water supply wells in the area are downgradient from Aerojet. Presence of the metals in the wells does not mean that they are due to background concentrations.*

As discussed in Comment 8, the revised BLRA will screen metals against the USEPA Region 9 Tap Water PRGs published in the October 2002 tables. If the maximum dissolved metal concentration is above its respective Tap Water PRG, the metal will be retained as a COPC.

29. *Table 4. Why is there no analysis of exposure due to volatilization from groundwater in Zone 1 for the current occupational and residential scenarios beyond the property boundary?*

There was a typo in Table 4. The 'Type of Analysis" for current occupational and residential scenarios should be 'Semi-Quant." The table will be revised to reflect this comment and provided in the revised BLRA.

Toxicity Assessment

Toxicity tables 6.1, 6.2, 7.1, and 7.2 were reviewed. Specific comments associated with each table are presented below.

Specific comments to Table 6.1

30. *Table 6.1 in the draft OU-5 BLRA should be in the same format as was presented in the Aerojet ROD Table 2.4B for ingestion and dermal*

pathways. Use the same presentation techniques as was used in Table 2.4B. Take out the columns showing permeability coefficients.

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

31. *You don't need to have the column "Oral Absorption Efficiency for Dermal" as it was not included in the ROD and route-to-route extrapolation was used to derive the dermal RfD. Please explain in the table footnotes that route-to-route extrapolation was used to derive dermal RfD values from oral RfD values and provide the rationale.*

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

32. *Don't cite the source of toxicity information as "PRG:IRIS". Citing the original source is enough (i.e., IRIS). Don't just cite "PRG" if the original source is IRIS or HEAST, etc. If you used a surrogate value, specify this in the table and cite the original toxicity source for that compound (i.e., toxicity data used for Total 1,2-Dichloroethene).*

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

33. *For total 1,2-Dichloroethene, a toxicity value of 1E-02 was used for the oral and dermal RfDs. The source cited was the "PRG" table. The correct source should be HEAST 1997 and indicate that cis-1,2-Dichloroethylene was used as a surrogate as it is more conservative than the value for trans-1,2-Dichloroethylene.*

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

34. *Identify all acronyms in the table footnotes.*

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

35. *Chemicals not selected as COPCs were included in this table (approximately 21 chemicals), but their rows were hidden. This will create confusion and errors when this data is eventually finalized and extracted*

for use in other reports (i.e., ROD). Remove all chemicals not selected as COPCs from this table. Don't include hidden rows. The table should only include data for the 34 COPCs.

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

36. *An oral RfD of 0.01 was used for 1,2-Dichloroethene. Table 6.1 cites "PRG" as the reference for this value. There is no published oral RfD for total 1,2-Dichloroethene and total 1,2-Dichloroethene is not listed in the Region 9 PRG table. Please cite that a surrogate value was used (cis-1,2-Dichloroethene) as the oral RfD for total 1,2-Dichloroethene. The source should be 1997 HEAST. Provide data for cis-1,2-Dichloroethene under the UF/MF column and the target organ column.*

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

37. *An oral RfD of 0.03 was used for kerosene and diesel based on toxicity for pyrene. Indicate in the table that pyrene was used as a surrogate chemical.*

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

38. *It appears that toxicity data from Nitrite was used (as published in IRIS) to evaluate Nitrate (as N). Based on tables presented in Section 3 and the risk characterization tables, it appears that Nitrate (as N) (as presented in all of the toxicity tables) should actually be Nitrite (as N). Please explain this and make the appropriate correction to all toxicity tables.*

The constituent should be Nitrite as N. The table will be revised in accordance with this comment in the revised BLRA.

39. *You don't have to cite a reference for those chemicals in which oral RfDs were not found.*

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

40. *Correct the citation used for perchlorate is NCEA. Indicate that the EPA Region 9 PRG table recommends the use of this RfD. However, the PRG*

table notes that this value has been withdrawn ("X") from IRIS or HEAST and is under review.

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

41. *Recommended changes to reference citations for the oral RfDs are provided in the table below.*

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

42. *Recommended changes to target organ and UF/MF information as presented in Table 6.1 are provided in the table below. Rather than using "NA" in the table below, use "-" to indicate no information available. Use this for all subsequent toxicity tables. Blank cells indicate that no change is necessary.*

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

Specific comments to Table 6.2

43. *Chemicals not selected as COPCs were included in this table (approximately 21 chemicals), but their rows were hidden. This will create confusion and errors when this data is eventually finalized and extracted for use in other reports (i.e., ROD). Remove all chemicals not selected as COPCs from this table. Don't include hidden rows. The table should only include data for the 34 COPCs.*

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

44. *Table 6.2 in the draft OU-5 BLRA is in the same general format as was presented in Table 2.4B of the Aerojet ROD for the inhalation pathway. However, please use the same presentation techniques as was used in Table 2.4B of the ROD. The inhalation RfC should be documented for all COPCs with inhalation non-cancer toxicity values. The inhalation RfC is considered the original source and the inhalation RfD is an extrapolated value derived from the RfC.*

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

45. *See table below for suggested changes to Table 6.2. Route-to-route extrapolation was used to estimate the RfC for many of the COPCs based on guidance from EPA Region 9 PRG Table. For these chemicals, cite "R9 PRG Table" as the reference. Make sure to identify the date of the PRG table. Also provide a key for the table.*

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

46. *An inhalation RfD of 0.03 was used for kerosene and diesel based on toxicity for pyrene. Route-to-route extrapolation was used. Indicate in the table that pyrene was used as a surrogate chemical.*

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

47. *You don't have to cite a reference for those chemicals in which an inhalation RfD was not found and route-to-route extrapolation was not used. Blank cells indicate that no change is necessary.*

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

48. *Recommended changes to target organ and UF/MF information as presented in Table 6.2 are provided in the table below. Rather than using "NA" in the table below, use "-" to indicate no information available. "OV" in the table below equals "primary target organ is based on the oral value."*

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

Specific comments to Table 7.1

49. *Chemicals not selected as COPCs were included in this table (approximately 21 chemicals), but their rows were hidden. This will create confusion and errors when this data is eventually finalized and extracted for use in other reports (i.e., ROD). Remove all chemicals not selected as*

COPCs from this table. Don't include hidden rows. The table should only include data for the 34 COPCs.

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

50. *Table 7.1 in the draft OU-5 BLRA is in the same general format as was presented in Table 2.4A of the Aerojet ROD for the ingestion and dermal pathways. However, please use the same presentation techniques as was used in Table 2.4A of the ROD. The table should have a key similar to that used in the ROD.*

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

51. *You don't need to have the column "Oral Absorption Efficiency for Dermal" as it was not included in the ROD and route-to-route extrapolation was used to derive the dermal cancer slope factor. Please explain in the table footnotes that route-to-route extrapolation was used to derive dermal cancer slope factor values from oral cancer slope factor values and provide the rationale.*

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

52. *Identify those COPCs in which OEHHA oral slope factors were used rather than those published in IRIS because the OEHHA values were more conservative (i.e., higher).*

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

53. *Identify those COPCs in which OEHHA oral slope factors were used (because they were more conservative) rather than the recommended provisional value published by NCEA and recommended by EPA Region 9 for use in risk assessments.*

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

54. *Provide the source for the "weight of evidence" value even if there is not a published oral slope factor.*

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

55. *The weight of evidence reported for total 1,2-Dichloroethene in Table 7.1 is "D". Please note in the table that this is based on cis-1,2-Dichloroethene which was used as a surrogate.*

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

56. *Indicate in the table that pyrene was used as a surrogate for diesel and kerosene.*

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

57. *Don't just cite "PRG" if the original source is IRIS or HEAST, etc.*

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

58. *The EPA Region 9 PRG Table lists an oral slope factor of 0.4 (mg/kg-day)$^{-1}$ for TCE based on an NCEA provisional value published in August 2001. This value is more protective than the one published by OEHHA and used in this risk assessment. Please use the oral slope factor value 0.4 (mg/kg-day)$^{-1}$ as recommended by EPA Region 9.*

The revised BLRA to be included in the RI/FS Report will include calculations of carcinogenic risk using the trichloroethene (TCE) slope factor from both NCEA and OEHHA.

59. *For chloroform, use the oral cancer slope factor value of 0.031 (mg/kg-day)$^{-1}$ published by OEHHA.*

The table will be revised based on most recent slope factor and provided in the revised BLRA.

60. *For dibromochloromethane, use the oral slope factor value of 0.094 (mg/kg-day)$^{-1}$ published by OEHHA. This value is more conservative than the value published in IRIS (0.084).*

The table will be revised based on the most conservative slope factor and provided in the revised BLRA.

61. *Specific change to Table 7.1 are provided in the table below. For source information that should have been identified as IRIS in Table 7.1, the date at the time of this review was inserted for the IRIS date and needs to modified for any updates when the document is next resubmitted.*

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

Specific comments to Table 7.2

62. *Chemicals not selected as COPCs were included in this table (approximately 21 chemicals), but their rows were hidden. This will create confusion and errors when this data is eventually finalized and extracted for use in other reports (i.e., ROD). Remove all chemicals not selected as COPCs from this table. Don't include hidden rows. The table should only indicate data for the 34 COPCs.*

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

63. *Table 7.2 in the draft OU-5 BLRA is in the same general format as was presented in Table 2.4A of the Aerojet ROD for the inhalation pathways. However, please use the same presentation techniques as was used in Table 2.4A of the ROD. The table should have a key similar to that used in the ROD.*

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

64. *The inhalation URF should be documented for all COPCs with inhalation cancer slope factors. The inhalation URF is considered the original source and the inhalation cancer slope factor is an extrapolated value derived from the URF.*

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

65. ***Indicate in Table 7.2 that surrogate chemicals were used to evaluate Total 1,2-Dichloroethene, diesel, and kerosene. Cis-1,2-Dichloroethene was used for total 1,2-Dichloroethene, and pyrene was used for diesel and kerosene.***

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

66. ***Make a note as to which inhalation cancer slope factors were based on route-to-route extrapolation.***

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

67. ***Identify those COPCs in which OEHHA inhalation slope factors were used rather than those published in IRIS or recommended by EPA Region 9 because the OEHHA values were more conservative (i.e., higher).***

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

68. ***For dibromochloromethane, use the inhalation slope factor recommended in the OEHHA table as it is more conservative than that recommended by EPA.***

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

69. ***The EPA Region 9 PRG Table lists an oral slope factor of 0.4 (mg/kg-day)$^{-1}$ for TCE based on NCEA provisional value published in August 2001. NCEA also recommends the use of the same value as the inhalation slope factor. Use the NCEA and EPA Region 9 recommended value of 0.4 (mg/kg-day)$^{-1}$ in the calculation of inhalation cancer risks for TCE.***

The revised BLRA will include calculations of carcinogenic risk using the TCE slope factor from both NCEA and OEHHA.

70. *Don't just cite "PRG" if the original source is IRIS or HEAST, etc.*

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

71. *Provide the source for the "weight of evidence" value even if there is not a published inhalation slope factor.*

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

Risk Characterization

72. *Section 5.3 First Paragraph. It is stated in the BLRA that under current conditions, there is no use of unmonitored or untreated groundwater beyond the property boundaries. Until the 1991 survey is updated and the currently known privately owned wells water uses are reviewed it is not appropriate to indicate there is no unmonitored exposures.*

So noted; as stated earlier in these responses, an update to the 1991 well survey is currently being conducted and will be provided in the RI/FS Report.

73. *Section 5.3 Second Paragraph. All volatile chemicals, not just TCE, should have been evaluated based on volatile migration from groundwater to indoor or outdoor air. Only evaluating TCE prevents an assessment of cumulative risk that needs to be presented in the BLRA. Revise the indoor air modeling to include all chemicals that are classified as volatile.*

The migration of VOCs from soil and groundwater into indoor and outdoor air is currently being evaluated and will be incorporated into the revised BLRA provided in the RI/FS Report.

On page 5-3, Section 5-3, Table, the table states that there were no concentrations of TCE detected beyond the property boundary in Zone 3. This statement is not true. As an example Figure 5-43 of the RI shows that TCE extends past the property boundary.

Figure 5-43 of the PGOU RI indicates that TCE is present beyond the property boundary in Layer C at a depth of 100 feet below ground surface (bgs). Section 5-3 states that TCE was not detected beyond the property

boundary within Layer A, which is the shallowest layer at 50 feet bgs. TCE was also detected in Layer B at a depth of 80 feet bgs.

Comment to Indoor Air Modeling

74. ***There is no explanation either in the main portion of the text or in Appendix C regarding what model was used to calculate risk-based concentrations of TCE in groundwater based on migration to indoor air. After reviewing Appendix C, the Johnson and Ettinger (J&E) Model was used to perform this evaluation. There is no discussion at all regarding site-specific parameters that were used in the model. The BLRA needs to discuss the exposure assumptions associated with this model and the uncertainties specific to the model. Based on the electronic files provided, site-specific parameters used appear to be limited to depth to groundwater (25, 30, and 50 feet), soil type directly above the water table (loamy sand), and soil temperature (15 degrees Celsius). Major inputs into the model should be provided within the text portion of the BLRA. The BLRA should provide information to substantiate the use of all site-specific parameters. The BLRA should provide information indicating why the EPA's site-specific and default values were used for all zones (except groundwater depth).***

    The indoor air modeling performed to evaluate the migration of VOCs from soil and groundwater into indoor and ambient will be presented in the revised BLRA.

75. ***Target risk levels for TCE should be presented based on both non-cancer effects and cancer risk. The summary table presented on Page 5-3 only presents the target risk levels based on cancer risk for TCE.***

    Indoor air modeling will be included within the revised BLRA.

76. ***The inhalation cancer slope factor used for TCE in the BLRA is not as conservative as that recommended by EPA. A cancer unit risk factor of 1.1E-4 $(ug/m^3)^{-1}$ should be used to estimate TCE cancer risk from inhalation exposures. The use of the EPA recommended unit risk factor for TCE would generate the following target groundwater concentrations based on 1E-06 and 1E-04 cancer risks (using the same defaults and site-specific parameters as was used in the BLRA):***

As shown in the table above, maximum detected concentrations of TCE in groundwater exceed the indoor air risk-based concentrations presented above.

As stated previously, the revised BLRA will include calculations of carcinogenic risk using the TCE slope factor from both NCEA and OEHHA.

77. *The TCE target risk level based on a groundwater depth of 30 feet as presented in the Table on Page 5-3 should be 154 ug/l rather than 129 ug/L (based on a unit risk factor of 2E-06 and a cancer risk of 1E-06).*

See response to comment 76 above.

78. *Use equations 4-7 and 4-8 in the EPA Region 9 PRG User's Guide to calculate risks and hazard indices based on inhalation of volatile chemicals in indoor air rather than using the J&E spreadsheet system. This is, use the J&E spreadsheet system to calculate the volatilization factor for groundwater to indoor air, and then apply this volatilization factor along with the groundwater EPC in the aforementioned equations. The following target groundwater concentrations for indoor air would be generated based on Equation 4-7 and the use of 0.4 $(mg/kg\text{-}day)^{-1}$ as the inhalation cancer slope factor for TCE:*

Indoor air modeling will be presented in the revised BLRA.

79. *The BLRA indicates that "the maximum detected concentration of TCE in the uppermost layer in each zone/location is well below the indoor air screening levels based on a target risk level of 1×10^{-4}; the upper bound of the range of acceptable risk." Note that this upper bound risk range is based on cumulative risk, not risk to one chemical. Also, as to not mislead the reader, the above sentence needs to be revised to reflect that EPA may consider cumulative risks less than 1×10^{-4} as unacceptable. The EPA policy set in place for establishing remediation goals based on excess cancer risks follows the CERCLA National Oil and Hazardous Substances Pollution Contingency Plan (NCP). According to the NCP, excess cumulative cancer risks in the range of 1×10^{-6} to 1×10^{-4} may or may not be considered acceptable, depending on site-specific factors such as the potential for exposure, technical limitations of remediation, and data uncertainties.*

The revised BLRA will include a statement regarding the USEPA's policy regarding excess cumulative cancer risks in the range of 1×10^{-4} to 1×10^{-6}.

80. ***Because of the uncertainties associated with the J&E model, information needs to be provided that indicates that indoor air concentrations predicted by the model are conservative and not underestimated. It is recommended that soil gas data collected during historical investigations be used to validate model. The J&E model can be used to predict concentrations in soil gas at different depths based on volatilization from groundwater through the capillary fringe and into the vadose zone. Compare the predicted soil gas concentrations with actual soil gas data.***

Copies of the J&E model and a list of all parameters used in the model will be provided in an appendix to the RI/FS Report. The risk assessment will include a table comparing predicted soil gas concentrations to actual soil gas data.

Comment on Outdoor Air Modeling

81. ***As with indoor air modeling, there is no explanation either in the main portion of the text or in Appendix C regarding what model was used to calculate risk-based concentrations of TCE in groundwater based on migration to outdoor air. The only information regarding outdoor air modeling is presented in Table C-2 of Appendix C. There is no discussion at all in the text regarding the identification of the model or site-specific parameters that were used in the model. Identify the model used to predict concentrations of TCE in outdoor based on volatilization from groundwater. Describe this model and the associated exposure assumptions/uncertainties in the main portion of the BLRA (i.e., Exposure Assessment). Major inputs into the model need to be provided within the text portion of the BLRA.***

An evaluation of the potential migration of VOCs from soil and groundwater is being conducted as part of the revised BLRA and will be incorporated into the RI/FS Report.

82. ***Risks based on inhalation of outdoor air should be evaluated based on exposure to all COPCs classified as VOCs.***

An evaluation of the potential migration of VOCs from soil and groundwater is being conducted as part of the revised BLRA and will be incorporated into the RI/FS Report.

83. *Use equations 4-7 and 4-8 in the EPA Region 9 PRG User's Guide to calculate risks and hazard indices based on inhalation of volatile chemicals in outdoor air. This is, calculate a volatilization factor for groundwater to outdoor air, and then apply this volatilization factor along with the groundwater EPC in the aforementioned equations (as suggested for indoor air).*

An evaluation of the potential migration of VOCs from soil and groundwater is being conducted as part of the revised BLRA and will be incorporated into the RI/FS Report.

84. *Section 5.4 – Tables 8.1 to 8.4 describe the residents as being "current/future" receptors. However, Section 5.4 describes the residents as being future receptors. Use a consistent designation of future receptors throughout the BLRA.*

Designation of current and future exposure scenarios will be made consistent within the revised BLRA.

The separate child and adult groundwater target concentrations were calculated by EPA's contractor for all COPCs based on the intake equations presented in Table 5.1 and toxicity data provided in Tables 6.1, 6.2, 7.1, and 7.2 (table below). Target concentrations are based on a hazard index of 1 and a cancer risk of 1E-06. Recommended toxicity changes are not reflected in the groundwater target concentrations as they were calculated in part to check risk calculations provided in the BLRA based on child and adult exposure to groundwater. The calculated target concentrations mentioned above were compared to target concentrations calculated by the EPA's contractor in the risk tables using the following equation:

$$Tgw = \frac{TL \times EPC}{CR \text{ (or HI)}}$$

Where:

Tgw = Target Groundwater Concentration

TL = Target Level (HI = 1 for non-carcinogenic effects and cancer risk = $1x10^{-6}$ for carcinogenic effects)
EPC = Exposure Point Concentration in Groundwater
CR (or HI) = Cancer Risk or HI calculated based on the EPC

Comparison of ERM's risk assessment target groundwater concentrations with USEPA Region IX Tap Water PRGs was discussed during the 12 February 2004 conference call. The USEPA indicated that the comparison was done to check risk calculations provided in the risk assessment and to determine the difference when using exposure assumptions recommended in the USEPA Region IX PRG table. USEPA explained that the same exposure assumptions used in the EPA Region IX PRG table should be used in the risk assessment. ERM will use the same exposure assumptions in the revised BLRA as included in the USEPA Region IX PRG User's Guide.

85. ***A portion of the risk calculations were reviewed. The groundwater EPCs used in the risk calculations and the selection of COPCs for each groundwater zone and layer were not QA'd against the data summary tables. The following risk tables were QA'd based on comparison of calculated target groundwater concentrations as described above (errors were found in the tables in bold and underlined and further described below).***

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

86. ***In Tables 8.1c and 8.1d, the inhalation slope factor for vinyl chloride was used to estimate risks based on groundwater ingestion. Use the oral slope factor for vinyl chloride to estimate risks from groundwater ingestion. Update Table 9.1 based on the corrections made in Tables 8.1c and 8.1d.***

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

87. ***Adult and child cancer intakes calculated for ingestion and dermal contact of N-Nitrosodimethylamine in Zone 3 groundwater (layer C) are offset by a factor of 10 (see Table 8.3c). As such, cancer risks calculated for this chemical are incorrect as presented in Tables 8.3c and 8.3d. Make the correction for this chemical in Tables 8.3c and 8.3d and update Table 9.1.***

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

88. ***Adult and child non-cancer intakes calculated for ingestion and dermal contact of 1,1,2-Tichloroethane and perchlorate in Zone 3 groundwater (layer C) are incorrect (see Table 8.3c). As such, non-cancer hazard indices calculated for these chemicals are incorrect as presented in Tables 8.3c and 8.3d. Make the correction for these chemicals in Tables 8.3c and 8.3d and update Table 9.1.***

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

89. ***In Table 8.3o, the oral slope factor for chloroform was used to estimate risks based on the inhalation exposure route. Use the inhalation slope factor for chloroform to estimate risks from inhalation. Update Table 9.1 based on the corrections made in Table 8.3o.***

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

90. ***The risk and hazard quotient calculated for bromoform based on child and adult inhalation is incorrect for Zone 3, APB Layer E (Tables 8.3g and 8.3h). 1,4-Dioxane is listed under inhalation exposure route instead of bromoform. 1,4-Dioxane was not listed under ingestion or dermal contact. Bromoform was not evaluated based on inhalation exposure as was done in previous tables. The calculation risks and hazard quotients for bromoform needs to be consistent with previous calculations and include inhalation.***

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

91. ***The risk and hazard quotient calculated for bromoform based on child and adult inhalation is incorrect for Zone 3, APB Layer F (Tables 8.3i and 8.3j). 1,4-Dioxane is listed under inhalation exposure route instead of bromoform. 1,4-Dioxane was not listed under ingestion or dermal contact. Bromoform was not evaluated based on inhalation exposure as was done in previous tables. The calculation risks and hazard quotients for bromoform needs to be consistent with previous calculations and include inhalation.***

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

92. *The cancer risk calculated for chloroform based on child and adult ingestion is incorrect for Zone 3, APB Layer E (Tables 8.3s and 8.3t). The oral slope factor was omitted for chloroform based on ingestion of groundwater. As a result, cancer risk was not calculated for chloroform based on groundwater ingestion.*

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

93. *Future QA checking will be made easier when the draft is revised for comments 22 and 23 using the risk PRG calculation format. Based on the errors identified above, conduct a 100% QA of all risk tables to assure the following:*

93a. Correct groundwater COPCs and EPCs were used for each zone and layer based what was selected in the data evaluation and exposure assessment.

93b. Cancer and non-cancer intakes were calculated correctly for each exposure route evaluated.

93c. Correct toxicity data were used to calculate risks and hazard indices.

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

94. *The risk characterization tables do not present the total risk for each individual COPC across all exposure routes. RAGS Part D Tables 9 and 10 need to be included among the risk characterization tables. RAGS Part D Table 9 allows for the summation of risks and hazard indices for each individual COPC across all exposure routes. RAGS Part D Table 10 provides a summary of the risk and hazard indices and allows for the estimation of hazard indices by target organ. HI's generated in the BLRA were significantly above one. As such, calculate total non-cancer hazard indices for COPCs grouped by primary target organ as is recommended in RAGS Part D.*

As agreed upon with agencies during the 12 February 2004 conference call, the revised BLRA will include an evaluation of each risk driver (cancer risk greater than 1×10^{-6} and hazard quotient of 0.1) across all exposure routes. In addition, no formal target organ evaluation will be completed.

95. *Section 5.4, 4th Sentence — The BLRA indicates that "the results of the assessment of potential risks under future use conditions are presented in Table 7 and summarized in Tables 8 and 9". Correct this statement because the BLRA does not contain a Table 7. Tables 7.1 and 7.2 present toxicity data.*

Tables and risk calculations will be reviewed for accuracy and revised accordingly in the revised BLRA.

96. *The risk characterization tables (Table 8.1a to 8.4j) exclude potential current risks from the migration of VOCs from groundwater to indoor and outdoor ambient air. As a result, cumulative risk to current/future child and adult receptors from all exposure routes have not been assessed in this BRA. A BRA should estimate the cumulative risk from exposure routes that impact the same receptor (i.e., child and adult residents). As such, the BRA should provide an assessment of cumulative risk to the current/future child and adult receptor through groundwater ingestion, inhalation of VOCs and dermal contact with groundwater during non-ingestion groundwater use, and inhalation of VOCs in indoor/outdoor air as a result of groundwater volatilization. Clear justification needs to be provided in the BRA for excluding one or more of the aforementioned exposure routes from the assessment of cumulative risk.*

An evaluation of the potential migration of VOCs from soil and groundwater is being conducted as part of the revised BLRA and will be incorporated into the RI/FS Report.

97. *Table 8.1g. In Zone 1, Layer F, adult exposure through ingestion of groundwater, a concentration of 7.7 µg/L TCE presents an additional cancer risk of 1.11x10-6. California's OEHHA has determined that a concentration of 0.8 µg/L presents a cancer risk of 1x10-6. Is the difference in calculated risk associated with the exposure time used in each of the calculations since the risk assessment used the California cancer-slope-factor for TCE?*

The revised BLRA will include an evaluation of TCE using both the NCEA slope factor and the OEHHA slope factor.

Thank you for your prompt review of the subject document. Please call me at (916) 924-9378 if you have any questions.

Sincerely,

Bruce A. Lewis

Bruce A. Lewis, R.G.
Program Director

BAL/hdl/dao/4676.01

cc: Ms. Cindy Caulk, Aerojet
Dr. Stan Smucker, United States Environmental Protection Agency
Mr. Alex MacDonald, California Regional Water Quality Control Board
Mr. Ed Cargile, Department of Toxic Substances Control
Dr. David Berry, Department of Toxic Substances Control
Mr. Andy Kallus, Weston