

**Responses to Comments from EPA  
(dated May 26, 1993)  
Baseline Risk Assessment  
Draft Remedial Investigation Report  
Operable Unit 5: East Side Aquifers  
Naval Air Station Moffett Field  
Mountain View, California**

**General Comments:**

1. Only the sample aliquots collected for inorganic analysis have been filtered. Sample aliquots for organics have not been filtered, so no impact on volatile organic compounds (VOCs) data would have occurred. All samples at all sites and for Phase I and Phase II RIs were collected in the same fashion. Some of the samples collected aside from the RI (Building 29 investigation) were not filtered, but those data are not part of the OU5 data set and were tested separately in the West Side Groundwater Characterization Report. A statement will be added to Section 6.2.1.1 of the text to clarify that samples for inorganic analysis had been filtered.
2. "Frequency of detection" is one of the criterion applied in the selection of chemicals of potential concern. Chemicals were eliminated if they were detected in 5 percent or less of the samples from the site. As stated in Section 6.2.2 on page 6-14, chemicals classified as known human carcinogens (Class A) were not eliminated from the final list of chemicals on the basis of the frequency of detection or concentration.
3. Surface water data and an assessment of human health risk due to surface water contamination from Moffett Field will be presented in OU6. The duck meat ingestion scenario will be removed from OU5.
4. As described in Section 6.3.2, the pathway of inhalation of volatile chemicals during home uses is among the exposure pathways considered for the risk assessment. The list of pathways is presented on page 6-45 of the Draft RI Report.

Because inhalation of volatiles was selected as a viable pathway for the future residential scenario, a description of the exposure model is included in Section 6.3.3.1 on page 6-49. A discussion of the exposure parameters for this pathway appears in Section 6.3.3.2 on page 6-51. The pathway for inhalation of volatiles during future residential use was evaluated for the following sites: 3, 4, 5 South, 5 North, 6, 7, 10 and 11.

5. Although Sites 1, 2, and 11 are not mentioned specifically, potential exposure pathways for ecological receptors are discussed in Section 6.7.3 on page 6-74 of the Draft RI Report. A statement regarding the distinction between treatment of this pathway for human health purposes versus ecological purposes will be added to the

discussion in Section 6.3.2 on the identification of potential exposure pathways to further clarify. A reference to the site-wide ecological risk assessment will be added to the text.

6. An environmental assessment for OU5 is presented in Section 6.7 of the Draft RI Report. Because the groundwater that makes up OU5 does not discharge to the surface within the confines of OU5, the environmental assessment is limited to a review of potential receptors and a qualitative assessment of the potential for adverse impacts. A complete ecological assessment will be provided in the site-wide ecological assessment. Reference to the ecological assessment will be added to the text.
7. The risk management statements presented in the discussion of summary and conclusions in Section 6.6 will be deleted.
8. As stated in Section 4.2.1, the four monitoring wells located within the west side of A1-, A2-, B2-, and C-aquifer zones were selected as background wells for OU5. These wells include: W14-04(A1), W14-06(A2), W09-40(B2), and W09-03(C). The wells were chosen on the basis of their geographic position upgradient of known sources on Sites 8 and 9 (IT, 1993) and the low concentrations of VOCs and total dissolved solids (TDS).

Each monitoring well, with the exception of W09-40(B2), was installed during Phase I field activities. Following installation, all wells were sampled monthly for 3 months and then quarterly for three quarters. The monitoring wells were sampled again during the final three quarters of Phase II. Inorganic parameters were analyzed during the first three monthly sampling events of Phase I only. Subsequent samples were analyzed for VOCs and total petroleum hydrocarbons (TPH).

This explanation of the background monitoring well selection will be added to the text.

9. OU5 is defined as the groundwater in the A1-, A2-, B2-, B3- and C-aquifer zones underlying the eastern portion (i.e., east of the western runway border) of Moffett Field. The identification of potential exposure pathways is limited to those pathways that involve groundwater underlying the sites in OU5 (Sites 1, 2, 3, 4, 5, 6, 7, 10, 11, 13, 15, and 19). OU6 is defined as the wetlands north of the site.

When the first draft of OU5 was written, the objective of OU6 was to perform an ecological assessment of the wetland areas; therefore, the human health exposure pathways were treated in OU5. The current exposure pathway for duck ingestion was included in OU5 to address concerns that contaminated groundwater would impact nearby surface waters. Evaluation of this pathway was also incorporated in response to public concerns. The pathway for human ingestion of duck meat was treated in a quantitative fashion; impacts of potentially contaminated surface waters upon the ducks were discussed qualitatively in Section 6.7. Because OU6 is now intended to address human health risk and the site-wide ecological assessment is intended to address ecological risk, the duck meat ingestion scenario will be deleted from OU5.

10. A conceptual model of the potential exposure pathways associated with OU5 will be provided.
11. The exposure models used to estimate chemical concentrations in indoor air via volatilization from groundwater and in homegrown vegetables via uptake of chemicals from groundwater are described in Appendix E. The rationale for selecting these models will be added to the discussion of exposure models in Section 6.3.3 and expanded in Appendix E. No model will be provided for estimation of duck meat ingestion because this scenario has been deleted from OU5.
12. Section 6.2.3 of the Draft RI Report includes a discussion on the chemicals of potential concern for each site. Each of the site-specific discussions contains a reference to a corresponding table. The table summarizes the detected chemicals, frequencies of detection, concentration ranges, corresponding background concentrations (if applicable), the arithmetic mean, the standard deviation, the 95 percent upper confidence limit of the arithmetic mean, category of selection for chemicals of potential concern and reason for exclusion (if applicable). Each table is further broken down by aquifer. This information appears in Tables 6.2-1 through 6.2-10.

Table 6.5-2 consists of chemicals that have contact-required quantitation limits (CRQLs) associated with risks above the lower limit of acceptable risk. This explanation appears in Section 6.2.5 on page 6-32 of the Draft RI Report.

These chemicals were carried through calculations representing the pathway for drinking water ingestion at the CRQL concentrations to evaluate potential false negatives (PFNs). The drinking water pathway was selected because it represents the most likely pathway at the site. It is also anticipated that the drinking water pathway is the most significant pathway of OU5. Additional text will be added to the explanation of PFNs in Section 6.3.2 on page 6-48.

The results of the evaluation of the PFNs appears in Section 6.6 on page 6-68 of the Draft RI Report. An explanation of the results will be added.

#### **Specific Comments:**

1. A statement will be added to the text to clarify that groundwater is contributing to surface water primarily at the lift station (Building 191) and any resulting exposure pathways will be evaluated as part of OU6.
2. The ultimate objective of the baseline risk assessment is to provide a basis for determining if remediation is necessary. Remediation would likely be targeted at specific site areas and in specific aquifers. Therefore, the chemicals of potential concern are selected on the basis of individual sites and aquifer zones to direct the remediation decisions for those sites and aquifers that present risks exceeding the acceptable risk range. This rationale will be added to the text.

3. The RI was conducted as described in the Phase I and Phase II Sampling and Analysis Plans. The presumption is that the plans, which were approved by the regulatory agencies, were adequate for characterizing risk in areas where it is reasonably possible that risk is elevated. Uncertainty increases with small data sets, but for sites where little or no sampling occurred in some aquifers, that uncertainty was considered acceptable.
4. No monitoring wells were installed specifically for Sites 13 and 15, so site-specific risk assessment cannot be performed. Site 13 is immediately adjacent to Site 6 and the risk associated with the groundwater at Site 6 is an adequate representation of risk for Site 13 groundwater. Site 15 is not directly monitored, although two of the Site 15 locations (sump 63 and separator 54) are in the areas of Sites 7 and 6. Site 15 will be sampled in the petroleum-related sites investigation to determine if any groundwater releases have occurred from Site 15 locations. Pages 6-5 and 6-14 will be corrected by adding these explanations.
5. The evaluation of metal concentrations, comparison to background levels, and evaluation of the impact of salt water metals is discussed in detail in Section 4.2, Evaluation of OU5 Analytical Data, and will not be presented again in Section 6.2.4.

Section 5.3, Routes of Transport of Organic Compounds, and specifically Section 5.3.2, Contaminant Migration from OU1 to the A1-aquifer zone, discuss the potential for movement of organic contaminants from landfill leachate to groundwater and surface water. A section entitled Interaction of Leachate and Groundwater (Section 5.3.3), will be added. Section 5.3.3 will state that the potential migration pathways for leachate inorganics is the same as those discussed in Section 5.3.2; that is, no pathway is believed to exist at Site 1, but the lift station near Site 2 creates a pathway to surface water. Contamination of groundwater by surface water is considered to be highly unlikely.

6. The purpose of this paragraph is to explain the elimination of chemicals from the list of chemicals of potential concern on the basis of frequency of detection. The reference to carbon tetrachloride was intended to serve as an example. To avoid confusion between the West Side Groundwater Characterization and OU5 reports, the reference to carbon tetrachloride will be deleted.
7. Chemicals that have CRQLs associated with risks above the lower limit of acceptable risks were carried through the risk assessment separately. The CRQLs and risk estimates for the chemicals in this analysis are provided in Table 6.5-2. A reference to this table will be added to the text on page 6-32.
8. Only one active well is used for agricultural water on Moffett Field. The irrigation well (24D01) is located in the southeastern corner of Moffett Field. Reference to this well and its location will be added to the text on page 6-32.

As stated on page 6-46 of the Draft OU5 RI Report, the agricultural well is used for irrigation of crops and watering golf greens. This well draws water from the C-

aquifer. This well is periodically sampled by Moffett Field personnel. Groundwater contaminants have not been detected in the well (IT, 1993). Furthermore, this well is upgradient from sources at OU5. Therefore, potential exposure pathways associated with this well were not evaluated.

9. A conceptual model of the potential exposure pathways associated with OU5 will be added.
10. The duck hunting scenario will be deleted from the OU5 baseline risk assessment. Refer to the response to General Comment 9 for a complete explanation.
11. The discussion in the referenced paragraph was intended to review the various definitions of potable water standards on the basis of TDS concentrations. The paragraph will be revised to clarify the TDS value that was used for comparison in this assessment.
12. The following discussion will be added to the text: Background metals were evaluated on the basis of data from four background monitoring wells W14-14(A1), W14-06(A2), W09-40(B2), and W09-03(C). As stated on page 6-32, metals that were excluded as chemicals of potential concern have also been carried through the risk assessment separately from the chemicals of potential concern. The results are presented in Table 6.5-1.

Due to analytical constraints, it is possible for chemicals that have not been detected to contribute significantly to potential risks. (As stated on page 6-32, chemicals that have CRQLs associated with risks above the lower limit of acceptable risk were carried through the drinking water scenario). The potential risks associated with these PFNs in drinking water were estimated assuming that these chemicals were present at groundwater in their CRQLs. The results are presented in Table 6.5-2.

13. The duck hunting scenario will be deleted from the OU5 baseline risk assessment. Refer to the response to General Comment 9 for a complete explanation.
14. The duck hunting scenario will be deleted from the OU5 baseline risk assessment. Refer to the response to General Comment 9 for a complete explanation.
15. For purposes of the California Lead Model, lead soil concentrations were estimated as the median value of the available soil background data (48 mg/kg) and were used as the soil concentration.

Because Section 6.4.2 is intended to provide an overview of the model, there is no discussion of the results in this section. The interpretation of on-site sampling data is provided in Section 6.6 (page 6-67) as part of the Summary and Conclusions.

16. The duck hunting scenario will be deleted from the OU5 baseline risk assessment. Please see the response to General Comment 9 for a complete explanation.

17. The drinking water pathway was selected because it represents the most likely pathway at the site. It is also anticipated that the drinking water pathway is the most significant pathway for OU5. As stated on page 6-32, background metals were evaluated in the basis of data from four background monitoring wells W14-04(A1), W14-06(A2), W09-40(B2), and W09-03(C). As stated on page 6-32, metals that excluded as chemicals of potential concern have also been carried through the risk assessment separately from the chemicals of potential concern.

As stated on page 6-32, the PFNs were evaluated by selecting chemicals that have CRQLs above the lower limit of acceptable risk.

18. The duck hunting scenario will be deleted from the OU5 baseline risk assessment. Refer to the response to General Comment 9 for a complete explanation.
19. All the metals detected were evaluated in the baseline risk assessment and in cases where the 95 percent upper confidence limit of the arithmetic mean of an individual chemical exceeded the background value, the chemical was specified as a chemical of potential concern. These chemicals were carried through the risk assessment and the associated risks were evaluated in the context of site background issues. The concluding statement as referenced was made after an evaluation of the existing data through the baseline risk assessment. No change will be made to this section.

The purpose of Table 6.6-1 is to summarize only the chemicals for which significant risks or hazard indices were calculated. Although some of the average values in the table are less than  $10^{-6}$  (e.g.,  $10^{-7}$ ), these chemicals are presented because the reasonable maximum exposure was greater than or equal to  $10^{-6}$ . If all chemicals that were carried through the risk characterization were added to the table, it would defeat the purpose for presenting a summary table; however, it is agreed that the category for "Total Noncarcinogens" will be re-labeled and clarified.

20. As stated on page 6-75, chemicals within the groundwater aquifers are effectively isolated from environmental receptors. In other words, the environmental receptors at Moffett Field have no significant contact with the groundwater as it exists in the aquifer.

The final sentence in Section 6.7.4 will be expanded to list the potential pathways of concern. As such, the final sentence will read, "Because groundwater may be discharged to nearby wetlands, environmental impacts may occur via the following exposure pathways:

- Dermal contact with contaminated surface water
- Consumption of contaminated surface waters,
- Ingestion of chemicals that have bioaccumulated into foods."

21. In Tables 6.2-1 to 6.2-10, the concentration represents the range of detection. The lower limit of the range represents the lowest detected concentration in cases where

the chemical was detected in all samples. In cases where the chemical was not detected in all samples, the lower limit of the range is equal to detection limit.

The UCL was calculated for a normal distribution as follows:

$$UCL = \bar{x} + t_{1-\alpha, n-1} \cdot (s\sqrt{n})$$

where

$\bar{x}$	= sample arithmetic mean
$t_{1-\alpha, n-1}$	= critical value for Student's t-Distribution
$\alpha$	= 0.05 (i.e., $1-\alpha = 0.95$ or 95% confidence limit for a one-tailed test)
$n$	= number of samples in the set
$s$	= sample standard deviation

The UCL was calculated for a lognormal distribution as follows:

$$UCL = e^{\bar{y} + \frac{1}{2} s_y^2 + H_{0.95} \times s_y / (n-1)^{\frac{1}{2}}}$$

where

$\bar{y}$	= $\Sigma y/n$ = sample arithmetic mean of the log-transformed data, $y = \ln x$
$s_y$	= sample standard deviation of the log-transformed data
$n$	= number of samples in the data set
$H_{0.95}$	= value for computing the one-sided upper 95% confidence limit on a lognormal mean from standard statistical tables (Gilbert, 1987)

The site-related upper confidence level (UCL) (including background) was used to determine exposure point concentrations. The UCL for background concentrations of carcinogens was used to determine exposure point concentrations to assess risks from background concentrations. This information facilitated the important comparison of the total risks (site-related including background) to background risks.

22. The "reason for exclusion" for JP-5 in the C aquifer will be revised to read "components are evaluated."
23. The duck hunting scenario will be deleted from the OU5 baseline risk assessment. Refer to the response to General Comment 9 for a complete explanation.
24. The tables will be revised so that the designation "No Data" (ND) refers to chemicals for which the appropriate data cannot be obtained to complete the risk calculation. Another designation will be added to the table in cases where the exposure pathway is "Not Applicable" (NA) to the chemical. For example, the pathway for "inhalation of

volatile organic compounds (VOCs) for domestic water use" does not apply to the metals. Both of these terms will appear in the footnotes for the tables.

25. The column entitled "Species Tested" will be changed to read "Species."

Arsenic and beryllium were not considered in the pathway for inhalation of volatiles from groundwater that may be used for domestic purposes. These metals do not volatilize.

The toxicity values will be corrected as appropriate.

26. The value for lead of 3.36 µg/L has been checked against the concentration of lead in Table 6.2-9 (page 3 of 3). The value that appears in the report is correct.

The value for lead of 4.83 µg/L has been checked against the concentration of lead in Table 6.2-9 (page 3 of 3). The value that appears in the report is correct.

**Editorial Comments:**

1. "Contributes" will change to read "contribute."
2. The last sentence will be rewritten to clarify the point that a chemical was only assumed to be carcinogenic if the available data indicated that it was carcinogenic.
3. The additional numeral "3" will be deleted from Table 6.2-8.
4. The extraneous "+" sign will be deleted from Table 6.2-1.
5. The second reference to the RCRA standard for TDS will be deleted.
6. The tables were numbered to correspond with the section in which the reference appears (e.g., tables labeled 6.2 are referenced in Section 6.2). This numbering system is also used to maintain consistency with tables in the RI document as a whole.
7. To maintain consistency within the RI document, the references for the baseline risk assessment are provided in Chapter 8.0.
8. "TDC" will be corrected to read "TDS."
9. The columns labeled "hazard quotient" will be corrected to read "ILCR."
10. The second reference to "aldrin" will be deleted from Table 6.5-2.

References: Gilbert, 1987  
"Statistical Methods for Environmental Pollution Monitoring," Van Nostrand Reinhold, New York, New York.

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