

**CLEAN**

Contract No. N62474-88-D-5086

Contract Task Order 0134

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**NAVAL AIR STATION, MOFFETT FIELD  
MOFFETT FIELD, CALIFORNIA**

**RESPONSE TO COMMENTS**

**BUILDING 29 AREA FIELD INVESTIGATION  
TECHNICAL MEMORANDUM  
VOLUMES I AND II**

Prepared By

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September 9, 1991

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Comments Report *See* ~~1189~~ <sup>1217</sup>  
~~1189~~ <sup>910909.01</sup>

## NAS MOFFETT FIELD BUILDING 29 AREA

### RESPONSE TO COMMENTS ON FIELD INVESTIGATION TECHNICAL MEMORANDUM VOLUMES I AND II

APRIL 15, 1991

This report presents point-by-point responses to comments received from regulatory agencies for the Building 29 Area field investigation technical memorandum (TM) dated April 15, 1991 for Naval Air Station (NAS) Moffett Field in Mountain View, California. Comments were received from Mr. Lewis Mitani of the U.S. Environmental Protection Agency (EPA) in a letter dated May 29, 1991; from Mr. Cyrus Shabahari of the California Department of Health Services (DHS) in a letter dated May 29, 1991; and from Mr. Steven Morse of the California Regional Water Quality Control Board (RWQCB) in a letter dated April 26, 1991. In general, responses to comments refer to sections of the draft technical memorandum.

#### Comments from Mr. Lewis Mitani, U.S. Environmental Protection Agency

#### GENERAL COMMENTS

Comment Number 1. The purpose of this investigation was to further characterize the lateral and vertical distribution of contaminants around Building 29. This document did not provide conclusions characterizing the lateral and vertical extent of contaminants around the Building 29 area.

*Response:* *An expanded summary of the lateral and vertical distribution of contaminants in the Building 29 area appears in Section 5.1 of the revised TM.*

Comment Number 2. It would be very useful to provide plume figures showing the areas of contamination for soil and groundwater for chlorinated VOCs, petroleum hydrocarbons, and inorganics.

*Response:* *Isoconcentration contour maps were developed to illustrate the lateral extent of soil and ground water contamination in the A1 zone of the A aquifer. These maps appear in Section 4.2 of the revised TM.*

Comment Number 3. In Section 4.2 "Nature and Extent of Contamination," figures and cross sections should be provided showing the distribution of contaminants in the soil and groundwater.

*Response: Planimetric contaminant concentration contour maps appear in Section 4.2 of the revised TM. Cross sections will be developed when the subsurface distribution of contaminants is more fully developed.*

Comment Number 4. The two plates show the locations of the HydroPunch samples, soil borings, and wells. However, other wells and soil borings that were not drilled during this investigation were shown on the plates. The plates should clearly distinguish between work done for this investigation and work done in previous investigations. The plates should show the location of the past Sump 61 and ground water direction. The HydroPunch names differed from what was provided in the text. The plates should distinguish between monitoring wells where soil samples were collected and monitoring wells where they were not.

*Response: The plates have been revised such that the legends distinguish between the data points associated with the Building 29 Area investigation and data that are part of the remedial investigation within Site 9. Figure 2 has been revised to show the approximate location of Sump 61, which was removed as part of the Phase II tank and sump removal activities. HydroPunch sample names have been corrected to be consistent between the text and the plates. Soil samples were collected from all A1 zone borings drilled using hollow stem augers, including soil borings converted into A1 zone monitoring wells.*

Comment Number 5. Because this investigation concentrates on a specific area, all results from past investigations in the area should be incorporated into the summaries and conclusions of this report. The plates and some of the tables provided some information on the past investigations but the information was incomplete. All analytical results of past investigations in the area should be presented in an appendix.

*Response: The TM summarizes data collected during soil gas sampling, cone penetrometer tests (CPTs), HydroPunch sampling, drilling and well installation, and ground water sampling related to the Building 29 Area investigation. The purpose of the field activities was to further characterize*

*lateral and vertical distribution of fuel contaminants in the area surrounding Building 29. The TM does not summarize the analytical results of previous investigations (the Site 9 Action Memorandum summarizes the results of previous investigations). However, such data were incorporated in creating contaminant concentration contour maps for identifying patterns of contaminant migration around the source area.*

## SPECIFIC COMMENTS

Comment Number 1. Page 9, 5th paragraph. Please specify that the six monitoring wells that were drilled as part of this investigation were A1 wells. Also clarify that four A2 wells were also drilled for a total of 10 wells drilled as part of this investigation.

*Response: The narrative within this paragraph was revised to specify the number of A1 zone wells and A2 zone wells installed as part of the Building 29 Area investigation.*

Comment Number 2. Page 10, Table 2. The table should make a distinction when the CPTs were done--as part of this field work or previous work.

*Response: Table 2 was revised and now includes footnotes to distinguish the Phase II remedial investigation (RI) CPTs from the Building 29 Area investigation CPTs. The dates when the CPTs were conducted also appear in Table 2 of the revised TM.*

Comment Number 3. Page 12, 1st paragraph. Clarify which wells were sampled for soils and the depth(s) for each. A table should be prepared depicting all soil boring and well boring samples, sampling depths, and analyses performed.

*Response: Tables that present the analytical results for all soil samples and water samples collected as part of the Building 29 Area investigation appear in Section 4.2 of the revised TM.*

Comment Number 4. Page 13, Table 3. Specify which wells were drilled as part of the Phase II tank and sump removal activities and which wells were drilled as part of this investigation.

*Response:* **Table 3 was revised and now includes footnotes that specify which wells were installed as part of the Phase II RI, the Building 29 Area investigation, and the Phase II tank and sump removal activities.**

**Comment Number 5. Page 17, 1st paragraph. Give the analytical methods that were used for the analyses.**

*Response:* **Discussion of the analytical methods used for the sample analyses appears in Section 4.2 of the revised TM.**

**Comment Number 6. Pages 22-23, Section 4.2, "Nature and Extent of Contamination". A discussion to support the conclusion that the "Concentrations of chlorinated VOCs in soils is generally less than 25 µg/kg" is needed. What about W29-3 (TCE at 70 µg/kg) and W61-1 (TCE at 100 µg/kg)?**

**Explain how it was determined that chlorinated VOCs in the ground water upgradient of Building 29 are 80 percent TCE and chlorinated VOCs in the ground water downgradient are 95 percent 1,2 DCE and give the significance of this information.**

**Specify the media (i.e., soil? ground water?) where TPH concentrations are greatest. TPH in the soil was not analyzed for in samples collected upgradient of the Building 29 area so how can it be concluded that soil TPH concentrations are "greatest in the area surrounding and downgradient of the Building 29 area?" No ground water samples were taken upgradient of the Building 29 area for this investigation.**

**What were the TPH determinations that indicated the fuel is increasingly degraded with distance? Will more data be obtained to determine the lateral extent of fuel contamination in the area? Please present data supporting the conclusion there is no evidence of vertical migration of TPH contamination with relation to soil and ground water.**

*Response:* **The intent of the initial paragraph in Section 4.2 is to provide a brief synopsis of the section. Detailed discussions of the results appear in following sections.**

*The discussion of chlorinated volatile organic compounds (VOCs) in soil has been modified to include a sentence stating 95 percent of the soils contain chlorinated VOC contamination at concentrations less than 25 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ).*

*Changes incorporated into the text specify the results used to determine the percent trichloroethene (TCE) of the total chlorinated VOCs upgradient of Building 29. Section 4.2.2.1 discusses the data used to determine the percentage 1,2-DCE of the total chlorinated VOCs and the significance of the information.*

*Concentrations of TPH in soil samples collected from the Building 29 area ranged from not detected to 4,700 mg/kg (about 0.5 percent) while TPH concentrations in ground water from the same area ranged from not detected to 6,700 micrograms per liter ( $\mu\text{g}/\text{L}$ ). A comparison of TPH contamination found in soils collected during well installation activities and ground water samples from the corresponding well are provided in the following table.*

<u>Well/Boring</u>	<u>Matrix</u>	<u>Purgeable TPH</u>	<u>Extractable TPH</u>
W29-1(A1)	water	0.062	ND
W29-1(A)-12	soil	ND	56
W29-2(A1)	water	2.70	4.00
W29-2(A)-10	soil	59	710
W29-3(A1)	water	ND	ND
W29-3(A)-12	soil	ND	ND
W29-4(A1)	water	ND	ND
W29-4(A)-10	soil	ND	ND
W29-5(A1)	water	3.20	0.610
W29-5(A)-13	soil	123	380
W29-6(A1)	water	0.056	ND
W29-6(A)-7	soil	ND	ND

*Concentration units for the above table are milligrams per liter (mg/L) for water samples and mg/kg for soil samples. The above table was generated from results presented in the text (Tables 7 and 10). The comparison of these results indicate soil in the Building 29 area is more contaminated with TPH than ground water.*

*Well W29-4(A1) is upgradient of Building 29 and the underground storage tanks (USTs); therefore, soil and ground water samples collected from this location are considered to be representative of the TPH contamination entering the Building 29 area. Results contained in Tables 7 and 10 indicate there is no detectable TPH contamination immediately upgradient of the "Old Tank Farm" in the soil or ground water.*

*Visual inspection of TPH extractable chromatograms compared to a chromatogram of JP-5 jet fuel indicate the fuel found in soil samples is somewhat degraded. A discussion of petroleum hydrocarbon fingerprinting analysis and degradation has been added to Appendix B. Well installation and sampling activities under the direction of the National Aeronautics and Space Administration (NASA) may provide more information concerning the lateral extent of TPH contamination downgradient of Building 29.*

*Because TPH contamination in soil is confined to a relatively narrow depth interval, little or no migration of TPH constituents is expected. Over 99 percent of the TPH contamination was measured in soil samples collected between 9 and 13 feet below land surface (BLS). Because TPH constituents are lighter (less dense) than water and only slightly soluble in water, very little vertical migration would be expected in the saturated zone.*

Comment Number 7. Page 23, Section 4.2.1.1, "Volatile Organic Compounds" (and throughout the report). Specify the contaminant 1,2 DCE (i.e., cis-1,2 DCE, trans-1,2 DCE, or total 1,2 DCE).

*Response:* *Section 4.2 has been revised to state that reported 1,2-dichloroethene (1,2-DCE) results are for total 1,2-DCE.*

Comment Number 8. Page 24, 1st paragraph. Please present data which indicate the chlorinated VOCs found in the soil from W29-3(A1) was associated with pore water and not the sediment.

*Response:* *Because the soil sample from well W29-3(A1) was collected from 21 feet BLS in the saturated zone, measured contaminant concentrations may be caused by pore water contained in the soil. Data which indicate soil sample W29-3(A1)-4 was collected in the saturated zone appear in Appendix D. To*

*support this conclusion, the text has been revised to include data comparing VOC contamination levels in ground water samples to those in soil samples.*

Comment Number 9. Page 24, 2nd paragraph. Please clarify how it was determined that "the contamination appears to have originally been an aviation fuel similar to JP-4 or JP-5."

This paragraph states that fuel was found in a narrow band between 9 and 13 feet BLS. According to Table 7 (which does not show results for all 10 soil borings and all 17 monitoring wells that were soil sampled) approximately 24 percent of the borings had maximum petroleum concentrations at depths outside the "narrow band." Please clarify.

The highest concentration of fuel mentioned in this paragraph (4,700 mg/kg) is not given on Table 7. Please clarify.

Petroleum hydrocarbon contamination was found in high levels upgradient of Building 29 (i.e., wells W29-6, W29-4, and W61-1). This must be included in the text because, as it stands, the text refers only to contamination identified "in the immediate area and downgradient of Building 29."

*Response:*

*The TPH (extractable) contamination was determined to have been a jet fuel similar to JP-5 from a gas chromatographic (GC) comparison between a sample of JP-5 and the TPH contamination, taking into account the loss of lower molecular weight compounds to evaporation and the alkanes to biodegradation. A brief discussion of petroleum hydrocarbon fingerprinting analysis and degradation has been added to Appendix B.*

*Table 7 has been modified to include results from all soil samples collected during the Building 29 Area investigation.*

*The five samples collected outside of the 9- to 13- foot interval all contained low levels of benzene, toluene, ethylbenzene and xylene (BTEX) or TPH. Combined, the TPH and BTEX contamination from these five samples makes up less than 1 percent of the total petroleum hydrocarbon contamination measured in soils during the Building 29 Area investigation.*

*The concentration cited in the text (4,700 mg/kg) is a typographical error. The entry has been changed to reflect the correct concentration (4,600 mg/kg).*

*Fuel contamination was found in the vicinity and downgradient of Building 29. The immediate area of Building 29 is meant to include the building and the two clusters of USTs (Old Tank Farm). TPH contamination was not found upgradient of this area in soil or ground water samples. TPH constituents were not detected in the ground water or soil samples collected from well W29-4(A1). The ground water sample from well W29-6(A1) contained 56 µg/L TPH purgeable as gasoline. Well W61-1(A1) is not considered to be upgradient of Building 29 and the soils and ground water associated with this well were not contaminated with TPH.*

Comment Number 10. Page 24, 3rd paragraph. How was it determined that the fuel contamination has not been in contact with ground water?

*Response: Chromatograms of the TPH contamination from soil boring SB-51 suggest a fuel which has not been subject to biodegradation. In addition, aromatic compounds (ethylbenzene and xylenes) were found in these soil samples. These aromatic compounds are slightly soluble in water and would have been removed if the soil was in contact with ground water since the mid-1960s.*

Comment Number 11. Page 25, Table 6. Show all 10 soils borings and the 17 monitoring wells where soil samples were collected on the table. Include maximum values for each (include a ND if contaminant was not detected).

*Response: Table 6 has been revised to include results for all soil samples analyzed for chlorinated VOCs collected during the Building 29 Area investigation. The dot notation for "not detected" was retained to make the tables more readable. The tabulated results (Appendix F) utilize the ND notation.*

Comment Number 12. Page 26, Table 7. Show maximum concentrations for each of the 10 soil borings and the 17 monitoring wells that were soil sampled on the table. Break down BTEX to show the concentrations for each of the four contaminants.

*Response:* **Table 7 has been revised to include results for all soil samples collected during the Building 29 Area investigation. In addition, BTEX results are now reported, separately.**

Comment Number 13. **Page 27, 1st paragraph.** This paragraph states that seven wells and 10 soil borings were sampled for inorganics but Table 8 does not show results for seven wells and 10 soil borings. Please provide results for all sampling locations.

*Response:* **Table 8 presents ranges of metal concentrations in the Building 29 Area. Results for all analyzed inorganic constituents appear in Appendix F. A more complete discussion of inorganic results is limited because background levels have not been established in the Building 29 area.**

Comment Number 14. **Page 30 6th paragraph.** Please indicate the significance of the statement regarding the correlation of metals in soil and ground water. Explain the reference to the "location" of the metals in soil and ground water.

*Response:* **Correlation between concentrations of analytes in ground water and soil samples from the same location (sample depth) would indicate that metals in soils may be a source of inorganic constituents in ground water.**

Comment Number 15. **Page 30, Section 4.2.2, "Ground Water Contamination".** Specify the names of the seven A1 zone wells and the four A2 zone wells that were sampled. Table 3 does not show 11 Building 29 wells. Table 9 does not show seven A1 wells.

*Response:* **Table 9 has been modified to include results from the seven A1 zone and four A2 zone wells sampled during the Building 29 Area investigation. Table 3 also contains results for these wells.**

Comment Number 16. **Page 31, 2nd paragraph.** VOCs found in the ground water included more than TCE, 1,2 DCE, and PCE. PCE was found in more than one sample. Please clarify.

*Response:* **The text has been changed to reflect that tetrachloroethene (PCE) was found in more than one sample. Table 9 contains concentrations of all target analyte list chlorinated VOCs detected in ground water samples, with the exception of vinyl chloride. Vinyl chloride results are discussed in section 4.2.2.1.**

Comment Number 17. **Page 31, 3rd paragraph.** Give evidence or site reference that PCE rapidly converts to TCE in the A1 zone at this site.

Substantiate the claim that the high PCE and TCE concentrations in HP29-100 are likely associated with activities at Hangar 1 and specify the activities.

*Response:* **Evidence that PCE is reduced to TCE (hydrogenolysis) in the A1 zone in the Building 29 area is not conclusive. The apparent disappearance of PCE may also be the result of adsorption to fine grained material (silts and clays). The text has been modified to suggest both processes.**

**The chlorinated VOC contamination found in HydroPunch sample HP29-100 cannot be associated with activities at Hangar 1 with certainty. The aircraft cleaning and maintenance activities known to have taken place at Hangar 1 provide the rationale for this statement. Alternately, chlorinated VOC contamination may be transported from Building 88 via channel sands or storm drains. Section 4.2.2.1 has been revised to suggest both interpretations.**

Comment Number 18. **Page 31, 4th paragraph.** Provide data supporting the conclusion that TCE contamination in W61-1(A1) is likely associated with wastes from Building 45 and Hangar 1 (Sump 61).

Give information to support that the high TCE concentrations found in W29-6(A1), W29-3(A1), HP29-52, HP29-66, and HP29-91 were the result of upgradient contamination. They were sampled in the Building 29 area.

How was it determined that the percentage TCE of the total chlorinated VOC contamination entering the Building 29 area averages 81.5 percent? This investigation did not sample upgradient of the Building 29 area. Only two ground water samples were taken south of the Building 29 area (HP29-100 and HP29-102). Detailed explanation is needed.

*Response:*

*Comparison of the VOC results for ground water samples collected from well W61-1(A1) to soil, ground water, and excavation water VOC results from the Sump 61 excavation (PRC, 1991) indicates the sump was not responsible for the levels of TCE found in ground water samples W61-1(A1). The statement suggesting the correlation has been removed from the text.*

*Figures showing the measured concentrations of TCE, PCE and 1,2-DCE in Site 9 ground water samples (A1 zone) have been added to section 4.2.2.1 (Figures 7, 8 and 9). The figures show widespread chlorinated solvent contamination upgradient of and extending into the Building 29 area. Information documenting high TCE concentrations in ground water upgradient of the Building 29 area appears in Section 4.2.2.1.*

*The percentage TCE of the total chlorinated VOC concentration was determined to be approximately 80 percent based on International Technology Corporation (IT) data from upgradient of the Building 29 investigation. These results appear in the Site 9 Action Memorandum (PRC, 1991). The text has been modified to include a reference to this document. The TCE to total chlorinated VOC ratio was calculated using results for ground water samples (well and HydroPunch) collected from the A1 zone downgradient of Building 88. Depending on the results used in the calculation, the TCE to total chlorinated VOC ratio ranges between 80 and 90 percent. The more conservative estimate of 80 percent is reported in the text. The 80 percent result agrees with a similar calculation performed on ground water from samples collected upgradient of the Building 29 area. The TCE to total chlorinated VOC ratio calculated from results for W9-23(A1), W9-35(A1), H9-5, H9-6 and W29-4(A1) is approximately 0.82.*

Comment Number 19. Page 32, Table 9. This table should show all 11 chlorinated VOC HydroPunch sample results.

*Response:*

*Table 9 contains all chlorinated VOC results for HydroPunch samples with the exception of a duplicate analysis of HydroPunch sample HP29-67. Chlorinated VOC results for HP29-67 dup are presented in Appendix F.*

Comment Number 20. Page 33, 1st paragraph. This paragraph mentions "the area affected by fuel contamination." Please define the area affected by fuel contamination.

How was it determined that the TCE to 1,2 DCE reaction appears confined to this area? How was it determined that the reduction of TCE to 1,2 DCE is nearly complete within 300 to 400 feet downgradient of Building 29? Wells W29-7 and W29-1 and HydroPunch HP29-18 showed high TCE levels and relatively low 1,2 DCE levels.

The major pathway of TCE transformation is to cis-1,2 DCE. The transformation from TCE to trans-1,2 DCE is only a minor pathway. To support the TCE to 1,2 DCE reaction, provide data on the concentrations of both cis- and trans-1,2 DCE as compared to TCE.

*Response:*

*Figures 6 and 10 show TPH-contaminated soil and ground water areas, respectively. The figures include data for the Building 29 and Site 9 areas. Section 4.2.2.2 has been revised to include a discussion of Figure 10.*

*IT data collected in 1990 and 1991 were used in conjunction with Building 29 Area investigation results to determine the area affected by microbial degradation of the chlorinated VOCs. Two ground water samples contain TCE in excess of 1,2-DCE concentrations (W29-7(A2) and HydroPunch HP29-18. These two samples are discussed in greater detail below.*

*Well W29-7(A2) is screened in an area unaffected by TPH contamination (the A2 zone); therefore, results indicating TCE concentrations in excess of 1,2-DCE levels would be expected. HydroPunch sample HP29-18 was collected near the locations of wells W29-1(A1) and W29-7(A2) at a depth of 26 feet BLS. Chlorinated VOC results for ground water samples from W29-1(A1) are consistent with a microbial reduction scenario (98 percent of the total chlorinated VOC contamination is 1,2-DCE). Chlorinated VOC results for sample HP29-18 are intermediate between those for W29-1(A1) and W29-7(A2). Because the HydroPunch sampling point (26 feet BLS) is also intermediate between the screened intervals of the two wells, the intermediate TCE to 1,2-DCE ratio may indicate communication between the A1 and A2 zones in this area.*

*Results discussed in this report are for total 1,2-DCE. The volatile organic analysis (VOA) method in use [EPA Contract Laboratory Program (CLP)] does not allow the quantification of the individual isomers.*

Comment Number 21. Page 33, 2nd paragraph. What was the TCE to 1,2 DCE reduction rate observed in the samples?

Substantiate the claim that the lower reduction rate of vinyl chloride is attributed to lower concentrations of petroleum hydrocarbons downgradient of the Building 29 area. Only one location was sampled 600 to 700 feet downgradient of Building 29 for this investigation.

*Response: The reduction rates for chlorinated VOCs discussed in the text are estimates intended for comparative purposes within Site 9. The reduction rates reported were calculated from field data assuming a uniform ground water velocity. The heterogenous nature of the A1 zone indicates this may be a poor assumption; therefore, the discussion and comparison of reduction rates has been dropped from the TM.*

Comment Number 22. Page 33, 4th paragraph. Clarification is needed for the statement "The majority of samples containing petroleum hydrocarbons were from Building 29 or downgradient of this area." The text should clarify that contamination exists in the Building 29 tank areas. See specific comment number 23.

*Response: The text has been revised to clarify the location of TPH contamination found in the vicinity of Building 29 (Old Tank Farm) and downgradient of this area.*

Comment Number 23. Page 39, 1st paragraph. TPH contamination does appear to be associated with the second cluster of four USTs located south of Building 29. Of the only two locations where the ground water was sampled downgradient of the southern cluster of four USTs, high TPH concentrations were found in both (W29-6 and HP29-79).

Include that TPH contamination is present in the ground water downgradient of Building 29, as far north as W29-1.

*Response: TPH contamination appears to be associated with the second cluster of USTs south of Building 29. HydroPunch HP29-79 was taken between the two*

*clusters of USTs and contained TPH in concentrations similar to concentrations found near the northern cluster of tanks (SB-65). However, concentrations of TPH in ground water samples from well W29-6(A1) were less than 60 µg/L. Results from additional field characterization activities will help determine the extent of TPH contamination in the tank areas.*

The extent of TPH contamination in ground water in the NASA area is presently unknown. Ground water TPH contamination may extend from Building 29 to the location of well W29-1 (A1). Confirmation of TPH contamination in this area is expected as additional information from NASA investigations becomes available.

Comment Number 24. Appendix F, "Soil and Ground Water Analytical Data". Definitions were not given for qualifiers "J," "BJ," and "D." Please clarify.

On Table F-7, HP29-41 recorded a ND(1000). A footnote should be added to explain this notation.

*Response: Appendix E (Laboratory Quality Assurance Results) has been revised to include definitions of data qualifiers. A footnote has been added to Table F-7 explaining the elevated detection limit [ND(1000)] associated with this sample result.*

Comments from Mr. Cyrus Shabahari, California Department of Health Services

#### GENERAL COMMENTS

Comment Number 1. It is evident that the USTs around Building 29 are not fully investigated. It is, therefore, important to initiate the needed investigation. The results could provide crucial information and contribute to the remedial design. Please state how the additional field activities will be undertaken to characterize the site further.

*Response: Field work is planned to investigate the contents of the USTs around Building 29 in addition to further investigation of the southwest quarter of Site 9. The field activities proposed within the work plan include ground penetrating radar surveys to accurately locate the four USTs south of Building 29; soil sampling and ground water sampling; and trenching to expose all 10 USTs*

*and to sample the tank contents. The results of these field activities will be evaluated prior to submittal of the 35 percent design work plan for source control activities at Site 9.*

**Comment Number 2.** Both documents fail to provide a contour map of the contamination. The data gathered from the previous investigations could be utilized into a three-dimensional contour map.

*Response:* Isoconcentration contour maps (two dimensional) were developed to illustrate the approximate lateral extent of soil and ground water contamination in the A1 zone of the A aquifer. These maps appear in Section 4.2 of the revised TM.

**Comment Number 3.** The documents focus the ground water removal only on the A1 zone. However, the contamination has appeared in both A1 and A2 zones. Furthermore, it is not clear how the aquifer zoning will affect the removal design and hence, the remedial action. Please provide an explanation.

*Response:* Contamination has been identified in both the A1 and A2 zones beneath Site 9. Recent studies have shown that contaminated ground water from off-site sources has migrated beneath NAS Moffett Field in the lower A2 permeable zone. The emphasis is on source control at Site 9. The source control goal at Site 9 is containment or removal of hazardous chemical constituents within shallow soils and the ground water within the A1 permeable zone beneath Site 9. This response action will be designed to prevent such contaminants from entering the regional ground water system.

**Comment Number 4.** The documents fail to discuss the soil remediation at Buildings 88 and 31. The provided data show copious signs of soil contamination at both areas. Please provide an explanation.

*Response:* The response to this comment is addressed by the response to comments for the Site 9 Action Memorandum (AM), and in the revised submittal of the AM.

Comment Number 5. The documents identify and propose the wells to extract the groundwater and treat approximately 4.4 million gallons of contaminated groundwater. It is not clear how the groundwater volume was estimated. And secondly, which downgradient wells will be chosen to ascertain the progress.

*Response: The response to this comment is addressed by the response to comments for the Site 9 Action Memorandum, and in the revised submittal of the AM. The final selection of extraction wells depends on results of preliminary aquifer tests to be conducted around Site 9. Based on the results of well performance and aquifer response, downgradient monitoring wells will be selected to evaluate the extraction system's performance.*

#### SPECIFIC COMMENTS

Comment Number 1. Page 12, last paragraph. It is not clear what the "...light nonaqueous phase liquids" are.

*Response: This paragraph describes the installation of shallow monitoring wells that are designed to detect light nonaqueous phase liquids (LNAPLs) such as free phase fuel product or "floating product."*

Comment Number 2. Page 23. Please provide an explanation as how the information for lateral contamination adjacent to the NASA facility will be ascertained. Moreover, it is not clear how this data gap will be filled. Please explain what you will undertake to fill this data gap.

*Response: The introduction to section 4.2 has been clarified by identifying data associated with the NASA area (well W29-5(A1)). Currently, the lateral extent of fuel contamination around the NASA facility is inadequately characterized due to insufficient data. Additional information is expected to be available in the future as NASA completes investigations in this area.*

Comments from Mr. Steven Morse, California Regional Water Quality Control Board

SPECIFIC COMMENTS

Comment Number 1. Page 15, 2nd paragraph. This states that wells are developed until "relatively silt-free." We note that EPA, in the Technical Enforcement Guidance Document used in the RCRA program, states that turbidity may interfere with organic contaminant analyses. The question of turbid wells impacting (i.e., lowering) apparent organic concentrations should be addressed at this site and throughout the Station.

*Response: Unfortunately, extensive well development procedures cannot eliminate turbidity when the well is screened in fine-grained material. Clay and silt sequences are prevalent in the A1 zone at Site 9. This paragraph was revised to provide a more concise description of the well development process used in the Building 29 Area investigation.*

Comment Number 2. Page 27, 2nd paragraph. This refers to the background soil metal concentrations contained the Draft Characterization Report. These concentrations were extensively commented on by the agencies and are reportedly being revised. This section should be revised when the Characterization Report is finalized.

*Response: Actual background levels for metals in soil and ground water at NAS Moffett Field are currently not defined. The draft TM compared metals concentrations with a site-wide range based on IT's draft Phase I characterization report (1990). Future sampling and analysis of metals concentrations at NAS Moffett Field will enable the determination of background values by applying a geostatistical approach.*

*Furthermore, source control actions at Site 9 focus on containment of specific contaminants of concern associated with identified sources. There are no known sources of metals contamination within Site 9.*

Comment Number 3. The data contained in Tables 9 and 10 would be easier to review if it were also presented on maps. Also, on Table 10 it states that the ground water concentrations are in mg/kg. This should be corrected.

*Response: Isoconcentration contour maps were developed to illustrate the approximate lateral extent of soil and ground water contamination in the A1 zone of the A aquifer. These maps are presented in Section 4.2 of the revised TM. The units for petroleum hydrocarbon concentrations in ground water samples on Table 10 have been corrected to indicate µg/L.*

Comment Number 4. We concur with the proposals for additional site characterization contained in Section 5.2.2.

*Response: Field work is planned to investigate the contents of the USTs around Building 29 in addition to further investigation of the southwest quarter of Site 9. The field activities proposed within the work plan include ground penetrating radar surveys to accurately locate the four USTs south of Building 29; soil sampling and ground water sampling; and trenching to expose all 10 USTs and to sample the tank contents. The results of these field activities will be evaluated prior to submittal of the 35 percent design work plan for source control activities at Site 9.*